Electric Utilities and Distributed Energy Resources–Opportunities and Challenges

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In recent years, utility ownership of distributed energy resources (DERs)[1] has become a controversial topic. In Arizona and New Hampshire, for example, spirited debates have occurred between third-party developers

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1. PETER KIND, DISRUPTIVE CHALLENGES: FINANCIAL IMPLICATIONS AND STRATEGIC RESPONSES TO A CHANGING RETAIL ELECTRIC BUSINESS (Edison Electric Institute 2013), *available at* http://www.eei.org/ourissues/finance/documents/disruptivechallenges.pdf.

and utilities seeking to participate in the growing DER economy.[2] Supporters of utility-owned DERs have generally argued that there are substantial system-wide benefits associated with utility investments in DERs, and that such investments should be encouraged.[3] Opponents, in contrast, have argued that electric utilities have built-in advantages over private companies and that it would be anti-competitive to allow utilities—and in some instance their corporate affiliates—to compete against private companies in the DER sector.[4]

As discussed below, this debate over utility ownership of DERs is occurring at a time of significant change in the electric utility industry. In the last decade, DER technologies have become more advanced and affordable, and whole industries have developed to provide customers with rooftop solar, microgrids[5] and battery storage.[6] At the same time, U.S. electricity sales have flat-lined, and are not expected to grow by more than one percent per year over the next several decades.[7] Despite these flagging electricity sales, utilities still must make expensive infrastructure investments, to the tune of around $100 billion per year, which is not counting the over $1 trillion in unrecovered investments that utilities have already made in the electrical grid.[8] Thus, according to many utilities, customers that utilize DERs, but still rely on the grid for backup power,

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2. *See, e.g.*, *Solar bill before NH House Panel Has Both Sides Shifting Stances*, NEW HAMPSHIRE UNION LEADER (Mar. 25, 2015) *available at* http://www.unionleader.com/article/20150324/NEWS05/150329553; Davide Savenije, *Who Won the Arizona Solar Show Down*, UTILITYDIVE, Nov. 18, 2013; *available at* http://www.utilitydive.com/news/who-won-the-arizona-solar-showdown/196126/.

3. *See, e.g.*, *Arizona Public Services Company, Application and Response to Commission Injury Decision 74237*, DOCKET NO. E-O1345A-13-0140 (filed Apr. 15, 2014).

4. *See, e.g.*, *L. Bird et al., Regulatory Considerations Associated With The Expanded Adoption of Distributed Solar*, NATIONAL RENEWABLE ENERGY LABORATORY 26–27 (NOV. 2013), *available at* http://www.nrel.gov/docs/fy14osti/60613.pdf.

5. *SolarCity Launches Microgrid Service, Available Worldwide*, SOLARCITY (Mar. 16, 2015) *available at* http://www.solarcity.com/newsroom/press/solarcity-launches-microgrid-service-available-worldwide.

6. *See, e.g.*, *Battery Backup*, SOLARCITY *available at* http://www.solarcity.com/residential/energy-storage; *see also* Gavin Bade, *Tesla's new home battery will have a lease option: report* (Apr. 27, 2015), *available at* http://www.utilitydive.com/news/teslas-new-home-battery-will-have-a-lease-option-report/391173/.

7. *Market Trends Electrticity demand*, ANNUAL ENERGY OUTLOOK 2015, U.S. ENERGY INFO. ADMIN. (Apr. 2015), *available at* http://www.eia.gov/forecasts/aeo/MT_electric.cfm.

8. *See, e.g.*, David Raskin, *Getting Distributed Generation Right: A Response to "Does Disruptive Competition Mean a Death Spiral for Electric Utilities?"*, 35 ENERGY L.J. 263, 266 (2014), *available at* http://www.felj.org/sites/default/files/docs/elj352/14-263-282-Raskin-final-11.1.pdf.

do not pay their fair share of the grid's infrastructure costs[9] and inequitably shift costs to non-DER users.

This Article explores the key business and regulatory issues associated with utility investments in DERs, as well as important considerations for regulators seeking to strike the appropriate balance between DER services provided by third parties and DER services provided by utilities.[10] Part I provides a brief overview of the electric utility industry, and the growth and impact of DERs in recent years. Part II analyzes two emergent distributed technologies—solar photovoltaics (PV) and distributed storage—as well as utility efforts to invest in these technologies. And Part III concludes with a discussion of two different regulatory models for addressing utility-ownership of DERs: the New York Public Service Commission's (New York Commission) Order Adopting the Reforming Energy Vision;[11] and the Arizona Residential Utility Consumer Office's (Consumer Office) Policy Statement on Utility Owned DG.[12]

As described below, the New York Commission has established a regulatory regime that "do[es] not generally favor utility ownership of DER assets[,]" in light of the state's preference for "competitive markets and risk based capital as opposed to ratepayer funding as a source of asset development."[13] Thus, the New York Commission has stated that it will restrict utility ownership of DERs to only a few narrow circumstances. Arizona's Consumer Office in contrast, while not having the decision making authority of the New York Commission, "supports sensible and cost effective utility involvement in [DERs]" and suggests that "the utility can offer a suite of different services that confer system benefits and consumer protections while minimizing rate impacts."[14]

Despite these different approaches to utility-ownership of DERs, however, both the New York Commission and Arizona's Consumer Office concur that, as a general presumption, utility investments in DERs should emphasize

9. Rick Tempchin, *Time to rethink metering rules: cost and fairness*, INTELLIGENTUTILITY (May 29, 2013), http://www.intelligentutility.com/article/13/05/time-rethink-metering-rules-cost-and-fairness.

10. Bird, *supra* note 4.

11. N.Y. PUB. SERV. COMM, ORDER ADOPTING REGUALTORY POLICY FRAMEWORK AND IMPLEMENTATION PLAN: PROCEEDING ON MOTION OF THE COMMISSION IN REGARD TO REFORMING THE ENERGY VISION, CASE 14-M-101 at 69 (Feb. 26, 2014) [hereinafter REV].

12. *Arizona Residential Utility Consumer Office Comments*, Docket No. E-01933A-14-0248 (filed Oct. 17, 2014) [hereinafter RUCO Comments].

