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Disunity Among the United States: Navigating Net-Metering Without Getting Electrocuted

Aundene Szmolyan

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DISUNITY AMONG THE UNITED STATES: NAVIGATING NET-METERING WITHOUT GETTING ELECTROCUTED

Aundene Szmolyan*

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This article is for the voting citizens, the policymakers, the innovators, and the believers who all understand that climate change is an immense problem with numerous contributing factors, requiring the search for a solution, one step at a time.

INTRODUCTION

California and Hawaii mandated that 100% of statewide energy production come from a renewable resource by 2045.¹ Twelve other states have no mandated renewable energy targets at all, thereby allowing for a continuance of the reliance upon traditional fossil fuels for consumer demands.² These opposed outlooks of future renewable energy standards represent the fringes of statewide energy policies. The other thirty-six states lie somewhere in the middle.

This dystopia of state-level energy policies results from numerous influencing factors, which ultimately entrench national dependence on fossil fuels and inhibit private economic action in the fight against climate change. Varying degrees of regulation of utility companies is one factor, while the presence of state-owned or investor-owned utility companies is another. Also, deeply held connections between the fossil fuel industry and state-level bureaucracy act to inhibit the adoption of progressive renewable portfolio standards. Finally, legal grants of monopolistic power to energy companies coupled with a lack of federal oversight and direction further entrench the established norm.

As it stands, the progress towards fighting climate change at the national level is in disarray,³ and there is a complete disunity of direction and goals at the state level. This paper highlights the disunity by providing a case study of the different regulations, which affect the solar power

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¹ National Conference of State Legislatures, *State Renewable Portfolio Standards and Goals*, NCSL.ORG, (Feb. 1, 2019) <http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx>.

² *See id.* (Alabama, Arkansas, Florida, Georgia, Idaho, Kentucky, Louisiana, Mississippi, Nebraska, Tennessee, West Virginia, Wyoming).

³ Paris Agreement Under the United Nations Framework Convention on Climate Change, Nov. 4, 2016 U.N.T.S (The Paris Agreement signed by Executive Agreement by President Obama) (Executive withdrawal by President Trump, effective Nov. 4, 2020).

industry across all fifty states, with a particular focus paid to net metering regulations. Through an examination of this industry, three startling conclusions will emerge. First, investor-owned utilities apply intense political pressure through lobbying efforts to maintain the current status quo of the utility industry's economic model, which results in the disfranchisement of average citizens from profitable "green" investments. Second, because of lobbying pressure, states have adopted a myriad of approaches towards net metering regulations, thereby creating uncertainty affecting future solar investments. Third, in many instances, existing laws bar investors' recourse to the courts; it will take innovative judicial challenges at the federal level to tackle future regulation. And fourth, the battle between solar and utility industries over the future of energy generation is just beginning, as solar storage laws are poised to be the next major front of green regulation.

Section II of this regulatory *exposé* juxtaposes the traditional utility economic model with the solar industry's rise. Attention will be directed to the special regulatory policies and initiatives that help guide the rise in these competing industries. It will explore the initial success the solar industry had regarding net metering laws, focusing particularly on the early-adopting states, while also examining the laws that allowed the utility companies to become the monopolistic behemoths they are today. Section III examines the emerging clash between the solar and utility industries. It will expose the coordinated response that emerged from the utility lobby to overturn net metering legislation across the United States. Section IV reviews how the lobbying efforts affected a change of regulatory net metering policies on a state by state basis. Section V looks at how shifting regulatory policies have affected solar investors, particularly noting the uncertainty that follows net metering regulations, which affect past, current, and future solar investments. Also, Section V highlights the lack of judicial recourse for solar investors regarding the regulatory policies that constantly alter the rates of returns that investors can make off their solar installations. Section VI finishes with suggestions for the utility industry going forward. First, it recommends a legal challenge to the most drastic pro-utility net metering laws adopted in a few states. Second, it identifies the key new solar storage regulations that will be complementary to existing net metering regulations and recommends their adoption in other states. Also, it previews how solar storage regulations will be the new battleground for renewable energy adoption at the state level.

I. SECTION I

(A) Utility Industry and Economic Model

Centralized energy distribution models—the standard for energy distribution of the twenty-first century—remained largely unchanged since Thomas Edison pioneered his utility company, General Electric, and his central power plant design in 1882.⁴ Innovational and technological advances—particularly under guidance from Samuel Insull at Chicago Edison in the 1900s-1930s—helped cement the structure of the centralized distribution model of energy for consumers.⁵ Simplistic in form and structure, the model follows familiar economic terms such as “the spoke and wheel.” First centralized power plants tapped natural resources at a generation plant, which are then converted into electrical power.⁶ Utility companies, who own, operate, and control the “grid” and control transmission and distribution, then purchased this supply of energy.⁷ Power is distributed along the grid—flowing through numerous transformers along power lines— and ultimately into the buildings of the retail consumers.⁸

The entrenchment of the centralized distribution model and the end pricing charged against consumers was as much an effect of circumstance—the need for rapid proliferation of energy for American consumption in the early 1900s—as it was of monopolistic policies.⁹ To the former, between 1902 and 1930, the industry grew exponentially as electricity prices fell year after year;¹⁰ consolidation of mass production by producers supplied the growing mass consumption demand;¹¹ rural

⁴ *Edison's Electric Light and Power System*, ENGINEERING & TECH. HIST. WIKI, https://ethw.org/Edison's_Electric_Light_and_Power_System (last updated Jan. 24, 2018).

⁵ *Samuel Insull American Utilities Magnate*, ENCYCLOPEDIA BRITANNICA, <https://www.britannica.com/biography/Samuel-Insull> (last updated July 15, 2019).

⁶ *Understanding the Grid*, THE DEP'T OF ENERGY (Nov. 17, 2014), <https://www.energy.gov/articles/infographic-understanding-grid>.

⁷ *Id.*

⁸ The Department of Energy, *supra* note 6, at 3.

⁹ Werner Troesken, *Regime Change and Corruption. A History of Public Utility Regulation*, CORRUPTION & REFORM: LESSONS FROM AM.'S ECON. HIST. at 267 (Mar. 2006) <https://www.nber.org/chapters/c9986.pdf>.

¹⁰ *Id.* at 261.

¹¹ *Id.*

electrification proliferated; and affordable energy became accessible to all. However, for this to happen, substantial economic investments needed to be made, which formed the basis of a natural *economic* monopoly.¹² However, the natural economic monopoly was quickly subsidized in the form of protected legal monopolies at the state and federal level.¹³

State public utility commissions (PUCs) were created at the turn of the twentieth century and rapidly proliferated across the United States until the 1940s.¹⁴ These commissions gave an exclusive franchise power to utility companies—to serve a given geographical area for a fee—¹⁵ codifying the utility companies as not only natural economic monopolies, but also as a legal monopoly.¹⁶

Federal support was also lent to these natural monopolies once energy generation reached a point where it was being transmitted across interstate lines. In 1935, the federal government asserted its control over such sales in the Federal Power Act.¹⁷ This Act sought to provide checks upon the growing state monopolies' pricing system¹⁸ by stipulating that the prices charged by utility companies be “just and reasonable.”¹⁹ However, jurisprudence of what is just and reasonable has been quite deferential to the rate set by PUCs,²⁰ and therefore inadvertently entrenched the monopolistic growth of utility companies and ensured the vertical integration system.²¹ Despite this effect, little else was done at the

¹² Jim Chappelow, *Natural Monopoly*, INVESTOPEDIA FIN. DICTIONARY (Aug. 29, 2019), https://www.investopedia.com/terms/n/natural_monopoly.asp. A natural monopoly, like the name implies, is a monopoly that does not arise due to collusion, consolidation or hostile takeovers. Instead, natural monopolies occur when a company takes advantage of an industry's high barriers to entry to create a “moat” or protective wall around its operations. *Id.*

¹³ Troesken, *supra* note 9, at 263–64.

¹⁴ *Id.* at 262.

¹⁵ *Id.* at 263–64.

¹⁶ *Id.* at 267–68.

¹⁷ Federal Power Act of 1935, 16 U.S.C. §§ 791(a)–828(c) (1935).

¹⁸ “It is declared that the business of transmitting and selling electric energy for ultimate distribution to the public is affected with a public interest, and that Federal regulation of matters relating to generation . . . is necessary in the public interest” 16 U.S.C. § 824.

¹⁹ 16 U.S.C. § 824 d (a).

²⁰ See discussion *infra* Section IV(B).

²¹ Barry C. Lynn, *America's Monopolies are Holding Back the Economy*, THE ATLANTIC (Feb. 22, 2017), <https://www.theatlantic.com/business/archive/2017/02/antimonopoly-big-business/514358/>.

federal level beyond “restructuring” the utility sector.²² The Energy Act of 1992 saw states’ “unbundle” electricity supply from transmission and distribution, allowing nonutility generators to produce and sell power in wholesale energy markets.²³ While the introduction of wholesale and retail competition, and the development of wholesale market institutions effectively helped market forces replace regulation, it did little to effectively break the monopoly or the vertical integration of the utility industry.²⁴

As it stands today, two types of utility companies dominate the market—Investor Owned Utilities (IOUs) and Municipal Utilities (MUs)—which contribute \$284 billion to the U.S. economy annually.²⁵ Roughly seventy percent of U.S. homes are powered by electricity originating from investor-owned utilities.²⁶ With corporate interests in mind, IOUs are allowed, at a rate determined by the public utility company that governs corporations, to earn a set profit *on their investment*. This profit model is directly linked to its costs. In its most simplistic form, this means the more an IOU spends, the higher its profit can be. However, this system is far from simple, and rather it is filled with financial models designed to profit the IOU and its shareholders, often at the expense of the customers they serve. Since IOUs grow their profit base by deploying capital, they have a natural bias towards making capital investments over taking actions that minimize the total costs for its customers, a.k.a the Averch Johnson effect.²⁷ This directly derives from the Return on Equity (ROE) model and largely contributes to market inefficiencies. For example, fixed costs, such as investments into the grid, transmission lines, and power generating plants are often taken to meet a “demand” that is not

²² GOVERNMENT ACCOUNTABILITY OFFICE, ENERGY MARKETS: CONCERTED ACTIONS NEEDED BY FERC TO CONFRONT CHALLENGES THAT IMPEDE EFFECTIVE OVERSIGHT (June 14, 2002).

²³ *Id.*

²⁴ *Id.*

²⁵ *United States GDP From Utilities*, TRADING ECON., <https://tradingeconomics.com/united-states/gdp-from-utilities> (last visited Sept. 11, 2019).

²⁶ Inara Scott, “*Dancing Backward in High Heels*”: *Examining and Addressing the Disparate Regulatory Treatment of Energy Efficiency and Renewable Resources*, 43 ENVTL. L. 255, 261 (2013).

²⁷ James Tong & Jon Wellinghoff, *Are Fixed Charges a Curse in Disguise for Investor Owned Utilities*, UTIL. DIVE (Mar. 25, 2015) <https://www.utilitydive.com/news/tong-and-wellinghoff-are-fixed-charges-a-curse-in-disguise-for-investor-ow/378648/>.

necessarily there or to “upgrade” existing infrastructure unnecessarily.²⁸ The more IOUs do this, the higher their potential rate of return they can make.²⁹ And the only check that keeps this system from spiraling out of control is that this is still technically an investment risk, and IOUs have an obligation to operate efficiently in order to earn that ROE.³⁰ The kicker though, is that in order to recoup this investment, higher fixed charges are tacked on to customers’ utility bills monthly.³¹ With few competitors to choose from in the market, customers can do little but pay these charges. To the IOU, this model is fantastic because these fixed charges represent a cost inefficiency somewhere in the point between generation, transmission and distribution which again require more investment (capital expenditures) to fix.³²

Other costs are also calculated into the profitability model of IOUs, namely salaries and energy purchases from generators. Because utilities have a capped rate of return based directly off their capital expenditures, IOUs can funnel excess cash into executive compensation packages, an act which thereby increases the amount of profitability that can be returned the following year. The same goes for purchasing energy. It is in an IOUs interest to purchase large quantities of energy from distributors via long-term power purchase contracts which increases the overall capital expenditure of the company. The more money spent, the higher the ROE that can be claimed for its shareholders. And so the cycle continues.

