

THE SUN ALSO RISES: PROSPECTS FOR SOLAR DISTRICT HEATING IN THE UNITED STATES

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ABSTRACT

Renewable thermal energy remains a largely untapped resource in the United States, despite its low costs and growing popularity in many other countries and the pressing need to rapidly deploy and scale carbon-free energy sources in order to mitigate anthropogenic climate change. In this article, an energy attorney and a civil engineer collaborate to examine the prospects in the United States for solar district heating (SDH), a thermal technology that leverages economies of scale to provide zero-carbon, round-the-clock space and water heating (on average, the two largest components of building energy demand) to neighborhoods and commercial zones at costs competitive with fossil fuels in some European countries. The article begins with an overview of solar heating markets and technology, and an examination of differences in SDH system costs between countries. The article then considers the vulnerability of neighborhood SDH systems to classification in various U.S. jurisdictions as “public utilities,” an argument that has been employed by incumbent electric utilities in an attempt to estop

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unwelcome competition from third-party-financed solar photovoltaic systems, through a two-part inquiry. First, the article reviews statutory regimes for utility classification in ten states that have already shown strong growth in other solar energy technologies: California, Arizona, New Jersey, North Carolina, Nevada, Massachusetts, Hawaii, Colorado, New York, and New Mexico. Second, the article examines a July 2014 ruling from the Iowa Supreme Court, *SZ Enterprises v. Iowa Utilities Board*, which was the first appellate decision in the country to consider the public utility status of third-party-financed distributed renewable energy systems. The article concludes with a broader discussion regarding the growing conflict between distributed energy and traditional utilities.

TABLE OF CONTENTS

I. INTRODUCTION 166

II. TECHNOLOGY AND MARKET PROFILE 170

III. ECONOMICS OF SDH SYSTEMS 174

IV. LEGAL AND REGULATORY CLASSIFICATIONS OF SDH SYSTEMS IN THE UNITED STATES 179

 A. Statutory Classifications of Public Utilities 182

 1. California 186

 2. Arizona 187

 3. New Jersey 188

 4. North Carolina 189

 5. Nevada 190

 6. Massachusetts 191

 7. Hawaii 193

 8. Colorado 195

 9. New York 197

 10. New Mexico 199

 11. Summary Table of Statutory Findings 199

 B. Case law: What Constitutes Service “to the Public?” 201

V. CONCLUSION 209

I. INTRODUCTION

This article examines prospects in the United States for solar district heating (“SDH”), a regionally undeveloped but a promising renewable energy technology for serving large thermal

energy loads in dense and semi-dense urban locations, which has found commercial success in Europe generally, and Denmark in particular.¹ SDH represents one among a number of distributed renewable energy technologies whose growth challenges the dominance of traditional utilities in retail energy service markets.² Unlike its electricity-generating cousins—solar photovoltaics, for example—SDH systems primarily generate heat.³ This allows SDH systems to meet the space-heating, space-cooling, or water-heating needs of the buildings it serves, needs that constitute the majority of energy demand for the average building.⁴ Moreover, by serving multiple dwellings through

¹ See discussion *infra* Part II.

² See, e.g., PETER KIND, DISRUPTIVE CHALLENGES: FINANCIAL IMPLICATIONS AND STRATEGIC RESPONSES TO A CHANGING RETAIL ELECTRIC BUSINESS 1 (Edison Elec. Inst. 2013), http://www.eei.org/ourissues/finance/documents/disruptive_challenges.pdf (“Recent technological and economic changes are expected to challenge and transform the electric utility industry. These changes (or ‘disruptive challenges’) arise due to a convergence of factors, including: falling costs of distributed generation and other distributed energy resources (DER); an enhanced focus on development of new DER technologies; increasing customer, regulatory, and political interest in demand-side management technologies (DSM); government programs to incentivize selected technologies; the declining price of natural gas; slowing economic growth trends; and rising electricity prices in certain areas of the country. Taken together, these factors are potential ‘game changers’ to the U.S. electric utility industry, and are likely to dramatically impact customers, employees, investors, and the availability of capital to fund future investment. The timing of such transformative changes is unclear, but with the potential for technological innovation (e.g., solar photovoltaic or PV) becoming economically viable due to this confluence of forces, the industry and its stakeholders must proactively assess the impacts and alternatives available to address disruptive challenges in a timely manner.”); Martin LaMonica, *Will Utilities Embrace Distributed Energy*, MIT TECH. REV., May 3, 2013, <http://www.technologyreview.com/view/514526/will-utilities-embrace-distributed-energy/> (“David Crane, the CEO of NRG Energy, which owns power plants and provides residential utility service, called distributed solar a ‘mortal threat’ to utilities earlier this year . . . The transition from a heavily centralized power grid to one with rooftop solar panels, natural gas generators at homes and businesses, plug-in electric vehicles, and technologies to reduce electricity use is clearly underway. Crane’s comments and the EEI report reflect the unease rippling through the traditionally slow-moving utility industry.”).

³ It is possible for SDH systems to also generate electricity, if they use concentrating solar power technologies for cogeneration. See, e.g., SPX CORP., THE FUTURE OF CONCENTRATED SOLAR POWER PLANTS: PRODUCTS AND SOLUTIONS 7 (2013), www.balcke-duerr.com/fileadmin/downloads/Brochure/Competence_Reference_Brochures/SPX_Brochure_Solar_Web.pdf. Currently, however, SDH systems mostly produce heat. See also discussion *infra* Part II.

⁴ See discussion *infra* Part II. Solar thermal systems in cooling-dominated climates can be configured to provide cooling. INT’L ENERGY AGENCY, TECHNOLOGY ROADMAP: SOLAR HEATING AND COOLING 17 (2012), <http://cansia>

larger, district-type installations, SDH systems have the potential to achieve lower per-unit costs than a solar thermal system serving a single building.⁵

But the district-level provision of service that allows SDH systems to produce energy at lower cost than individual systems may have an Achilles' heel in some United States jurisdictions: the potential for economic regulation by state utility commissions.⁶ Utility regulation dates to the late-Nineteenth and early-Twentieth Centuries, when states exerted control over naturally monopolistic enterprises, such as emerging electricity systems, in order to protect consumers from monopolistic pricing of services.⁷ In return for limitations on the rates they could charge and the profits they could reap from customers, enterprises were often granted protection from competition through exclusive grants to serve particular territories.⁸ Thus the regulatory risk faced by distributed energy technologies, and in particular by technologies like SDH that might serve more than one customer, is two-fold: first, that the returns necessary to attract capital to new and disruptive technologies and business models, which carry greater risk than established utilities, might not be allowed if the enterprise is subject to utility regulation at its inception; and second, that established utilities may assert their grants of exclusivity over service territories so as to shut out competition from distributed energy.⁹

This is not an idle or theoretical threat. Utilities have already asserted such rights in an attempt to prevent competition from

.ca/sites/default/files/2012_solarheatingcooling_roadmap_final_web.pdf. Space heating comprises 37% of average building energy demand in the United States, and water heating makes up 12.3 percent. U.S. DEP'T OF ENERGY, *Buildings Sector Energy Consumption, in 2011 BLDGS. ENERGY DATA BOOK 1-2* (Mar. 2012), http://buildingsdatabook.eren.doe.gov/docs/DataBooks/2011_BEDB.pdf.

⁵ See discussion *infra* Part III.

⁶ See discussion *infra* Part IV.

⁷ See generally Robert L. Swartwout, *Current Utility Regulatory Practice from a Historical Perspective*, 32 NAT'L. RESOURCES J. 289, 299 (1992) (discussing the involvement of municipal governments in regulating utilities during the late-nineteenth and early-twentieth centuries).

⁸ *Id.* at 303. See also *Jersey Cent. Power & Light Co. v. F.E.R.C.*, 810 F.2d 1168, 1189 (D.C. Cir. 1987) (Starr, J., concurring) (describing the relationship between utility companies and government as one that is "alien to the free market").

⁹ See AM. GAS ASS'N, *DEMAND GROWTH: REALIZING THE POTENTIAL OF DISTRIBUTED ENERGY 7* (2011), http://bridgestrategy.com/index.php/download_file/view/227/554/ (explaining reasons why distributed energy has "not already become the 'standard' for new development and retrofits").

on-building solar photovoltaic systems financed by third-party companies, who install equipment on the customer-side of the electric meter and sell the electricity generated by the system back to consumers at a contractually-determined rate.¹⁰ An SDH system installed, for example, in a new neighborhood development may find itself similarly challenged, and possibly more vulnerable to public utility classification owing to its district-style technology. We explore this question through a review of public utility legislation in the top ten states for installed solar energy capacity, followed by a detailed examination of the Iowa Supreme Court's opinion in *SZ Enterprises v. Iowa Utilities Board*, the only appellate court decision to date that considers the applicability of public utility regulation to third-party-owned distributed renewable energy systems.¹¹

Though SDH may seem an exotic and foreign technology today, a failure to understand the regulatory risks of the technology may itself preclude investment in the United States by neighborhood developers, municipalities, or even utilities themselves, a classic chicken-and-egg problem that we hope to address in this article. Academically, SDH provides an excellent theoretical exercise for considering the boundaries of utility classification, because it is both distributed—proximate to load and unconnected to existing utilities—and yet also collective in its provision of service to multiple buildings and households, unlike a third-party solar photovoltaic array on a single rooftop.¹² As such, it acutely demonstrates the ways in which distributed renewable energy technologies are subtly fraying the ontological edges of public utility classification.

We will first provide a brief overview of solar thermal and SDH technologies and markets worldwide in Section II, and then

¹⁰ See generally Richard Bahrenburg, *Attempting to Think Green but Covered in Red Tape: Re-thinking the Need for Exclusivity Grants in the Modern Movement Towards Green Energy*, THE SELECTED WORKS OF RICHARD BAHRENBURG, at 3 (Jan. 2013), http://works.bepress.com/cgi/viewcontent.cgi?article=1000&context=richard_bahrenburg (defining “net-metering” as the process by which investor-owned utility installers sell back excess electricity produced by the homeowner).

¹¹ *SZ Enters. v. Iowa Utils. Bd.*, 850 N.W.2d 441 (Iowa 2014).

¹² See JUSTIN BARNES ET AL., PROPERTY TAXES AND SOLAR PV SYSTEMS: POLICIES, PRACTICES, AND ISSUES 1, 9, 30 (N.C. Solar Ctr. et al. eds., 2013), <http://www.icleiusa.org/action-center/report-property-taxes-and-solar-pv-systems-policies-practices-and-issues> (describing different types of rooftop systems and the different ways to utilize their benefits).

discuss differences in system cost between countries in Section III. State public utility statutes, followed by the *SZ Enterprises* case, are reviewed in Section IV. We offer some conclusions as to the broader implications of our analysis in Section V.

II. TECHNOLOGY AND MARKET PROFILE

The term *solar thermal energy* refers to a suite of technologies that include flat panel collectors, evacuated tube collectors, air collectors, and mirror devices, all of which capture energy from the sun for direct heating or cooling applications, industrial process heat, or conversion to electricity through mechanical means.¹³ Solar thermal technologies tend to exhibit lower installation costs and faster payback periods than solar photovoltaics.¹⁴ Despite limited use in the United States,¹⁵ solar

¹³ See generally BRIAN NORTON, *HARNESSING SOLAR HEAT* 91–176, 191–200 (Springer 2014) (providing a detailed account of “the breadth of solar energy technologies for the conversion of solar energy to provide heat”).