13. *Id.*

14. *Id.*

markets not already being served by third parties. Under such a presumption, utilities that seek to compete in established DER markets are thus more likely to encounter regulatory resistance, and have their DER proposals rejected or modified, than utilities offering new DER services associated with undeveloped markets. As utilities look for new business opportunities, therefore, a strategic focus on underutilized DER technologies and business models may be beneficial for utilities.

I. BACKGROUND

The electric utility industry has evolved over time to include several categories of electricity providers with their own incentive structures, financing mechanisms and degrees of regulatory oversight. In the United States, approximately 70 percent of the population obtains their electricity from investor-owned utilities (IOUs), which are shareholder owned companies whose retail and distribution rates are set by state commissions. Under what has been referred to as the "regulatory compact,"[15] IOUs assume an obligation to serve all customers within a designated service area, and are provided an opportunity to earn a regulated return on their investments to serve those customers under "cost of service" regulation.[16] As private companies, IOUs are financed through a combination of shareholder equity and bondholder debt. Thus, IOUs must provide shareholders with a sufficient return on investment to obtain the capital needed to fund expensive infrastructure projects. Many IOUs are part of larger holding companies that have unregulated affiliates or subsidiaries engaged in a variety of competitive, energy-related businesses, in addition to regulated utilities.

In contrast to IOUs, around 30 percent of the U.S. population is served by public power entities, including city- and municipally-owned utilities,

15. Dr. Karl McDermott has described the regulatory compact as an unstated societal agreement whereby "[t]he utility was granted an exclusive service franchise/territory, and in exchange, accepted the responsibility to serve everyone in the territory and submit to price (rate) regulation. The utility was obligated to supply service efficiently, but had the right to recover its costs, including an opportunity to earn a return/profit equal to its market-determined cost of debt and equity capital." MCDERMOTT, KARL, COST OF SERVICE REGULATION IN THE INVESTOR-OWNED ELECTRIC UTILITY INDUSTRY: A HISTORY OF ADAPTATION (2012), *available at* http://www.eei.org/issuesandpolicy/stateregulation/documents/COSR_history_final.pdf.

16. Cost-of-Service Regulation can be defined as "[t]raditional electric utility regulation, under which a utility is allowed to set rates based on the cost of providing service to customers and the right to earn a limited profit." REGULATORY ASSISTANCE PROJECT at 107. Utilities are generally entitled to recover their revenue requirement from customers, which "is the sum of operation and maintenance expenses, depreciation, taxes, and a return on rate base." *Id.* at 117. Rate base is defined as "[t]he total investment used to provide service, including working capital, but net of accumulated depreciation." *Id.* at 115.

and electric cooperatives. City- and municipally-owned utilities are owned by communities and governed by local elected officials or their appointees. Electric cooperatives serve historically underserved areas of the country, and are jointly owned by customers, or member communities. Both municipal utilities and electric cooperatives are not-for-profit entities, and establish their own rates charged to customers.

Through most of the twentieth century, the most economical means of supplying communities with electricity was through large central-station generation plants, which employed "economies of scale" to keep electricity prices low.[17] Over time, utilities thus built larger and larger power plants further and further away from load centers, and transmitted electricity to customers via transmission lines that sometimes extended hundreds of miles.[18]

Moreover, as utility companies developed, most were vertically integrated in that they owned and operated their own generation facilities, transmission systems, and distribution lines. Beginning in the 1990s, however, some states undertook utility restructuring, and required utilities to spinoff or divest their generation assets to separate companies or affiliates for the purpose of introducing competition in the generation section.[19] In states that have undergone restructuring, utilities still maintain a monopoly on distribution services, but are precluded from owning generation assets.

DERs—including, "[g]eneration technologies [that] generate electricity near the particular load they are intended to serve"[20]—are not new. In the 19th and early 20th centuries, most electricity was produced in close proximity to where it was ultimately consumed. Due to the factors cited above, however, the electric industry "gradually converged around gigawatt-scale thermal power plants located far from urban centers."[21] While the vast

17. *See, e.g*., *Survey of The Potential Benefits of Distributed Generation and Rate-Related Issues That May Impede Their Expansion* at 1-1, U.S. DEP'T OF ENERGY (Feb. 2007), *available at* http://www.ferc.gov/legal/fed-sta/exp-study.pdf. The motivation behind establishing "economies of scale" is that "increasingly larger units produc[e] electricity at successively lower unit costs." *Id*.

18. *Id.* at 1–2.

19. For an overview of electric restructuring in states *see* Severin Borenstein & James Bushnell, The U.S. Electricity Industry after 20 Years of Restructuring (Energy Inst. at Haas, Working Paper No. 252), *available at* http://ei.haas.berkeley.edu/pdf/working_papers/WP252.pdf.

20. *Modeling Distributed Generation in the Buildings Sectors*, U.S. ENERGY INFO. ADMIN. 1 (Aug. 29, 2013).

21. *Id.* at 1.

majority of the electricity consumed in the United States still comes from central station power plants, the use of DERs has increased significantly in recent years.[22] The following discussion focuses on two forms of DERs—rooftop solar, and energy storage—and identifies recent efforts by utilities to develop these resources.

A. The Growth of Distributed Generation Technologies

1. Rooftop Solar

According to the Solar Energy Industry Association, since 2006, solar PV installations in the United State have increased an astounding 1,600 percent, experiencing a compound annual growth rate of 76 percent.[23] In 2006, a new rooftop solar installation was completed every eighty minutes, whereas in the first half of 2014 a new rooftop solar installation was completed every three minutes.[24] Additionally, the top 25 companies that utilize rooftop solar in the United States, including companies such as Walmart and Apple, have increased their usage by 103 percent since 2012.[25]

Several factors have driven this prodigious growth. First and foremost are state net-metering laws, which are utilized by 95 percent of rooftop solar installations in the United States.[26] Net-metering generally allows customers with distributed generation (DG) to export their excess electricity back to the grid, and be compensated or credited by utilities at the full retail rate. While the merits of net-metering are hotly contested, and beyond the scope of this article, opponents of net-metering generally argue that net-metered customers rely on the grid for most of their electricity, but pay less for the same amount of grid services than non-net metered

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22. *See Modeling Distributed Generation in the Buildings Sectors*, U.S. ENERGY INFO. ADMIN. (Aug. 29, 2013) *available at* http://www.eia.gov/forecasts/aeo/nems/2013/buildings/.