With the vast sums of money at stake, it is understandable that utilities sought to influence state-level policies towards favoring the maintenance of their continued market dominance and profitability rates.³³

²⁸ *Id.*

²⁹ See generally Scott, *supra* note 26, at 262–64 (Discussing how the rate setting model which determines what utility companies can charge, is directly dependent upon a utility’s Revenue Requirement, which is in turn based on multiple factors discussed in the previous sentences).

³⁰ See Tong & Wellinghoff, *supra* note 27.

³¹ *Id.*

³² See David Roberts, *After Rising For 100 Years, Electricity Demand is Flat and Utilities are Freaking Out*, VOX (Feb. 27, 2018), <https://www.vox.com/energy-and-environment/2018/2/27/17052488/electricity-demand-utilities> (noting that despite electricity sales becoming stagnant over the last 11 years, Utility GDP growth has constantly increased).

³³ See Ari Peskoe, *Unjust Unreasonable and Unduly Discriminatory: Electric Utility Rates and the Campaign Against Rooftop Solar*, 11 TEX. J. OIL GAS & ENERGY L. 211, 214–15 (Prices for utility distribution service are set through regulatory proceedings before state public utility commissions (PUCs)” and “[w]hile PUCs are now more involved in the details of rate design [omit

Almost uniformly, IOUs make up some of the largest campaign financiers, political donors, and political lobbying groups across the fifty states. For example, Florida Power & Light, one of the four largest IOUs in the state, provides power to \$4.8 million Floridians in 2015, which generated a whopping \$1.65 billion in profit that year.³⁴ In the decade preceding that year, in order to protect that profit, FPL and other IOUs contributed at least \$18 million to state politicians and political committees and \$12 million on lobbying.³⁵ As well, in 2017, Florida IOUs conducted a \$20 million campaign to pass a ballot initiative seeking to ban third-party energy suppliers from the state altogether.³⁶

IOUs are not alone in seeking to maintain their continued influence over the market. The fossil fuel industry is a big supporter, as well. With the vertically integrated system of IOUs purchasing power from centralized power plants, which derive the majority of their energy from fossil fuels, the two industries are intimately connected. For example, the Koch Brothers, investor magnates with enormous financial stakes in both the utility and fossil fuel industry, have spent enormous sums seeking to influence issues related to both industries. Koch Industries alone, separate from the network of nonprofit organizations that also fund campaigns, spent more than Exxon Mobile did in 2014 supporting fossil fuels.³⁷ Simultaneously in the same year, the Koch funded group “Americans for Prosperity” was an active participant in Georgia, Florida, and Kansas, in support of existing utility structures over emerging renewable energy structures.³⁸

ratemaking continues to be a top-down process that begins with an IOU’s proposed rates.”)

³⁴ Tim Dickinson, *The Koch Brothers’ Dirty War on Solar Power*, ROLLING STONE (Feb. 11, 2016), <https://www.rollingstone.com/politics/politics-news/the-koch-brothers-dirty-war-on-solar-power-193325/>.

³⁵ *Id.*

³⁶ Julia Pyper, *How Solar Scored a ‘Game-Changing’ Victory in Florida*, GREEN TECH MEDIA (Apr. 25, 2018), <https://www.greentechmedia.com/articles/read/how-solar-scored-a-game-changing-victory-in-florida#gs.Y3g0WmDX>.

³⁷ Gideon Wiessman & Bret Fanshaw, *Blocking the Sun 12: Utilities and Fossil Fuel Interests That Are Undermining American Solar Power*, FRONTIER GROUP, at 13 (Oct. 2015), https://environmentamericacenter.org/sites/environment/files/reports/EA_BlockingtheSun_scrn_0.pdf.

³⁸ *Id.* 13–14.

Municipal Utilities (MUs), representing most of the remaining thirty percent market share of utility providers, present a stark contrast to IOUs. As a government-owned utility, most are established as nonprofit entities that do not answer to shareholders.³⁹ In this structure, they have access to tax-exempt financing for their investments, they do not pay federal income tax on their margins, and they generally compensate their executives on par with government levels.⁴⁰ Essentially, MUs take the money IOUs pay in income taxes and profits to its shareholders and spend it more outright on its customer base instead. This generally results in providing cheaper residential electricity for its customers, while also delivering more reliable service and faster restoration periods after power failures.⁴¹

(B) Solar Industry and Economic Model

The growth of the solar industry in the United States has been directly reliant upon technological innovation and decreasing costs of production, government back subsidization of investments in solar, and third-party market entrepreneurs.⁴² A brief history. The first solar cell was built in 1954 and became commercially available in 1956.⁴³ However, at a cost of \$300 per watt,⁴⁴ and at a four percent energy conversion efficiency rate,⁴⁵ it was far beyond reach for mass adoption. Over the next twenty years, the NASA space program spearheaded research and development in the solar field, and NASA's first practical use was to

³⁹Diane Cardwell, *Cities Weigh Taking Over From Private Utilities*, N.Y. TIMES (Mar. 13, 2013), <https://www.nytimes.com/2013/03/14/business/energy-environment/cities-weigh-taking-electricity-business-from-private-utilities.html>.

⁴⁰*Id.*

⁴¹*Id.*

⁴²John Rogers & Laura Wisland, *Solar Power on the Rise*, UNION OF CONCERNED SCIENTISTS, at 5 (Aug. 2014), <https://www.ucsusa.org/sites/default/files/attach/2014/08/Solar-Power-on-the-Rise.pdf>.

⁴³Victoria C., *The History of Solar Power*, EXPERIENCE (June 29, 2017), <https://www.experience.com/advice/careers/ideas/the-history-of-solar-power/>.

⁴⁴*Id.*

⁴⁵Luke Richardson, *The History and Invention of Solar Panel Technology*, ENERGYSAGE (May 3, 2018), <https://news.energysage.com/the-history-and-invention-of-solar-panel-technology/>.

power satellites in space.⁴⁶ By the 1970s, the cost per watt dropped to twenty dollars, but such costs were still prohibitive and general solar adoption was limited to government buildings, remote location power production, and large corporations.⁴⁷ This downward trend in cost continued through the 1990s and into the 2000s until, almost fifty years after its invention, solar became commercially viable for the average consumer.⁴⁸

Government backing was the second major incentive for the solar industry's advancement, and it has fit the conclusion that “[i]ncentives that reduce the up-front cost of adoption and that are subject to low uncertainty are found to have the largest impact [on solar adoption].”⁴⁹ The first major push at the legislative scale came under the Carter administration.⁵⁰ In 1978, the Carter administration signed into law the Energy Tax Act to “provide tax incentives for the production and conservation of energy.”⁵¹ This act created the first commercial and residential energy credit equating to thirty percent of the first \$2,000 investment and a twenty percent credit on the next \$8,000.⁵² The credit failed to have the desired effects⁵³ and did

⁴⁶ *Id.* In 1958, the Vanguard I satellite used a one-watt panel, and by 1964 NASA launched the first Nimbus spacecraft which was a fully self-sufficient satellite operating entirely on a 470-watt system. *Id.*

⁴⁷ See Victoria C. *supra*, note 43.

⁴⁸ See Richardson, *supra*, note 45 (“[T]he average individual home unit installation cost has fallen year over year, dropping nearly 70% from 2010 to 2017, *pre subsidation levels.*”); see generally John Farrell, *Solar PV Economies of Scale Improve in 2010*, INST. FOR LOC. SELF-RELIANCE (Sept. 15, 2011), <https://ilsr.org/solar-pv-economies-scale-improve-2010/> (discussing an in-depth report of dropping solar rates from 2009-10).

⁴⁹ Ilya Chernyakhovskiy, *Solar PV Adoption in the United States: An Empirical Investigation of State Policy Effectiveness*, U. MASS. AMHERST (Masters Thesis) (2015), https://scholarworks.umass.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1097&context=masters_theses_2.

⁵⁰ Energy Tax Act, Pub. L. No. 95-618, 92 Stat. 3174 (1978).

⁵¹ *Id.*

⁵² Energy Tax Act at 3175.

⁵³ See *The President's Energy Program, Phase III: Hearings Before the House Comm. on Ways and Means*, 96th Cong., 1st Sess. 27-30 (1979) (statement of Rep. Bill Frenzel) (“*The principal tax credit bill we passed last year does not seem to have given great incentive in the marketplace . . . The tax credit does not motivate, but rather simply occurs at the end of the year when the fellow finds there was a tax credit available. And I do not think that is a very efficient and effective stimulus.*”).

not coincide with the widespread adoption of solar.⁵⁴ The solar industry continued its slow trudge towards mass adoption until 2005 when the Bush administration reintroduced the solar residential tax credit and increased the commercial tax credit.⁵⁵ What was supposed to be a two-year tax credit extended four times⁵⁶ and is widely credited with assisting the solar industry's 1600% growth since 2005.⁵⁷

Many state-level incentives accompanied the twelve-year period of tax credits at the federal level. California, Nevada, Arizona, and Hawaii all offered individual state tax benefits, in the form of tax credits, tax deductions, sales tax exemptions, property tax exemptions, and net metering benefits.⁵⁸ These federal and state-level tax credits and subsidies helped to reduce the average cost per installation unit (pre-incentives) from \$17,000 to about \$12,000 in 2017.⁵⁹ This reduction in cost helps

⁵⁴ Matthew Sabas, *History of Solar Power*, INST. FOR ENERGY RES. (Feb. 18, 2016), <https://www.instituteforenergyresearch.org/renewable/solar/history-of-solar-power/>.

⁵⁵ Energy Policy Act of 2005, Pub. L. 109–58, 199 Stat. 594 (codified as amended at 42 USCA § 15801 (2005)).

⁵⁶ The tax credit was passed for a two-year period but was extended in 2006. Tax Relief and Health Care Act of 2006, Pub. L. 109–432, 120 Stat. 2922. This was again extended during the 2008 financial bailout package through 2016. Emergency Economic Stabilization Act of 2008, Pub. L. 110–343, Div. A, 122 Stat. 3765. In 2015, the investment tax credit was extended once again, although it iterated a phase-out of the tax credit by the year 2022. I.R.C. § 48(a)(5)(E)–(6)(B) (Supp. III 2015).

⁵⁷ *The Future of the Investment Tax Credit Under President Trump*, SULLIVAN SOLAR POWER (Nov. 30, 2016), <https://www.sullivansolarpower.com/about/news-and-events/industry-news/the-future-of-the-investment-tax-credit-under-president-trump.html>.

⁵⁸ See CAL. REV. & TAX. CODE § 73 (West 2019) (implementing California property tax exemptions for installed solar systems, allowing business and homeowners to exclude the added value of a system from the valuation of their property for taxation purposes); ARIZ. REV. STAT. tit. 43 § 1083(a)–(b) (LexisNexis 2019) (explaining that Arizona's State solar tax credit grants 25% of the total system cost, up to \$1000); NEV. REV. STAT. ANN. § 701B.005 (West 2019) (Nevada's state rebate program for solar installation systems); N.J. REV. STAT. tit. 54 § 54:32B-8.33 (2019) (New Jersey's sales tax exemption). *But see Oklahoma – Energy Tax Credit, Solar Rebates and Incentives*, DASOLAR ENERGY, <https://www.dasolar.com/energytaxcredit-rebates-grants/oklahoma> (last visited Jan. 28, 2019) (explaining that Oklahoma offers no Sales tax exemptions, no property tax exemptions, no solar power performance payments, no solar energy rebates).