¹⁴ See, e.g., WILLIAM T. GUINEY, *SOLAR THERMAL ENERGY: THE TIME HAS COME* 2 (Johnson Controls, Inc. 2012), http://www.institutebe.com/InstituteBE/media/Library/Resources/What's%20New/Paper_Solar-Thermal-White-Paper.pdf (“While solar photovoltaic and wind power tend to dominate the news, solar thermal remains the most cost-effective source of on-site renewable energy. It typically costs less to install and pays back faster than photovoltaic energy. Common uses include swimming pool heating, boiler water preheating, domestic water and space heating, air conditioning, and heat for a wide range of commercial and industrial processes. In the nonresidential sector, users of solar thermal technology include hotels, hospitals, prisons, restaurants and cafeterias, government buildings, universities and schools, athletic facilities, manufacturing plants, and laundries.”); SCHOTT WHITE PAPER ON SOLAR THERMAL POWER PLANT TECHNOLOGY 26 (Schott 2006), <http://www.powerinfo.today.com/images/stories/pdf/schott-white-paper-on-%20Solar-Thermal-Power-Plant-Technology.pdf>. For a scientific perspective on the levelized costs of concentrating solar power compared to wind and solar photovoltaic power production, see Michael Dale, *A Comparative Analysis of Energy Costs of Photovoltaic, Solar Thermal, and Wind Electricity Generation Technologies*, 3 *APPL. SCI.* 325, 325–26, 332–33 (2013) (analyzing the levelized cost of electricity (“LCOE”) as total costs divided by total energy service production).

¹⁵ See WERNER WEISS & PETER BIERMAYR, *POTENTIAL OF SOLAR THERMAL IN EUROPE* 38 (Eur. Solar Thermal Indus. Fed’n 2009), http://eeg.tuwien.ac.at/eeg.tuwien.ac.at_pages/publications/pdf/WER1.pdf (“The most dynamic markets for flat-plate and evacuated tube collectors worldwide are in China and Europe as well as in Australia and New Zealand. The average annual growth rate between 1999 and 2006 was 22% in China and Taiwan, 20% in Europe, and 16% in Australia and New Zealand. The market for flat-plate and evacuated tube collectors has been consistently weak in Canada and the USA. Although the installed capacity of flat-plate and evacuated tube collectors in the USA is very low compared with other countries, especially with regard to the large US population, the market for new installed glazed collectors has been growing significantly in both 2005 (45 MW_{th}) and 2006 (87 MW_{th}).”).

2015] SOLAR DISTRICT HEATING IN THE U.S. 171

thermal is the leader in installed capacity for nontraditional (*i.e.*, non-biomass, non-hydropower) renewable energy on a global basis.¹⁶ As of 2012, solar thermal energy was present in fifty-eight countries and covered 384.7 million square meters of collector area, accounting for 269.3 GWth of installed capacity, the vast majority of which was in China (180.4 GWth) and Europe (42.8 GWth).¹⁷ Water-based solar thermal systems yielded 227.8 TWh of energy worldwide in 2012, the equivalent of 24.5 million tons of oil, saving 79.1 million tons of carbon dioxide from emission into the atmosphere.¹⁸ The technology's reach is expanding: in 2013, it covered 471 million square meters in collector area and reached an estimated installed capacity of 330 GWth, an increase of 22.5 percent over the previous year.¹⁹

Especially in Denmark and Sweden, but also in Austria, Germany, Greece, and Spain, solar thermal technologies have been applied to district heating systems, providing zero-carbon heat for space and water heating to neighborhoods and cities located near the collection facilities.²⁰ To date, there are over 150 solar district heating (SDH) systems with a nominal thermal power of over 350 kWth in Europe.²¹ Some of these systems are quite large: the world's largest SDH plant in Dronninglund, Denmark covers 37,275 square meters with collectors and has a capacity of 26 MWth; it was designed to meet half of the heating demand of 1,400 nearby customers.²² Denmark has seen a massive increase in solar district heating capacity in just a few years due to favorable market conditions, including high taxes on fossil fuels and new electricity market developments,²³ as well as

¹⁶ See FRANZ MAUTHNER & WERNER WEISS, SOLAR HEAT WORLDWIDE: MARKETS AND CONTRIBUTION TO THE ENERGY SUPPLY 2012 at 7 (Int'l Energy Agency Solar Heating & Cooling Programme 2014), <http://www.aee-intec.at/0uploads/dateien1016.pdf>. It is second only to wind power in annual energy generation from nontraditional renewables. *Id.*

¹⁷ *Id.* at 5.

¹⁸ *Id.* at 6.

¹⁹ *Id.* at 7.

²⁰ *Id.* at 37.

²¹ JAN-OLOF DALENBÄCK & SVEN WERNER, MARKET FOR SOLAR DISTRICT HEATING 12 (CIT Energy Mgmt. AB 2012), <http://www.solar-district-heating.eu/Portals/0/SDH-WP2-D2-3-Market-Aug2012.pdf>.

²² MAUTHNER & WEISS, *supra* note 16, at 36.

²³ Specifically, rapid growth in the presence of zero-fuel-cost wind power on the Danish grid has reduced wholesale demand for electricity from the combined heat and power (CHP) plants that were an integral part of the country's traditional district heating systems. CHP plant operation, which often burns costly (and heavily taxed) natural gas, is uneconomic without a buyer for

an experience-driven mastery of economies of scale, which have reduced system costs by building larger and larger systems that now provide solar energy at prices competitive with natural gas in the region.²⁴ Denmark is now the uncontested world leader in SDH, with fifty large-scale SDH plants in operation, at an average collector area of 7,800 square meters each.²⁵ Denmark installed 40,000 square meters of new solar thermal collectors in 2011, 76,000 square meters in 2012, and 96,000 square meters in 2013.²⁶

North American applications of solar district heating have to date been far more modest, but have benefitted technologically from the pioneering work of the Europeans: the Drake Landing Solar Community (DLSC) near Calgary, Canada has a comparatively small capacity of 1.6 MWth, but provides ninety percent of the annual heating load to its fifty-two single family detached dwellings through the use of innovative seasonal energy storage technology.²⁷ Drake Landing utilizes an array of closed-loop borehole heat exchangers to store summertime solar heat underground on a seasonal basis, for re-extraction and use during the winter months, when solar thermal energy may not be readily available.²⁸ 800 solar panels, mounted on garage roofs, absorb energy from the sun during the daytime and heat a water-glycol solution, which runs through an insulated collector system that connects the panels.²⁹ The collector system moves the heated glycol through a shallow trench in the ground to a central building that houses a short-term water storage tank, and the heat from the glycol solution transfers to the water in the tank.³⁰ The glycol solution then returns to the collector loop for further

its electricity. District heating systems found themselves in need of new heat plants that did not depend on electricity sales for sufficient revenues and thus could operate when the wind was blowing. SDH plants filled this niche because of their size-driven economies of scale, very low operational costs, and long-term price stability. *Cf. id.* at 37.

²⁴ *Id.*

²⁵ *Id.* at 35, 37.

²⁶ *Id.* at 35.

²⁷ *Id.* at 36; Bruce Sibbitt et al., *The Performance of a High Solar Fraction Seasonal Storage District Heating System—Five Years of Operation*, 30 ENERGY PROCEDIA 856, 857 (2012).

²⁸ Sibbitt et al., *supra* note 27, at 858.

²⁹ *How It Works: Capturing the Solar Thermal Energy*, DRAKE LANDING SOLAR CMTY., <http://www.dlsc.ca/how.htm> (last visited Jan. 9, 2015) [hereinafter *Capturing the Solar Thermal Energy*].

³⁰ *Id.*

heat absorption.³¹ During warmer months, the heated water in the storage tank is moved via direct circulation of fluid into the borehole thermal energy storage system, which consists of a total of 144 holes in the ground that each reach 37 meters in depth and cover a ground area of approximately 35 meters in diameter.³² As the heated solution travels through the borehole pipes, heat is transferred to the earth.³³ The soil within the borehole array reaches a temperature of up to 80 °C by the end of the summer.³⁴ The water returns to the solar panels, now cooled, for another cycle of heating.³⁵ In the winter, a separate district heating loop collects heat from the borehole system and distributes it to the homes.³⁶ An example of a seasonal solar thermal energy storage system and connection to a district heating loop typical of DLSC is shown in Figure 1.

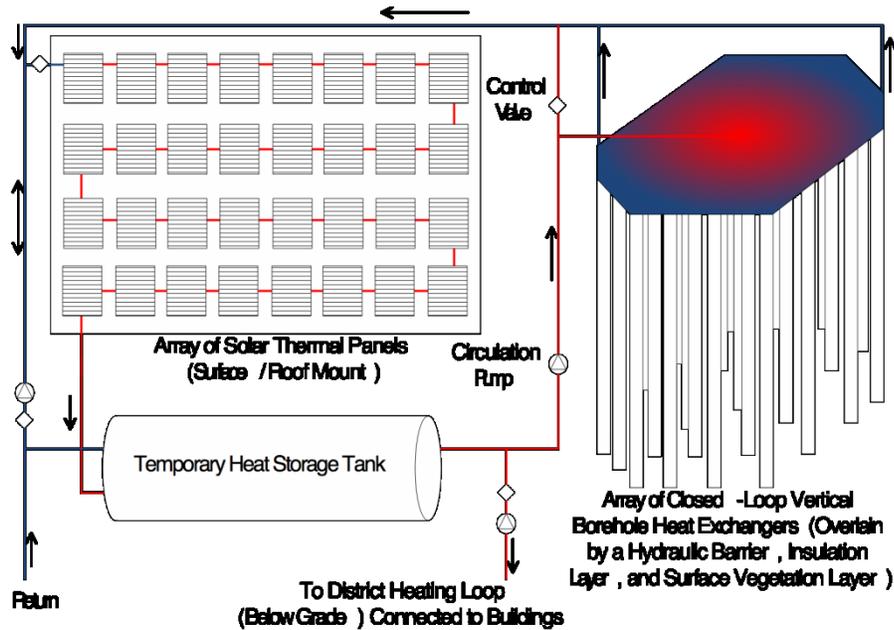


Figure 1: Schematic of a Seasonal Solar Thermal Energy Storage System and Connection to a District Heating Loop

³¹ *Id.*
³² *Id.*
³³ *Id.*
³⁴ *Id.*
³⁵ *Id.*
³⁶ *Id.*

A number of European projects, both predating Drake Landing and following it, have also installed borehole thermal energy storage (BTES) technologies for larger systems, including a 13 MWth system in Braedstrup, Denmark.³⁷ Combined SDH and thermal energy storage (SDH- TES) systems of the sort used in the Drake Landing community and at Braedstrup provide two critical capabilities for reducing dependence on fossil fuel-based electrical grids and natural gas utilities: they capture free and abundant energy from the sun for use in nearby heat-related applications, and also store that energy as heat in materials with high specific heat capacity such as soil, concrete, or aquifers for use at a later time, when the sunlight is no longer available.³⁸ An SDH-TES system can collect excess solar thermal heat on sunny days, store it underground in the subsurface, and re-extract it when needed, potentially obviating the need for back-up heating systems.³⁹

III. ECONOMICS OF SDH SYSTEMS

Though SDH systems comprise only a small percentage of solar thermal applications at present,⁴⁰ their increasingly large sizes suggest that they may achieve lower energy production costs than smaller systems through economies of scale.⁴¹ In Europe,

³⁷ The European projects using BTES systems are located in Braedstrup, Denmark (13.0 MWth), Crailsheim, Germany (5.1 MWth), Neckarsulm, Germany (4.0 MWth), Groningen, The Netherlands (1.7 MWth), Anneberg, Sweden (1.7 MWth), and Kerava, Finland (0.8 MWth). See *Ranking List of European Large Scale Solar Heating Plants*, SOLAR DISTRICT HEATING, <http://www.solar-district-heating.eu/ServicesTools/Plantdatabase.aspx> (last visited Jan. 9, 2014). For more information on the Braedstrup project, see Henrik Björn, *Borehole Thermal Energy Storage In Combination With District Heating*, EUROPEAN GEOTHERMAL CONGRESS 2013, Pisa, It., June 3–7 (2013).