23. *Solar Investment Tax Credit (ITC)*, SOLAR ENERGY INDUS. ASS'N, http://www.seia.org/policy/finance-tax/solar-investment-tax-credit (last visited Mar. 13, 2015).

24. *Solar Energy Facts: Q3 2014*, SOLAR ENERGY INDUS. ASS'N (2014), *available at* https://www.seia.org/research-resources/solar-industry-data (last updated Dec.17, 2014).

25. *Solar Means Business 2014: Top U.S. Commercial Solar Users*, SOLAR ENERGY INDUS. ASS'N (Oct. 2014), *available at* http://www.seia.org/research-resources/solar-means-business-2014-top-us-commercial-solar-users (last visited Mar. 13, 2015). According to SEIA, the top companies utilizing solar PV consist of Walmart, Kohl's, Costco, Apple, IKEA, Macy's, Johnson & Johnson, Target, McGraw Hill, Staples, Campbell's Soup, U.S. Foods, Bed Bath & Beyond, Kaiser Permanente, Volkswagen, Walgreens, Safeway, FedEx, Intel, L'Oreal, General Motors, Toys "R" Us, Verizon, White Rose Foods, Toyota and AT&T. *Id.*

26. LARRY SHERWOOD, U.S. SOLAR MARKET TRENDS 2013, INTERSTATE RENEWABLE ENERGY COUNCIL, INC. (IREC), at 14 (2014).

customers.[27] Opponents also argue that net-metering laws are anti-competitive because utilities are forced to purchase net-metered power at an artificially high price; utility scale solar, for example, is significantly cheaper than rooftop solar, and still provides many of the same environmental benefits.[28] Advocates of net-metering, in contrast, argue that rooftop solar provides numerous societal benefits, such as providing customers with "green energy" alternatives, control over their electricity consumption, and reduced electricity bills.[29]

Another factor that has driven the growth of rooftop solar is the Business Energy Investment Tax Credit (ITC), which provides tax incentives for several DER technologies, including solar.[30] The ITC allows individuals and companies to claim a 30 percent tax credit for the cost of certain generation technologies that meet certain requirements.[31] After 2016, however, the rate for residential units will be eliminated and the rate for commercial units will decline to 10 percent,[32] which will likely affect the market for rooftop solar, combined heat and power (CHP) and other forms of DERs in the future.

Falling costs of PV technologies have also made rooftop solar more accessible. The average price of a PV panel has dropped by 64 percent since 2010,[33] which is largely due to a proliferation of lower cost solar panels produced in China.[34] Despite such declining costs, however, rooftop solar systems remain prohibitively expensive for many individuals and businesses. In Arizona, a typical residential rooftop solar system can cost

27. *See* Net Metering, *What others are saying*, APS, at 1, http://www.azenergyfuture.com/getmedia/ae141374-ec88-436f-94f7-1dcba72e02eb/What-others-are-saying-net-metering.pdf/

28. DAVID FELDMAN ET AL., PHOTOVOLTAIC SYSTEM PRICING TRENDS: HISTORICAL, RECENT, AND NEAR-TERM PROJECTIONS (2014), U.S. DEP'T OF ENERGY, http://www.nrel.gov/docs/fy14osti/62558.pdf.

29. *See, e.g., Issues and Policies*, *Net Metering*, SOLAR ENERGY INDUS. ASS'N, http://www.seia.org/policy/distributed-solar/net-metering.

30. 26 U.S.C. § 48(a)(3)(A)(i and ii) (2014).

31. *Id.*

32. *Id.*

33. For example, the average installed cost of PV in 2009 was approximately $7.50 per watt, while in $2013 it was $2.89 per watt. *The Case For The Solar Investment Tax Credit (ITC)*, SOLAR ENERGY INDUS. ASS'N, *available at* http://www.seia.org/research-resources/case-solar-investment-tax-credit-itc.

34. DAVID FELDMAN ET AL., PHOTOVOLTAIC SYSTEM PRICING TRENDS: HISTORICAL, RECENT, AND NEAR-TERM PROJECTIONS – 2014 EDITION, *available at* http://www.nrel.gov/docs/fy14osti/62558.pdf.

between $20,000 and $30,000.[35] Companies such as SolarCity have helped expand the market for rooftop solar by offering customers the ability lease solar PV panels for little or no money down in exchange for a long-term commitment to purchase the output of the rooftop unit.[36]

2. *Distributed Storage*

Unlike rooftop solar, distributed storage, including flywheel, battery, and compressed air technologies, has traditionally been too expensive to be widely deployed. But declining technology costs[37] and new federal and state policies could help make electricity storage more commonplace. FERC's Order No. 755, for example, requires that ancillary service providers be compensated based upon their responsiveness to control signals, which benefits owners of fast-ramping storage technologies.[38] Likewise, at the state level, California compensates retail customers for the use of storage through its Self-Generation Incentive Program. This program offers users of certain storage technologies $1.65/Watt, for a maximum of $5 million, or 60 percent of the project's costs.[39] Additionally, as discussed below, California has required its three investor-owned utilities to procure a significant amount of electricity storage—1300 MW—by 2020.[40] This state mandate alone could have a catalytic effect on the electricity storage industry in the United States.

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35. Ryan Randazzo, *Costs of rooftop solar out of reach for many in Arizona*, AZCENTRAL, http://www.azcentral.com/business/consumer/articles/20130726arizona-solar-costs-high.html.

36. Mathias Aarre Maehlum, *Best Solar Lease and PPA – SolarCity, SunRun, Sungevity, SunPower or Real Goods Solar?*, ENERGY INFORMATIVE, *available at* http://energy informative.org/best-solar-lease-ppa-solarcity-sunrun-sungevity-sunpower/.

37. Public reports now forecast a decline in the cost from the current $700–$3,000 per kWh of installed electricity storage in 2014 to less than half of that over the next three years. Some analyst projections and vendor quotes point to even more significant cost reductions, forecasting that the installed costs of battery systems will drop to approximately $350/kWh by 2020. JUDY CHANG ET AL., THE VALUE OF DISTRIBUTED ELECTRICITY STORAGE IN TEXAS: PROPOSED POLICY FOR ENABLING GRID-INTEGRATED STORAGE INVESTMENTS 2 (The Brattle Group 2014), *availabe at* http://www.brattle.com/system/news/pdfs/000/000/749/original/The_Value_of_Distributed_Electricity_Storage_in_Texas.pdf.