⁵⁹ *Id.*

create a regulatory system to provide a return for a solar installation investment, which has altogether driven solar adoption nationwide.⁶⁰

The third market driver for solar adoption in the U.S. is the rise of third-party investors allowing for innovative ownership structures.⁶¹ Many companies, including solar manufacturers, offered financing methods for homeowners principally in the form of leasing or power purchase agreements.⁶² These structures often require little to no money down for the homeowner and offer attractive fixed long term power purchase rates.⁶³ Essentially, solar installers own the system, and the customer leases it and pays off that lease by “buying” the electricity generated on-site at set rates. These methods directly contribute to the mass adoption of solar by the average consumer who otherwise is unable to afford the upfront investment costs.⁶⁴ It is so successful that a study of solar adoption in leading solar states, Arizona, California, and New Jersey, found that installations are overwhelmingly occurring in middle-class neighborhoods with median household incomes ranging from \$40,000 to \$90,000.⁶⁵

Despite all the market forces that drove solar adoption, current solar production capacity is limited. Across the U.S., photovoltaic capacity

⁶⁰ Alex Crees, *Best and Worst Ranked States for Solar Industry Growth*, CHOOSE ENERGY (Jan. 30, 2018), <https://www.chooseenergy.com/news/article/best-and-worst-ranked-states-for-solar-industry-growth>. While not conclusive on its own, it should be of little surprise that Oklahoma, without such incentives, ranks among the worst U.S. states for solar power with only 32 solar related companies, less than 700 residences powered by solar, and less than .01% of the states total electricity coming from solar. *Id.*

⁶¹ See Rogers & Wisland *supra*, note 42.

⁶² *Id.*

⁶³ *Id.*

⁶⁴ Mari Hernandez, *Solar Power to the People: The Rise of Rooftop Solar Among the Middle Class*, CTR. FOR AM. PROGRESS (Oct. 21, 2013, 9:07 AM), <https://www.americanprogress.org/issues/green/reports/2013/10/21/76013/solar-power-to-the-people-the-rise-of-rooftop-solar-among-the-middle-class/>. The reality of this development is staggering with Arizona Public Service databases reporting 80% of solar power adoption in that state was from low to middle income households, 67% for California, and 63% for Nevada. *Id.* In fact, nearly 83% of all solar investments in New Jersey, a solar energy leader, were facilitated through leases or power purchase agreements. *Third Party Solar Financing*, SEIA, <https://www.seia.org/initiatives/third-party-solar-financing> (last visited Jan. 29, 2019).

⁶⁵ See Hernandez *supra*, note 64.

(both residential and commercial) sits at only sixty-six gigawatts, enough to power 12 million homes.⁶⁶ While this number is small on a macro level, one cannot deny the economic benefits the emerging industry represents. The U.S. solar industry, in 2017, generated \$17 billion in investments and had more than 10,000 companies active in the field.⁶⁷ Those companies combine to employ over 250,000 people in the United States and do so across a range of technical skills requirements.⁶⁸ Work in solar includes installation, manufacturing, engineering, sales and marketing, finance, project development, and much more.⁶⁹ With its continued adoption, the solar industry promises to employ thousands, if not millions more, across the US.

II. SECTION II

(A) *The Rise of Net Metering*

Considering the well-established centralized distribution of energy model that governed utility companies for the last century, it should be of no shock that the rise of solar would pose a market threat. It seemed inevitable that as time elapsed the two energy industries would soon come to conflict with one another. By the 1980s, solar innovation transformed the idea of distributed generation of energy into an economic reality.⁷⁰ In 1979, solar pioneer Steven Strong built a Department of Energy-funded solar house that had the solar generating capacity to outproduce its demand.⁷¹ The home was specifically engineered to feed the excess production of power back to the utility company, and a small meter installed with the home would indicate with an arrow, pointing forward or backward respectively, whether the house was drawing energy from the grid or feeding into it. ⁷² This simply became coined as net metering.

⁶⁶ *Solar Market Insight Report 2018 Year In Review*, SEIA (Mar. 13, 2019), <https://www.seia.org/research-resources/solar-market-insight-report-2018-year-review>.

⁶⁷ *Solar Industry Research Data*, SEIA, <https://www.seia.org/solar-industry-research-data> (last visited Mar. 15, 2019).

⁶⁸ This number is more than double the employment in 2012. *Id.*

⁶⁹ *National Solar Jobs Census*, THE SOLAR FOUND., <https://www.thesolarfoundation.org/national/> (last visited Mar. 1, 2019).

⁷⁰ Roberto Verzola, *Net energy metering opens the floodgates to solar rooftops and other small-scale renewables* (Mar. 17, 2015), <https://rverzola.wordpress.com/2015/03/17/1823/>.

⁷¹ *Id.* (quoting BOB JOHNSTONE, SWITCHING TO SOLAR: WHAT WE CAN LEARN FROM GERMANY'S SUCCESS IN HARNESSING CLEAN ENERGY 91 (2011)).

⁷² *Id.*

As a concept, net metering followed the simplicity of the original house built by Strong. Distributed generation, rising from solar and wind generators, reverses the energy meter when supplying excess energy to the grid.⁷³ Conceptually, this meant that the one meter that measured electricity in also measured electricity out.⁷⁴ In reality, this meant that “parity pricing” became the standard net metering model.⁷⁵ That is, distributed generators receive payment for their generation at the same rate, “the retail rate,” that they would pay for their consumption.⁷⁶ Ultimately, this was the standard formula that states and utility companies themselves would adopt going forward.⁷⁷

However, the adoption of net metering policies was far from uniform across the fifty states. From Steven Strong’s net metering experiment in 1979-2012, only forty of the fifty states adopted net metering laws.⁷⁸ Despite this though, by 2012, net metering laws were intimately linked to solar adoption, and its effects were readily apparent; ninety-nine% of all newly installed solar systems in the United States that year were net-metered.⁷⁹ Moreover, with this concerted action, it was inevitable that an “equal and opposite reaction” would soon take place.

(B) Utility Company Pushback and the “Utility Death Spiral”

With the adoption of solar finally reaching a critical mass whereby it had the potential to displace utility company profits by reducing load demand, there was a concerted pushback from the utility companies themselves. In 2012-13, The Edison Electric Institute (EEI), the utility lobby, which represents IOUs, qualified distributed-generation and net-metering as a “disruptive technology” that could compete with utility companies in the market of power distribution and thereby lead to declining retail sales, loss of customers, and potential obsolescence.⁸⁰

⁷³ *Id.*

⁷⁴ *Id.*

⁷⁵ *Id.* at 2.

⁷⁶ *Id.*

⁷⁷ *Id.* at 5.

⁷⁸ Hiroko Tabuchi, *Rooftop Solar Dims Under Pressure from Utility Lobbyists*, N.Y. TIMES (July 8, 2017), <https://www.nytimes.com/2017/07/08/climate/rooftop-solar-panels-tax-credits-utility-companies-lobbying.html>.

⁷⁹ See Verzola, *supra* note 70, at 9.

⁸⁰ *Id.*

Thus, the utility industry initiated a coordinated effort to repeal, replace, and render ineffective existing net metering laws.⁸¹

This effort centralized its focus on three arguments against net metering across the United States. The first argument focused its attack on the parity pricing model as stated by the EEI:

Because of the way that net metering policies originally were designed, net-metered customers often are credited for the power they sell to electric companies, usually at the full retail electricity rate, even though it would cost less for the companies to produce the electricity themselves or to buy the power on the wholesale market from other electricity providers.⁸²

The second major argument that the utilities put forth focused on the effect net metering had on the grid. It argued that solar equipped homeowners, especially homeowners who net meter to the point where they get credits from the utility company, get a free ride from the use of the grid.⁸³ Ultimately, this would shift grid maintenance costs to those who do have net metering capacities and would thereby create economic inequality among customers' utility bills.⁸⁴ Also, the marketability of this argument increased when discovery displayed that solar adoption primarily benefited the wealthy and that such adoption and continuance of net metering policies would give the wealthy the market advantage, while shifting grid maintenance costs to the poor who could not afford to install solar systems.⁸⁵

⁸¹ See Tabuchi, *supra* note 78.

⁸² *Spread of Net Metering, & Utility Backlash – Net Metering History Part 3*, Clean Technica (Sept. 10, 2015), <https://cleantechnica.com/2015/09/10/spread-of-net-metering-utility-backlash-net-metering-history-logic-part-2/>.

⁸³ See Tabuchi, *supra* note 78.

⁸⁴ *Id.*

⁸⁵ See generally Monica Martinez, *The Poor Shouldn't Have to Bear the Cost of Solar Power*, FORBES (June 13, 2014), <https://www.forbes.com/sites/realspin/2014/06/13/the-poor-shouldnt-have-to-bear-the-cost-of-solar-power/#5060ea9ce322>; Dan Way, *Duke Energy: Renewable Power Has Poor Subsidizing Wealthy*, CAROLINA J., (Jan. 9, 2014), <https://www.carolinajournal.com/news-article/duke-energy-renewable-power-has-poor-subsidizing-wealthy/> (outlining this cost shifting argument). *But see* Hernandez, *supra* note 64 (the majority of solar adoption is from low to middle income homes).

While the credibility of the arguments is a constant source of consternation for solar proponents,⁸⁶ they had a significant legislative effect upon net metering policies across the United States. Since 2013, nearly every state with a net metering policy has undertaken a review of their regulations; almost all states modified their approach towards it. With actions ranging from eliminating net metering to maintaining the status quo, the approach that the fifty states took regarding distributed generations is anything but united. Instead, the distributed generation and net metering policies across the fifty states represent a quagmire of diverse political and economic agendas in the form of constantly shifting laws and regulations. The next section of this market exposé will seek to wade

⁸⁶ See *Evaluation of Net Metering in Vermont Conducted Pursuant to Act 125 of 2012*, PUB. SERV. DEP'T, 6–28 (Jan. 15, 2013), <http://www.leg.state.vt.us/reports/2013ExternalReports/285580.pdf> (evaluating from a ratepayer standpoint if customers using net metering systems are subsidized by other customers who do not employ net metering, it was determined that non-solar customers benefit from net metering as the increase in net-metering systems decreases the non-solar ratepayers costs of energy, capacity, and transmission which directly contribute to the overall rate paid); Lindsey Hallock & Rob Sargent, *Shining Rewards The Value of Rooftop Solar Power for Consumers and Society*, THE FRONTIER GRP. (2015), https://environmentamerica.org/sites/environment/files/reports/EA_shiningrewards_print.pdf (reviewing 11 net metering studies that came, individually, to the conclusion that the retail rate at net metering distributed generation is compensated is actually *undervalued* in comparison to the benefits it provides, thereby rebutting the attacks against the parity pricing model); Me. Pub. Util. Comm'n, *Maine Distributed Solar Valuation Study* (Mar. 1, 2015), <https://www.nrcm.org/wpcontent/uploads/2015/03/MPUCValueofSolarReport.pdf> (finding that non-solar ratepayers derive a substantial benefit from distributed generation in that the distributed energy sold saves the non-solar ratepayer in the form of electricity costs by displacing costs normally calculated into energy costs supplied by the utility company including purchasing energy from more expensive power sources, reduced transmission costs on the electric grid system, reduced future investment costs to build more centralized power plants to meet peak demand, and the stabilization of energy prices at peak periods); *Nevada Net Energy Metering Impacts Evaluation*, ENERGY & ENVTL. ECON., INC., 6–7 (July 2014), http://puc.nv.gov/uploadedFiles/pucnv.gov/Content/About/Media_Outreach/Announcements/Announcements/E3%20PUCN%20NEM%20Report%202014.pdf?pdf=Net-Metering-Study (determining that the impact Net Metering policies and distributed generation benefits had from 2004-2016 upon non-solar participants was a \$36 million dollar savings and that after net metering regulation changes in 2016, the cost-shifting towards non-solar participants would be negligible).

through these competing approaches and to bring a sense of understanding for those trying to make educated decisions regarding future investments.