³⁸ See John S. McCartney et al., *Soil-Borehole Thermal Energy Storage Systems for District Heating*, EUROPEAN GEOTHERMAL CONGRESS 2013, Pisa, It., June 3–7 (2013); Sibbitt et al., *supra* note 27, at 857–59; R. Zhang et al., *Efficiency of a Community-Scale Borehole Thermal Energy Storage Technique for Solar Thermal Energy*, in GEOCONGRESS 2012, at 4386 (Am. Soc’y Civil Eng’rs 2012); B. Sibbitt et al., *The Drake Landing Solar Community Project—Early Results*, CANADIAN SOLAR BUILDINGS CONFERENCE, Calgary, Can., June 10–14 (2007); A. Gabrielsson et al., *Thermal Energy Storage in Soils at Temperatures Reaching 90°C*, 122 J. SOLAR ENERGY ENG’G 3 (2000).

³⁹ See *Capturing the Solar Thermal Energy*, *supra* note 29 (explaining the mechanics of how the SDH-TES systems function, in relation to back-up heating systems).

⁴⁰ Systems over 350 kWth comprise about 1 percent of the European solar heating market. DALENBÄCK & WERNER, *supra* note 21, at 12.

⁴¹ *Id.*

total SDH system capital costs to date have ranged from €300 to €600⁴² per meter squared of installed collectors, while smaller solar thermal systems sized to single buildings can range from 200 euros per meter squared for a simple domestic hot water system to as high as 1,000 euros per meter squared for more complex systems.⁴³ Energy production costs, excluding subsidies, for SDH range from four eurocents/kWh in Denmark to seven eurocents/kWh in Sweden and six to eight eurocents/kWh in Austria.⁴⁴ Experts anticipate that costs will continue to decline as project size and quantity increases, which is projected to occur so long as European countries continue to promote renewable energy and restrict fossil fuel use through taxation and other penalties.⁴⁵

The cost of the Drake Landing system in Canada was much higher, as it was both the first SDH system in North America, and also unique in that it was designed to provide essentially all of the space and water heating needs for its community.⁴⁶ The system's total capital cost was approximately 7 million Canadian dollars and the system included 2,293 square meters of collector area,⁴⁷ thus Drake Landing's capital costs equal USD 2,823 per meter squared of installed solar collectors. These higher capital costs reflect both a lack of the industry experience and expertise in both solar thermal systems and district heating systems that European projects enjoy,⁴⁸ and the need to develop a brand-new

⁴² Approximately \$400 to \$800. GOOGLE CONVERTER, <https://www.google.com/#q=currency+converter> (last visited Jan. 9, 2015).

⁴³ DALENBÄCK & WERNER, *supra* note 21, at 16.

⁴⁴ See JAN-OLOF DALENBÄCK, SUCCESS FACTORS IN SOLAR DISTRICT HEATING 9–13 (CIT Energy Mgmt. AB 2010), <http://www.solar-district-heating.eu/Portals/0/SDH-WP2-D2-1-SuccessFactors-Jan2011.pdf> (examining solar district heating success stories in Denmark, Austria, and Sweden). The same range in U.S. currency is five cents/kWh (Denmark) to eleven cents/kWh (high range of Austria). For comparative purposes, the average retail price of natural gas for consumers in California in April of 2014 was \$11.48/thousand cubic feet, or four cents/kWh. U.S. ENERGY INFO. ADMIN., *California Price of Natural Gas Delivered to Residential Consumers*, EIA.GOV, <http://www.eia.gov/dnav/ng/hist/n3010ca3m.htm> (last updated Dec. 31, 2014).

⁴⁵ DALENBÄCK, *supra* note 44, at 14.

⁴⁶ See CAN. DIST. ENERGY ASSOC., DRAKE LANDING SOLAR COMMUNITY: AN EXERCISE OF TECHNOLOGY EXPANSION 1 (2007), <http://www.districtenergy.org/assets/CDEA/Case-Studies/Drake-Landing-Solar-Community9-25-07.pdf>.

⁴⁷ *Id.* at 3; Sibbitt et al., *supra* note 27, at 857.

⁴⁸ See CAN. DIST. ENERGY ASSOC., *supra* note 46, at 5 (“To generate an informed understanding of the design and operational considerations for Drake Landing, the project team reviewed and visited precedent setting solar thermal operations in Europe, where the technology is well established. Prior to the

district heating system in the community to distribute the solar thermal energy, a challenge that many European projects do not face because of Europe's well-established district heating sector.⁴⁹ Long before the advent of SDH systems, European countries installed altogether some six thousand district heating systems that provided heat to consumers through co-generation, recycled heat, trash incineration, biomass, and fossil fuel boilers.⁵⁰ Thus many European SDH projects are capable of simply selling their heat to large, pre-existing district heating systems.⁵¹ This provides two benefits: first, the project need not build its own district heating loop; second, excess solar heat that might harm the solar thermal system can be exported to the district heating system, which serves as a buffer and *de facto* short-term storage system.⁵² SDH systems in locales without existing district heat are therefore more dependent on dedicated storage facilities as a control mechanism to protect the system from excess heat.⁵³

The presence of existing district heating systems also have downsides for the economic viability of SDH, essentially because European district heating systems are already so efficient.⁵⁴ In the summer, many district heating systems use free "recycled heat" from cogeneration, waste incineration, and industrial processes during the day to serve much of their daytime load; and available heat from the solar thermal system simply adds more free heat to what is often already a surplus of heat.⁵⁵ Some

development of Drake Landing, the application of solar energy at the neighborhood level for space heating and hot water in Canada was experimental. By speaking with operators and users of existing systems, the team was able to gain valuable insights into the technical, economic and market considerations to be considered for a residential renewable district energy system. Seeing first-hand how a district energy system operates can help project development teams, as well as community stakeholders address design concerns, dispel misconceptions and assess strategies for advancing project development.").

⁴⁹ See DALENBÄCK & WERNER, *supra* note 21, at 24–27 (depicting the district heating systems that are located and currently operating in Europe).

⁵⁰ See *id.* at 25, 27 (listing European countries that use district heating systems and the various uses of the heat).

⁵¹ See, e.g., DALENBÄCK, *supra* note 44, at 9–14 (explaining the mechanics of the positive cost perspectives of the district heating systems in Austria).

⁵² See *id.* at 12 (describing net-metering of solar heat in Sweden).

⁵³ See *id.* at 23 (stating that storage units must provide a small amount of heat when compared with the total district heat load).

⁵⁴ DALENBÄCK & WERNER, *supra* note 21, at 24–25.

⁵⁵ *Id.* at 27. In Denmark, notably, high concentrations of wind power on the grid often satisfy wholesale electricity demand to such an extent that gas-fired cogeneration plants can no longer sell their generated electricity, making plant

European SDH systems thus face a temporal mismatch between supply and demand that is attributable to the European energy system's already impressive efficiencies.⁵⁶

While prospective North American SDH systems would in most cases not be able to plug in to a readily available district heating system, they are also less likely to face competition from already highly efficient heat distribution systems, as the U.S. energy sector is notably less efficient than Europe's.⁵⁷ The buildings sector accounted for 41 percent of primary energy consumption in the United States in 2010.⁵⁸ Within that sector, the two largest components of building energy demand were space heating (37 percent) and water heating (12.3 percent).⁵⁹ These space and

operation uneconomic during periods of high wind power generation, and creating a niche market for SDH. MAUTHNER & WEISS, *supra* 16, at 36–37. While the situation is specific to Denmark at present, it does suggest possible future synergies between SDH systems and wholesale electricity markets with high concentrations of wind or other renewable power.

⁵⁶ See RACHEL YOUNG ET AL., THE 2014 INTERNATIONAL ENERGY EFFICIENCY SCORECARD xii (2014), <http://www.aceee.org/sites/default/files/publications/researchreports/e1402.pdf> (ranking Germany #1, Italy #2, and the European Union #3 among countries worldwide for energy efficiency).

⁵⁷ See *id.* (ranking United States 13th among countries for energy efficiency); see also *id.* at x–xi (“The United States has made some progress toward greater energy efficiency in recent years, particularly in areas such as building codes, appliance standards, voluntary partnerships between government and industry, and, recently, fuel economy standards for passenger vehicles and heavy-duty trucks. However, the overall story is disappointing. The United States, long considered an innovative and competitive world leader, has progressed slowly and has made limited progress since the last *International Scorecard* in 2012. In contrast, countries including Germany, Japan, and China are surging ahead. Countries that use energy more efficiently use fewer resources to achieve the same goals, thus reducing costs, preserving valuable natural resources, and gaining a competitive edge over other countries. In the United States, a great deal of resources are wasted, and costs have been allowed to remain unnecessarily high. The inefficiency in the U.S. economy means a tremendous waste of energy resources and money. Across most metrics analyzed in this *International Scorecard*, in the past decade the United States has made limited progress toward greater efficiency at the national level. The overall U.S. score of 42 is less than half of the possible points and is 23 points away from the top spot. Further, the United States falls behind Canada, Australia, India and South Korea. These scores suggest that this list of countries may have an economic advantage over the United States because using less energy to produce and distribute the same economic output costs them less. Their efforts to improve efficiency likely make their economies more nimble and resilient. This raises a critical question: looking forward, how can the United States compete in a global economy if it continues to waste money and energy that other industrialized nations save and can reinvest?”).

⁵⁸ U.S. DEP'T OF ENERGY, *supra* note 4, at 1.

⁵⁹ *Id.* at 1–2.

water heating needs are most often met through retail utility services, which supply electricity or natural gas to on-site furnaces for heat production in each building.⁶⁰ Thus SDH systems in the United States would, in most cases, require the construction of new heat storage and distribution systems of the sort demonstrated at Drake Landing, and their primary competitors would be utility-provided natural gas and electricity.⁶¹

If we compare the costs of retail gas or electric service to the high capital costs exhibited by the Drake Landing project, it becomes clear that North American SDH systems are not currently capable of successfully competing with gas or electricity without subsidies.⁶² However, with California's retail gas prices at \$12.07 per thousand cubic feet, or four cents per kilowatt-hour,⁶³ and European SDH projects achieving costs of four to eight cents per kilowatt-hour,⁶⁴ the gap is narrowing. If SDH systems continue to decrease costs as project sizes grow, and if natural gas and electricity become more expensive as a result of either environmental policies or supply factors,⁶⁵ a day may come

⁶⁰ Cf. U.S. ENERGY INFO. ADMIN., *Household Heating Fuels Vary Across the Country*, TODAY IN ENERGY (Oct. 28, 2011), <http://www.eia.gov/todayinenergy/detail.cfm?id=3690> (stating that natural gas heats 50 percent of the homes in the U.S. but that electricity is widely used in the South).

⁶¹ See *id.* (stating that natural gas heats 50 percent of the homes in the U.S. and electricity is widely used in the South). The Drake Landing system itself was a joint venture between the Town of Okotoks, Alberta, a neighborhood developer, a home builder, and ATCO Gas, a retail gas utility. ATCO is expected to become the sole owner of the system. CAN. DIST. ENERGY ASSOC., *supra* note 46, at 4.