38. *Frequency Regulation in the Organized Whole Sale Markets*, 137 F.E.R.C. ¶ 61,064, at 2 (2011).39. SOLAR ENERGY INDUS. ASS'N, *supra* note 23.

39. SOLAR ENERGY INDUS. ASS'N, *supra* note 23.

40. Jeff St. John, *California Passes Huge Grid Energy Store Mandate*, GREENTECH MEDIA, INC. (Oct. 17, 2013), http://www.greentechmedia.com/articles/read/california-passes-huge-grid-energy-storage-mandate.

B. Benefits and Costs

The state and federal policies described above are "premised on the range of societal benefits that [DERs] may provide[.]"[41] While such "benefits" may vary according to the perspective of the stakeholder, commonly cited benefits of DERs include: generation and capacity values, deferred transmission and distribution investments, reduced line losses, fuel cost hedging and environmental and reliability benefits.[42] DER units cost less per project, and have fewer environmental permitting requirements,[43] than large central station power plants. Thus, investments in DERs may help utilities avoid costs they would otherwise incur in building new power plants, or in acquiring energy or capacity from wholesale markets. Additionally, a greater reliance on DERs can produce efficiencies over and above the current grid configuration. For example, around 5 to 8 percent of electricity that flows through transmission lines is lost in the form of heat.[44] DERs reduce these line losses by producing electricity in close proximity to where it is ultimately consumed.[45]

Another potential benefit of DERs is enhanced reliability. As demonstrated during Superstorm Sandy in 2012, buildings with their own CHP units,[46] or campuses with their own microgrids,[47] were able to keep

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41. ANDREW SATCHWELL ET AL., FINANCIAL IMPACTS OF NET-METERED PV ON UTILITIES AND RATEPAYERS: A SCOPING STUDY OF TWO PROTOTYPICAL U.S. UTILITIES 1 (2014).

42. *See* ELECTRICITY INNOVATION LAB ROCKY MOUNTAIN INSTITUTE, A REVIEW OF SOLAR PV BENEFIT & COST STUDIES 31 (2d ed. 2013) [hereinafter ROCKY MOUNTAIN INSTITUTE]. Depending on your perspective, DERs may not provide benefits at all. *i.e*., "efficient energy storage combined with distributed generation could create the ultimate risk to grid viability." PETER KIND, DISRUPTIVE CHALLENGES: FINANCIAL IMPLICATIONS AND STRATEGIC RESPONSES TO A CHANGING RETAIL BUSINESS 3 (Edison Electric Inst. 2013).

43. TODD FOLEY ET AL., AMERICA'S POWER PLAN: FINANCE POLICY: REMOVING INVESTMENT BARRIERS AND MANAGING RISK 16, *available at* http://americaspowerplan.com/wp-content/uploads/2013/09/APP-FINANCE.pdf.

44. *The Potential Benefits of Distributed Generation and Rate-Related Issues that may Impede Their Expansion: A Study Pursuant to Section 1817 of the Energy Policy Act of 2005*, U.S. DEP'T OF ENERGY 3–18 (2007) [hereinafter U.S. DEP'T OF ENERGY].

45. For example, according to the Federal Energy Regulatory Commission, approximately 5 to 8 percent of electricity was lost between power plants and final consumption in the U.S. from 1993 to 2007.

46. U.S. DEP'T OF ENERGY, *supra* note 45.

47. Princeton University, which has its own microgrid, was able to switch its microgrid to "island mode," and insulate key campus buildings from blackouts that affected much of New Jersey. *See* Morgan Kelly, *Two years after Hurricane Sandy, recognition of Princeton's microgrid still surges*, NEWS AT PRINCETON (Oct. 23, 2014), *available at* https://www.princeton.edu/main/news/archive/S41/40/10C78/index.xml?section=featured.

electricity flowing despite blackouts in the surrounding areas. Likewise, rooftop solar, while an intermittent resource, was also able to provide needed electricity in the weeks after the storm when the main transmission grid was down and fuel for backup generators could not be resupplied.[48]

Additional benefits of DERs can include deferred distribution and transmission system upgrades,[49] and environmental benefits from emission free solar PV and high efficiency CHP. In certain states, these "green" DER technologies may contribute to state renewable portfolio and energy efficiency requirements, and provide owners with additional revenue through Renewable or Energy Efficiency Credits.

Despite such benefits, however, DERs present a variety of challenges to the electricity system. A very high penetration of DERs, such as rooftop solar, could disrupt distribution circuits unless certain controls are utilized.[50] Additionally, customer-sited DERs may erode utility revenues due to fewer retail sales, deferred capital investments, and operational and siting challenges.[51] The Lawrence Berkeley National Laboratory, for example, has found that if rooftop solar penetration reaches 2.5 percent (it is currently 0.2% nationally) shareholder earnings for some utilities could fall by 4 percent.[52] Additionally, if rooftop solar penetration were to reach 10 percent—a typical utility in the Southwest could see its earnings drop between 5 and 13 percent, and a typical utility in the Northeast could see earnings decline between 6 and 41 percent.[53] Over time, such lost revenue could have larger ramifications such as by impacting shareholder returns, raising a utility's' cost of capital, and potentially requiring rate-increases to fund infrastructure investments.

Thus, although DERs can offer significant benefits to society, customer sited-DERs also impose costs on utilities. It is not surprising, therefore, that utilities have begun exploring new business models to capitalize on

48. *See* ROCKY MOUNTAIN INSTITUTE, *supra* note 43, at 7, 8; Stephen Lacey, *Amidst a Surge in Extreme Weather Distributed Energy Takes on New Meaning for the US Grid*, GREENTECH MEDIA, *available at* https://www.greentechmedia.com/articles/featured/after-superstorm-sandy-states-look-to-distributed-energy-and-microgrids.

49. As discussed *infra* the Long Island Power Authority is paying developers to install rooftop solar facilities in some small Long Island communities, which have a growing need for electricity, but lack the infrastructure to meet that demand. This initiative is expected to save the utility $80 million that would otherwise be spent building new transmission lines and grid. *See* Maria Gallucci, *Why Are Some Big Utilities Embracing Small-Scale Solar Power?*, INSIDE CLIMATE NEWS (Sept. 12, 2013), *available at* http://insideclimatenews.org/news/20130912/why-are-some-big-utilities-embracing-small-scale-solar-power.