III. SECTION III

(A) *Arkansas*

The Arkansas Renewable Energy Development Act of 2001 made Arkansas one of the early adopters of net metering regulation.⁸⁷ However, by 2017, adoption by net metering customers had not taken off with only 500 net metering customer's in the state.⁸⁸ This undoubtedly is a correlation to the law banning third-party investors from participating in net metering adoption,⁸⁹ which as stated in Section II(B) *supra*, was one of the primary drivers of solar adoption. However, this relatively low adoption did not deter the utility lobby from presenting its arguments to the Arkansas Legislature.⁹⁰ The effect that these arguments had was readily apparent as the Arkansas Public Utilities Commission's working groups on net metering became divided along ideological lines, with one working group advocating a change to the retail parity pricing module and another recommending a continuation of the parity pricing status quo.⁹¹ New legislation soon followed that sent a mixed signal.⁹² In the first instance, legislation in 2017 grandfathered existing retail rates for existing net metering customers statewide.⁹³ However, for new solar installation investors, a new pricing module was established. The new module had four major components. First, the Arkansas Public Utility Commission

⁸⁷ Kyle Massey, *Private solar's future In Arkansas hinges on review*, WASH. TIMES (Oct. 23, 2016), <https://www.washingtontimes.com/news/2016/oct/23/private-solars-future-in-arkansas-hinges-on-review/>.

⁸⁸ *Id.*

⁸⁹ Fran Alexander, Opinion, *Let Arkansas Shine*, ARK. DEMOCRAT GAZETTE (Feb. 19, 2019), <https://www.arkansasonline.com/news/2019/feb/19/fran-alexander-let-arkansas-shine-20190/?opinion>.

⁹⁰ *Id.*

⁹¹ Robert Walton, *Arkansas net metering working group fails to reach consensus*, UTILITY DIVE (Sept. 19, 2017), <https://www.utilitydive.com/news/arkansas-net-metering-working-group-fails-to-reach-consensus/505203/>.

⁹² *Id.*

⁹³ *Id.*

(APUC) adopted aggregate⁹⁴ net metering.⁹⁵ Second, the APUC replaced retail parity pricing with an “avoided cost” pricing system.⁹⁶ Third, Arkansas implemented indefinite carry-over periods for positive net metering.⁹⁷ And fourth, Arkansas implemented a residential net metering cap of 25kW or 100% of the net metering customer’s highest monthly usage in the previous twelve months of residential use, whichever is greater.⁹⁸ Currently, as we stand today, the Arkansas Senate has proposed Bill 145, which seeks to eliminate the ban of third-party solar investments in the state.⁹⁹

(B) *California*

California has unquestionably been the leading state for distributed generation and net metering adoption.¹⁰⁰ California’s first net metering policy followed the Parity Pricing Retail rate model but implemented a distributed generation cap of five percent of total peak electricity demand for its investor owned utilities (IOUs).¹⁰¹ However, utility lobbying in California also had an effect and in 2016, the California Public Utilities Commission approved Decision (D.) 16-01-044, which aimed to continue the net metering structure while also making adjustments to align the costs of new net metering customers with those of non-metering customers.¹⁰² However, with the widespread adoption of solar, California’s IOUs quickly reached their five percent cap by 2015, and California adopted its next-generation program known as Net

⁹⁴ “‘Aggregate net metering’ is a modification to net metering that . . . allow[s] electric customers to offset energy use at all meters or buildings with solar at any meter or building.” John Farrell, *Aggregate Net Metering*, INST. FOR LOC. SELF-RELIANCE (June 5, 2015), <https://ilsr.org/aggregate-net-metering/>.

⁹⁵ *Net-Metering Rules*, Ark. Pub. Serv. Comm’n, 2-1/2 (Sept. 15, 2017), http://www.apscservices.info/Rules/net_metering_rules.pdf.

⁹⁶ *Id.* at 2-2.

⁹⁷ *Id.*

⁹⁸ *Id.* at B-1.

⁹⁹ See Alexander, *supra* note 89.

¹⁰⁰ Sara Matasci, *Explaining Net Metering 2.0 in California*, ENERGYSAGE (Jan. 2, 2019), <https://news.energysage.com/net-metering-2-0-in-california-everything-you-need-to-know/>.

¹⁰¹ *Id.*

¹⁰² Net Energy Rule Making (R.) 14-07-002, Cal. Pub. Util. Comm’n, <http://www.cpuc.ca.gov/General.aspx?id=3934> (accessed on Mar. 09, 2018).

Metering 2.0.¹⁰³ Four features classify this new structure.¹⁰⁴ First, previous net metering systems are grandfathered in at the retail rate for 20 years.¹⁰⁵ Second, new solar installations parity pricing module was replaced with a “Time of Use”¹⁰⁶ compensation rate.¹⁰⁷ Third, utility companies are allowed to charge a one-time interconnection fee to connect new solar panels to the electric grid.¹⁰⁸ And fourth, distributed generation systems would have to pay non-bypassable charges to the utility company for energy bought from the company, which they did not have to previously.¹⁰⁹

(C) *Colorado*

Colorado was another early net metering adopter; although uniquely, net metering resulted from a mandate through a public ballot initiative approved by Colorado voters in 2004.¹¹⁰ Since then it has been a pioneer in offering various new forms of eligibility for net metering systems including aggregate net metering, community solar gardens, and now Solar-Plus-Storage systems.¹¹¹ As of December 2018, the Colorado net metering regulatory landscape looks as follows: first, there is a distributed generation system cap of 120% of a customer’s average annual consumption, allowing for varying system caps based upon a customer’s needs.¹¹² Second, distributed generation customers who become net

¹⁰³ See Matasci, *supra* note 100.

¹⁰⁴ *Id.*

¹⁰⁵ *Id.*

¹⁰⁶ “In a [Time of Use] rate structure, the cost of electricity varies throughout the day based on electricity demand. The highest electricity prices come in the afternoon and evening, when air conditioners are running at top speed and customers are returning home from work. Solar system owners on TOU rates still receive a credit worth the cost of one kWh for every kWh they generate. However, because the rate changes throughout the day, the value of net metering credits is also variable. One kWh of solar electricity sent back to the grid at 10 am, during ‘off peak’ hours, will be worth less than a kWh sent back to the grid in the afternoon and evening ‘peak’ hours.” 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/>.

¹⁰⁷ See Matasci, *supra* note 101.

¹⁰⁸ *Id.*

¹⁰⁹ *Id.*

¹¹⁰ *Colorado Net Metering*, DSIRE, <http://programs.dsireusa.org/system/program/detail/271> (last updated Nov. 30, 2018).

¹¹¹ *Id.*

¹¹² *Id.*

exporters are compensated with monthly carry-over credits at a 1:1 ratio of kW hours produced.¹¹³ After a year, customers can choose to carry over their production indefinitely or receive cash compensation at the utilities average hourly incremental cost of the preceding calendar year.¹¹⁴ Moreover, distributed generation producers are eligible to receive renewable energy credits, which can be sold to public utility companies.¹¹⁵ All in all, Colorado is a pioneer in energy storage, and Governor Hickenlooper declared solar storage as an *energy right* for Colorado's constituents.¹¹⁶

(D) *Connecticut*

In Connecticut, the utility lobby successfully implemented its anti-net metering agenda.¹¹⁷ The state legislature passed one of the most retrogressive net metering policies in the country in 2018.¹¹⁸ First, existing net metering customers are grandfathered in for the next twenty years, and new net metering opportunities are not open to new customers.¹¹⁹ Second, new distributed generation systems are compensated either in a “buy all/sell all” format¹²⁰ or in an excess production over a specified period format.¹²¹ The former mandates that utility companies purchase all energy generated by customers at a wholesale rate, regardless of the amount generated, and then sell all of the energy needed by those same customers back to them at a retail rate, effectively prohibiting customers from utilizing their own generated energy.¹²² The alternative format allows for distributed generators to consume their own power and sell their excess power back to utility companies, but only if that excess is produced during a specified period set by public utility companies.¹²³

¹¹³ *Id.*

¹¹⁴ *Id.*

¹¹⁵ *Id.*

¹¹⁶ Colo. Rev. Stat. § 40-2-130 (2018).

¹¹⁷ Stephen Pelton, *Eliminating net metering was a huge step backward*, CT Mirror (Jan. 17, 2019), <https://ctmirror.org/category/ct-viewpoints/eliminating-net-metering-is-a-huge-step-backward/>.

¹¹⁸ S. B. 9, Conn. Gen. Assemb. (2018).

¹¹⁹ *Id.*

¹²⁰ *Id.*

¹²¹ *Id.*

¹²² See Pelton, *supra* note 117.

¹²³ *Id.*

(E) Hawaii

Hawaii was initially a pioneer in net metering adoption. In 2001, the state implemented its retail rate net metering regulation.¹²⁴ This retail rate, in addition to Hawaii's high energy costs because fossil fuels for energy needed to ship to Hawaii's local power generators, which made Hawaii one of the most expensive states for electricity, created a push for widespread distributed generation adoption. Ultimately, it reached sixteen percent penetration on some islands.¹²⁵ However, Hawaii's regulation is an interesting cautionary tale of what can happen when rapid net metering adoption takes place.¹²⁶ In 2015, Hawaii succumbed to lobbying from IOUs and shut down the net metering program completely. Two interim systems replaced the net metering program. First, in high solar penetration areas, solar customers were able to continue sending energy back to the grid, *without receiving any compensation for their exports*.¹²⁷ In non-high solar penetration areas, distributed generators were compensated for their exports at a wholesale rate, while simultaneously paying a \$25 monthly grid connection cost to the IOU. These interim systems were replaced in 2018 by two new tariffs, which accompanied the adoption of solar-storage systems. Hawaii now has a Customer Grid Supply Plus tariff, which is a first-come-first-serve rate for residential and small commercial systems with a region-specific capacity limit.¹²⁸ This system credits customers at a variable rate by island and with ultimate control of the output from distributed generation systems controlled by utility companies. The other system, the Smart Export tariff, posits excess generation to an on-site battery system during daylight hours with the discharge of that stored electricity to happen during the evening.¹²⁹ Excess electricity exported to the grid in the evening, overnight, and early morning receives a credit,

¹²⁴ Eric Wesoff, *Rooftop Solar in Oahu Crashes with Loss of Net Metering, Lack of Self-Supply Installs*, GREEN TECH MEDIA (Feb. 7, 2017), <https://www.greentechmedia.com/articles/read/rooftop-solar-in-hawaii-crashes-with-loss-of-net-metering-lack-self-supply#gs.IakcyOOA>.

¹²⁵ *Id.*

¹²⁶ *Id.* ("Hawaii has an unprecedented amount of DG PV feeding into [their] isolated island grids . . . There are limits to what today's grids can accommodate . . . Even if surplus power does not feed back into the grid, . . . there are limits as to just how low combustion generators can be ramped down.").

¹²⁷ *Id.*

¹²⁸ *Hawaii Distributed Generation Tariffs*, DSIRE, <http://programs.dsireusa.org/system/program/detail/596> (last updated Nov. 28, 2018).

