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Current Trends and Issues in Reforming State-level Solar Net Energy Metering Policies

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Current Trends and Issues in Reforming State-level Solar Net Energy Metering Policies

David E. Dismukes*

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INTRODUCTION

The last decade has seen a considerable shift in the way electric utilities provide service to their customers. This change is most apparent in the tremendous growth of small-scale, behind-the-meter generation that largely occurs at the residential and small commercial level and is heavily reliant upon solar photovoltaic (PV) technologies. Historically, only large

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industrial customers had the ability to self-generate their own electricity because the costs associated with smaller-scale electric generation technologies were simply too prohibitive relative to utility-provided service. Today, technological innovation, federal and state public policies and tax incentives, and substantive equipment and decreasing installation costs have created meaningful solar self-generation opportunities for smaller-scale customers. In several states, regulatory policies known as “net energy metering” (NEM) regulations have helped to facilitate not only small-scale generation interconnection to the distribution system, but also the “sale” of unused self-generation to the utility distribution grid. NEM policies also typically include special regulatory provisions that require utilities to establish a relatively streamlined and consistent process for distribution-level interconnection, as well as a regulatory-established (and posted) set of rates or credits that are offered as reimbursement for NEM-generated electricity put (or “sold”) to a regulated electric utility’s distribution grid.

NEM regulations allow small-scale generators to “put” their excess, self-generated electricity to the distribution grid when it is not utilized on-site. These NEM customers are also “charged” for any additional electric utility service they take, usually at night when solar technologies are not operational. Hence, the prefix “net” in NEM regulations: customers taking advantage of these policies have their energy charges and credits reconciled or “netted” at the end of the month. If an NEM customer “sells back” more electricity than he or she uses, that NEM customer will receive a credit. If that NEM customer uses more electricity than it sells back, it will have a net charge for the month (albeit one lower than if it took 100% of its service from a utility).

The original purpose of many NEM policies was to remove market barriers for small scale, behind-the-meter generation.¹ Three common market barriers to the development of these behind-the-meter resources have existed in the past, including: (1) the inability to interconnect and synchronize these resources with the local utility distribution grid; (2) the ability to continue to receive certain retail electricity services at times when the behind-the-meter generation may not be operational; and (3) the ability to sell excess electricity generated by these behind-the-meter resources at times when that on-site generation is not needed. These

1. “Behind-the-meter” generation comes from a renewable energy generating facility (most commonly solar) that generates electricity for on-site use, at a home, business or industrial facility. The physical location is “behind-the-meter” on the owner’s property, not on the side of the electric distribution grid or utility.

barriers are not dissimilar to those that are faced by large scale industrial cogeneration applications that were removed by the Public Utilities Regulatory Policies Act of 1978 (PURPA). In fact, as will be discussed later, many NEM policies arose during the same time period in which PURPA was also being implemented and refined as a distribution-level analogue to promote additional customer-owned generation.² Historically, behind-the-meter, NEM systems that were interconnected to a utility's distribution grid were few in number and considered a type of niche application. The emergence of substantial financial incentives, tax breaks, and cost reductions in small scale generation technologies, particularly solar PV, has substantially increased NEM participation over the past decade, far exceeding many utilities' and their regulators' expectations.

The rapid growth of NEM systems has not come without a considerable degree of regulatory and policy concern. In the past, NEM policies developed in a manner that paid little attention to program design inefficiencies and the implications these inefficiencies would have on other utility ratepayers if NEM participation grew to relatively large levels. Regulators and utility companies did not worry about the rapid growth of NEM participation in the 1990s and early 2000s since technology and costs tended to naturally limit participation levels. However, the recent growth of behind-the-meter solar generation has forced many state utility regulators to go back and revisit, and potentially reform, their existing rules and policies on what constitutes NEM, how NEM generation will be measured, and, more importantly, how NEM systems will be reimbursed for the electricity they put (or "sell") on to the electric distribution grid.

The purpose of this Article is to examine the evolution of solar NEM installations, solar cost trends driving new installations, and how these rapid technological and economic changes in the development of behind-the-meter generation have forced many state utility regulators to modify their respective NEM rules and regulation. It will also examine the implications these changes have for both NEM customers and the broader class of ratepayers that do not have NEM installations. The Article will further reference specific state regulations and examine how these NEM policy issues have been handled in Louisiana's recent reform activities.

2. In 1978, Congress passed the "National Energy Act" (NEA), which was composed of five different statutes, one of which was PURPA. The goal of PURPA was to eliminate barriers to industrial "CHP" applications in order to increase energy efficiency and improve electric system reliability.

I. NEM INSTALLATION, CAPACITY, AND COST TRENDS

The following subsections will analyze the considerable growth in installed NEM capacity in Louisiana and the United States as well as the cost trends and state and federal policy incentives that have contributed to NEM development.

A. NEM Installation and Capacity Trends

The U.S. Energy Information Administration (EIA) collects NEM data as part of its “Monthly Electric Sales and Revenue with State Distributions Report” that is filed by electric utilities and suppliers, also known as the Form EIA 861M.³ The purpose of this form is to collect information from electric utility companies, energy service providers, and distribution companies that sell or deliver electric power to end users. The survey was expanded in 2011 to include data on NEM installations, NEM installation types, NEM capacities, and NEM net generation.⁴ This expansion was, without a doubt, driven by the rapid development of these types of installations and the fact that existing data series on these installations was lacking, thereby making it difficult to comprehensively and accurately examine trends and make comparisons across differing states. While the expanded version of this data currently allows for national and state level comparisons, these comparisons are unfortunately limited to time periods starting in 2011.

Figure 1 shows the trend in the United States and Louisiana NEM capacity installations over the past several years. In 2019 there were 2.1 million U.S. NEM customers with over 22,358 megawatts (MW) of NEM capacity. Louisiana reported 24,424 NEM installations, accounting for over 146 MW of capacity. These NEM installations, at the federal and state level, are almost entirely dominated by solar energy (94% at the national level, 100% in Louisiana).⁵ It is important to note that EIA’s NEM data for Louisiana is across the entire state and accounts for those behind-the-meter installations interconnected into utilities regulated by the

3. The U.S. Energy Information Administration (EIA) collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment.

4. Net generation is defined as gross NEM system generation less on-site electricity consumption.

5. *EIA-861M (formerly EIA-826) Detailed Data, Net Metering 2011 through 2019*, U.S. ENERGY INFO ADMIN., <https://www.eia.gov/electricity/data/eia861m/> [<https://perma.cc/W6K6-YVTU>] (last visited Jan. 20, 2020).

Louisiana Public Service Commission (LPSC, or the Commission), as well as those regulated by municipal utilities, and the City Council of New Orleans (which regulates Entergy New Orleans, LLC).

Over the past eight years, U.S. NEM capacity has grown at an average annual compound rate of 41%, while Louisiana NEM capacity has grown at an average annual compound rate of about 55% over the same time period. Louisiana currently ranks twentieth among the states in total NEM installed capacity.⁶ Louisiana also ranks third among the 11 states in the Southeast region in terms of solar/NEM capacity as a share of total in-state generation.⁷ Thus, Louisiana is a state with a larger than average number of NEM installations, capacity, and generation, and it is not surprising that Louisiana has been faced with a number of the same policy and legal challenges that other leading states have been facing with these behind-the-meter solar NEM installations.

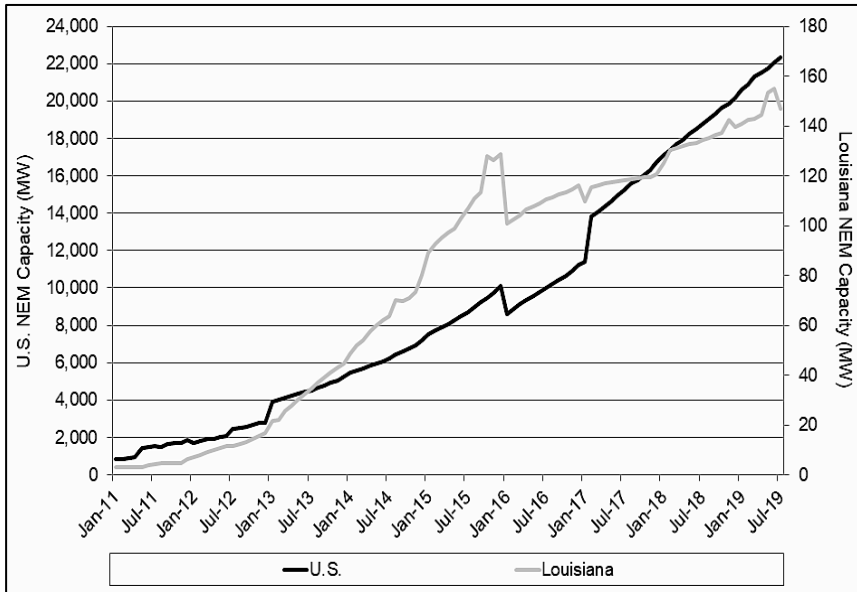


Figure 1: U.S. and Louisiana Installed Capacity (MW)⁸

6. *Id.*

7. *Id.* Form EIA-860 Detailed Data with Previous Form Data (EIA-860A/860B), U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/electricity/data/eia860/> [<https://perma.cc/M2SR-CCMJ>] (last visited Jan. 20, 2020).