⁶² See CAN. DIST. ENERGY ASSOC., *supra* note 46, at 3–4 (detailing the high capital costs of the Drake Landing project); see also Sibbitt et al., *supra* note 27, at 857. The Drake Landing system supplies heat to its homes at an average of \$60/month, but this rate does not reflect the true capital costs of the project, which were subsidized.

⁶³ See U.S. ENERGY INFO. ADMIN., *supra* note 44 (providing the average residential price for natural gas for the month of August 2014).

⁶⁴ See DALENBÄCK, *supra* note 44, at 10–11 (detailing some costs per kilowatt-hour in various European districts). Note, however, that many of these projects do not include the costs of building a new district heating system, as a legacy system is often already available in European cities. See also DALENBÄCK & WERNER, *supra* note 21, at 24–25 (discussing costs in terms of taxes but not mentioning costs of building new district heating systems).

⁶⁵ The U.S. Energy Information Administration states that “[b]ecause of limited alternatives for natural gas consumption or production in the near term, even small changes in supply or demand over a short period can result in large price movements that bring supply and demand back into balance.” U.S. ENERGY INFO. ADMIN., *Natural Gas Explained: Factors Affecting Natural Gas Prices*, EIA.GOV (last updated May 5, 2014),

where unsubsidized SDH systems of sufficient scale provide heat at lower costs than fossil fuel-based utility infrastructures.

IV. LEGAL AND REGULATORY CLASSIFICATIONS OF SDH SYSTEMS IN THE UNITED STATES

Suppose all of the contingencies for the development of a successful SDH industry in the United States come to pass: housing growth is strong enough to provide a growth market for neighborhood scale SDH systems, installed by or in partnership with housing developers, municipalities, *et cetera*; the resulting experience curve⁶⁶ drives average SDH energy production costs below 5 cents per kilowatt-hour; and environmental and climate regulations increase the retail prices of electricity and natural gas relative to renewable sources such that SDH systems can provide space and water heating more cheaply than can incumbent utilities. What would an SDH industry look like in the United States? Would opportunities arise for sufficient profit to attract the capital necessary for growth? Or would SDH be a non-profit enterprise driven by local governments for district energy in downtown areas? Would utilities themselves invest in SDH systems, or would a new set of entities aim to compete with electricity or gas head-on? The answers to those questions depend, in part, on how state energy regulators and courts might classify and thus regulate SDH systems of various types.

The nature of the relationship between SDH systems and state utility regulation is as of yet uncertain, but is likely to influence the feasibility of SDH deployment in the United States.⁶⁷ The

http://www.eia.gov/energyexplained/index.cfm?page=natural_gas_factors_affecting_prices. Some environmental organizations have called for stronger oversight and regulation of natural gas producers, which would presumably increase the costs of gas production. See, e.g., ENV'T'L. DEF. FUND, *Natural Gas: We Need Stricter Rules and Oversight*, EDF.ORG, <http://www.edf.org/climate/natural-gas> (last visited Jan. 9, 2015). And of course, the imposition of any form of economy-wide carbon restriction would increase the prices of natural gas as well as electricity under current generation profiles. Cf. RES. FOR THE FUTURE, *CONSIDERING A U.S. CARBON TAX: FREQUENTLY ASKED QUESTIONS* 8 (Dec. 2012), <http://www.rff.org/Documents/Centers/CECE/carbon-tax-FAQs.pdf> (discussing how a tax on carbon would increase overall energy prices).

⁶⁶ See Pankaj Ghemawat, *Competition and Business Strategy in Historical Perspective*, 76 BUS. HIST. REV. 37, 46 (2002) (“[Boston Consulting Group’s] standard claim for the experience curve was that for each cumulative doubling of experience, *total* costs would decline by roughly 20 to 30 percent due to economies of scale, organizational learning, and technological innovation.”).

⁶⁷ See generally ANN DILLEMUTH ET AL., *Integrating Solar Energy into Local Development Regulations*, in SOLAR BRIEFING PAPERS 35–43 (2014), available at

question we address here is whether SDH systems would be subject to state utility regulation in the same way as electricity and gas service, which are often limited in the rates they may charge to those necessary to recoup their costs of service and a reasonable return on investment to attract low-risk capital.⁶⁸ Would regulators assert jurisdiction over SDH systems and actively control the rates they charge to consumers, or would SDH system owners be able to charge rates that would allow substantial profit to developers? A corollary question is whether electricity and gas utilities, if faced with competition from SDH suppliers, could legally bar SDH systems from competing with them, as electric utilities have attempted with third-party solar PV systems.

SDH systems are virtually unknown in the United States, and so no case history exists to fully understand how various state utility commissions might classify them.⁶⁹ Legislative certainty

<https://www.planning.org/research/solar/briefingpapers/pdf/localdevelopmentregulations.pdf> (describing the intimate relationship between different state positions such as city planner, local government officials and engaged citizens are critical to the implementation of SDH development in the U.S.).

⁶⁸ See *Jersey Cent. Power & Light Co. v. F.E.R.C.*, 810 F.2d 1168, 1189 (D.C. Cir. 1987) (Starr, J., concurring) (“The utility business represents a compact of sorts; a monopoly on service in a particular geographical area (coupled with state-conferred rights of eminent domain or condemnation) is granted to the utility in exchange for a regime of intensive regulation, including price regulation, quite alien to the free market. . . . Each party to the compact gets something in the bargain. As a general rule, utility investors are provided a level of stability in earnings and value less likely to be attained in the unregulated or moderately regulated sector; in turn, ratepayers are afforded universal, non-discriminatory service and protection from monopolistic profits through political control over an economic enterprise.”) (internal citations omitted). Note that just a few years after this ruling, the Federal Energy Regulatory Commission restructured wholesale gas and electricity markets to allow for a more competitive and potentially profitable environment. See *infra* note 75 and accompanying text. However, retail distributors remained subject to state utility regulation unless the state took action to deregulate the retail market. Even in states that did pass new legislation to allow retail electricity competition, incumbent utilities retained substantial market power in most instances, and remained subject to regulatory oversight. See COMPETE COAL., KEMA WHITE PAPER: INNOVATION IN COMPETITIVE ELECTRICITY MARKETS 22–24 (Feb. 2011), <http://www.competecoalition.com/files/KEMA%20Innovation%20in%20Electricity%20Markets%20White%20Paper.pdf> (explaining Texas’ experience with retail electricity competition).

⁶⁹ Moreover, what district heating that does exist in the US is often related to cogeneration, the use of waste heat from independent electricity production or industrial processes for space and water heating. See *generally* SCOTT A. SPIEWAK & LARRY WEISS, COGENERATION AND SMALL POWER PRODUCTION

2015] SOLAR DISTRICT HEATING IN THE U.S. 181

for SDH is similarly lacking, though some states have existing exemptions for renewable energy sources that would apply to SDH,⁷⁰ or have pioneered legislation for geothermal heat suppliers that may include SDH systems using geothermal technologies for thermal storage within their ambit.⁷¹ Thus our legal analysis is of necessity a hypothetical one.

Still, the issues that arise from our inquiry are not imaginary: conflicts between local communities and energy utilities have already arisen in the form of attempted municipalizations of power systems by climate-conscious communities seeking increased use of renewable energy,⁷² as well as growth in rooftop solar photovoltaic (PV) systems that compete with utility infrastructures and may be funded by independent third parties.⁷³ Meanwhile, energy efficiency programs and standards have gradually reduced building energy demand from utilities

MANUAL (Fairmont Press, 5th ed. 1997) (arguing that these district heating systems *do* possess a nexus with electricity production and all of the regulatory entanglement that such a thing entails). *See also* Mass. Inst. of Tech. v. Dep't of Pub. Utils., 684 N.E.2d 585, 591–93 (Mass. 1997) (finding that state regulator could permissibly require university operating large cogeneration plant to pay transition charge to electric utility formerly supplying campus in order to cover utility's stranded costs).

⁷⁰ *See infra* note 117 and accompanying text (citing Hawaii's codified exemption for renewable energy).

⁷¹ The state legislative approaches to geothermal heat systems are astonishingly varied. *See, e.g.,* COLO. REV. STAT. ANN. § 40-40-104 (West 2014) (exempting geothermal heat suppliers, including systems that augment geothermal heat with solar energy, from utility-style regulation by the Colorado Public Utilities Commission); *id.* § 30-20-603 (authorizing geothermal heat supply districts within county-formed "local improvement districts"); OR. REV. STAT. ANN. § 523.030 (West 2014) (establishing legal category for geothermal heat districts under regulation of Oregon's Department of Geology and Mineral Industries, and rights for cities to provide geothermal heat within their borders); MD. CODE, ANN. PUB. UTIL. § 7-701(d) (West 2014) (including geothermal and cooling systems within the state's renewable energy portfolio standard, but only if they "replace[s] or displace[s] inefficient space or water heating systems whose primary fuel is electricity or a non-natural gas fuel source;" or "replace[s] or displace[s] inefficient space cooling systems that do not meet federal Energy Star product specification standards;"); WASH. REV. CODE ANN. § 35.97.020 (West 2014) (allowing cities to procure heat from geothermal and other heat sources); N.M. STAT. ANN. § 3-25-3 (West 2014) (allowing cities to operate natural gas or geothermal utilities).

⁷² *See, e.g.,* City of Boulder, Colorado, 144 F.E.R.C. ¶ 61,069 (July 29, 2013).

⁷³ *See, e.g.,* SZ Enters. v. Iowa Util. Bd., 850 N.W.2d 441, 470 (Iowa 2014) (finding that third-party operated PV solar system selling electricity to city-owned building was not a public utility and could not be prevented from operations by state public utility board).

and will continue to do so in the coming decades.⁷⁴ In identifying potential interactions and relationships between SDH systems, regulators, and traditional utilities, we hope to provide guidance to developers and cities that may consider SDH systems in the future. We limit our inquiry here to law on the books, but urge readers to consider the protean nature of utility law for our later discussions of policy considerations.⁷⁵

A. *Statutory Classifications of Public Utilities*

Based on a plain-language reading of relevant statutes, would an SDH system be classified as a public utility? The question is not merely academic; public utility classification subjects enterprises to rate regulation, limits on investment returns and

⁷⁴ See *Projected Impacts of State Energy Efficiency and Renewable Energy Policies*, U.S. ENVTL. PROT. AGENCY, <http://epa.gov/statelocalclimate/state/statepolicies.html> (last updated May 7, 2014).

⁷⁵ Indeed, the regulatory landscape for utilities can fundamentally change with startling speed. The Federal Energy Regulatory Commission (FERC), which regulates wholesale energy markets, restructured both the electricity and gas industries into competitive wholesale markets in just a few years in the late 20th Century. See *Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, 61 Fed. Reg. 21540-01 (May 10, 1996) (codified at 18 C.F.R. pts. 35 & 385); *Transmission Access Policy Study Grp. v. F.E.R.C.*, 225 F.3d 667, 681 (D.C. Cir. 2000) (upholding FERC's restructuring of electricity markets); *Pipeline Serv. Obligations and Revisions to Regs. Governing Self Implementing Transp. Under Part 284 of the Comm'n's Regs.*, 59 F.E.R.C. ¶ 61,030 (Apr. 8, 1992) (codified at 18 C.F.R. pt. 284); *United Distrib. Cos. v. F.E.R.C.*, 88 F.3d 1105, 1191 (D.C. Cir. 1996) (upholding Order 636 "[i]n its broad contours and most of its specifics," and remanding on "certain aspects"). State regulators in roughly half of the US states followed suit by restructuring retail electricity markets as well, allowing competition between service providers at the customer site. See U.S. ENERGY INFO. ADMIN., *Electricity Restructuring by State*, EIA.GOV, http://www.eia.gov/electricity/policies/restructuring/restructure_elect.html (last updated Sept. 2010). Competitive restructuring set off a legal battle over "stranded costs," the assets held by incumbent utilities that would become useless in a newly competitive market, where load-serving entities could buy power from anywhere. *Transmission Access Policy Study Grp.*, 225 F.3d at 683. Ultimately, FERC would allow, and courts would approve, the recovery of stranded costs for incumbent utilities through increased transmission prices to anyone using the transmission system to source power from competing sources. *Id.* The details of electricity restructuring are beyond the scope of this paper, but the event serves to illustrate both the rapidity with which the utility regulatory landscape can change, as well as the ability of powerful incumbents to secure their financial solvency at the expense of new entrants.

competitive behavior, and a high degree of regulatory oversight.⁷⁶ If an SDH provider were to be classified as a public utility, a state regulator may assert control over the rates that it charges to system users, typically limiting those rates to what is necessary to meet the provider's costs, plus a reasonable return on investment to attract capital.⁷⁷ In other words, an SDH industry subject to extensive cost-of-service regulation would be limited in the profits it might make.