¹²⁹ *Id.*

again at a variable rate by island.¹³⁰ Furthermore, regardless of the tariff, there is a 100 kW system capacity limit on three of Hawaii's islands and a 50 kW limit on the Fourth of July.¹³¹

(F) *Indiana*

Indiana is another state which has acquiesced to arguments put forth by the utility lobby,¹³² despite the fact that Indiana Power & Light, one of Indiana's IOUs, had only 100 solar generation customers.¹³³ Indiana passed legislation to ultimately phase out net metering from the state.¹³⁴ Currently, Indiana's net metering regulatory climate consists of three regressive policies. First, a grandfather clause for existing net metering customers.¹³⁵ Second, the retail rate credit is replaced with a wholesale-plus-premium credit, effectively replacing the eleven cents per kW charge with a four cents per kWh charge.¹³⁶ Third, a statewide 1.5% peak summer load distributed generation cap is also implemented.¹³⁷

(G) *Florida*

Florida has a mixed history with net metering. It was a late state adopter, only establishing its own net metering regulations in 2008. The regulation initially implemented a parity pricing compensation system, but it simultaneously charged customers both "customer charges" and "demand charges" regardless of whether excess energy is delivered to the utility company.¹³⁸ Other familiar models were present in the 2008 regulations. First, there is a 10 kW residential system cap as well as an IOU system generating cap limited to 115% of the household's monthly

¹³⁰ *Id.*

¹³¹ *Id.*

¹³² See Tabuchi, *supra* note 78, ("[A] group of utility lobbyists descended on the statehouse, handing out talking points that said credits for rooftop solar panels lead to higher rates for everyone else. They were there to support a bill . . . that would roll back Indiana's net metering system by reducing the rate utilities paid to solar consumers for their excess electricity.").

¹³³ Robert Walton, *Indiana Will Phase Out Retail Rate Net Metering*, UTILITY DIVE (May 4, 2017), <https://www.utilitydive.com/news/indiana-will-phase-out-retail-rate-net-metering/441932/>.

¹³⁴ *Id.*

¹³⁵ Burns Ind. Code Ann. § 8-1-40-14

¹³⁶ Burns Ind. Code Ann. § 8-1-40-18; Walton *supra*, note 133.

¹³⁷ Burns Ind. Code Ann. § 8-1-40-10.

¹³⁸ Docket No. 070674-EI; PSC-08-0161-FOF-EI (3) (2008).

kW usage.¹³⁹ Second, excess credits at the end of each annual billing cycle are payment claimable by the distributed generator customer at the Avoided Cost rate.¹⁴⁰ Third, application fees are required, ranging from \$400 to \$1000, for distributed generator systems with a capacity over between 10kW and 2000kW.¹⁴¹ And fourth, there is no state-wide net metering cap.¹⁴² However, Florida has long locked out third-party solar investments, thereby crippling adoption.¹⁴³ This position was recently reversed in 2018, albeit the new legal requirements for third-party participation is far from clear.¹⁴⁴

(H) *Maine*

Maine's net metering regulatory landscape can be described as tumultuous at best. IOU lobbying had a great effect, and in 2017, Maine discarded its net metering laws and adopted the first buy all/sell all pricing system in the United States.¹⁴⁵ To implement this system, Maine adopted a "gross metering" on-site system requirement that required expensive initial investments born by distributed generators so that the Maine government measured net metering production.¹⁴⁶ However, this system proved disastrous, cost ratepayers as much as \$3,300 per installation.¹⁴⁷ over the next year, and has been slowly dismantled.¹⁴⁸ The gross metering requirement was repealed for medium and large size distributed

¹³⁹ *Id.*

¹⁴⁰ *Id.* at (8)e-f.

¹⁴¹ *Id.* at 4(f).

¹⁴² *See generally* Docket No. 070674-EI; PSC-08-0161-FOF-EI (no statewide cap).

¹⁴³ *See* Pyper *supra*, note 36.

¹⁴⁴ *Id.* (Florida's reversal on third-party participation still bans the sale of electricity from third-party providers, thereby forcing companies like Sunrun to alter their power purchase agreements to become a true equipment leasing agreement rather than a contract for energy agreement.)

¹⁴⁵ *Distributed Generation Buy-All Sell-All Program*, ENERGY.GOV, <https://www.energy.gov/savings/distributed-generation-buy-all-sell-all-program> (accessed Mar. 6, 2019).

¹⁴⁶ Christian Roselund, *Maine Regulators Reverse Gross Metering Decision for Mid-sized Large Customers*, PV-Magazine (Dec. 12, 2018), <https://pv-magazine-usa.com/2018/12/12/maine-regulators-reverse-gross-metering-decision-for-mid-sized-large-customers/>.

¹⁴⁷ *Id.*

¹⁴⁸ *Maine PUC Stops Tax on Medium & Large Customers Using Their Own Power*, NAT. RESOURCES COUNCIL OF MAINE (Dec. 12, 2018), <https://www.nrcm.org/maine-environmental-news/maine-puc-stops-tax-medium-large-customers-using-own-solar-power/>.

generators,¹⁴⁹ and the Maine legislature is currently considering a bill to eliminate the gross metering requirement for all system sizes going forward.¹⁵⁰

(I) *Mississippi*

Mississippi's net Metering regulatory landscape has been directly affected by utility lobbying efforts. A late-comer to the solar game, Mississippi's regulatory actions regarding net metering epitomize the conflict between solar advocates and utility companies, despite the fact that Mississippi had little to no net metering projects at that time.¹⁵¹ In 2014, the Mississippi commission released a study that agreed with the solar advocates' position that net metering posed a benefit for Mississippi customers.¹⁵² However, the state's utility regulators deviated from the report's recommendation and instead sought to implement a compromise between solar advocates' compensation request of ten cents per kilowatt-hour generated and utility companies' request of 4 to 4.5 cents per kilowatt-hour generated (the wholesale rate).¹⁵³ Finding a middle ground, Mississippi credited customers at the wholesale electricity rate (the avoided cost rate) plus 2.5 cents per kilowatt-hour, averaging to about 7 to 7.5 cents per kilowatt-hour.¹⁵⁴ Second, Mississippi sought to incentivize low-income adoption by creating an additional two cents per kilowatt-hour for the first 1000 customers (per the two IOUs) that installed distributed

¹⁴⁹ See Roselund, *supra*, note 146.

¹⁵⁰ Betsy Lillian, *Maine Legislature Holding Public Hearing on Bill to Repeal Gross Metering*, SOLAR INDUSTRY (Jan. 29, 2019), <https://solarindustrymag.com/maine-legislature-holding-public-hearing-on-bill-to-repeal-gross-metering/>.

¹⁵¹ Julia Pyper, *Mississippi Regulators Strive for Compromise with New Net Metering Rule*, GREENTECH MEDIA (Dec. 07, 2015), <https://www.greentechmedia.com/articles/read/mississippi-regulators-strive-for-compromise-with-new-net-metering-rule#gs.1196lf>.

¹⁵² See generally Stanton ET AL., *Net Metering in Mississippi Costs, Benefits, and Policy Considerations* 2, 3 (Sept. 19, 2014), <http://www.synapse-energy.com/sites/default/files/Net%20Metering%20in%20Mississippi.pdf>.

¹⁵³ See Pyper, *supra* note 151.

¹⁵⁴ CMSR 39-000-004(II)03-106; Mississippi Public Service Commission Schedule No. 59 (Sept. 18, 2016),

<https://www.mississippipower.com/content/dam/mississippipower/pdfs/business/pricing-and-rates/special-application-rates/RENM.pdf>.

generation projects.¹⁵⁵ Third, the state has a three percent statewide net metering cap and a 20kW residential system cap.¹⁵⁶ What is perhaps most interesting about Mississippi's regulatory field is not the unsurprising fact that it has led to slow adoption of distributed generation customers, but rather that the Public Service Commission is now overdue on its mandated compensation review, which was to happen on or before January 2019.¹⁵⁷ Considering that adoption was slow, one can only query why the rate compensation scheme did not reach an equilibrium in its compromise but rather reached a decision that maintained the status quo for the utility industry.

(J) Nevada

Senate Minority Leader Harry Reid once described Nevada as the "Saudi Arabia of solar energy."¹⁵⁸ For a long time, Nevada held up that high praise as a pioneer in the solar industry. However, in 2014, the Nevada Public Utilities Commission, bowing to pressure from utility companies, adopted a retrogressive net metering pricing model. The model replaced the retail parity pricing structure with a declining model that bottomed out at the wholesale rate of electricity¹⁵⁹ and added an additional three-part rate for distributed generation services including a monthly service charge, a demand charge, and an energy charge.¹⁶⁰ This new model had no grandfather clause and applied retroactively to all 17,000 existing solar customers.¹⁶¹ Under the 2015 regime, solar providers left the state almost instantly, and the solar industry laid off hundreds of individuals from their jobs.¹⁶² However, economics and voter backlash resulted in the

¹⁵⁵ *Id.*

¹⁵⁶ CMSR 39-000-004(II)03-101-02.

¹⁵⁷ *Id.* See Mississippi Public Service Commission Schedule No. 59, *supra* note 133. Without this review, the 2.5 cent compensation buffer became optional for utility companies to pay as of January 3, 2019.

¹⁵⁸ See Dickinson *supra*, note 34.

¹⁵⁹ Julia Pyper, *Nevada Regulators Eliminate Retail Rate Net Metering for New and Existing Solar Customers*, GREENTECH MEDIA (Dec. 23, 2015), <https://www.greentechmedia.com/articles/read/Nevada-Regulators-Eliminate-Retail-Rate-Net-Metering-for-New-and-Existing-S#gs.XRpkIEz>.

¹⁶⁰ *Application of Nevada Power Company: Before the Public Utilities Commission of Nevada*, No. 15-07042 at 55 (Dec. 21, 2015, 8:27 AM), http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2015-7/8305.pdf

¹⁶¹ See Dickinson, *supra* note 34.

¹⁶² Jan Ellen Spiegel, *In Northeast net metering in flux as states look to reform solar policy*, ENERGY NEWS NETWORK (July 17, 2018),

restoration of Nevada's pro-net metering outlook. In 2017, the Public Utilities Commission of Nevada set forth new net metering guidelines. Under the new regime, compensation for excess generation is credited at ninety-five percent of the retail electricity rate.¹⁶³ Furthermore, compensation is paid for the net excess of electricity sent back to the utility on a monthly basis rather than on a kW per hour basis.¹⁶⁴ Under the new net-metering laws, Nevada reestablished itself as a force in the net metering industry. While there were only 287 net metering applications in 2016, under the 2015 regime, there were 3,200 applications the following year after the new net metering legislation was implemented.¹⁶⁵

(K) *New Jersey*

New Jersey has long been at the forefront of the renewable energy adoption, and despite utility-funded campaign efforts, New Jersey stands out among the pack with one of the most progressive renewable portfolio standards in the nation.¹⁶⁶ In seeking to meet New Jersey's advanced 2050 goals, it is unsurprising that net metering became a major focus of the current energy portfolio in the state. In New Jersey, four major features define the net metering agenda. First, distributed generation customers are credited at the full retail rate for their monthly excess generation.¹⁶⁷ Second, distributed generation customers do not have a system capacity size limit on their installations, although the system generation cannot

<https://energynews.us/2018/07/17/northeast/in-northeast-net-metering-in-flux-as-states-look-to-reform-solar-policy/>.

¹⁶³ Julia Pyper, *Nevada PUC Approves Net Metering Rules Expected to Reboot the State's Rooftop Solar Industry*, (Sept. 5, 2017), <https://www.greentechmedia.com/articles/read/nevada-puc-approves-net-metering-rules-expected-to-reboot-the-rooftop-solar#gs.pFNzj1jv>.

¹⁶⁴ *Id.*

¹⁶⁵ John Weaver, *Net Metering Drives Rooftop Solar Resurgence in Nevada*, PV-MAGAZINE (May 7, 2018), <https://pv-magazine-usa.com/2018/05/07/net-metering-in-nevada-once-again-shown-as-solar-power-winner/>.