8. Form EIA-861M (formerly EIA-826) Detailed Data, U.S. ENERGY INFO ADMIN., <https://www.eia.gov/electricity/data/eia861m/> [<https://perma.cc/M2SR-CCMJ>] (last visited Jan. 20, 2020). Disclaimer: Figure includes both LPSC-

acceleration of the global PV module market. Figure 3 shows PV exports across the globe have experienced a 41% compound annual growth rate from 2004 through 2017, reaching 90 gigawatts (GW) of PV capacity shipped in 2017.¹⁰ In addition to seeing dramatic growth, the leadership position in the global PV market has shifted over the past decade from country to country. In 2000, the United States accounted for 30% of global PV supply,¹¹ but in 2018, it accounted for a market share of only 0.41%, its lowest level to date.¹² Growth in the market first shifted to Japan, which experienced significant growth due to residential subsidies enacted in the mid-1990s; the market then shifted to Germany, whose generous feed-in tariff subsidy produced substantial growth in German domestic solar demand; and finally to China and developing Asian countries, which invested heavily in PV manufacturing beginning in 2006.¹³ In 2018, Asian countries accounted for 98% of all PV shipments, with China supplying 57% of all total PV shipments.¹⁴

10. DAVID FELDMAN ET AL., NAT'L RENEWABLE ENERGY LAB., PV MARKET UPDATE 12 (2018), https://arpa-e.energy.gov/sites/default/files/Q4%202017%20Solar%20DRAFT_MLdf2_ed_MOSAIC_meeting_posting_Kelsey.pdf [<https://perma.cc/7GK3-96EK>].

11. GALEN BARBOSE ET AL., U.S. DEP'T OF ENERGY, SUNSHOT VISION STUDY 3–4 (2012).

12. DAVID FELDMAN ET AL., NAT'L RENEWABLE ENERGY LAB., Q4 2018/Q1 2019 SOLAR INDUSTRY UPDATE 46 (2019), <https://www.nrel.gov/docs/fy19osti/73992.pdf> [<https://perma.cc/5FGW-RM6U>].

13. *Id.* Feed-in tariffs can be used as a policy mechanism to encourage investment in new or developing technologies by providing compensation in the form of a tariff that is set above the prevailing wholesale or retail rate.

14. *Id.*

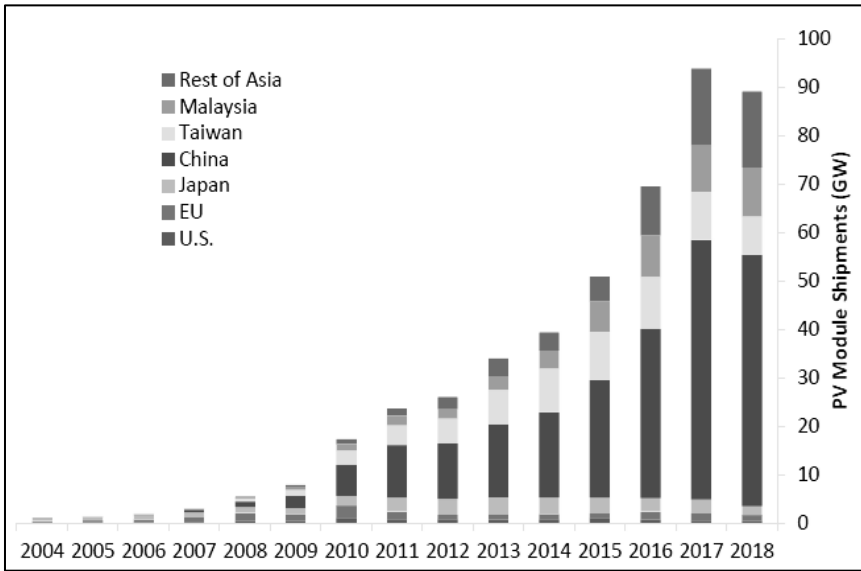


Figure 3: Photovoltaic Module Exports¹⁵

Figure 4 shows the use of foreign manufactured PV modules is a factor for the decrease in PV prices. Installations using internationally manufactured PV modules have been consistently less expensive than U.S. product installations.¹⁶ In 2018, the price of modules sold in the United States decreased by 25%; however, such prices were still 61% higher than the global average.¹⁷ Additionally, the massive growth in PV manufacturing around the world has also increased supply and put downward pressure on PV module prices globally.¹⁸

15. *Id.*

16. *Id.* at 61.

17. *Id.*

18. See William Pentland, *Trade Duties on Solar Imports from China and Taiwan Clear Final Hurdle*, FORBES, (Jan. 22, 2015, 10:32 AM), <https://www.forbes.com/sites/williampentland/2015/01/22/trade-duties-on-solar-imports-from-china-and-taiwan-clear-final-hurdle/#3d581fdc54e7> [https://perma.cc/2YT8-GAKM] (It should be noted that in January 2015, the U.S. International Trade Commission determined that the U.S. PV industry is being materially injured by imports of “certain crystalline silicon photovoltaic products from China and Taiwan that the U.S. Department of Commerce has determined are sold in the United States at less than fair value and are subsidized by the government of China.” This decision will result in the U.S. Department of Commerce imposing countervailing duties and antidumping duties on solar imports from China).

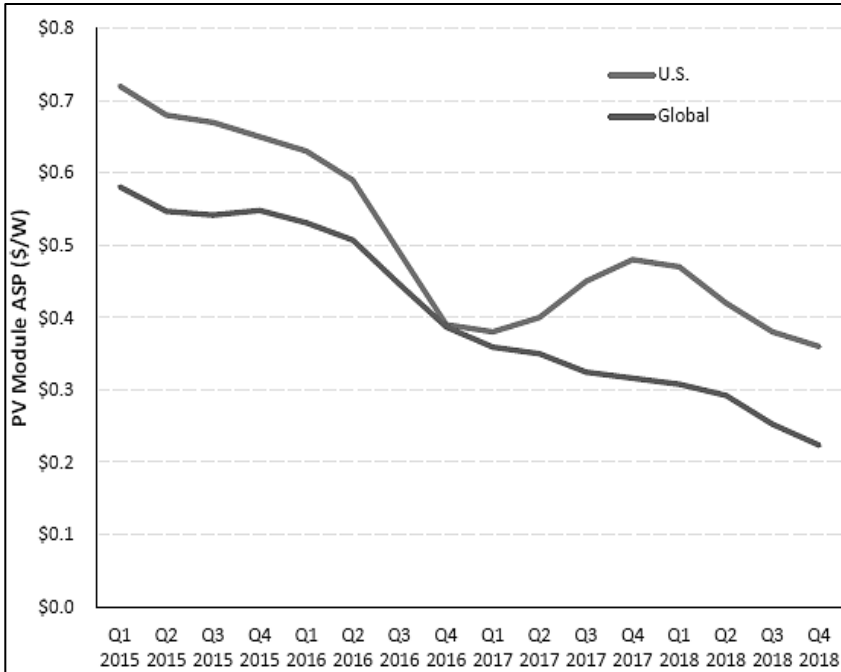


Figure 4: Price Differences between U.S. and non-U.S. Solar PV Modules¹⁹

Figure 5 shows the cost of a solar PV module in 2000 was around \$4 per watt of DC capacity. This cost remained relatively constant until 2008, after which prices plunged to the current levels of under \$1 per watt. This decrease affected many domestic solar producers, and U.S. PV manufacturing declined significantly as a result. In 2017, U.S. PV production fell by 66% (cells) and 43% (modules), on a year over year basis.²⁰ While domestic solar producers have suffered, the increase in imports of less expensive solar modules has resulted in a boon for solar customers.²¹

19. DAVID FELDMAN ET AL., NAT'L RENEWABLE ENERGY LAB., SOLAR INDUSTRY UPDATE 61 (2019), <https://www.nrel.gov/docs/fy19osti/73992.pdf> [<https://perma.cc/V8ZE-DGMX>].