The profit opportunity for SDH systems lies in the difference between the SDH system's cost of service—which is defined largely by its initial capital cost, as it uses no fuel—and the current prices of utility-provided electricity or gas, which are dependent on both fixed capital costs and continuous input of fossil-fuel resources, which, unlike sunlight, have costs.⁷⁸ Theoretically, a cost-effective, non-utility SDH system that provides energy at lower cost than electricity or gas systems could charge the going rate for electricity or gas-based energy services.⁷⁹ The consumer would see no difference in cost between

⁷⁶ State authority to regulate the rates charged by public utilities was first recognized in U.S. law in the landmark *Munn v. Illinois* case, which upheld the power of a state legislature to regulate rates charged by grain storage warehouses on the shores of Lake Michigan. See 94 U.S. 113, 135–36 (1876). *Munn* established that “[p]roperty does become clothed with a public interest when used in a manner to make it of public consequence, and affect the community at large. When, therefore, one devotes his property to a use in which the public has an interest, he, in effect, grants to the public an interest in that use, and must submit to be controlled by the public for the common good, to the extent of the interest he has thus created. He may withdraw his grant by discontinuing the use; but, so long as he maintains the use, he must submit to the control.” 94 U.S. at 126. For a definitive review of the Supreme Court's evolving jurisprudence on the constitutional limitations on the economic regulation of utilities throughout the Twentieth Century, see *Duquesne Light Co. v. Barasch*, 488 U.S. 299, 307–10 (1989) (“[W]hether a particular rate [set by a state regulatory commission] is ‘unjust’ or ‘unreasonable’ will depend to some extent on what is a fair rate of return given the risks under a particular rate-setting system, and on the amount of capital upon which the investors are entitled to earn that return.”); see also *Jersey Cent. Power & Light Co. v. F.E.R.C.*, 810 F.2d 1168, 1189 (“Judicial review of the Commission's order[] will . . . function accurately and efficaciously only if the Commission indicates fully and carefully the methods by which, and the purposes for which, it has chosen to act, as well as its assessment of the consequences of its order[] for the character and future development of the industry.”).

⁷⁷ See *Duquesne Light Co.*, 488 U.S. at 310.

⁷⁸ See, e.g., U.S. ENERGY INFO. ADMIN., *Electricity*, EIA.GOV, <http://www.eia.gov/electricity/data.cfm> (last visited Jan. 9, 2015); U.S. ENERGY INFO. ADMIN., *Natural Gas*, EIA.GOV, <http://www.eia.gov/naturalgas/data.cfm> (last visited Jan. 9, 2015).

⁷⁹ See generally INT'L ENERGY AGENCY, TECHNOLOGY ROAD MAP: ENERGY-

fossil-fuel-based utility service and the solar-driven SDH service, and thus no increase in their energy bill, but the SDH system would enjoy profits commensurate with its ability to provide lower-cost energy service.⁸⁰ If prices for electricity and gas rise due to supply instability, future carbon regulations, and other geopolitical developments, the SDH system would earn still larger returns.⁸¹ Of course, decreases in fossil fuel prices would have the opposite effect,⁸² but the upside potential provides a basis for investment for those with the appropriate risk tolerance and expectations for future energy markets. This upside potential is only possible, however, if SDH systems can charge market prices for energy services, which is dependent on them *not* being classified as public utilities by state regulators.⁸³ State statutes are the starting point of our inquiry into the utility status of SDH systems, as “retail” utility regulation—that is, regulation of services provided to end-users—has long been a

EFFICIENT BUILDINGS: HEATING AND COOLING EQUIPMENT 11 (2011), http://www.iea.org/publications/freepublications/publication/buildings_roadmap.pdf (stating that current technologies for space and water heating cannot meet all the demands today at a reasonable cost, but that cost reductions and improved performance are likely to occur because there is “substantial room for innovation and for improving existing technologies”).

⁸⁰ See generally Press Release, Env’t Am., Building a Solar Future: Repowering America’s Homes, Businesses and Industry with Solar Energy (Mar. 9, 2010), <http://www.environmentamerica.org/reports/ame/building-solar-future-repowering-america%E2%80%99s-homes-businesses-and-industry-solar-energy> (“[T]he price of many solar technologies is declining rapidly.”).

⁸¹ Cf. U.S. ENERGY INFO. ADMIN., *supra* note 65 (explaining that because there are “limited alternatives” to natural gas consumption, small changes in supply or demand can result in large price movements that will bring the supply and demand back into a balance); ENVTL. DEF. FUND, *supra* note 65 (stating that stronger oversight and regulation will increase the cost of gas production); RES. FOR THE FUTURE, *supra* note 65, at 9 (“A carbon tax would result in higher prices for carbon-intensive goods and services, potentially rewarding innovation and investment in renewable energy, energy efficiency, carbon sequestration, and other technologies”).

⁸² Cf. Julie Johnsson & Mark Chediak, *Electricity Declines 50% as Shale Spurs Natural Gas Glut: Energy*, BLOOMBERG (Jan. 17, 2012, 4:26 PM), <http://www.bloomberg.com/news/2012-01-17/electricity-declines-50-in-u-s-as-shale-brings-natural-gas-glut-energy.html> (stating that because wholesale electricity and natural gas prices have dropped, energy producers are expected to postpone or abandon coal, nuclear and wind projects).

⁸³ See *Munn v. Illinois*, 94 U.S. 113, 126 (1876) (explaining that property devoted for public use must then be “controlled by the public”); *Jersey Cent. Power & Light Co. v. F.E.R.C.*, 810 F.2d 1168, 1189 (D.C. Cir. 1987) (noting the concessions utility businesses make to obtain “a monopoly on service in a particular geographical area”).

2015] SOLAR DISTRICT HEATING IN THE U.S. 185

state governmental function.⁸⁴ State legislation defines the enterprises over which the state utility commission exercises jurisdiction, and specific enabling statutes differ widely from state to state.⁸⁵ If there is ambiguity in the applicability of state utility regulation to a particular enterprise, courts are the ultimate arbiters of the meaning of statutes.⁸⁶

For illustrative purposes, we examine the applicability of public utility law to SDH systems in the top ten states for solar energy by total installed capacity as of 2013: California (5,660 MW), Arizona (1,822 MW), New Jersey (1,211 MW), North Carolina (557 MW), Nevada (450 MW), Massachusetts (440 MW), Hawaii (343 MW), Colorado (331 MW), New York (247 MW), and New Mexico (236 MW).⁸⁷ These states have seen substantial deployment of other solar energy technologies, either because of supportive policy environments, exceptional solar resources, or both.⁸⁸ If SDH were to find a foothold as a new industry in the United States, it stands to reason that these states would be logical places to begin, and investors would need to know whether new projects would find themselves subject to the complexities of cost of service regulation or, alternately, enjoy the flexibility and profit opportunities more typically associated with disruptive technologies and business models.⁸⁹

A disclaimer before we begin: a state-specific analysis beyond the scope of this article would be required for any potential SDH

⁸⁴ See *Munn*, 94 U.S. at 135–36 (upholding a state statute regulating the public storage of grain in a warehouse).

⁸⁵ See discussion *infra* Parts IV.A.1–10.

⁸⁶ See *Marbury v. Madison*, 5 U.S. 137, 177 (1803) (“It is emphatically the province and duty of the judicial department to say what the law is. Those who apply the rule to particular cases, must of necessity expound and interpret that rule. If two laws conflict with each other, the courts must decide on the operation of each.”).

⁸⁷ See SOLAR ENERGY INDUS. ASS’N., 2013 TOP 10 SOLAR STATES (2014), <http://www.seia.org/sites/default/files/resources/Top-10-Solar-States-Infographic.pdf>.

⁸⁸ See CHARLES KUBERT & MARK SINCLAIR, STATE SUPPORT FOR CLEAN ENERGY DEPLOYMENT: LESSONS LEARNED FOR POTENTIAL FUTURE POLICY vi-viii (Nat’l Renewable Energy Lab. 2011), <http://www.nrel.gov/docs/fy11osti/49340.pdf>; D. RENN. . . ET AL., SOLAR RESOURCE ASSESSMENT 1 (Nat’l Renewable Energy Lab. 2008), <http://www1.eere.energy.gov/solar/pdfs/42301.pdf> (“[M]uch of the analysis and planning that resulted from this [2008] study can proceed rapidly.”).

⁸⁹ See generally Joel B. Eisen, *Can Urban Solar Become a “Disruptive” Technology?: The Case for Solar Utilities*, 24 NOTRE DAME J.L. ETHICS & PUB. POL’Y 53, 92–93 (2010) (discussing options for disruptive business models for solar PV technologies).

system under consideration, and inquiries to the state public utility commission or its equivalent as to the classification of SDH within the regulatory framework would be prudent before commitment of any investment. In the absence of any such concrete cases to date, we must engage in an initial examination of the law on the books, which of course differ from state to state, sometimes dramatically.

1. California

California's state code defines public utilities generally:

Public utility" includes every common carrier, toll bridge corporation, pipeline corporation, gas corporation, electrical corporation, telephone corporation, telegraph corporation, water corporation, sewer system corporation, and heat corporation, where the service is performed for, or the commodity is delivered to, the public or any portion thereof.⁹⁰

Whenever any common carrier, toll bridge corporation, pipeline corporation, gas corporation, electrical corporation, telephone corporation, telegraph corporation, water corporation, sewer system corporation, or heat corporation performs a service for, or delivers a commodity to, the public or any portion thereof for which any compensation or payment whatsoever is received, that common carrier, toll bridge corporation, pipeline corporation, gas corporation, electrical corporation, telephone corporation, telegraph corporation, water corporation, sewer system corporation, or heat corporation, is a public utility subject to the jurisdiction, control, and regulation of the commission and the provisions of this part.⁹¹

"Heat corporations" are further defined in the code to include "every corporation or person owning, controlling, operating, or managing any heating plant for compensation within this state, except where heat is generated on or distributed by the producer through private property alone solely for his own use or the use of his tenants and not for sale to others."⁹² This would seem to suggest that any SDH facility furnishing heat to the public would qualify as a public utility in California. However, another code

⁹⁰ CAL. PUB. UTIL. CODE § 216(a) (West 2014).

⁹¹ *Id.* § 216(b).

⁹² *Id.* § 224.