¹⁶⁶ *See* State of New Jersey Assembly Bill No. 3723 (218th legislature) (signed into law May 23, 2018) (The 2019 Energy Master Plan, adopted by NJ Gov. Phil Murphy, both accepted as a truth that humans are the leading drivers of climate change and mandated a conversion of the State's energy production profile to be 100% clean by 2050).

¹⁶⁷ N.J.A.C. 14:8-4.3(1).

exceed annual electric consumption on-site.¹⁶⁸ Third, monthly credits carry over¹⁶⁹ and the annual excess generation,¹⁷⁰ leftover credits at the end of an annual billing cycle, are paid out to distributed generators at the avoided cost rate i.e. wholesale.¹⁷¹ These three features represent a gold standard for new generation net metering laws. The fourth feature of the New Jersey Model is a state-wide net metering cap with a 2.9% of state annual sales of electricity.¹⁷²

(L) *New York*

New York responded quite uniquely to lobbying from the utility industry. Initially, like most states, New York had a standard retail compensation scheme for distributed generation.¹⁷³ It also had a state net metering cap that started at one percent, was increased to three percent, and then doubled to six percent.¹⁷⁴ However, in 2017, in response to utility concerns, New York transitioned its scheme from the standard net metering model to a compensation model called the Value of Distributed Energy Resource (“VDER”).¹⁷⁵ This new model is arguably the most complex compensation model in the United States, as it accounts for a series of considerations while demanding “fair and accurate compensation

¹⁶⁸ N.J.A.C. 14:8-4.3(a).

¹⁶⁹ N.J.A.C. 14:8-4.3(d).

¹⁷⁰ Note: this is different from annual generation in that the annual system generation cap is measured against a previous 12-month energy supply period. Thus, excess generation can be greater than consumption but still less than the previous annual system generation cap.

¹⁷¹ N.J.A.C. 14:8-4.3(e).

¹⁷² *Id.*; *New Jersey Net Metering*, DSIRE (Nov. 16, 2018), <https://programs.dsireusa.org/system/program/detail/38>. *But see New Jersey Senate Bill 2018-S592*, LEGISSCAN (Jan. 2018), <https://legiscan.com/NJ/text/S592/id/1685055> (proposing to increase New Jersey net metering cap to 5.8%).

¹⁷³ David G. Schieren, *New York Solar Net-Metering is Under Attack*, SUNPOWER (Nov. 10, 2017), <https://www.empower-solar.com/blog/our-response-to-net-metering-changes>.

¹⁷⁴ *New York Net Metering*, ENERGY.GOV, <https://www.energy.gov/savings/net-metering-23> (last accessed Mar. 9, 2019); *New York Net Metering*, DSIRE (Jan. 5, 2019), <https://programs.dsireusa.org/system/program/detail/453>.

¹⁷⁵ Kerry Thoubborn, *VDER: NY’s Replacement to Net Metering*, ENERGYSAGE (Dec. 20, 2018), <https://news.energysage.com/vder-ny-replacement-net-metering/>.

to all market participants.”¹⁷⁶ VDER seeks to do this by “creat[ing] different values for the electric system [used], and impose different costs on the electric system, depending on its individual characteristics and the nature of its use, including when and where the [distributed energy resource] is operated.”¹⁷⁷ The new approach itself attempts to value distributed generation by including value for “reduced energy consumption, energy generation, green energy attributes . . . , capacity, reduced system stress, displacement of the need for traditional grid infrastructure, increased reliability, load shifting, demand response, peak load reduction, voltage support, frequency management and reactive power.”¹⁷⁸ This new system is undoubtedly one of the most in-depth and nuanced compromises between pro-renewable advocates, utility companies, and non-distributed generation customers.

Under the VDER model, net metering installations installed pre-2017 VDER implementation were grandfathered in.¹⁷⁹ Second, two components were implemented in the post-2017 “phase one” period.¹⁸⁰ The pre-existing net metering compensation scheme will cover phase one net metering, including new distributed generation installations between March 9, 2017, and January 1, 2020, albeit with a twenty-year contract cap.¹⁸¹ The second component is the “Value Stack” tariff.¹⁸² This tariff is based on monetary crediting for net hourly injections and will receive compensation for a term of twenty-five years.¹⁸³ It also applies specifically to certain defined system types, namely community distributed generators.¹⁸⁴ Furthermore, the tariff modifies compensation for solar plus

¹⁷⁶ *In re The Value of Distributed Energy Resources*, 2017 N.Y. P.U.C. LEXIS 121, *29 (Mar. 9, 2017).

¹⁷⁷ *Id.* at 30.

¹⁷⁸ *Id.* at 31, 32 (“For any individual DER, [net energy metering] may be over- or-under compensatory as compared to the actual values and costs that resource creates.”).

¹⁷⁹ *New York Net Metering*, *supra* note 174.

¹⁸⁰ *Id.*

¹⁸¹ *In re The Value of Distributed Energy Resources*, *supra* note 176, at 6.

¹⁸² *Id.* at 23–24.

¹⁸³ *Id.*

¹⁸⁴ See John Farrell, *Is New York’s Compromise the Future for Net Metering?*, RENEWABLE ENERGY WORLD (Mar. 7, 2017), <https://www.renewableenergyworld.com/ugc/articles/2017/03/06/is-new-yorks-compromise-the-future-for-net-metering.html>. The new law has all but closed the market to new implementation of community distributed generation projects. *Id.* The new law reduces the required compensation amount from utilities to

storage generators by lowering the compensation when energy is fed back to the grid from a storage site, depending on the size of the generation system.¹⁸⁵ As it stands, New York's regulatory approach to net metering will be a system on which to keep an eye, especially if future legislators seek to make a compromise in net metering policies for all parties affected.

IV. SECTION IV

If any picture can be painted from the survey of the net metering regulatory landscape, it is the disunity of policies across the United States. The constantly shifting landscape produced a hodgepodge of solar adoption rates across the states, spurned both residential and commercial investors in the solar energy field nationwide, produced disparity in legal treatment between early adopters and newcomers, and did little to truly alter the centralized IOU/MU model that dominates energy distribution.

(A) *The Effect on Investors - Uncertainty*

Studies show that net metering is the most utilized state incentive for renewable power nationwide.¹⁸⁶ The shifting landscape regarding net metering poses a risk to both current and future investors in the solar field.¹⁸⁷ With seven years of data to work with since the utility lobby has both successfully and unsuccessfully lobbied to reduce net metering compensation schemes, there is evidence across all fifty states of the risk posed to solar investors.¹⁸⁸ Nevada's 2015 compensation scheme¹⁸⁹ is perhaps one of the starkest examples of the effects a shifting regulatory scheme can have on investors. From the implementation of the scheme in 2015, Nevada lost one-third of all solar jobs in a year and a half period.¹⁹⁰

community but requires that the community projects to still pay full retail to the consumer. *Id.*

¹⁸⁵ *In re The Value of Distributed Energy Resources*, *supra* note 176, at 72–73.

¹⁸⁶ *Net Metering Map*, DSIRE (Oct. 2012), http://www.disreusa.org/documents/summarymaps/net_metering_map.pdf; *Net Metering Map*, DSIRE (Apr. 2019), https://s3.amazonaws.com/ncsolarcen-prod/wp-content/uploads/2019/07/DSIRE_Net_Metering_April2019.pdf.

¹⁸⁷ Dan Gearino, *What Should the Future of Net Metering Look Like?*, INSIDE CLIMATE NEWS (June 11, 2019), <https://insideclimateneews.org/news/11062019/rooftop-solar-net-metering-rates-renewable-energy-homeowners-utility-state-law-changes-map>.

¹⁸⁸ *Id.*

¹⁸⁹ *See supra* (J) Nevada.

¹⁹⁰ *See Spiegel, supra* note 162.

SolarCity and Sunrun, Nevada's two largest solar operations, both announced they were leaving the state soon after the 2015 scheme was introduced.¹⁹¹ However, while risk from an operational standpoint is always associated with regulation, the regulatory posture drastically affects the average consumer, as well. First, from a pure investment standpoint, anti-net metering policies put downward pressure on solar stocks.¹⁹² Sunrun Inc. declined from its \$13.74 per share high on December 18, 2015, to \$5.04 on February 12, 2016, representing a sixty-nine percent drop in share price following Nevada's decision.¹⁹³ Second, and more importantly for the average solar investor, was the Nevada Public Utilities Commission's willingness to apply its 2015 pricing scheme retrogressively to existing solar customers.¹⁹⁴ This drastic move showed one of the greatest potential risks for the average consumer, regarding a shifting regulatory climate. Not only did it negatively affect future investments in the US from residential customers, it also affected investor *expectations* that were based on previous regulatory promises. While this net metering policy shift seems to be the exception and not the rule,¹⁹⁵ the mere possibility of this happening in other states that adopt pro-utility legislation can certainly make future solar adopters skittish about their investment.

Additionally, uncertainty among legislatures and public utility commissions on how to properly value the cost of distributed generation going forward is a hinderance for future solar investments. New York indeed established itself as the leading state considering the greatest

¹⁹¹ Ivan Penn, *SolarCity to Leave Nevada after PUC Cuts Rooftop Solar Benefits*, LA TIMES (Dec. 23, 2015), <https://www.latimes.com/business/la-fi-solarcity-nevada-rooftop-20151223-story.html>; David Roberts, *Nevada's Bizarre Decision to Throttle its Own Solar Industry Explained*, VOX (Jan. 20, 2016), <https://www.vox.com/2016/1/20/10793732/nevada-solar-industry-explained>.

¹⁹² *Attacks on Renewable Energy and Net Metering Policies*, ENERGY & POL'Y INSTITUTE (May 2014), <https://d3n8a8pro7vhm.cloudfront.net/energyandpolicy/pages/99/attachments/original/1400726723/Report-State-Renewable-Energy-Attacks-by-Fossil-Fuel-Front-Groups.pdf?1400726723>.

¹⁹³ See *infra* Appendix C, at 47.

¹⁹⁴ See Dickinson, *supra* note 34.

¹⁹⁵ See *supra* Section IV (showing that all other states discussed maintained a permanent or declining grandfather clause for established residential distribution generation).

variable of metrics regarding the cost of solar.¹⁹⁶ And yet, the New York VDER model has quite created one of the most complex regulatory fields for future investments, also standing out as the exception rather than the rule.

The more standard rule is that states are split among a dichotomy, with net meter rates determined by public utility commissions that favor either solar advocates or the utility industry.¹⁹⁷ And with these rates constantly changing and under review,¹⁹⁸ intense pressure is placed upon solar businesses in creating an effective strategy for solar investments.

(B) Lack of Judicial Resource

The effect around uncertainty in rate changing is only exacerbated when investors realize that there is little recourse to federal judicial review to challenge rates that are either mildly biased towards favoring net metering, or blatantly so. This is because The Johnson Act largely barred federal courts from interfering with state administrative agencies and their subdivisions regarding rate-making decision.¹⁹⁹

Moreover, since the seminal decision in *Federal Power Commission v. Hope Natural Gas Co.*,²⁰⁰ the Supreme Court adopted a level of deference to utility rate pricing by utility regulators and takings clause violations.²⁰¹ In *Hope Natural Gas*, the Court considered a rate order issued by the Federal Power Commission which reduced rates chargeable by the utility company Hope Natural Gas.²⁰² In considering the challenge that the mandated rate did not adequately address the utility company's needs, the Court stated that it "cannot say they are [inadequate], unless we are to substitute our opinions for the expert judgment of the administrators to whom Congress entrusted the decision."²⁰³ To do so otherwise would insert into the congressionally mandated rate charging authority that public utility commissions possess

¹⁹⁶ See *supra*(L)New York.

¹⁹⁷ See *generally supra* Section III.