20. FELDMAN ET AL., *supra* note 10, at 19.

21. GALEN BARBOSE ET AL., LAWRENCE BERKELEY NAT'L LAB., INSTALLED PRICE TRENDS FOR DISTRIBUTED PHOTOVOLTAIC SYSTEMS IN THE UNITED STATES - 2018 EDITION 21 (2018).

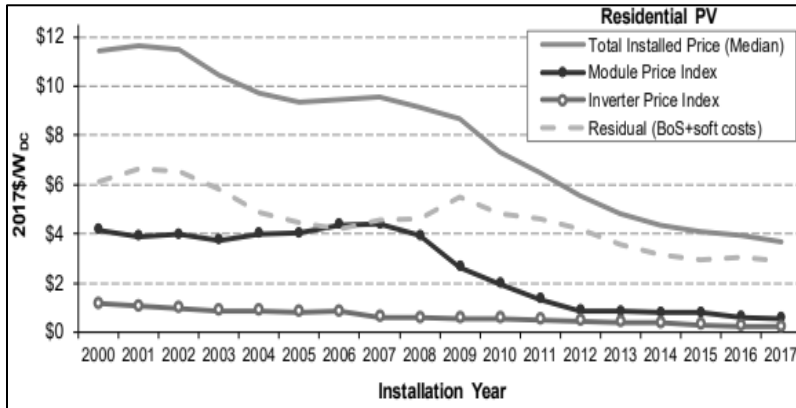


Figure 5: Total Installed PV Price is Decreasing Due to Low Module Costs²²

The total cost of a PV system is made up of the module costs, the inverter costs and “balance of system” or “BOS” costs.²³ BOS costs now account for a large share of the total PV system cost. Figure 6 depicts the cost components for residential, commercial, and utility scale systems from 2010 to 2018. Since 2010, the price of residential PV system costs has declined 63%, and the majority of this decrease is attributable to module prices falling 82% over that period.²⁴

22. *Id.* at 21, fig. 13.

23. Balance of system costs include items such as permitting fees, installation labor, overhead, racking, customer acquisition costs, and sales tax.

24. RAN FU ET AL., NAT’L RENEWABLE ENERGY LAB., U.S. SOLAR PHOTOVOLTAIC SYSTEM COST BENCHMARK: Q1 2018, at 21 (2018).

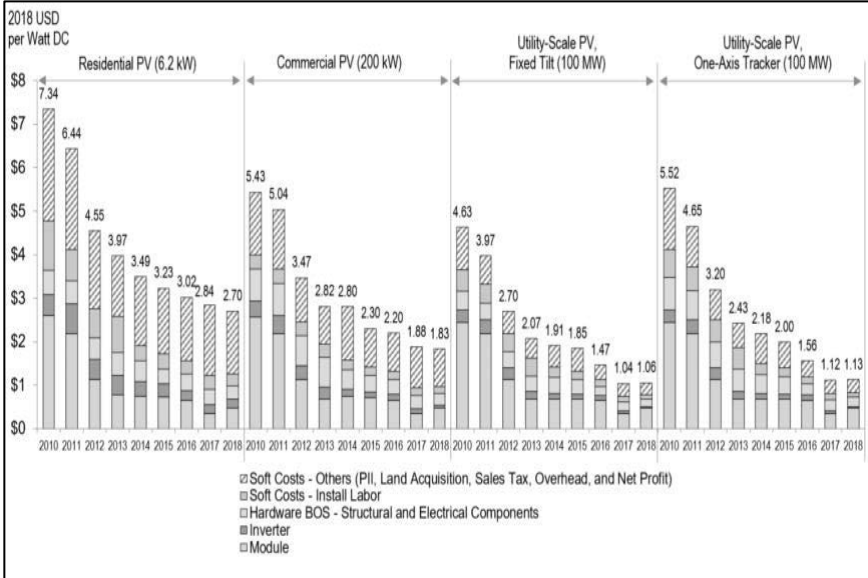


Figure 6: Module, Inverter and Balance of System Costs, 2010–2018²⁵

State policymakers started to respond to falling module and installed system costs by scaling back government-backed tax incentives and rebates. Figure 7 shows the average pre-tax rebate for installed systems decreased to less than \$1 per watt from highs of \$4 to \$8 per watt in the 2000 to 2004 period.

25. *Id.* at viii, fig. ES-1.

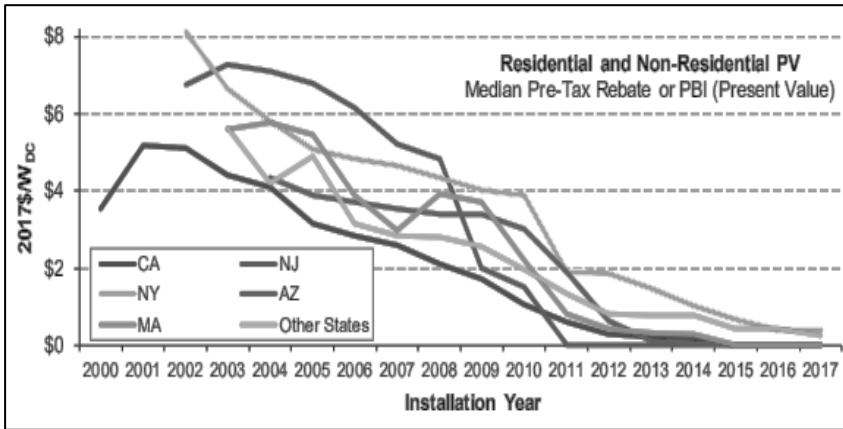


Figure 7: Declining State Rebates and Incentives²⁶

II. REGULATORY POLICIES SUPPORTING NEM INSTALLATION GROWTH

In addition to technological advances and declining costs, a number of state and federal regulatory policies and tax incentives have encouraged the development of NEM capacity.

A. Louisiana and Other State-level NEM Policies

The origins of state NEM policies date back to the initial days of PURPA implementation in the early 1980s, which attempted to extend the access, buy-back, and back-up provisions afforded to large scale co-generators to smaller, distribution-level generation resources. In the early 1980s, ten states had enacted either NEM policies, programs, or legislation.²⁷

The passage of the Energy Policy Act of 1992 (EPAAct 1992) brought a renewed interest in efficiency and small-scale generation opportunities. As part of reviewing and implementing policies outlined in EPAAct 1992, several states adopted utility specific or statewide NEM policies during the 1990s. These policies represent the more “modern” period of NEM adoption and are the basis for many state NEM policies that are still in place today. The increased policy emphasis on renewable energy during

26. BARBOSE ET AL., *supra* note 21, at 22, fig. 14.

27. In Re: Review of Policies Related to Customer-owned Solar Generation and Possible Modification of the Commission’s Current Net Metering Rules, *Ex Parte*, Review of LPSC Rules Regarding Distributed Generation: Report on Phase II of Rule-Making, Docket No. R-33929 (La. Pub. Serv. Comm’n, Jan. 8, 2019).

this time period resulted in new and additional restrictions on state regulatory NEM policies. The new restrictions ensured that only those generators bringing renewable or efficiency benefits, as opposed to those that simply offered simple cycle generation opportunities, were promoted at the distribution interconnection level.

For instance, all but two state-level NEM programs adopted during the 1990s limited NEM eligibility to renewable technologies. During the 1990s, 11 more states enacted state policies for NEM.²⁸ Currently, 48 states and the District of Columbia have one or more utilities within the state offering NEM service, and many state policies currently allow NEM state-wide.

Louisiana's first foray into NEM began in 2003 when the Louisiana Legislature passed Act 653, which allowed the LPSC to define rules and conditions for both residential and smaller-scale commercial NEM installations. Originally, Louisiana statutes restricted residential NEM installations to 25 kW or less, whereas commercial systems were restricted to 100 kW or less.²⁹ Those capacity limitations increased in 2008 via Act 543, allowing commercial systems to be as large as 300 kW.

Statutes created Louisiana's original NEM policies, which were designed to provide a unique opportunity for niche solar installations since, at that time, these systems were still very expensive relative to utility-provided electricity. Ultimately, the LPSC initiated a rulemaking proceeding in 2005 to further flesh out the details on what types of NEM installations would be allowed, any limitations on NEM installation sizes, any other caps or restrictions on aggregate level of NEM installations that would be allowed on a per utility basis, and, most importantly, how electricity "put" to the distribution grid by NEM systems would be reimbursed.