2015] SOLAR DISTRICT HEATING IN THE U.S. 187

provision, § 216, specifically considers entities involved in geothermal, solar, or cogeneration activities:

Any corporation or person engaged directly or indirectly in developing, producing, transmitting, distributing, delivering, or selling any form of heat derived from geothermal or solar resources or from cogeneration technology to any privately owned or publicly owned public utility, or to the public or any portion thereof, is not a public utility within the meaning of this section solely by reason of engaging in any of those activities.⁹³

§ 216 would thus exempt operators of SDH systems from public utility status, so long as they were not engaged in other activities that would result in their classification as public utilities.⁹⁴

2. Arizona

The Constitution of the State of Arizona defines “public service corporations” as:

All corporations other than municipal engaged in furnishing gas, oil, or electricity for light, fuel, or power; or in furnishing water for irrigation, fire protection, or other public purposes; or in furnishing, for profit, hot or cold air or steam for heating or cooling purposes; or engaged in collecting, transporting, treating, purifying and disposing of sewage through a system, for profit; or in transmitting messages or furnishing public telegraph or telephone service, and all corporations other than municipal, operating as common carriers, shall be deemed public service corporations.⁹⁵

SDH systems may be classified as furnishing water for “other public purposes,” or as providing “hot . . . air or steam for heating or cooling,” and thus be deemed public utilities subject to regulation by the Arizona Corporation Commission, so long as they are operated for profit, and not by a municipal corporation.⁹⁶ No exemption for solar or geothermal systems from public utility

⁹³ *Id.* § 216(e).

⁹⁴ *See id.* (noting that the statute would exempt operators of SDH systems from public utility status, but must not be engaged in other activities where they could be classified as public utilities).

⁹⁵ ARIZ. CONST. art. 15, § 2.

⁹⁶ *See id.* (explaining that SDH systems may be deemed public utilities and subject to regulation, but only if they are operated for profit and not by a municipal corporation).

regulation exists in Arizona's state code or regulations.

3. New Jersey

New Jersey's statute governing public utilities states in § 48:2-13(a):

The term "public utility" shall include every individual, copartnership, association, corporation or joint stock company, their lessees, trustees or receivers appointed by any court whatsoever, their successors, heirs or assigns, that now or hereafter may own, operate, manage or control within this State any railroad, street railway, traction railway, autobus, charter bus operation, special bus operation, canal, express, subway, pipeline, gas, electricity distribution, water, oil, sewer, solid waste collection, solid waste disposal, telephone or telegraph system, plant or equipment for public use, under privileges granted or hereafter to be granted by this State or by any political subdivision thereof.⁹⁷

Heat supply is not listed under the affirmative inclusion of enterprises under control of public utility regulations. However, subsection (e) in the same section states:

Notwithstanding the provisions of subsection a. of this section, the board shall have the authority to classify as regulated the sale of any thermal energy service by a cogenerator or district heating system, for the purpose of providing heating or cooling to a residential dwelling if, after notice and hearing, it determines that the customer does not have sufficient space on its property to install an alternative source of equivalent thermal energy, there is no contract governing the provision of thermal energy service for the relevant period of time, and that sufficient competition is no longer present, based upon consideration of such factors as: ease of market entry; presence of other competitors; and the availability of like or substitute services in the relevant geographic area. Upon such a classification, the board may determine such rates for the thermal energy service for the purpose of providing heating or cooling to a residential dwelling as it finds to be consistent with the prevailing cost of alternative sources of thermal energy in similar situations. The board, however, shall continue to monitor the thermal energy service to such residential dwellings and, whenever the board finds that the thermal energy service has again become sufficiently competitive pursuant to the criteria listed above, the

⁹⁷ N.J. STAT. ANN. § 48:2-13(a) (West 2014).

2015] SOLAR DISTRICT HEATING IN THE U.S. 189

board shall cease to regulate the sale or production of the service. The board shall not have the authority to regulate the sale or production of steam or any other form of thermal energy, including hot and chilled water, to non-residential customers.⁹⁸

We can see in subsection (e) that the legislature of New Jersey considered the possibility of competition between thermal energy suppliers and other services, such as electric or gas utilities, and has provided a test for determining public utility status for thermal energy suppliers on an *ad hoc* basis. Such a test would control the Board of Public Utility Commissioner's determinations of public utility status for SDH systems.⁹⁹ Note the similarities between New Jersey's statutory test for public utility status and the inquiries performed by courts in *Serv-Yu* and *SZ Enterprises*, which we examine *infra*.¹⁰⁰ All of these tests consider the presence or absence of competition between different energy suppliers as a critical factor in determining public utility status.

4. North Carolina

North Carolina's N.C.G.S. § 62-3(23) states:

"Public utility" means a person, whether organized under the laws of this State or under the laws of any other state or country, now or hereafter owning or operating in this State equipment or facilities for... [p]roducing, generating, transmitting, delivering or furnishing electricity, piped gas, steam or any other like agency for the production of light, heat or power to or for the public for compensation; provided, however, that the term "public utility" shall not include persons who construct or operate an electric generating facility, the primary purpose of which facility is for such person's own use and not for the primary purpose of producing electricity, heat, or steam for sale to or for the public for compensation.¹⁰¹

North Carolina's broad public utility definition includes both

⁹⁸ *Id.* § 48:2-13(e).

⁹⁹ *See id.* (explaining the test provided for under the statute would control the Board of Public Utility Commissioner's public utility status for SDH systems).

¹⁰⁰ *See* discussion *infra* Part IV.B (discussing the *Serv-Yu* factors which are similar to New Jersey's statutory test for public utility status).

¹⁰¹ N.C. GEN. STAT. ANN. § 62-3(23)(a)(1) (West 2014).

typical commodities such as electricity and gas and “other like agenc(ies)” for the production of light, heat, and power for the public.¹⁰² No exemption exists in the public utilities statute for geothermal or solar energy facilities. SDH systems serving the public would thus likely be classified as a public utility in North Carolina under current law.

5. Nevada

Nevada’s public utility statute provides:

“Public utility” or “utility” . . . includes:

(a) Any plant or equipment, or any part of a plant or equipment, within this State for the production, delivery or furnishing for or to other persons, including private or municipal corporations, heat, gas, coal slurry, light, power in any form or by any agency, water for business, manufacturing, agricultural or household use, or sewerage service, whether or not within the limits of municipalities.¹⁰³

By defining utilities according to both specific commodities and end-services such as heat and light, Nevada provides its commission with broad jurisdiction that would likely include SDH systems. The inclusion of municipal corporations within the ambit of state-regulated public utilities is unusual; in many other states, municipal utilities are immune to state utility regulation because they are not-for-profit entities that are politically accountable to municipal voters.¹⁰⁴ So while in the other states we have examined here, an SDH system could avoid utility regulation if it were owned and operated by a municipal corporation, Nevada would not provide such an exemption.

Nevada law exempts some third-party renewable energy systems that produce electricity from utility regulation:

¹⁰² See *id.* (noting that the North Carolina definition of “public utility” is so broad that it includes all typical commodities of gas and electric, including other like agencies that are established for the production of light, heat and power for the public).

¹⁰³ NEV. REV. STAT. ANN. § 704.020(2)(a) (West 2014).

¹⁰⁴ See THE REGULATORY ASSISTANCE PROJECT, ELECTRICITY REGULATION IN THE U.S.: A GUIDE 11 (Mar. 2011), www.raonline.org/docs/RAP_Lazar_ElectricityRegulationInTheUS_Guide_2011_03.pdf (explaining that the regulation of municipal utilities in “most states . . . is left to local governmental bodies and electrical utility boards”).

2015] SOLAR DISTRICT HEATING IN THE U.S. 191

“Public utility” or “utility” does not include:

10. Persons who for compensation own or operate individual systems which use renewable energy to generate electricity and sell the electricity generated from those systems to not more than one customer of the public utility per individual system if each individual system is: (a) Located on the premises of another person; (b) Used to produce not more than 150 percent of that other person’s requirements for electricity on an annual basis for the premises on which the individual system is located; and (c) Not part of a larger system that aggregates electricity generated from renewable energy for resale or use on premises other than the premises on which the individual system is located.

As used in this subsection, “renewable energy” has the meaning ascribed to it in NRS 704.7811.¹⁰⁵

No such exemption currently exists in Nevada law for thermal energy systems utilizing renewable energy, and so SDH systems serving other persons in Nevada would all presumably be regulated as utilities.

6. Massachusetts

Not all states have definitions for the term “public utility,” instead defining each type of service separately. The Massachusetts state code, for example, defines a “steam distribution company” as:

[A] person, firm, partnership, association or private corporation organized or operating under the laws of the commonwealth with the primary purpose of operating a plant, equipment or facilities for the manufacture, production, transmission, furnishing or distribution of steam to or for the public for compensation within the commonwealth; provided, however, that steam distribution company shall not include: (i) an entity producing or distributing steam exclusively on private property and solely for use by the entity or the entity’s tenant, and not for distribution or sale; or (ii) a company that produces and sells steam as a by-product of the production of electricity for sale in the wholesale electricity markets and does not own or operate pipelines off site of the generating facility for the distribution of steam.¹⁰⁶

¹⁰⁵ NEV. REV. STAT. ANN. § 704.020(10)(a)–(c) (West 2014).

¹⁰⁶ MASS. GEN. LAWS ANN. ch. 164, § 1 (West 2014).

The code places steam distribution companies under the jurisdiction of the Department of Public Utilities, which:

[S]hall have supervision of facilities operated by steam distribution companies for the sole purpose of ensuring public safety and shall establish reasonable rules and regulations pertaining to the construction and operation of steam distribution facilities and equipment used in manufacturing and transporting steam. The department shall keep itself informed as to the methods, practices, and condition of all facilities and equipment associated with the distribution of steam, including ducts and conduits, and shall make such examinations and investigations of the steam distribution system as necessary, including the adequacy of operation, maintenance and capital improvements to insure safe operation of facilities operated by a steam distribution company.¹⁰⁷

The “sole purpose” language in the grant of jurisdiction makes clear that the state’s role in steam distribution regulation is limited to safety issues, and does not include regulation of rates and returns associated with economic regulation of monopolies.¹⁰⁸ It is also notable that Massachusetts has restructured its retail electric service sector so as to now require electric companies “to accommodate retail access to generation services and choice of suppliers by retail customers.”¹⁰⁹ Thus unlike traditional utility regulation, which regulates rates in the public interest, Massachusetts has embraced a competitive model that requires utilities to allow usage of distribution infrastructure by other suppliers, a system meant to control rates through competition.¹¹⁰ Massachusetts exempts alternative energy producers from its definition of “electric company,”¹¹¹ and so an SDH system providing both heat and electricity directly to customers would presumably not be required to allow open access to its distribution lines to competitors.

¹⁰⁷ *Id.* ch. 164B, § 1.

¹⁰⁸ *See id.* (emphasizing that the “sole purpose” language in the statute limits the state’s role to strictly safety issues).

¹⁰⁹ *Id.* ch. 164, § 1A(a).

¹¹⁰ *See* THE ELEC. ENERGY MKT. COMPETITION TASK FORCE, REPORT TO CONGRESS ON COMPETITION IN WHOLESALE AND RETAIL MARKETS FOR ELECTRIC ENERGY 2 (Apr. 2007), <http://www.ferc.gov/legal/fed-sta/ene-pol-act/epact-final-rpt.pdf> (discussing market based utility regulation).

¹¹¹ MASS. GEN. LAWS ANN. ch. 164, § 1.