50. *See e.g*. HAWAII PUB. UTIL. COMM'N, Case 2011-0206, Proceeding to Investigate the Implementation of Reliability Standards, Order 32053, at 35.

51. *See* ROCKY MOUNTAIN INSTITUTE, *supra* note 42, at 7, 8.

52. SATCHWELL, *supra* note 41.

53. *Id.* at 32.

an expanding market for DER services. These efforts have taken the form of both investments by regulated utilities, which are subject to oversight by state commission, and by utility affiliates, which are walled off from the regulated utility and function like private companies. Where the regulated utility develops DER "notable benefits to the utility include the ability to put [DER] assets in the utility rate base and to strategically locate [DERs] on the grid to obtain optimal value and efficiency for the overall electrical system."[54] State utility commissions must approve these investments, and ratepayers would assume some of the risk of these ventures.[55] Where the unregulated affiliate invests in DERs, both the risk and reward of the venture would generally be allocated to the company's shareholders.

II. UTILITY INVESTMENTS IN DERS

Both regulated utilities and unregulated utility affiliates have proposed a number of DER programs in recent years.[56] And while utilities have shown the most interest in rooftop solar, one can imagine a multitude of DER services provided by utilities. However, utility investments in DERs are not without their risks. As discussed below, Southern California Edison (SCE), which was one of the first regulated utilities to propose and implement its own rooftop solar program, ultimately suspended its rooftop solar program prior to completion. At least part of the reason why SCE suspended its rooftop solar program was because of the regulatory restrictions imposed by the California Public Utilities Commission. SCE's experience, thus, may inform other utilities regarding the conditions under which utilities can effectively "compete directly on a regulated basis for behind-the-meter energy services in their franchise service areas[,]"[57] as some commentators have advocated.

54. Bird, *supra* note 4, at 25.

55. SATCHWELL, *supra* note 41, at 56.

56. Arizona Public Services, a regulated utility in Arizona, has been authorized to develop 8 MW of solar PV systems on 1,500 rooftops within its service territory, the costs for which will be determined in a future rate case, in addition to another *See* ARIZ. CORP. COMM'N, Decision No. 74878 (Dec. 23, 2014); Duke Energy Renewables, an unregulated subsidiary of the nation's largest electric utility, has developed 10 MW of commercial rooftop solar facilities across 25 sites in North Carolina. *See North Carolina Solar Distributed Generation*, DUKE ENERGY, *available at* http://www.duke-energy.com/north-carolina/renewable-energy/nc-solar-distributed-generation-program.asp.

57. *See, e.g.*, John Slocum, *Threat From Behind the Meter,* PUB. UTIL. FORTNIGHTLY (July 2013), http://www.ceadvisors.com/publications/reportsandpublications/Public%20Utilities%20Fortnightly_Threat%20from%20Behind%20the%20Meter_Slocum.pdf.

A. Utility Investments in Rooftop Solar

In 2008, SCE—motivated by California's ambitious renewable portfolio standard[58]—requested permission from the California PUC to build 250 MW of primarily rooftop solar installations within its service territory, and recover the cost in rates.[59] Each of the proposed rooftop solar installations would be between 1 and 2 MW, and would be located on buildings that do not typically employ net-metering, such as warehouses.[60] At the time of its proposal, SCE had not selected the specific sites in question, but would do so according to several rubrics, including sun exposure, and the structural integrity of the buildings.[61]

SCE's proposed price tag for the program was $875 million, which averaged out to $3.50 per watt.[62] This price-point was around half the average cost of installed solar PV capacity in the state.[63] According to SCE, it could deliver on this low cost "through economies of scale and improvements in technology and efficiency."[64] Specifically, SCE suggested that it could ". . . obtain volume discounts for its proposed base case investment of $875 million," and could "utilize its established electric supply relationships with potential vendors and commercial building lessors who are also its customers."[65] SCE argued that it could produce electricity more cost effectively than private competitors because of economies of scale, pre-existing customer relationships, and other attributes commonly associated with utilities.[66]

The California PUC approved SCE's request to develop 250 MW of Utility Owned Generation (UOG) over five years and required that 90 percent of systems to be located on commercial rooftops and 10 percent to be ground-mounted.[67] Importantly, the California PUC also required SCE to double the program's size, and to solicit competitive bids from independent developers (IPPs) for an additional 250 MW of rooftop solar,

58. *See* Cal. Pub. Util. Code § 399.15(b)(1).

59. *Application of Southern California Edison Company (U338-E) for Authority to Implement and Recover in Rates the Cost of its Proposed Solar Photovoltaic (PV) Program*, Docket No. A.08-03-015 (filed Mar. 27, 2008) (2008 Application).

60. *Id.* at 3.

61. *Id.* at 11.

62. *Id.* at 13.

63. *Id.*

64. *Id.*

65. *Id.*

66. *Id.*

67. *Decision Addressing a Solar Photovoltaic Program For Southern California Edison Company*, Docket No. A.08-03-015 (June 22, 2009).

which would also be developed within SCE's service territory.[68] The costs of the UOG portion of the program were subject to cost-of-service ratemaking, and would be capped at the proffered $3.50 per watt, plus a 10 percent contingency.[69] Any costs in excess of this amount would undergo a reasonableness review.[70]

After only two years of administering the program, however, SCE requested permission to scale back its program. In February 2011, SCE filed its first Petition for Modification, and requested permission to downsize the program by half,[71] and obtain the remainder through California's new Renewable Auction Mechanism.[72] SCE also sought to increase the ground-mounted percentage of the program from 10 percent to 20 percent. As justification for these changes, SCE cited the economic downturn of 2008, a lack of new commercial and industrial rooftop space, and competition between the IPP and UOG portions of the program for available rooftop locations.[73] SCE also argued that these reductions would result in savings to ratepayers of $300 million. The California PUC agreed and modified the program as requested.[74]

In May 2012, just two months after the California PUC granted this request, SCE requested an additional reduction in the UOG portion of the program—this time from 125 MW to 110 MW.[75] While SCE's second request was denied on procedural grounds, in July 2012 SCE filed a third and final request to modify the program—from 125 MW to 91 MW. According to SCE "continuing circumstances have made it difficult and

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68. *Id.* at 1. According to the California PUC, the comparison of UOG and IPP projects would provide "important information about the costs and benefits of each form of renewable facility ownership, including both the sharing of risks between various stakeholders and the ultimate effect on ratepayers." *Id*. at 58.