Louisiana's original NEM rules were comparable to those promulgated by many other states. The LPSC, for instance, codified the original statutory restrictions on individual installation sizes noted earlier. The LPSC also defined a utility-specific cap that restricted the total capacity on NEM systems for any utility to 0.5% of "monthly peak demand."³⁰

The method by which "monthly peak demand" was measured ultimately created some controversy, particularly later when the overall utility-specific installation caps were close to being reached. Some utilities

28. YIH-HUEI WAN ET AL., NAT'L RENEWABLE ENERGY LAB., CURRENT EXPERIENCE WITH NET METERING PROGRAMS 7–9 (1998).

29. Net Energy Metering Rule-Making, General Order, Docket No. R-27558, (La. Pub. Serv. Comm'n 2005).

30. *Id.*

took the position that “monthly peak demand” was defined as the highest demand in any given month.³¹ Other parties, particularly the solar industry, took the position that the cap should be calculated using the single highest peak demand month, which usually occurs in the hottest months of August or September for most Louisiana utilities.³²

The Louisiana utility definition of monthly peak demand differs substantially from traditional approaches since it estimates the solar installation share based on the peak demand measured in any month, even relatively lower demand shoulder months that arise in the spring and fall. The utility interpretation would have set a much more restrictive cap (limiting solar installations) than the one being argued by the solar industry. Ultimately, the LPSC sided with the utility companies on the definition of the utility-specific installed capacity cap,³³ which led to a situation where most utilities had reached their installed capacity caps in the 2015 time period.³⁴

Historically, Louisiana has also utilized a traditional net metering approach to measuring monthly bills and reimbursements. That is, LPSC-jurisdictional utilities assessed an NEM customer’s consumption and on-site generation and then subtracted the two (in terms of the kWh used and generated in any given month) in order to arrive at a “net” amount (in energy or kWh terms) that was subsequently multiplied by the retail rate. If the number was negative, the utility would provide a credit to the NEM customer, and if the number was positive, the NEM customer would remit a net payment to the utility. Valuation for the electricity sold back to the grid, in the early NEM policy debates, was set at full retail rates. In other words, NEM customers were reimbursed for their grid sales at full retail rates even though those full retail rates include reimbursement amounts for the local utility for the costs of transmission and distribution service and other costs entirely unrelated to electricity generation.

31. Consolidated Order, No. U-32913, Notification Pursuant to the LPSC’s 2011 Net Metering Order, Docket No. R-31417, (La. Pub. Serv. Comm’n, Dec. 17, 2015).

32. *Id.*

33. *Id.*

34. Entergy Louisiana, LLC, Comments in Response to Staff’s Initial Request for Comments (Phase II) Regarding Proposed Modifications to the Commission’s Current Net Metering Rules, Docket No. R-33929, (Feb. 24, 2017), <http://lpsestar.louisiana.gov/star/ViewFile.aspx?Id=9d423808-e67f-440b-8fc6-b0aaf2089f53> [<https://perma.cc/3RQ3-HA4X>]; Susan Buchanan, *Solar Customers Turned Away by Electric Co-ops*, LA. WEEKLY, <http://www.louisianaweekly.com/solar-customers-turned-away-by-electric-co-ops/> [<https://perma.cc/6JNJ-P TQU?type=image>] (last visited Jan. 20, 2020).

Soon after the 2005 LPSC rulemaking process, the Louisiana Legislature adopted a set of solar energy tax credits, via Act 371 in 2007, which were some of the most generous in the United States at the time they were passed. These solar tax credits were based on an income tax credit for residential property owners that installed solar or wind energy systems after January 1, 2008. The solar energy tax incentive included a 50% income tax credit for the first \$25,000 of the cost of each system with a maximum credit of \$12,500 per system.³⁵ In 2009, the tax credit was extended to all taxpayers. This credit was applicable to personal, corporate, or franchise taxes, depending on the taxpayer purchasing and installing the system. Later, the Louisiana Department of Revenue confirmed, via private letter ruling, that a single taxpayer could be refunded multiple credits by purchasing multiple systems.³⁶

The Louisiana solar tax incentive, when combined with the federal investment tax credit (ITC) of 30%, enabled Louisiana residents to offset as much as 80% of the costs attributable to solar installations. Interestingly, the Louisiana Legislature did not anticipate widespread participation in the solar tax credit program when it was passed since the “fiscal note,” or the state fiscal impact associated with the legislation was estimated to only total around \$500,000 per year.³⁷ By 2016, the cumulative lost tax revenue was estimated to have exceeded more than \$147 million.³⁸

Ultimately the interaction of (a) generous state tax incentives, (b) generous federal tax incentives, and (c) considerable cost reductions in smaller-scale rooftop PV, stimulated a massive amount of solar installations in Louisiana. Collectively, these trends put most Louisiana utilities in the position of meeting their NEM system caps as early as 2015.³⁹ The challenge that arose for the Louisiana solar industry during this time period was that utility companies were not required to continue to enroll customers for NEM service after the utility-specific NEM installed capacity caps were met.

Most Louisiana utilities continued to interconnect these solar projects even after reaching their caps, even though LPSC rules did not require

35. LA. REV. STAT. § 47:6030(B) (2019).

36. La. Dep’t of Rev., Private Letter Ruling Redacted Version No. 09-018 Individual Income Tax and Corporation Income Tax Qualification for the Solar Energy Systems Tax Credit (Oct. 6, 2009), <http://www.revenue.louisiana.gov/LawsPolicies/PLR09018.pdf> [<https://perma.cc/C7C6-CTNP>].

37. Richard Thompson, *Boon or Boondoggle? Mounting Costs of Louisiana Solar Power Tax Breaks Could Spur Changes*, TIMES-PICAYUNE, Dec. 8, 2012.

38. Jennifer Larino, *Louisiana has no More Tax Credits for Solar Owners*, TIMES-PICAYUNE, July 20, 2016.

39. See sources cited *supra* note 34.

these continued interconnections. Utilities did, however, limit the reimbursement rate that post-cap NEM customers received for their NEM generation to a much smaller “avoided cost” amount, measured as the posted prices for wholesale electricity generation prevailing in regional power markets at that time.

The LPSC upheld the utility post-cap reimbursement rates in 2016 in a set of “interim rules” designed to be a stop-gap measure that utilities would follow until the LPSC completed an omnibus rulemaking investigation (Docket R-33929) designed to assess the prior NEM rules’ continued efficiency given current market conditions and regulatory trends. The LPSC’s “phase 2” rulemaking process (conducted after the post-interim, or phase 1 process) began in 2017 and lasted for two and a half years.

In September 2019, the LPSC adopted its final set of updated NEM rules that made several important changes to the Commission’s prior NEM practices. First, the LPSC officially eliminated the 0.5% cap on each utility’s allocation of NEM capacity thereby allowing solar installation in the state to grow unfettered by any limit or constraint. Next, the Commission outlined a new set of net metering guidelines that included requiring all customer-generators (who submit interconnection requests after December 31, 2019) to be credited for their electricity sales that go back to the utility distribution grid at an avoided generation cost rate. The LPSC defined this avoided cost rate as the posted market price for wholesale electricity generation as reflected by the 12-month average locational marginal price for each LPSC-jurisdictional electric utility.

The new NEM rule also created a 15-year grandfathering period for installations that became active prior to year-end 2019. This grandfathering provision allows prior-installed systems to continue to receive the more generous retail rate form of reimbursement for their on-site generation, rather than the market-based electricity generation rate that newer systems would be paid.⁴⁰

B. Renewable Portfolio Standards as a Catalyst for NEM Growth

While rebates and tax policies have been important recent catalysts for renewable energy development across the United States, one of the earliest and perhaps more important catalysts for renewable energy development has been the adoption of state-level renewable energy mandates that are

40. In re: Review of Policies Related to Customer-Owned Solar Generation and Possible Modification of the Commission’s Current Net Metering Rules, General Order, Docket No. R-33929, (La. Pub. Serv. Comm’n Sept. 19, 2019).

referred to as renewable portfolio standard (RPS) policies. RPS policies have been adopted extensively at the state level, not the federal level.

RPS policies set mandatory annual renewable energy generation targets over some fixed period that can span from one to two decades. These policies set annual renewable energy generation targets, usually defined as a percent of total annual generation that each market participant is required to fulfill on a pro-rata basis. These percentages typically ramp up in a linear fashion over the target period. Figure 8 shows 38 states and the District of Columbia have adopted an RPS or renewable energy goal.⁴¹ RPS states, collectively, represent over 75% of current retail U.S. electricity sales, and the anticipated growth of renewable generation shares are anticipated to increase by as much as one-third of some states' retail electricity sales by the year 2030.