2015] SOLAR DISTRICT HEATING IN THE U.S. 193**7. Hawaii**

Hawaii's state code defines "public utility" to include in part:

[E]very person who may own, control, operate, or manage as owner, lessee, trustee, receiver, or otherwise, whether under a franchise, charter, license, articles of association, or otherwise, any plant or equipment, or any part thereof, directly or indirectly ... for the production, conveyance, transmission, delivery, or furnishing of light, power, heat, cold, water, gas, or oil.¹¹²

It exempts, however, providers of seawater-based district cooling and renewable energy systems on customer property from public utility classification:

(K) Any person who owns, controls, operates, or manages any seawater air conditioning district cooling project; provided that at least fifty per cent of the energy required for the seawater air conditioning district cooling system is provided by a renewable energy resource, such as cold, deep seawater;

(M) Any person who: (i) Owns, controls, operates, or manages a renewable energy system that is located on a customer's property; and (ii) Provides, sells, or transmits the power generated from that renewable energy system to an electric utility or to the customer on whose property the renewable energy system is located; provided that, for purposes of this subparagraph, a customer's property shall include all contiguous property owned or leased by the customer without regard to interruptions in contiguity caused by easements, public thoroughfares, transportation rights-of-way, and utility rights-of-way; and:

(N) Any person who owns, controls, operates, or manages a renewable energy system that is located on such person's property and provides, sells, or transmits the power generated from that renewable energy system to an electric utility or to lessees or tenants on the person's property where the renewable energy system is located; provided that: (i) An interconnection, as defined in section 269-141, is maintained with an electric public utility to preserve the lessees' or tenants' ability to be served by an electric utility; (ii) Such person does not use an electric public utility's transmission or distribution lines to provide, sell, or transmit electricity to lessees or tenants; (iii) At the time that the lease

¹¹² HAW. REV. STAT. ANN. § 269-1 (West 2014).

agreement is signed, the rate charged to the lessee or tenant for the power generated by the renewable energy system shall be no greater than the effective rate charged per kilowatt hour from the applicable electric utility schedule filed with the public utilities commission; (iv) The rate schedule or formula shall be established for the duration of the lease, and the lease agreement entered into by the lessee or tenant shall reflect such rate schedule or formula; (v) The lease agreement shall not abrogate any terms or conditions of applicable tariffs for termination of services for nonpayment of electric utility services or rules regarding health, safety, and welfare; (vi) The lease agreement shall disclose: (1) the rate schedule or formula for the duration of the lease agreement; (2) that, at the time that the lease agreement is signed, the rate charged to the lessee or tenant for the power generated by the renewable energy system shall be no greater than the effective rate charged per kilowatt hour from the applicable electric utility schedule filed with the public utilities commission; (3) that the lease agreement shall not abrogate any terms or conditions of applicable tariffs for termination of services for nonpayment of electric utility services or rules regarding health, safety, and welfare; and (4) whether the lease is contingent upon the purchase of electricity from the renewable energy system; provided further that any disputes concerning the requirements of this provision shall be resolved pursuant to the provisions of the lease agreement or chapter 521, if applicable; and (vii) Nothing in this section shall be construed to permit wheeling.¹¹³

Hawaii defines “renewable energy system” as:

[A]ny identifiable facility, equipment, apparatus, or the like that converts renewable energy, as defined in section 269-91, to useful thermal or electrical energy for heating, cooling, or reducing the use of other types of energy that are dependent on fossil fuel for their generation.¹¹⁴

It provides further that geothermal steam providers are exempt from public utility status, though it makes no mention of whether such systems would include augmentation of geothermal resources by solar means:

The producer of geothermal steam or electricity generated from geothermal steam shall be excluded from coverage of the term

¹¹³ *Id.*

¹¹⁴ *Id.*

2015] SOLAR DISTRICT HEATING IN THE U.S. 195

“public utility” as defined in section 269-1.¹¹⁵

Hawaii’s code is not entirely clear as to whether an SDH system providing only heat would be classified as a public utility or not. SDH would qualify as a “renewable energy system” under the state’s definition, as it converts renewable energy to useful thermal energy.¹¹⁶ But the language of the exemptions from public utility status require that the renewable energy system “provides, sells, or transmits the power generated from that renewable energy system to an electric utility or to lessees or tenants on the person’s property where the renewable energy system is located.”¹¹⁷ This would suggest that the exemption only applies to renewable energy systems producing power, and not ones providing thermal energy.

If an SDH system also produced electric power, it would qualify for the exemption, so long as it were located on a contiguous plot of customer property, such as a city block owned by a single entity. A larger SDH system serving multiple customers, however, would fall outside the exemption’s ambit and be subject to public utility classification.¹¹⁸ It is also unclear whether an SDH-BTES system would be further exempted through classification as a “producer of geothermal steam.”¹¹⁹

8. Colorado

Colorado defines “public utility” to include:

[E]very common carrier, pipeline corporation, gas corporation, electrical corporation, telephone corporation, water corporation, person, or municipality operating for the purpose of supplying the public for domestic, mechanical, or public uses and every corporation, or person declared by law to be affected with a public interest, and each of the preceding is hereby declared to be a public utility and to be subject to the jurisdiction, control, and regulation of the commission.¹²⁰

¹¹⁵ *Id.* § 269-27.1(b).

¹¹⁶ *See id.* § 269-1 (“Renewable energy system’ means any identifiable facility, equipment, apparatus, or the like that converts renewable energy, as defined in section 269-91, to useful thermal or electrical energy.”); *see also* SPX CORP., *supra* note 3 (explaining that SDH systems generate heat).

¹¹⁷ HAW. REV. STAT. ANN. § 269-1 (West 2014).

¹¹⁸ *Id.*

¹¹⁹ *Id.* § 269-27.1(b).

¹²⁰ COLO. REV. STAT. ANN. § 40-1-103(1)(a)(I) (West 2014).

Colorado has unique legislation for geothermal heat providers:

The general assembly hereby declares that geothermal heat is a valuable, indigenous resource, the development of which will enhance local economies, and that it is in the public interest of the state to promote the development of geothermal heat supply systems. Therefore, it is the policy of this state to remove the barriers to such development which might result from the imposition of comprehensive regulation by the public utilities commission.¹²¹

“Geothermal heat supplier” means any person who supplies geothermally heated groundwater or other substances to the public or other customers for industrial process heat, commercial use, space heating, or other purposes. The term includes systems which enhance the thermal content of the substance supplied through the use of heat pumps, solar assistance, or other means.¹²²

Geothermal heat suppliers are found to be affected with the public interest and subject to the limited jurisdiction and regulation of the commission as described in this article only.¹²³

Geothermal heat suppliers which are selling at wholesale to other entities which are reselling the heat or converting it to electricity are exempt from the provisions of this article and any other provisions which might subject such geothermal heat suppliers to the jurisdiction of the commission.¹²⁴

Municipal and county geothermal heat suppliers acting alone, together, or in concert with private parties are exempt from the provisions of this article and any other provisions which might subject such entities to the jurisdiction of the commission, except as to service provided outside of their boundaries.¹²⁵

Some states deal with geothermal heat elsewhere in their codes, primarily involving matters of project development and permitting.¹²⁶ The only state that explicitly contemplates a coupling of geothermal heat with solar energy, though, is

¹²¹ *Id.* § 40-40-102.

¹²² *Id.* § 40-40-103(2).

¹²³ *Id.*

¹²⁴ *Id.*

¹²⁵ *Id.* § 40-40-104(1)–(3).

¹²⁶ *See e.g.*, HAW. REV. STAT. ANN. § 269-27.1 (West 2014).

2015] SOLAR DISTRICT HEATING IN THE U.S. 197

Colorado. This is relevant to SDH prospects because the geothermal heat supplier exemption is broader than the state's exemption for third-party solar energy:

The supply of electricity or heat to a consumer of the electricity or heat from solar generating equipment located on the site of the consumer's property, which equipment is owned or operated by an entity other than the consumer, shall not subject the owner or operator of the on-site solar generating equipment to regulation as a public utility by the commission if the solar generating equipment is sized to supply no more than one hundred twenty percent of the average annual consumption of electricity by the consumer at that site. For purposes of this paragraph (c), the consumer's site shall include all contiguous property owned or leased by the consumer, without regard to interruptions in contiguity caused by easements, public thoroughfares, transportation rights-of-way, or utility rights-of-way.¹²⁷

Third party solar systems providing heat or electricity must be located on customer property and be limited in capacity to qualify for an exemption from public utility regulation. But an SDH project with a BTES component could constitute a geothermal heat supplier under C.R.S. § 40-40-103, which allows for the use of "solar assistance."¹²⁸ If it did, an SDH system would be exempt from utility regulation in Colorado, irrespective of size or collector location, so long as the heat or electricity is sold at wholesale to a retail reseller. Also notable is that cities and counties acting as geothermal heat suppliers are exempt from utility regulation, reflecting Colorado's historical commitment to autonomy for home-rule municipalities.¹²⁹

9. New York

The state of New York provides for extensive regulation of "steam corporations" providing heat as public utilities.¹³⁰ Exemptions from regulation exist for self-contained systems providing heat only to the owner, steam produced from co-generation or alternative energy facilities, and steam produced

¹²⁷ COLO. REV. STAT. ANN. § 40-1-103(2)(c) (West 2014).

¹²⁸ *Id.* § 40-40-103(2).

¹²⁹ *Id.* § 40-40-102.

¹³⁰ See N.Y. PUB. SERV. LAW § 80 (McKinney 2014) (discussing the "General powers of [the] commission in respect to steam heating").

by non-profit cooperatives:

The term “steam corporation,” when used in this chapter, includes every corporation, company, association, joint stock association, partnership and person, their lessees, trustees or receivers appointed by any court whatsoever owning, operating or managing any steam plant, (a) except where steam is made or produced and distributed by the maker, on or through private property solely for the maker’s own use or the use of the maker’s tenant and not for sale to others, (b) except where steam is made or produced by the maker solely from one or more co-generation or alternate energy production facilities or distributed solely from one or more of such facilities to users located at or near a project site or (c) except where steam is made or produced and distributed solely for the use of its members by a non-profit cooperative corporation organized under the cooperative corporations law.¹³¹

New York further defines “alternate energy production facility,” to include:

[A]ny solar, wind turbine, fuel cell, tidal, wave energy, waste management resource recovery, refuse-derived fuel, wood burning facility, or energy storage device utilizing batteries, flow batteries, flywheels or compressed air, together with any related facilities located at the same project site, with an electric generating capacity of up to eighty megawatts, which produces electricity, gas or useful thermal energy.¹³²

Thus a solar district heating-only system would qualify as an alternate energy production facility under New York’s exemptions because it uses solar energy to produce useful thermal energy. Additional components of the system that produce electricity, such as concentrating solar power, would be limited to eighty megawatts or face utility regulation. A BTES component, though not an energy storage device “utilizing batteries, flow batteries, flywheels or compressed air,” would be a “related facility” located on-site and thus also qualify for exemption.¹³³

¹³¹ *Id.* § 2(22).

¹³² *Id.* § 2(2-b).

¹³³ *See Capturing the Solar Thermal Energy*, *supra* note 29 (indicating that rather than using batteries or compressed air, borehole thermal energy storage utilizes ground insulation in close proximity to solar energy collection).

10. New Mexico

New Mexico defines “public utility,” *inter alia*, as:

[E]very person not engaged solely in interstate business and, except as stated in Sections 62-3-4 and 62-3-4.1 NMSA 1978, that may own, operate, lease or control . . . (4) any plant, property or facility for the production, transmission, conveyance, delivery or furnishing to or for the public of steam for heat or power or other uses.¹³⁴

An exemption exists for “any person not otherwise a public utility who furnishes the service or commodity only to himself, his employees or tenants, when such service or commodity is not resold to or used by others.”¹³⁵ An SDH facility serving its owner or the employees or tenants of that owner would qualify for the exemption. A system serving the public would be subject to public utility regulation. The interplay of the exemption with the primary definition leaves little room for anything in-between, such as a system serving non-employees or non-tenants but not large enough to constitute “the public.” If we employ the canon of statutory construction entitled *expressio unius est exclusio alteris*, it suggests that had the legislature intended to exempt such service from utility regulation, the exemption provided would not have been so specifically tailored to apply only to building owners, employees, and tenants.¹³⁶

11. Summary Table of Statutory Findings

We have constructed a table of findings (Table 1) from our state statute examination, and here summarize likely classifications of SDH systems as subject to utility regulation or not according to our most earnest attempts at a plain reading of the statute, differentiated by the size and composition of the system.¹³⁷ For each of the ten states examined, we consider

¹³⁴ N.M. STAT. ANN. § 62-3-3(G)(4) (West 2014).