¹⁹⁸ *Id.*

¹⁹⁹ See 28 U.S.C. § 1342 (2018) ("The district courts shall not enjoin, suspend or restrain the operation of, or compliance with, any order affecting rates chargeable by a public utility and made by a State Administrative agency or a rate-making body of a State political subdivision.").

²⁰⁰ Fed. Power Comm'n v. Hope Nat. Gas Co., 320 U.S. 591 (1944).

²⁰¹ Megan Mclean, *Throwing Shade: The Case Against Judicial Interference with Solar Net Metering Policies*, 46 ENVTL. L. REP. 10873, 10876 (2016).

²⁰² *Id.* (citing *Hope Natural Gas*, 320 U.S. at 615).

²⁰³ *Hope Natural Gas*, 320 U.S. at 615.

a “novel doctrine which has no express statutory sanction.”²⁰⁴ As such, the Supreme Court noted that an agency’s rate order is “the product of expert judgment which carries a presumption of validity,” and “he who would upset the rate order under the Act carries the heavy burden of making a convincing showing that it is invalid because it is unjust and unreasonable in its consequences.”²⁰⁵ This decision largely freed courts from oversight of a public utility commission’s utility pricing mechanisms and shifted judicial oversight to examining the reasonableness of the resulting rate.²⁰⁶ This holding largely extended to state court decisions, as well.²⁰⁷ Ultimately, this jurisprudence now cuts both ways, and it *should*²⁰⁸ largely bar distributed generators from challenging their own compensation schemes under new net metering regulations.

Therefore, going forward, uncertainty in the face of future regulations presents the largest challenge for solar adoption nationwide. Accurately structuring business strategies is immensely complicated and costly when faced with a shifting regulatory landscape. In some cases, a regulatory shift can be so drastic as to result in the immediate winding down of current operations in a state or it causes delays in starting operations in another. This uncertainty is not only limited to net metering regulations, but also to solar-storage regulations,²⁰⁹ and continues to bar

²⁰⁴ *Id.* at 616.

²⁰⁵ *Id.* at 602.

²⁰⁶ *See* Peskoe, *supra* note 33, at 230.

²⁰⁷ *Id.* at 233 (first citing Office of Consumer Counsel v. Dep’t of Pub. Util. Control, 905 A.2d 1, 6 (Conn. 2006) (“In the specialized context of a rate case, the court may not substitute its own balance of the regulatory considerations for that of the agency, and must assure itself that the [department] has given reasoned consideration to the factors expressed in [the statute].”); then citing Iowa-III. Gas & Electric Co. v. Ill. Commerce Comm’n, 19 Ill. 2d 436, 442 (Ill. 1960) (Deference to the Commission is “especially appropriate in the area of fixing rates.”); then citing Farmland Ind., Inc. v. Kan. Corp. Comm’n, 37 P.3d 640, 650 (Kan. App. 2001) (The Kansas Corporation Commission “has broad discretion in making decisions in rate design types of issues.”); then citing Ohio Consumers’ Counsel v. Pub. Util. Comm’n, 926 N.E.2d 261, 266 (Ohio 2010) (upholding SFV natural gas rate design) (“The lack of a governing statute telling the commission how it must design rates vests the commission with broad discretion in this area.”); and then citing Application of Ark. La. Gas Co., 558 P.2d 376, 377 (Okla. 1976) (“The establishment of rates and the apportionment thereof among various groups of customers is a legislative function of the Commission.”)).

²⁰⁸ *But see infra* Section V (A).

²⁰⁹ *See infra* (B) Progressing towards Solar-plus-Storage adoption.

mass solar adoption so long as the uncertainty remains. Thus, the focus going forward needs to be on establishing a semblance of stability in a market that is anything but stable.

V. RECOMMENDATIONS FOR THE SOLAR INDUSTRY GOING

FORWARD

The shift in the net metering regulatory landscape is indeed laudable for most parties concerned. New rate models and net metering compensation schemes are seeking innovative ways to accurately take utility industry, solar, and non-solar customer concerns into account. However, while New York offered the most comprehensive model yet towards this goal, other states continue to balk at supporting distributed generation which is undermining the progress toward adoption of renewable energy rates nationwide. Thus, these states and certain pro-utility net metering laws are the initial focus of this next section.

(A) A Takings Clause Challenge to the Buy All/Sell All

Compensation Scheme

Connecticut, Maine, and Nevada's net metering compensation schemes have presented the greatest threat to both net metering's progress nationwide and to in-state solar investments. First, recall that the buy all/sell all model, enacted in all three states, forces all distributed generators to sell all their electricity to the utility company at the wholesale rate and then buy back what is needed for their energy consumption at the utility retail sales rate. I propose that this net metering scheme be challenged as an illegal taking of a distributed generator's property in violation of the Takings Clause of the United States Constitution.²¹⁰

The Takings Clause of the United States Constitution commands simply, "nor shall private property be taken for public use, without just compensation." The application of this clause to challenging utility rates is no stranger to the field of utility rate pricing, albeit it has almost uniformly been used by utility companies in its history. In fact, in the case of Takings Clause challenges to utility regulation and pricing, the Supreme Court developed a distinct line of jurisprudence.²¹¹ The *Federal Power Commission v. Hope Natural Gas Co.*²¹² decision, discussed *supra*, provided guidance for a Takings Clause challenge in the context of utility

²¹⁰ U.S. CONST. amend. V.

²¹¹ See McLean, *supra* note 201, at 10875.

²¹² Fed. Power Comm'n v. Hope Nat. Gas Co., 320 U.S. 591 (1944).

rate pricing. In *Hope Natural Gas*, the Supreme Court adopted its deferential approach to utility rate pricing by articulating an “end results” test.²¹³ Under this test, the Court made clear that rates that enable a company to operate successfully, maintain its financial integrity, attract capital, and compensate its investors cannot be condemned as invalid.²¹⁴ This created a presumption of validity concerning rate-making that cannot be successfully challenged without convincingly showing that a rate is *unjust or unreasonable*.²¹⁵ The Supreme Court reaffirmed this test in *Duquesne Light Co. v. Barasch* in 1989, which upheld a Pennsylvania law that prohibited consideration of utilities’ stranded costs into the utility rate formulation.²¹⁶ The Supreme Court grounded its decision in the fact of a loss of revenue of \$35 million for Dusquesne Light Company because of its stranded costs, which amounted to two percent of the utility’s base and only reduced the utility’s annual allowance by two-fifths percent and did not “jeopardize the financial integrity of the companies, either by leaving them insufficient operating capital or by impeding their ability to raise future capital... [and it did not show] that these rates are inadequate to compensate current equity holders from the risk associated with their investments under a modified prudent investment scheme.”²¹⁷

This decision laid the ground work for a successful challenge to net metering, for utility companies now know they must put forth an argument that net metering leaves utility companies with stranded costs that do meet the threshold of “jeopardiz[ing] the financial integrity” of the utility companies, which amounts to a constitutional taking.²¹⁸ However, irony has it that *Hope Natural Gas* and *Dusquesne* provide the ammunition needed to overturn a buy all/sell all net metering scheme by a challenge originating from the distributed generator.

As stipulated, a showing must be made that a rate is unjust or unreasonable to be successful. And the Supreme Court impliedly articulated that one way to meet this burden is to show a rate-making jeopardizes the financial integrity of a company or by providing rates inadequate to compensate equity holders. Here, with evidence that emerged out of Nevada and Maine and which can be applied to Connecticut going forward, it is clear that a buy all/sell all program is

²¹³ *Id.*

²¹⁴ See McLean, *supra* note 201, at 10876 (citing 320 U.S. at 605).

²¹⁵ *Id.* (citing 320 U.S. at 615).

²¹⁶ *Id.* at 10877 (citing *Duquesne Light Co. v. Barasch*, 488 U.S. 299, 301 (1989)).

²¹⁷ *Dusquesne Light Co.*, 488 U.S. at 312.

²¹⁸ See McLean, *supra* note 201, at 10877.

indeed unjust and unreasonable when asserted *from the perspective of distributed generators*. The buy all/sell all model in Connecticut seeks to shift net metering compensation that was historically granted at retail rates to the wholesale rate, which the Public Utilities Regulatory Authority will determine. The effect of this in Nevada was clear in that it cannot adequately compensate future solar investments and prevents third-party investors from reaching profitable margins. The fact is, the wholesale rate compensation package cannot give a return to match the initial investment costs made into solar installation, let alone have the investment reach a level of profitability.

Utility companies do have a viable defense in distinguishing that the line of Takings Clause cases under *Hope Natural Gas* and *Dusquesne* applies only to utility monopolies and that new distributed generators cannot rely upon such precedent. However, that leads to the possibility for distributed generator's to make a Takings Clause claim under the traditional land use context. In the land use context, the Supreme Court addressed what constitutes an invalid taking by applying a multi-factored ad hoc balancing test.²¹⁹ In *Pennsylvania Central Transportation*, the Supreme court enumerated three factors to be considers: [1] "the economic impact of the regulation on the claim[.]" [2] "the extent to which a regulation has interfered with distinct investment backed expectations," and [3] "the character of the governmental action."²²⁰ As the test stands today, the economic impact of the regulation needs to "substantially exceed 50%" and be closer to ninety percent of the property diminished.²²¹ The "distinct investment backed expectations" was modified to an interference with a "reasonable investment-backed expectations"²²² and the character of governmental action was clarified to include a regulation that interferes with an existing use of property.²²³ While this test was intended for a traditional land taking, it extended to the taking of personal property as well.²²⁴

Pleading a case under the *Penn. Central* inquiry has merit. First, the buy all/sell all regulation is mandated by the government and is a regulation that distinctly interferes with the use of property. Second, the

²¹⁹ Penn. Cent. Trans. v. New York City, 438 U.S. 104, 124 (1978).

²²⁰ *Id.*

²²¹ See Mclean, *supra* note 201, at 10876 (citing [Mark W. Cordes, *Takings Jurisprudence as Three-Tiered Review*, 20 J. NAT. RESOURCES & ENVTL. L. 1, 39 (2005)]).

²²² *Id.* (citing [Kaiser Aetna v. United States, 444 U.S. 164, 175 (1979)]).

²²³ *Id.* (citing [Christopher Serkin, *Existing Uses and the Limits of Land Use Regulations*, 84 N.Y.U. L. REV. 1222, 1250 (2009)]).

²²⁴ *Horne v. Dep't of Agric.*, 135 S. Ct. 2419, 2426 (2015).

substantial decrease in value of the solar investment must be pled on a case-by-case basis, but with wholesale electricity costs ranging as low as two cents per kilowatt and retail costs raising as high as twenty-six cents per kilowatt, legitimate arguments can be made. Third, in respect to reasonable investment backed expectations, the owner's expectations are measured before the regulation instead of after the regulation, thereby creating an objective fact-based determination based on market rather than individual expectations.²²⁵

Providing evidence for reasonable market expectations should not prove difficult. Solar installations are often sized either to system capacity limit or to a proximate size that expect to offset either a portion or all of energy consumption demand. Additionally, agreements with third-party solar providers, either in the form of lease agreement's or power purchase agreements, share a uniformity across the market, and are based on expectations of power demand based upon a set return cost for providing that power. Furthermore, for future installers considering solar, reasonable market expectations are set. A solar system is expected to pay off its initial investment in anywhere from a ten to twenty-five year period. Regardless of if that solar system produces excess power over personal demand, an objective market expectation of any investor would be that an investor gets first use of the product of his investment. Here the investment is the fixed costs into installation of the solar system, and the product of the labor of this investment is electricity. Just as a farmer of raisins has a reasonable expectation that he can use and dispose of the fruits of his labor,²²⁶ so too should the "farmer" of electricity be able to use and dispose of his own product without governmental interference.²²⁷ As the buy all/sell all

²²⁵ Jonathan Houtan ET AL., *The Basics of a Regulatory Taking Inverse Condemnation Claim*, ALI-CLE COURSE MATERIALS (Jan. 24–26, 2019), <https://www.ali-cle.org/search/courses-webcasts-telephone-ondemand-publications-coursematerials/The%20Basics%20of%20a%20Regulatory%20Taking%20Inverse%20Condemnation%20Claim>.