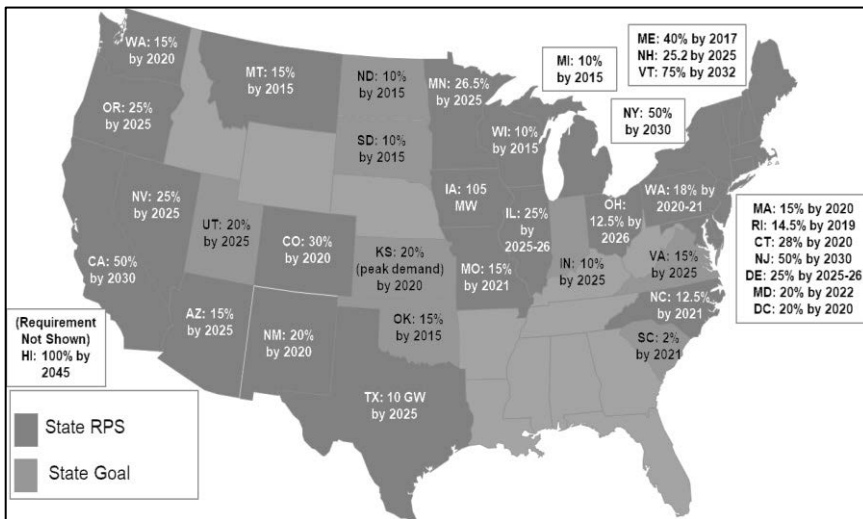


Figure 8: State Renewable Portfolio Standards as of July 2018⁴²

RPS policies were adopted for a variety of reasons, the two primary reasons being: (1) to reduce energy costs to consumers during a time period when natural gas-based generation costs were very high; and (2) to

41. *State Renewable Portfolio Standards and Goals*, NAT'L CONF. ST. LEGIS., <http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx> [<https://perma.cc/4345-NXSM>] (last updated Dec. 31, 2019).

42. *Id.*

create economic development opportunities.⁴³ Another important rationale for the adoption of RPS policies was the belief that if a large enough market for renewable energy could be guaranteed, over an extended time period, investment in renewable energy manufacturing and development would arise that would drive down average renewable energy manufacturing cost as scale increased.⁴⁴ In this instance, scale economies were expected to arise through the RPS standard that increased on a year-to-year basis with the expectation that average renewable energy development costs would fall as annual renewable energy percentages increased.

Most RPS requirements were historically met through large, transmission-level renewable energy investments, such as large-scale, on-shore wind projects. Increasingly, though, a larger share of many states' RPS requirements are met by both grid-scale solar energy projects (interconnected into the transmission grid) as well behind-the-meter solar generation (interconnected at the distribution grid level).⁴⁵ All of these renewable energy investments are financially supported, in large part, through tradable credits known as "renewable energy certificates" (REC).

RPS policies effectively create a property right for renewable energy developers that entitles each qualifying renewable energy generator to receive one REC for each megawatt-hour (MWh) of renewable generation that originates from the qualified facility. Market participants sell or purchase RECs, which are then retired with state regulators in order to meet each market participant's individual RPS requirements. The market forces of supply and demand help determine REC prices: when renewable generation is abundant, RECs will be abundant, and the price of those RECs will fall, and vice versa.

In most states, any qualifying renewable project, regardless of size, can receive a REC. The projects can trade RECs and thus generate additional revenue to support their investment. Most solar NEM investments arising in states with an RPS can receive, at a minimum, a REC and in some instances, can receive a solar REC (SREC) if there are separate set-asides for solar energy in those states. Typically, a SREC has a higher value than a conventional REC since installations competing to sell these SRECs are based upon output from a solar facility, and not a

43. J. HEETER ET AL., NAT'L RENEWABLE ENERGY LAB. & LAWRENCE BERKELEY NAT'L LAB., A SURVEY OF STATE-LEVEL COST AND BENEFIT ESTIMATES OF RENEWABLE PORTFOLIO STANDARDS (2014).

44. Sean Johnson et al., *Feasibility of U.S. Renewable Portfolio Standards under Cost Caps and Case Study for Illinois*, 49 ENERGY POL'Y 499–500 (2012).

45. GALEN BARBOSE, LAWRENCE BERKELEY NAT'L LAB., U.S. RENEWABLES PORTFOLIO STANDARDS: 2019 ANNUAL STATUS REPORT 16, 19 (2019).

variety of other lower cost renewable energy technologies such as on-shore wind, biomass, and other lower-cost qualifying options.

Sales of RECs and SRECs (created as part of the RPS process) provide additional financing opportunities for solar installations and when coupled with on-site energy savings, state and federal tax credits, and generous NEM reimbursement policies, have helped stimulate an unanticipated large level of solar installations. Like tax incentives, RPS policies helped to create a situation where the growth of solar installations, including those that are classified as NEM installations, have far exceeded what many states anticipated when their NEM policies were adopted. Thus, RPS-created growth has led to many instances where states have had to re-visit their NEM policies.

C. NEM Measurement Issues

One of the initial NEM policy reforms that states have addressed over the last several years involves how the actual “netting” process for electricity flows back and forth from an NEM customer are measured. Historically, most states utilized a very simple approach at “netting” NEM on-site generation and consumption. This netting process requires utilities to take the difference between an individual NEM installation’s billing period consumption (in kWh terms) and its on-site generation (also in kWh) terms and “net” those two numbers. If the generation was greater than the consumption, then that “net” amount of generation was multiplied by a reimbursement rate (usually the full retail rate) and credited to the NEM customer’s account. If the consumption amount was greater than the generation amount, that difference was multiplied by the retail rate and charged to the NEM customer. If generation and consumption were exactly offsetting, then the NEM customer would owe the utility company nothing for that billing period.

The problem with this “traditional” netting approach is that it effectively values generation and consumption on equal terms. As this Article discusses in greater detail below, retail rates (and the service supported by these rates) are “bundled” and include several utility functions including generation, transmission, distribution, customer service and other administrative and general (A&G) functions. The “full” retail rate reflects all these costs. The problem with “valuing” NEM generation at this full retail rate is that NEM generation does not “avoid” a large part of these retail functions such as transmission, distribution, customer service, and A&G. Thus, some regulators have adopted approaches that more accurately reflect the unbundled, “generation-only” value of these behind-the-meter solar resources.

Modification to the measurement and valuation of NEM generation can utilize three different alternatives. The first, and one that is becoming more common, is referred to as “two-channel” billing, or “net billing.” Under two-channel billing, all electricity exported by the NEM customer to the utility’s distribution grid is valued at a rate consistent with the utility’s generation cost, something that is commonly referred to as the utility’s “avoided cost of generating electricity.” The avoided cost, as used in this and many other instances in utility regulation, is simply the marginal cost of generating electricity. It is often called the “avoided” cost since it also represents, at the margin, the cost of electricity “avoided” by using the alternative generating resource, which, in this instance, is the NEM renewable generation.

Recently, several states attempted to reform their NEM processes to incorporate this two-channel approach. Nevada was one of the first states to reform its traditional approach in order to utilize a two-channel method for Nevada Power Company and Sierra Pacific Power Company (NV Energy).⁴⁶ The Nevada Commission’s decision was followed shortly by similar NEM policy changes adopting two-channel billing in Arizona,⁴⁷ Hawaii,⁴⁸ and Indiana.⁴⁹ More recently, Michigan also adopted a two-channel NEM approach.⁵⁰ Interestingly, in June 2017, the Nevada Legislature passed a statute that effectively overturned the Nevada Commission’s February 2016 decision and reinstated traditional net metering.⁵¹

46. Application of Nevada Power Company d/b/a NV Energy for Approval of a Cost-of Service Study and Net Metering Tariffs, Modified Final Order, Docket No. 15-07042, (Nev. Pub. Util. Comm’n Feb. 17, 2016). Application of Sierra Pacific Company d/b/a NV Energy for Approval of a Cost-of-service Study and Net Metering Tariffs, Docket No. 15-07041, ¶ 94 (Nev. Pub. Util. Comm’n, Feb. 17, 2016).

47. In the Matter of the Commission’s Investigation of Value and Cost of Distributed Generation, Opinion and Order (Decision No. 75859), Docket No. E-00000J-14-0023, (Ariz. Corp. Comm’n Jan. 3, 2017).

48. Instituting a Proceeding to Investigate Distributed Energy Resource Policies, Decision and Order (No. 33258), Docket No. 2014-0192, (Pub. Utils. Comm’n of Haw., Oct. 12, 2015).