69. *Id.* at 58.

70. *Decisions Partially Granting Southern California Edison Company's Petition for Modification of Decision 09-06-049 (SPVP) and Making Conforming Changes to Decision 10-12-049 (RAM)*, at 15 (Feb. 23, 2012).

71. *Southern California Edison Company's (U 338-E) Petition for Modification of Decision 09-06-049* (filed Feb. 11, 2011).

72. Under the Renewable Auction Mechanism, utilities can acquire the output of independent renewable generation projects, which are between 3 MW and 20 MW, which are located on the utility side of the meter, and can be sited anywhere within the footprint of the California Independent System Operator. *See* http://www.cpuc.ca.gov/PUC/energy/Renewables/hot/Renewable+Auction+Mechanism.htm.

73. *See supra* note 60, at 8.

74. *Id.* at 11.

75. Advice Letter 2724-E, Pub. Utilities Comm'n, to Akbar Jazayeri, VP of Regulatory Operations, S. Cal. Edison Co., at 1-2 (filed May 1, 2012).

less economical to build []PV projects . . ."[76] Specifically, SCE inferred that it could not cost effectively develop its proposed projects as a result of "overloaded or constrained circuits . . . building roof conditions. . . difficulties in obtaining building tenant or landlord construction approval, . . . inability to obtain a suitable building permit to construct the solar facility, interconnection applications that require[d] unanticipated upgrades which cause excessive costs and lengthy interconnection construction schedules, and the economics of smaller sized roofs that are not viable under the cost requirements of [the PUC authorization].[77]

A few lessons may be drawn from SCE's experience with its rooftop solar program. First, the regulatory constraints placed on the SCE program likely had a significantly negative affect on SCE's ability to develop rooftop solar units cost effectively. From the outset, the California PUC required SCE to fund an equal number of private projects, and compete against those private projects for finite rooftop space. Moreover, the costs of SCE's solar projects were capped at around half the average cost of rooftop solar capacity in the state at the time (although SCE, not the California PUC, originally proposed these cost parameters). Second, although SCE was attempting to develop a new market for very large rooftop solar arrays, in 2008, California already had the most robust private market for distributed solar in the United States.[78] Building owners thus had several options when choosing rooftop solar developers. Thus, having to compete for finite locations at an administratively determined price point likely hindered SCE's rooftop solar program, whereas private developers, without these limitations, and with the benefit of net-metering, continue to flourish in California.

B. Utility Ownership of Energy Storage

Unlike rooftop solar, there is not a robust private market for distributed storage. This is because the price of distributed storage has historically been too high to attract significant investment.[79] Additionally, electricity storage is subject to some regulatory uncertainty because it has "characteristics that sometimes bring value to generation and other times to transmission or

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76. Advice Letter 2724-E/E-A, Pub. Utilities Comm'n, to Akbar Jazayeri, VP of Regulatory Operations, S. Cal. Edison Co., at 1–2 (Nov. 14, 2012), *available at* http://www.cpuc.ca.gov/PUC/energy/Renewables/hot/Renewable+Auction+Mechanism.htm.

77. Petition for Modification of Decision 12-02-035, (July 27, 2012), at 7.

78. Susan V. Lee, *Alternatives*, CAL. PUB. UTIL. COMM'N (Oct. 2009), http://docs.cpuc.ca.gov/PUBLISHED/NEWS_RELEASE/96627.htm.

79. *See* CHANG, *supra* note 37, at 1.

distribution."[80] Despite these issues, storage offers significant benefits to users, prompting utilities, states and private developers to take steps to increase the use of distributed storage.

In 2010, California signed into law Assembly Bill No. 2514, which directed the California PUC to determine whether to impose electricity storage targets on the investor-owned utilities in the state.[81] After considering the issue, in 2013 the California PUC issued an order directing the state's three investor-owned utilities to procure over 1300 MW of distributed storage by 2020.[82] Under the order, the utilities would be allowed to use distributed storage for various purposes including capacity, ancillary services, and peak shaving. Moreover, the utilities will be able to recover the costs of their procurements in rates based on the service a specific storage project is designed to perform.[83] As with SCE's rooftop solar program, however, the California PUC found that utilities may own no more than half of all of the storage projects that would count towards their targets[84] and must procure the remainder from third party developers. The California PUC also held that the storage systems owned by the utilities could either be interconnected to the transmission grid, or located behind the customer's meter.[85]

While it is too soon to tell how California's ambitious storage programs will fare, it is arguable that California's investor-owned utilities will not encounter the same obstacles that SCE faced with its rooftop solar program. This is because, unlike SCE's rooftop solar program, the California utilities will not be required to develop and operate storage projects for substantially

80. Kaun, B., S. Chen, *Cost-Effectiveness of Energy Storage in California: Application of the EPRI Energy Storage Valuation Tool to Inform the California Public Utility Commission,* at 2–1, Proceeding R. 10-12-007, ELECTRIC POWER RES. INST. (June 2013), *available at* http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=0000000030 02001162.

81. *2014 Storage Plan Assessment Recommendations for the U.S. Department of Energy*, ELECTRIC ADVISORY COMM. (Sept. 2014), *available at* http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200920100AB2514 .

82. *Order Instituting Rulemaking pursuant to Assembly Bill 2514 to Consider the Adoption of Procurement Targets for Viable and Cost-Effective Energy Storage Systems*, Decision 13-10-040 (issued Oct. 17, 2013).

83. *Application of SAN DIEGO GAS & ELECTRIC COMPANY (U902M) for Approval of its Energy Storage Procurement Framework and Program As Required by Decision 13-10-040*, at 40 Decision 14-10-045 (Oct. 16, 2014).

84. *Id.* at 52.

85. *Id.* at 59. Specifically, the California PUC stated that "there may be beneficial applications of utility-owned or utility-contracted storage projects behind the meter. Therefore, we will not preclude utility ownership or contracts of customer-side storage."

less than the going market rate, as was required of SCE in the context of its solar program. Additionally, the market for distributed storage is much less mature than it is for rooftop solar,[86] and California utilities are unlikely to face substantial competition in providing distributed storage to customers. Finally, storage does not depend upon specific siting conditions to be effective, and can be located nearly anywhere as the case may require.