²²⁶ Cf. *Horne* 135 S. Ct. at 2419–30 (considering whether a requirement that raisin growers set aside a portion of their raisin crop to the government to stabilize the market constituted a taking requiring just compensation, the Court found that it was for title of the raisins were transferred to the government, and therefore lose the entire bundle of property rights in the appropriated raisins i.e. the right to possess, use and dispose of them).

²²⁷ *But see* Mclean, *supra* note 201, at 10878 (arguing that electricity, or the electrons produced, is not a traditional property product such as farming but rather a different category of goods such as oysters which are *fares naturae*,

requirement forces the sale of electricity at a wholesale cost and precludes the distributed generator's personal use of his or her own produced electricity before the sale, it is clear doing so interferes with the reasonable expectations of an investment.

While challenging the buy all/sell all regime is just one small step in the continued push toward renewable energy adoption, it poses significant advantages to the solar industry. The Takings Clause challenge is inherently unique to the specific buy all/sell all regulation and is not transferrable to other forms of net metering regulation. However, it is a weapon in the arsenal which can and should be wielded to challenge a program that is already proven to be the ultimate "death spiral" for the solar industry.

(B) Progressing towards Solar-plus-Storage adoption.

Another character feature of many new net metering laws is the feed in tariff charges that regulators allow utilities to charge net metering customers for connecting to and supplying to the grid.²²⁸ This model is completely dependent on the current premise that the majority of residential solar systems cannot supply 100% of consumption demands. Most of the solar system energy is generated during daylight peak hours when the average generator is away from the household, and most of the energy consumption comes in the hours after work, representing the peak energy rates. Thus, solar system generators generally roll the meter back during the day and then push it forward at night. However, this is largely due to many solar models needing to instantly transfer its electricity generated directly to a source, rather than being able to store it onsite for later use. Theoretically, the correctly installed distributed generator, combined with a storage mechanism, can create houses, or even communities that are 100% independent from the grid, or in the very least, that are never needed to supply energy back to the grid, even though the system may still need to pull from the grid.²²⁹

subject to the absolute control of the state, or dangerous products such as chemicals, which require a permit to sell those products) This argument is flawed. Oysters are *fares naturae* because they arise from nature, unlike electricity which, beyond lightning strikes, is not. As well, electricity generation does not pose the same societal risks associated with selling toxic chemicals and substances, especially when generated on a small scale for personal use.

²²⁸ See Section III *supra* (A) & (G).

²²⁹ See generally David Frankel and Amy Wagner, *Battery Storage: The Next Disruptive Technology in the Power Sector*, MCKINSEY & CO. (June 17, 2019), <https://www.mckinsey.com/business-functions/sustainability/our-insights/battery-storage-the-next-disruptive-technology-in-the-power-sector>.

However, we are not yet at this reality. Where the solar systems improved and proliferated across the last two decades, solar storage systems are not at the same level. Solar storage only recently started realizing its potential as synergies with distributed generation began to emerge.²³⁰ And while the economics are starting to catch up,²³¹ solar-plus-storage laws are far behind. Many states indicated above have altogether prohibited onsite solar storage.²³² However, others such as Colorado are pioneering the legislative framework around solar storage. In 2018, the Colorado Legislature passed SB 18-009. The statute states:

The threat of interruptions in electric supply due to weather, malicious interference, or malfunctions in centralized generation and transmission facilities makes distributed resources, including energy storage systems paired with other distributed resources, an effective way for residents to provide their own reliable and efficient supply of electricity. . . [Therefore] Colorado's consumers of electricity have a right to install, interconnect, and use energy storage systems on their property without the burden of unnecessary restrictions or regulations and without unfair or discriminatory rates or fees.²³³

As one of the most progressive energy storage laws in the country, Colorado's agenda plans for that point when a breakthrough is finally made in commercial on-site energy storage.²³⁴

²³⁰ See Emily Fisher, *Energy Storage for Solar Systems Will be an \$8 Billion Market in 2026*, LUX RES. INC. (Jan. 28, 2016), <http://www.luxresearchinc.com/news-and-events/press-releases/read/energy-storage-solar-systems-will-be-8-billion-market-2026> (coining the term as 'partial grid deflection' and leading consulting firm McKinsey & Co. is betting that this will become the latest disruptor to the energy market).

²³¹ See Frankel & Wagner, *supra* note 229 (“[B]attery-pack costs are down to less than \$230 per kilowatt-hour in 2016, compared with almost \$1,000 per kilowatt-hour in 2010.”).

²³² See Section III *supra* (G)Florida; *see also* states that have mandated a buy all/sell all program thereby indirectly prohibiting on site solar).

²³³ COLO. REV. STAT. ANN. § 40-2-130(1)(a)(II), (1)(b)(II) (West 2018).

²³⁴ See Aundene Szmolyan, *The Age of Abundance: Revelation of Reality, or Revolution of Green?*, ENVIROLINE (Feb. 6, 2018), <http://www.enviroline.ca/news-analysis/news/2018/02/06/the-age-of->

However, recommending that all states adopt a similar energy storage statute would be as successful as asking all states to adopt a uniform set of net metering policies that compensated distributed generation at the retail rate; the same concerns that affect the utility lobby regarding net metering²³⁵ also affect energy storage systems. That is not to say that Colorado's legislation should not be a model for future solar-storage legislation. Undoubtedly it should be, at least if you are a pro solar advocate.

Pro-solar storage regulations can also help offset net metering regulations that shifted away from retail compensation schemes to time-of-use compensation schemes.²³⁶ As recalled from Section IV(B) *supra*, a time-of-use regulation reduces the return on investment because it compensates for solar electricity when demand for energy is at its lowest, and then charges for consumption at the time when the rates are highest, rather than compensating at a set retail parity pricing. The allowance for the installation of solar-storage systems where time of use regulations are in place allows distributed generators to bank their own generation on site during the day in order to be utilized in the evening.

CONCLUSION

The solar industry, much like the utility industry, enjoyed rapid growth due in large part to regulatory policies designed to further implementation. However, the last decade proved challenging for solar as numerous tax incentives and credits are winding down, parity pricing net metering regulation is transforming into new regulatory schemes, and IOUs are pouring millions of dollars into anti solar campaigns. Solar-storage presents the greatest solution for a true, large scale breakthrough of distributed generation in the United States, but that industry too is soon to come under immense pressure. If we seek to truly modernize our electricity consumption and usher in a new paradigm to replace the utility model built by Thomas Edison over 100 years ago, it will take a coordinated effort on behalf of state legislatures across the country to bring a level of certainty to a market that has anything but.

abundance-revelation-of-reality-or-revolution-of-green/ (of all panels at The Economist's 2017 Annual Energy Summit, the singular agreed upon point is that for successful widespread progress towards a green energy future requires a breakthrough in energy storage).

²³⁵ See generally *supra* Section II.

²³⁶ See Section III, *supra* (B).

APPENDIX A

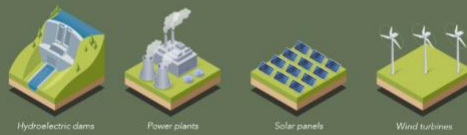
UNDERSTANDING THE GRID

How does electricity get from a power plant to your home? The basic functions of your home or business are powered by energy sources that may be hundreds of miles away. Here's how that energy gets from the source to the electrical outlets in your home or office.



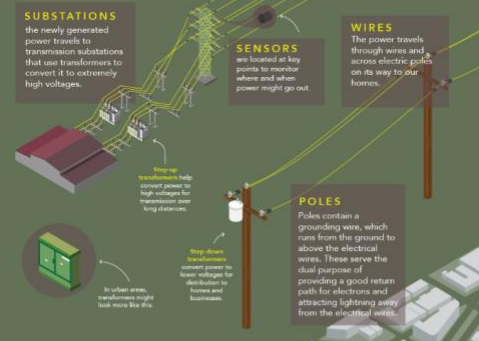
GENERATION

Electricity starts at a generator, which can be powered by burning fossil fuels, collecting wind, solar or water energy, or from nuclear reactions.



TRANSMISSION & DISTRIBUTION

After it's generated, the power needs to travel from the power plant to homes, businesses and other facilities. This process is called transmission.



INTERCONNECTIONS

North America is comprised of two major and three minor alternating current (AC) power grids or "interconnections."

END USE

Once distributed, electricity is used to keep food cold, rooms lit and computers charged.



APPENDIX B

NET ENERGY METERING

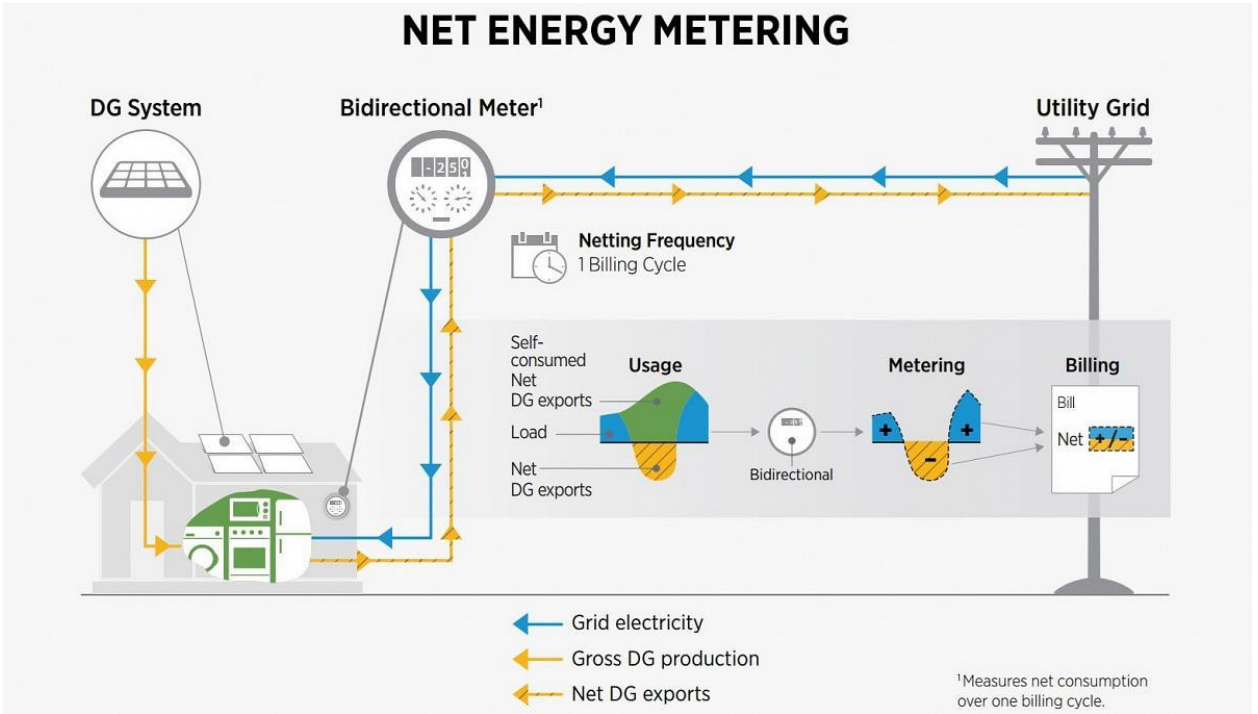


Figure 4. Schematic of Net Energy Metering (Source: NREL, 2017)

APPENDIX C

Sunrun Inc

NASDAQ: RUN · March 12, 2:19 PM EDT

14.85 ▲ 0.010 (0.067%)