49. S.B. 309, 120th Gen. Assemb., 1st Reg. Sess. (Ind. 2017).

50. In the Matter, on the Commission’s Own Motion, to Implement the Provisions of Sections 173 and 183(1) of 2016 PA 342, and Section 6a(14) of 2016 PA 341, Order, Case No. U-18383, (Mich. Pub. Serv. Comm’n, Apr. 18, 2018).

51. Application of Nevada Power Company d/b/a NV Energy and Sierra Pacific Power Company d/b/a NV Energy for Approval of Tariff Schedules and Rates Pursuant to Assembly Bill 405, Order, Docket No. 17-07026, (Nev. Pub. Util. Comm’n, Sept. 1, 2017).

The second alternative to traditional net metering that emerged in recent years is referred to as a “value of solar” (VOS) approach. The VOS approach is similar to two-channel billing in that the consumption and production streams of an NEM customer are considered separately. The primary difference, however, is that rather than valuing solar generation at the marginal or avoided cost of generation only, a VOS approach values on-site solar generation based on a host of other considerations that include but is not limited to: avoided generation costs; avoided costs of transmission and distribution investment; avoided environmental compliance costs; and avoided line losses. In most states, such considerations have the net impact of raising the NEM generation reimbursement rate to levels that are comparable to, if not higher than, what was previously offered using a retail rate valuation method. For example, Mississippi values electricity exported by a NEM solar generator to the electric utility distribution grid at \$0.025 plus the applicable utility’s avoided cost rate.⁵² Thus, if the avoided cost reported in the market is \$0.03, a Mississippi-based NEM generator will get \$0.055 per kWh (three cents plus the \$0.025 VOS “adder”) for its excess generation that is put to the electric utility grid.

The third alternative to traditional net metering limits the portion of exported electricity from a distributed generation facility that can be applied against a customer’s transmission and distribution portion of electric bills. For instance, in March 2017, the Maine Public Utilities Commission completed a rulemaking process to replace its traditional net metering rules with a revised version that would phase-out the ability of net metered customers to use distributed generation systems to net charges associated with transmission and distribution service over a 15-year period.⁵³ Shortly after Maine adopted this revised net metering approach, New Hampshire approved a similar policy change that reduced the creditable portion of distributed generation to only 25% for distribution purposes.⁵⁴

52. In re: Order Establishing Docket to Investigate the Development and Implementation of Net Metering Programs and Standards Order Adopting Net Metering Rule, Order, Docket No. 2011-AD-2, (Miss. Pub. Serv. Comm’n, Dec. 3, 2015).

53. Public Utilities Commission Amendments to Net Energy Billing Rule (Chapter 313), Order Adopting Rule and Statement of Factual and Policy Basis, Docket No. 2016-00222, (Pub. Utils. Comm’n of Me., Mar. 1, 2017).

54. Development of New Alternative Net Metering Tariffs and/or Other Regulatory Mechanisms and Tariffs for Customer-Generators, Order No. 26,029, Docket No. DE 16-576, (N.H. Pub. Utils. Comm’n, June 23, 2017).

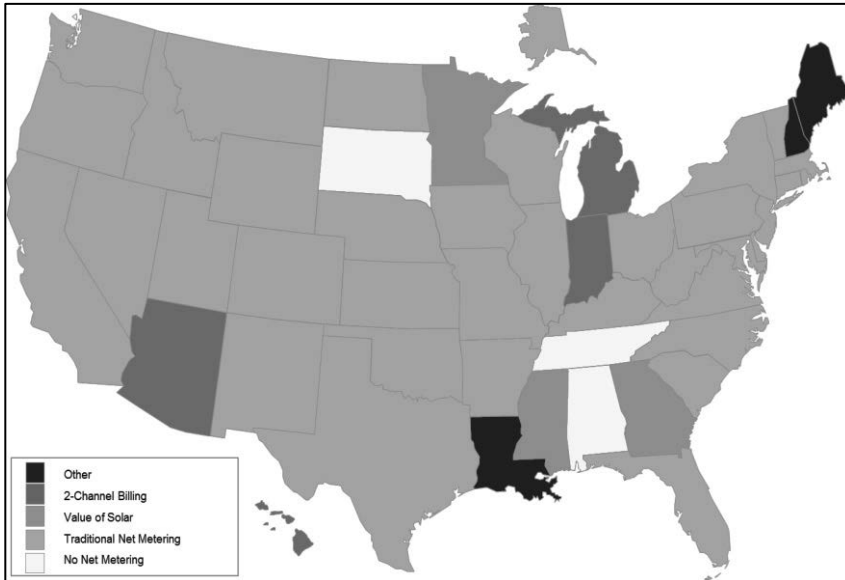


Figure 9: Alternate Net Metering Policies⁵⁵

D. Individual System Capacity Requirements

Most states limit the size (capacity) of any NEM resource interconnected into a utility's distribution grid. The policy purpose of this restriction is simple: facilitate behind-the-meter solar installations and facilitate some distribution sales at times when the host may be underutilizing the self-generated electricity. The goals of these NEM policies have not been to create an entirely new set of stand-alone generators that are being dispatched into the distribution level of the utility's grid in a manner comparable to what goes on at the bulk power system level. NEM policies have never been about creating "mini" merchant power plants.

NEM capacity restrictions vary by state and often by customer class (i.e., residential versus commercial may have differing capacity caps). There are currently five states (Arizona, Colorado, Georgia, Ohio, and New Jersey) that do not implement a strict capacity restriction (in terms of a fixed kW installation capacity cap) but instead evaluate systems on an application-by-application basis based on the capacity of the proposed

55. In Re: Review of Policies Related to Customer-owned Solar Generation and Possible Modification of the Commission's Current Net Metering Rules, *Ex Parte*, Review of LPSC Rules Regarding Distributed Generation: Report on Phase II of Rule-Making, Docket No. R-33929 (La. Pub. Serv. Comm'n, Jan. 8, 2019).

installation relative to the host's total annual usage. In other words, these states usually require an individual NEM customer's installation to not exceed their highest peak monthly demand, or some small share above that level, like 110% above the highest monthly peak. This percentage of usage-based capacity installation cap holds regardless of whether the installation is at a commercial facility or is a residential household.

Each state's NEM installation-specific size limitations are presented in Figure 10. This figure highlights the size restrictions for commercial, and in some instances, industrial-oriented NEM installations. If the state is indicated as having a size restriction based on "annual usage," this entails that the state restricts total NEM capacity to some share, usually 100% of the host's highest monthly peak.

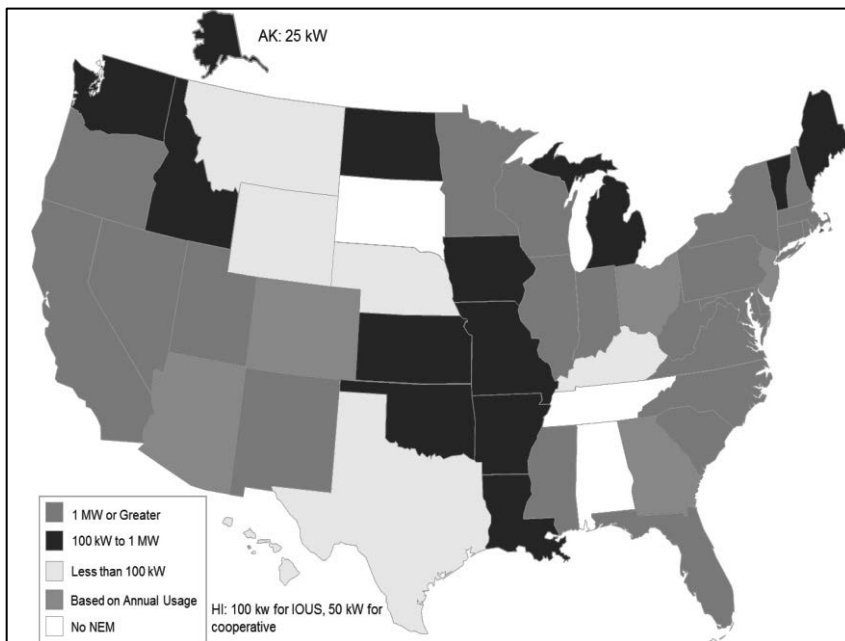


Figure 10: State NEM Capacity Limits (Commercial/Industrial Systems)⁵⁶

As recently as 2014, there were only 14 states which had separate residential system limitations.⁵⁷ However, as seen in Figure 11, these restrictions have changed considerably over the last several years, with most states now having some type of capacity restriction in place, even for