Although not addressed by the California PUC, it may also be the case that the particular attributes of distributed storage actually lend themselves to utility investments in a way solar technologies do not. According to Oncor, Inc., for example, a distribution utility in Texas, utility investments in storage may actually be *necessary* to unlocking the broad societal benefits of storage technologies.

As detailed in a November 2014 report,[87] Oncor analyzed the conditions under which energy storage could be cost-effectively deployed in Texas.[88] After evaluating the benefits to merchant developers, society-at-large, and rate-paying customers,[89] Oncor concluded that if the installed cost of battery storage drops to approximately $350 per kilowatt-hour, which it is anticipated to do by 2020, "up to 5,000 MW . . . of grid interconnected, distributed electricity storage would be cost effective from a . . . system-wide societal perspective."[90] This amount of storage would cost roughly $5.2 billion. But, as a result of the investment, the grid in Texas would be less congested, it would require fewer upgrades, and rate-paying customers would see their electricity bills go down slightly.[91] Additionally, rate-paying customers would "obtain additional reliability benefits in the form of reduced power outages."[92]

According to Oncor, however, such a significant investment in storage is unlikely to be made under current regulatory and market conditions.[93] Merchant developers are unlikely to make investments at this scale, because the costs of storage cannot be recouped through the wholesale energy

86. As reported by the U.S. Department of Energy, there are only around 20 third-party owned distributed storage projects, which are currently operational in California. *See* http://www.energystorageexchange.org/ (last visited Apr.16, 2015).

87. *See* CHANG, *supra* note 37.

88. *Id.* at 2.

89. *Id* at 5. According to the Oncor Report, merchant values include the profits a private investor could capture in wholesale power markets, which are driven by energy arbitrage values and ancillary services prices. Societal benefits include: 1) avoided distribution outages; 2) deferred transmission and distribution investments; 3) production cost savings; and 3) avoided generation investments. Customer benefits include the societal benefits, in addition to power purchase cost savings, and customer bill offsets.

90. *Id.* at 2.

91. *Id.*

92. *Id.*

93. *Id.* at 17.

markets alone.[94] Likewise, utilities are unlikely to make such significant investments in storage because the same benefits can be obtained more cheaply through other technologies. Additionally, Texas has a de-regulated retail electricity market,[95] which may preclude utilities in Texas from owning electricity storage as a matter of law.

To overcome these obstacles, Oncor has recommended regulatory changes to allow utilities to own and operate electric storage on the distribution system, and then auction the excess storage capacity to market participants through arms-length transactions. These market participants could then "schedule the charging and discharging of the storage devices to maximize revenue on the wholesale markets."[96] Proceeds from the auction would be used to reduce costs to ratepayers. According to Oncor, this scenario would overcome "the barriers created by fragmented value streams that will otherwise lead to under-investment in electric energy storage[,]"[97] while also respecting the barrier between regulated utilities and market activity.

The Oncor proposal is likely to generate important questions regarding the classification of energy storage under law, and whether the benefits of storage justify the significant expenditures recommended by Oncor. However, Oncor's proposal is significant because it presents a credible means for allocating the diffused benefits of energy storage to the actors most willing to pay for them. Additionally, the proposal demonstrates how the involvement of utilities *and* private developers can help realize the full benefits of distributed storage. Although California has not implemented a similar plan, adopting elements of Oncor's proposal could help ensure the California's storage program is deployed as cost effectively as possible, and could be a model for other utilities and states in the future.

III. REGULATORY CONSIDERATIONS

As demonstrated by SCE's experience with its rooftop solar program, utility investments in DERs may not always be cost-effective, which may be due to both regulatory constraints and competition from private developers. In contrast, with regard to California's storage mandate and Oncor's storage proposal, utility investments may be an important, or even

94. *Id*.
95. Tex. S.B. 7 (Jan. 1, 2002).
96. *Id.* at 18.
97. *Id.*

an indispensable, factor in unleashing the societal benefits of particular DER technologies.

Two states, New York and Arizona, are developing distinct regulatory regimes governing utility ownership of DERs. In New York, with the Reforming Energy Vision initiative, the New York Commission is attempting to create distribution-level energy markets that rely heavily on DERs, but prohibit utilities from owning or investing in DERs in most circumstances.[98] In contrast, Arizona's Consumer Office encourages utility ownership of DERs "as long as a balanced, level playing field is established."[99]

These two contrasting visions for utility investment in DERs will likely result in their own unique opportunities and challenges. However, both the New York and Arizona models contain a presumption that where utility investments in DERs are authorized, they should primarily focus on areas not being addressed by private markets. This presumption was perhaps also evident in the California PUC treatment of SCE, when it required SCE to fund an equal number of independent rooftop projects. As utilities consider what role they may play in the expanding DER economy, investing in new markets and technologies may thus be more favorably received by regulators, and thus provide greater investment opportunities, than efforts to compete in established DER markets.

A. New York's Reforming Energy Vision

In the Reforming Energy Vision proceeding, the New York Commission evaluated the costs and benefits of utility investments in DERs, by both regulated utilities and their unregulated affiliates, and concluded that "with a few exceptions . . . DER will remain a non-utility service provided by the competitive market."[100] With regard to regulated utility investments in DERs, the New York Commission observed that such utilities may have opportunities to exercise market power by, for example, using non-public information to secure prime DER locations on the distribution grid, or slow-walking interconnection requests from competitors.[101] The New York Commission determined it could likely mitigate these market power concerns,[102] but concluded nonetheless that "even the potential for utility ownership risks discouraging potential investment from competitive

98. REV at 48 & 67.

99. RUCO Comments, *supra* note 12, at 1.

100. REV at 52.

101. *See* REV at 69; *see* The Alliance for Solar Choice, Motion to Dismiss, Docket No. E-01345A-13-0140 at 10 (filed Aug. 15, 2014).