56. *Id.*

57. *Id.*

unexpected policy or ratemaking consequences of having too much NEM capacity on a utility's distribution system.⁶⁰

Figure 12 shows that 28 states (56%) have aggregate/system level NEM capacity limitations. Nine states have aggregate capacity limits of between 1.0% and 2.9% of a utility system's annual peak demand, while another three states, have set aggregate capacity limits on net metering at less than 1.0% of a utility system's annual peak demand. Another three states (Maryland, Nevada, and New Hampshire) impose a fixed aggregate NEM capacity cap, on MW terms, that is not tied to some share of a utility's annual system peak. For instance, Maryland has an administratively determined total NEM capacity limitation of 1,500 MW,⁶¹ which is set on a statewide basis, not a utility basis. Nevada assesses its NEM aggregate capacity limitations on a percentage of annual statewide peak demand rather than a fixed statewide capacity amount. Until 2019, Louisiana had a utility specific NEM capacity cap of 0.5% of a utility's monthly peak demand, but recently removed this cap during the process of changing and modifying its NEM rules.⁶²

60. J. HEETER ET AL., NAT'L RENEWABLE ENERGY LAB. & LAWRENCE BERKELEY NAT'L LAB., STATUS OF NET METERING: ASSESSING THE POTENTIAL TO REACH PROGRAM CAPS, at v (2014).

61. MD. CODE REGS. 20.50.10.01(A) (2019).

62. In re: Review of Policies Related to Customer-Owned Solar Generation and Possible Modification of the Commission's Current Net Metering Rules, *Ex Parte*, General Order, Docket No. R-33929, (La. Pub. Serv. Comm'n, Sept. 19, 2019).

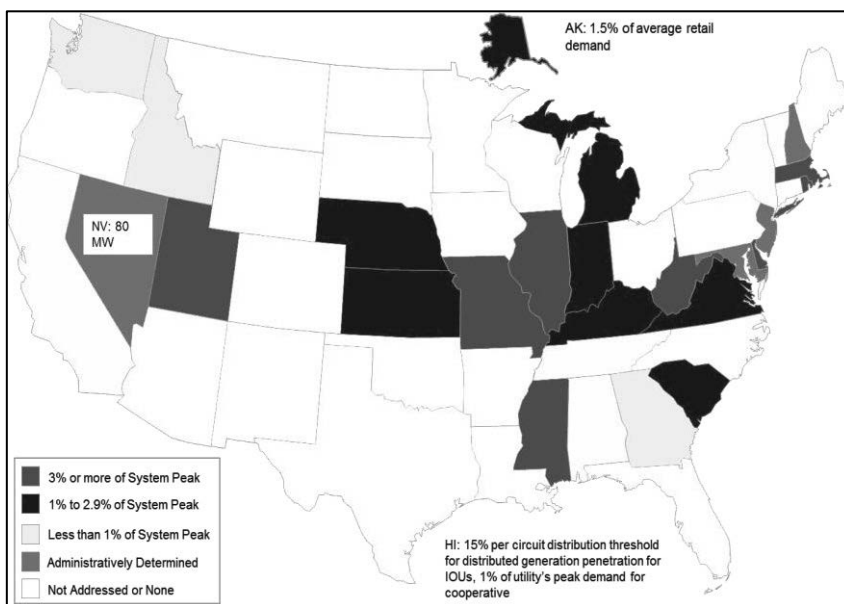


Figure 12: State Policies Regarding Aggregate Utility System Capacity Limits⁶³

F. Excess Generation Payments and Credits

Two of the most controversial issues associated with state regulatory NEM reform include: (a) the method which calculates “net” NEM generation; and (b) the means by which NEM generation will be valued. Both issues are interrelated because valuation is at the heart of the matter for each. Historically, valuing NEM generation at full retail rates was a relatively straightforward and administratively simple approach, even if many regulators and most utilities recognized that this valuation approach likely did not reflect the true opportunity cost of NEM generation. Today, however, thousands, if not tens of thousands, of NEM customers are interconnected into utility distribution grids making the financial and ratemaking ramifications of even small NEM valuation errors considerable.

Many state regulatory commissions are currently re-assessing NEM generation valuation. A large number are considering proposals that would

63. In Re: Review of Policies Related to Customer-owned Solar Generation and Possible Modification of the Commission’s Current Net Metering Rules, *Ex Parte*, Review of LPSC Rules Regarding Distributed Generation: Report on Phase II of Rule-Making, Docket No. R-33929, (La. Pub. Serv. Comm’n, Jan. 8, 2019).

value NEM generation in a fashion comparable to any other form of self-generated electricity, including industrial cogenerated electricity originally motivated by PURPA. Typically, the “avoided cost” of wholesale power generation is valued as the LMP, which is reported by independent third parties, such as a Regional Transmission Organization (RTO) or Independent System Operator (ISO). If one assumes that an LMP-based measure is the more accurate measure (a position on which solar advocates do not agree), then the flows of electricity utilized for on-site consumption and those associated with on-site generation need to be separately measured and valued. Thus, the first controversial issue in this reform debate is how this accounting should be handled, and, increasingly, many states are moving to the two-channel approach.

The next controversial issue becomes determining the per unit value that will be used to credit the separately identified NEM generation put to the utility distribution grid. NEM valuation policies can be generally divided into two distinct models: cost-based or incentive-based approaches. Cost-based approaches value NEM generation at a utility’s avoided or marginal cost of energy. Cost-based approaches vary depending upon whether the utility or state in question is part of an organized regional power market. For those utilities that are part of an organized market, then the LMPs discussed earlier, which reflect the hourly cost of generation being dispatched by the RTO or ISO, serve as the cost-proxy. For those utilities that are not part of an organization market, some cost-based proxy, developed from some type of generation (production) cost model is utilized. This production cost model utilizes inputs on all variable production operating costs, such as fuel stock purchases and variable emission control costs, and any other variable operating costs. Incentive-based approaches value generation contributed by the net metered generation system at some administratively determined price that tends to be either maintaining the use of full retail rates for valuing NEM generation, or some other VOS-based estimate that was discussed earlier. Figure 13 shows that numerous states incentivize excess solar generation by crediting it at the retail rate. Meanwhile, other states, such as Kansas, Mississippi, Missouri, Nebraska, and Louisiana value this excess solar generation on an avoided cost basis. Georgia, however,

utilizes an administratively determined rate to reimburse excess NEM generation.

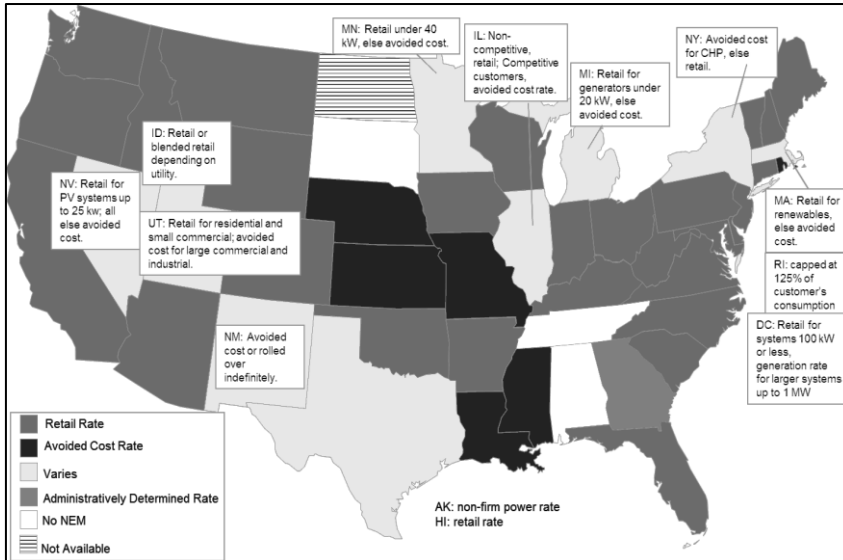


Figure 13: State Policies Regarding Excess Credit Valuation⁶⁴

Lastly, once states determine a valuation approach, states must then decide how these credits will be transferred, accrued, and, in some instances, banked for future use. Generally, there are two methods of financial reimbursement: (1) offering a credit for each kWh of NEM generation (direct credit); or (2) offering payment for each kWh of NEM generation (direct payment). Most states use the first method, which allows any net excess generation to be carried over to the NEM customer's next bill as a kWh credit. In some states, credits that accrue during a 12-month period will be paid to the customer via check or billing credit.⁶⁵ Other states, including Louisiana, allow a cash payment for outstanding excess solar generation credit balances if the NEM customer discontinues

64. In Re: Review of Policies Related to Customer-owned Solar Generation and Possible Modification of the Commission's Current Net Metering Rules, *Ex Parte*, Docket No. R-33929, Review of LPSC Rules Regarding Distributed Generation: Report on Phase II of Rule-Making, (La. Pub. Serv. Comm'n, Jan. 8, 2019).

65. *Net Metering*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, <https://programs.dsireusa.org/system/program/detail/276> [<https://perma.cc/UNN2-RSLH>] (last visited Jan. 17, 2020).

service, while others do not allow a cash payment at all, and any unused credit is retained by the utility.⁶⁶

The direct payment method of reimbursement usually involves offering an NEM generator some type of predefined rate for its generation, and then offering a monthly payment to that generator for the excess generation put to a utility's electric distribution grid.⁶⁷ Very few states, however, reimburse for NEM generation via direct payment. For example, in New Mexico the utility can choose how to deal with net excess generation. It may credit or pay the customer for NEM generation at the utility's avoided cost rate, or it may credit the customer for the kWh of NEM generation from month-to-month and pay for any accrued credits if the customer terminates service.⁶⁸

Figure 14 highlights state policies for reimbursement of accrued NEM generation credits. Only two states, Arizona and Texas, allow permanent banking of NEM generation credits, meaning those credits can rollover and accumulate without expiring. Most states reset all excess generation credits without compensation annually. At the end of an annualized period, any NEM generation credits in the customer's account expire and are ceded to the utility. In Oregon and Utah, any NEM generation credits accrued in an NEM customer's account at the end of 12 months are valued at the utility's avoided cost and paid to fund low-income assistance programs.⁶⁹

The remaining states pay annually accrued NEM generation credits at either the full retail rate, or an avoided cost rate. Louisiana requires utilities to compensate new net metered generators based on the utilities' avoided cost rate for any excess generation remaining in the final month a customer takes service from the utility, i.e., when a customer closes out his or her account.

66. Attachment A, *Ex Parte*, Docket No. R-31417, Section. 2.04C, General Order, (La. Pub. Serv. Comm'n, July 26, 2013). *Net Metering*, *supra* note 65.

67. N.M. CODE R. § 17.9.570 (2019).

68. *Id.*

69. OR. ADMIN. R. 860-039-0060 (2019). UTAH ADMIN. CODE r. 54-15-104 (2019).

Several states allow community solar projects to participate in the NEM tariff/service offering. While other states may allow community solar projects, but do not allow those projects to also participate in NEM. Figure 15 shows that 23 states, or approximately 46% of jurisdictions with net metering policies, have implemented policies allowing customers to aggregate with one another to attain NEM service.

NEM aggregation policies differ substantially from state to state regarding specifics such as eligible customers and tariffs, and geographic limitations for aggregation. For instance, six states with NEM aggregation policies do not allow non-physically connected or “virtual” aggregation (solar farm or community). Furthermore, states with policies allowing virtual net metering aggregation are concentrated in the Northeast and Mid-Atlantic. Only four states outside of these two regions (Arkansas, California, Colorado, and Washington), allow for virtual net metering aggregation.

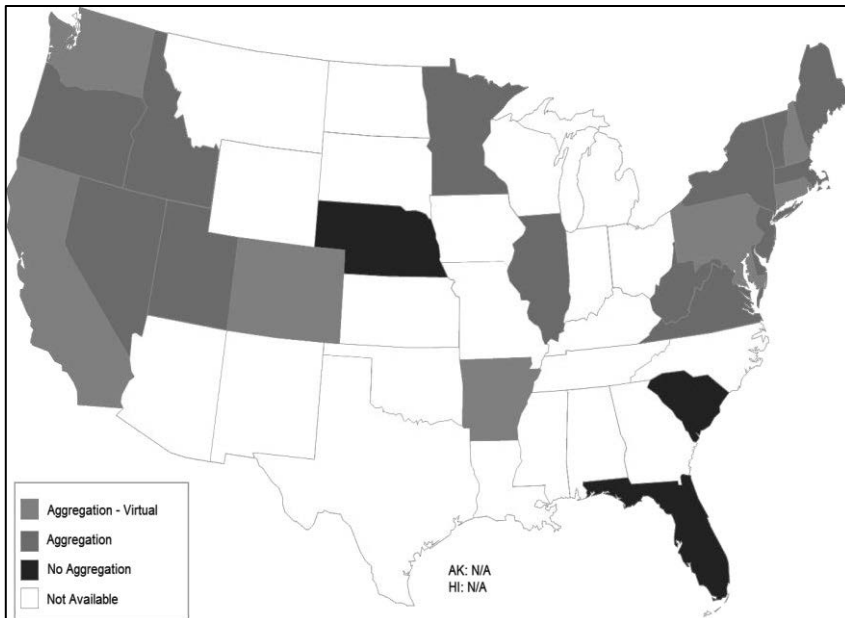


Figure 15: State Policies Regarding Net Energy Metering Aggregation⁷¹

CONCLUSION

The growth of solar energy over the past decade has not come without a certain amount of growing pains. This should not be unexpected as, for decades, a very extensive set of regulatory and legislative set-asides,

71. *Id.*

incentives, and subsidies have buttressed solar energy; changing or modifying any of these is no easy task. However, past policies have opted to support these mechanisms, in large part, because the perceived cost of doing so was not that unreasonable given: (a) the anticipated benefits that could arise from “kick-starting” an emerging industry with positive environmental attributes; and (b) what was seen at the time as niche, behind-the-meter generation technology. This has all changed over the past decade as installations have expanded in an exponential, not linear fashion. Today, solar energy is (under certain measures) competitive with many types of fossil fuel-based generation, particularly at grid-scale installation level.

Solar’s growth, and its successes, raises two important policy questions. First, can or should public policy continue to support technologies that are at or have met commercial competitiveness? Second, can public policy continue to lay out the level and scope of financial support for technologies that are currently installed at capacity levels (and installation numbers) that are orders of magnitude larger than historic norms? Regulatory policy has been grappling, in large part, with both questions over the past several years. Most utility regulators, and some state legislatures, have recognized some policies need to be changed to reflect current policy and market realities. NEM policies are one such area that has needed, and is receiving, a workover to correct prior design inefficiencies that have been allowed to persist, for various reasons, over the past several decades.

One of the more controversial aspects of the NEM policy reform process has been the reduction of reimbursement rates for behind-the-meter excess generation that is put to the utility distribution grid. The inefficiencies inherent in prior NEM generation reimbursement/valuation practices represent one of the more pervasive excess costs associated with legacy NEM policies. However, these reimbursement rates also strike at what is considered a very important selling point for solar developers in respective retail markets: the ability to sell-back, as opposed to purchase, electricity. While no NEM policy reform is removing that ability, many solar advocates often suggest that any reform of the current reimbursement rate that is downward in nature is tantamount to eliminating such privileges.

The problem with leaving inefficient reimbursement rates and other NEM legacy policies in place is that they are not without a cost, and that cost continues to grow on a year-end and year-out basis. The cost of every kWh of self-generated electricity that is purchased by utility from a NEM installation is passed along to other non-NEM retail customers. For example, if the prevailing market rate for wholesale electricity generation

is three cents per kWh, and the retail rate of electricity (which reflects the cost of generation, transmission and distribution), is nine cents per kWh, then the other, non-NEM retail ratepayers will be paying for this excess six cents per kWh cost. This may not have been a big issue in the past when NEM installations numbered in the hundreds, but today, it becomes exceptionally problematic, inequitable, and very likely regressive when these NEM installations number in the thousands or tens of thousands, which is increasingly becoming the case for many utilities across the country.

Thus, it is not unreasonable to see NEM reforms undertaken at the state level in response to the rapid growth of behind-the-meter solar generation. The purpose of this NEM reform process is often misunderstood and, unfortunately, misrepresented. This Article attempts to put some of these changes into perspective with past precedents and current trends. The bottom line, however, is that the NEM reform process is not and should not be considered one that attempts to shut down or somehow discourage continued cost-effective residential and small commercial solar installations.

States are still supporting and maintaining NEM policies, even though the policies are changing. The goal in the NEM reform process is simply to minimize the negative ramifications that legacy aspects of these rules have had, and continue to have, on non-NEM customers. One thing that has not changed about these NEM rules and policies is their fundamental commitment to reducing market barriers to behind-the-meter generation and setting up a system of rules for access that is fair, non-discriminatory (from a generation technology or ownership perspective) and consistent.