102. These include, that utilities that own DERs will be restricted to recovery of their actual costs, and REV market will not deploy bid based auctions but will rely on the use of tariffs. REV at 66–67.

providers" and that "[m]arkets will thrive best where there is both the perception and the reality of a level playing field and that is best accomplished by restricting the ability of utilities to participate" in DER markets.[103]

With this general presumption in mind, however, the New York Commission, found that utility ownership of DERs should be authorized where "markets have had an opportunity to provide a [DER] service but have failed to do so in a cost effective manner."[104] Specifically, the New York Commission stated that "[t]here will be circumstances where the utility identifies a resource need for new transmission or a distribution plant that could be met by greater penetration of DER."[105] Where there is not effective third party proposals to meet the need as part of a competitive process, "the utility can present to the [New York] Commission an alternative that will support some level of utility investment[,]" and will be paid for on a regulated basis by rate payers.[106]

The New York Commission was more permissive with regard to utility affiliates, finding that affiliate investments outside of a utility's service territory should generally be allowed because they don't present market power concerns.[107] Moreover, restricting these investments "would limit the choices available to customers and might have the effect of dampening customer engagement in DERs."[108] However, affiliate investments within a utility's service territory present risk of discriminatory treatment.[109] Thus, where affiliates compete for projects within a utility's service territory, a third party will need to determine winners in competitive solicitations, or report directly to the New York Commission where that is not possible.[110] Codes of conduct will also need to be in place to mitigate market power

103. *Id*. at 67.
104. *Id*. at 70. The other instances where utilities would be authorized to invest in DERs include where a project consists of energy storage integrated into the distribution system in order to "support greater penetration of intermittent renewable resources without compromising system reliability[,]" a project will enable low or moderate income customers to benefit from DERs, and markets are not likely to satisfy the need" or where a project is being sponsored for demonstration purposes. *Id.*
105. *Id.* at 68.
106. *Id.*
107. *Id*. at 71.
108. *Id.*
109. *Id.*
110. *Id*.

concerns,[111] and caps on utility-affiliate market share may be considered in the future.

B. Arizona's Policy Statement on Utility Owned DERs

In contrast to New York's Reforming Energy Vision initiative, the Arizona Consumer Office argues that utility DER investments will benefit consumers, so long as a level playing field can be established.[112] Specifically, in its Policy Statement on Utility Owned DG, the Arizona Consumer Office states that "[w]ith geo-targeting, capacity value improving orientations, and advanced inverters, the utility is in a unique position to maximize the value of [DER] resources to the grid."[113] Thus, in order to realize these benefits, the Arizona Consumer Office has sought to develop a holistic policy framework to accommodate DER investments from both utilities and third parties. Under this framework, which is based on seven guiding principles,[114] "[t]he utility should not be completely immune from market forces while having a 'blank check' to install [DER] systems" and likewise, "third party developers should not be overly compensated through generous rate design while having no responsibility [for] grid management concerns."[115]

One principle governing this proposed regulatory design is for "utilit[ies to] focus on serving markets not optimally suited to third party developers."[116] This presumption would not preclude utilities from investing in rooftop solar, for example, which is a prevalent DER technology in Arizona.[117]

111. *Id.* One model for such a code of conduct is the FERC's "Standards of Conduct," which generally requires that a utility's transmission function and marketing function employees operate independently of each other. Also the Standards of Conduct prohibit passing transmission function information to marketing function employees, and imposes posting requirements to help detect any instances of undue preference. *See* 18 C.F.R. pt. 358 (2014).

112. RUCO Comments, *supra* note 12, at 11.

113. *Id.* at 5.

114. These seven principles are: 1) lowest cost program design for utility owned DG that does not cost more to ratepayers than the third party "revenue loss/cost shift"; 2) shared commit to providing accurate information and quality systems to customers; 3) Fair interconnection polices for third party owned systems; 4) shared responsibilities around grid safety and vitality as issues arise with higher levels of penetration; 5) appropriate rate design for customers of third party systems that avoids gross over or under compensation; 6) transparent sharing of non-confidential information between the utility and third party developers; and 7) utility focus on serving markets not optimally suited for third party developers. *Id.* at 2.

115. *Id.*

116. *Id.*

117. In fact, using its new policy framework, the Arizona Consumer Office supported Tucson Electric Power's recent proposal to own 3.5 MW of residential owned rooftop solar. *Id.* at 3. Under the TEP proposal, customers would be charged a $250 fee, and would be

Rather, this presumption would help incentivize DER proposals in novel areas that private markets haven't addressed, which would inurn to the benefit of individuals that would otherwise be deprived of the advantages of certain DER technologies.

As demonstrated above, the New York and Arizona proposals diverge on the question of utility ownership of DERs. While the New York Commission contends that even the appearance of utility investment in DERs will suppress third party participation, the Arizona Consumer Office sees clear benefits from utility ownership. Despite these differences, both state policies share a preference for utility investments in areas not likely to be being addressed by private markets. An example of such an area, which could potentially be acceptable under both the New York and Arizona regulatory designs, would be a proposal for a utility to develop distributed storage along the lines suggested by Oncor in Texas. A proposal along these lines, if accepted, would provide a utility with substantial investment opportunities, and would also provide society as a whole with the numerous benefits of distributed storage. In contrast when SCE sought to own 250 MW of rooftop solar, the California PUC imposed stringent regulatory requirements, including the funding of a significant number of independent rooftop solar projects within SCE's service territory, which likely inhibited the success of SCE's program.

IV. CONCLUSION

Regardless of where a state falls on the regulatory spectrum, a point of common ground among states appears to be a preference for utilities to invest in DERs that are not being addressed by private markets. Where utilities have been authorized to compete against third-party developers, regulators have imposed strict requirements that appear to have limited the success of these utility proposals. In the future, a strategic orientation by utilities to develop DER technologies in new or underutilized markets may not only provide utilities with more fruitful investment opportunities, and

locked into a set rate for up to 25 years based on their average historic energy usage, unless their energy use changes by more than 15 percent. The fixed price could allow customers to generate significant savings if TEP's rates increase in future. The Arizona Corporation Commission approved the TEP as a demonstration project, and will require to TEP seek cost recovery in a future rate case. *See* Julia Pyper, *Arizona Utilities Get Approval to Own Rooftop Solar*, GREENTECHSOLAR: (Dec. 26, 2014), http://www.greentechmedia.com/articles/read/arizona-utilites-get-the-go-ahead-to-own-rooftop-solar.

fewer regulatory constraints, but also provide communities with the benefits of DERs that may not otherwise be developed.