¹³⁵ *Id.* § 62-3-4(A)(1).

¹³⁶ *Cf.* *Andrus v. Glover Constr. Co.*, 446 U.S. 608, 616–17 (1980) (“Where Congress explicitly enumerates certain exceptions to a general prohibition, additional exceptions are not to be implied, in the absence of a contrary legislative intent.”).

¹³⁷ The table and findings do not include interpretations by state agencies or courts of ambiguous language in the statutes, which we consider in the following sub-section. See discussion *infra* Table 1 (showing prospective regulatory classifications of SDH systems under relevant statutory language in

whether, based on existing statutory language, utility regulation would be likely to extend over SDH systems serving: (a) only their owner; (b) other persons, such as neighboring buildings or blocks, within a limited geographic area; (c) “the public,” meaning sufficient quantities and types of customers to constitute a public interest in the service, as defined by state regulators or courts; and (d) “the public” with additional sales of electricity through a hybrid heat/electricity cogeneration system such as concentrating solar power (CSP) or other technologies. Note that we use the term “regulated” in a specific sense, to refer to economic regulation — that is, the control of rates charged by the entity to customers.

SDH systems located entirely on-site and serving only their owners are almost universally exempted from utility regulation, as there is no sale of energy between parties. Great diversity exists from state to state as to how SDH systems serving others or the public would be treated. Based on our initial review, the states with the least likelihood of regulatory interference with the profit-driven development of medium-to-large scale SDH systems serving multiple customers are California, Massachusetts, Colorado, and New York. This is because under current law in each of these states, SDH systems serving the public would be exempt from rate regulation and could charge market rates for service according to the price of electricity or gas.

ten states). These interpretations, if relevant, might govern the dividing line between SDH systems serving a limited number of customers and SDH systems serving “the public.”

State (in descending order according to the amount of cumulative installed solar energy capacity in the state as of 2013)	SDH serving only property owner	SDH serving other persons, but not “the public”	SDH serving “the public”	SDH serving “the public” and producing both heat and electricity
California	Not regulated	Not regulated	Not regulated	Not regulated
Arizona	Not regulated	Regulated, if for profit, to residential customers	Regulated, if for profit	Regulated, if for profit
New Jersey	Not regulated	May be regulated, if sufficient competition is not deemed present	May be regulated, if sufficient competition is not deemed present	May be regulated, if sufficient competition is not deemed present
North Carolina	Not regulated	Not regulated	Regulated	Regulated
Nevada	Not regulated	Regulated	Regulated	Regulated
Massachusetts	Not regulated	Not regulated	Only regulated for public safety	Only regulated for public safety
Hawaii	Ambiguous (exemption only contemplates power generation)	Ambiguous (exemption only contemplates power generation)	Regulated	Regulated, unless electricity sales are only to others on property or an electric utility at wholesale.
Colorado	Not regulated if limited in size	Not regulated if limited in size, or coupled with BTES system and selling heat at wholesale.	Not regulated if coupled with BTES system and selling at wholesale, or operated by or in concert with city or county heat suppliers	Not regulated if coupled with BTES system and selling at wholesale, or operated by or in concert with city or county heat suppliers
New York	Not regulated	Not regulated	Not regulated	Regulated, unless electrical generation capacity is below 80 MW.
New Mexico	Not regulated	Regulated	Regulated	Regulated

Table 1: Prospective Regulatory Classifications of SDH systems under Relevant Statutory Language in Ten States

B. Case law: What Constitutes Service “to the Public?”

Some state statutes, such as those in North Carolina and Colorado, demarcate public utility status according to the provision of a service to “the public.”¹³⁸ This language necessarily implies that the provision of services to some customer or

¹³⁸ See COLO. REV. STAT. ANN. § 40-1-103(1)(a)(I) (West 2014) (defining “public utility” to mean service to the public); see also N.C. GEN. STAT. ANN. § 62-3 (West 2014) (describing “public utility” in terms of service to the public).

customers that do not constitute “the public” would not classify an entity as a public utility in such states. Canons of statutory interpretation further imply that such a category of service provision must theoretically exist, lest the phrase in the statute be meaningless.¹³⁹ And even in states where such language does not appear, such as Arizona, courts have interpreted public utility classification to require a nexus between the activities of an entity and the public interest or concern.¹⁴⁰ Thus a plain reading of statutory language alone, as we have done for the previous sub-section’s analysis, may not be entirely dispositive of the state of the law in a particular jurisdiction. In this subsection, we explore a recent court ruling regarding the public utility status of third-party power purchase agreement (PPA) solar PV systems, which are perhaps our closest analogue to SDH systems in the United States from a business perspective.¹⁴¹

In *SZ Enterprises v. Iowa Utilities Board*, Eagle Point Solar, a third-party financier for a “behind-the-meter” solar PV system

¹³⁹ The canon against surplusage stands for the principle that “[a] statute should be construed so that effect is given to all its provisions, so that no part will be inoperative or superfluous, void or insignificant.” *Corley v. U.S.*, 556 U.S. 303, 314 (2009) (internal quotations omitted).

¹⁴⁰ *See, e.g., Sw. Transmission Coop. v. Ariz. Corp. Comm’n*, 142 P.3d 1240, 1243 (Ariz. Ct. App. 2006) (“Determining whether an entity is a public service corporation requires a two-step analysis. First, we consider whether the entity satisfies the literal and textual definition of a public service corporation under Article 15, Section 2 of the Arizona Constitution. Second, we evaluate whether the entity’s business and activity are such ‘as to make its rates, charges, and methods of operations a matter of public concern.’”) (internal citation omitted); *see also Griffith v. N.M. Pub. Serv. Comm’n*, 520 P.2d 269, 272 (N.M. 1974) (“[S]ales to sufficient of the public to clothe the operation with a public interest, as well as the specific language of the statute, will determine whether or not the operation of a water system is for public use.”); *El Vadito de los Cerrillos Water Ass’n v. N.M. Pub. Serv. Comm’n*, 858 P.2d 1263, 1270 (N.M. 1993) (“[P]ublic utilities are clearly characterized by an interest in serving the public at large, or a willingness to extend service to an indefinite public, without restricting service to privileged individuals.”) (internal citation omitted).

¹⁴¹ Third party PPA solar is similar to SDH in that involves an entity other than a homeowner owning and operating renewable energy equipment on or near customer property and selling output to the customer. *See SZ Enters. v. Iowa Util. Bd.*, 850 N.W.2d 441, 453 (Iowa 2014) (describing how a third-party power purchase agreement functions). It differs from SDH, however, in that an SDH system shares its collected energy among all of its customers, while the typical third party solar PPA might only involve the solar company and a single customer on whose property the equipment is installed. *See Capturing the Solar Thermal Energy*, *supra* note 29 (diagramming how a solar district heating system shares collected heat among many homes); *see also SZ Enters.*, 850 N.W.2d at 453 (indicating that a single customer will be involved in a PPA arrangement).

2015] SOLAR DISTRICT HEATING IN THE U.S. 203

installed on a city building, appealed a decision of the Iowa Utilities Board (IUB) that had precluded it from installing and operating the system.¹⁴² By classifying Eagle Point as a “public utility” and an “electric utility,” the IUB had prevented Eagle Point from providing electric service to customers within the exclusive service territory of the incumbent electric utility.¹⁴³ To date, *SZ Enterprises* is the only appellate court decision in the United States that has considered whether third-party PPA solar is a public utility under the laws of its state.¹⁴⁴

In its decision, the Iowa Supreme Court noted the importance of non-utility classification to the fledgling third-party PPA industry, raising some of the same issues we have covered in this article for SDH:

A fundamental legal question . . . is whether PPAs may coexist with traditional public utilities within the existing state regulatory environment. A threshold question is often whether the developer-owner in a third-party PPA is a public utility or electric supplier subject to state regulation. This definitional question often turns on whether the developer-owner in a third-party PPA is regarded as furnishing or supplying electricity “to the public.” The consequences of this threshold determination are critical to the viability of third-party PPAs. In states where public utilities have exclusive service areas, a finding that a PPA is a public utility generally means that a PPA violates the exclusive territory provisions of state law and is thus unlawful. In states where public utilities do not have exclusive service areas, the consequence is that PPAs may be subject to substantial regulation as a public utility, including requirements to submit tariffs and to provide service to all who desire it.¹⁴⁵

The court recognized the existence of two divergent lines of authority across the country for determining whether an

¹⁴² See *SZ Enters.*, 850 N.W.2d at 444 (outlining the procedural history wherein Eagle Point Solar appealed from the Iowa Utilities Board decision). Third-party financiers install their PV equipment on the customer’s side of the electricity meter and sell the electricity the system generates back to consumers at a predetermined rate in a power purchase agreement (PPA). *Id.* at 453.

¹⁴³ *Id.* at 444.

¹⁴⁴ *Id.* at 456 (“Aside from [a Florida case involving cogeneration], the parties have not cited, and we have not found, appellate caselaw on the question of whether the developer-owner under a PPA is a public utility within the scope of regulatory statutes.”). The court did review several state regulatory body decisions that had considered the question, of which Arizona, Nevada, New Mexico, and Oregon had all concluded that developer- owners of PPAs were not public utilities under the relevant statutes. *Id.*

¹⁴⁵ *Id.* at 454 (internal citations omitted).

enterprise is a public utility.¹⁴⁶ One method requires that the entity “directly or indirectly hold itself out as providing service to all comers,” and thus “a business that provides sporadic services of a commodity that might ordinarily be associated with a public utility might not be drawn within the ambit of regulation.”¹⁴⁷ The second method the court describes as more “flexible” and “functional,” concentrating on “the nature of the underlying service and whether there is a sufficient public need for regulation.”¹⁴⁸ Iowa precedent follows this second method, examining the nature of the service and weighing it alongside policy factors enumerated in prior case law, such as *Iowa State Commerce Commission v. Northern Natural Gas Co.*, which adopted factors from an Arizona case, *Natural Gas Service Co. v. Serv-Yu Coop.*¹⁴⁹

In *Northern*, the court defined “to the public” as meaning “sales to sufficient of the public to clothe the operation with a public interest.”¹⁵⁰ It uses the *Serv-Yu* factors for determining whether the sales were so clothed.¹⁵¹ The *Serv-Yu* factors are:

- (1) What the corporation actually does.
- (2) A dedication to public use.
- (3) Articles of incorporation, authorization, and purposes.
- (4) Dealing with the service of a commodity in which the public has been generally held to have an interest.
- (5) Monopolizing or intending to monopolize the territory with a public service commodity.
- (6) Acceptance of substantially all requests for service.
- (7) Service under contracts and reserving the right to discriminate is not always controlling.
- (8) Actual or potential competition with other corporations whose business is clothed with public interest.¹⁵²

Applying the *Serv-Yu* factors to Eagle Point, the *SZ Enterprises* court flies through factors one to seven in favor of Eagle Point’s non-utility classification with a lithe ease and a bounce in its

¹⁴⁶ See *id.* (explaining the differences in authority wherein under different circumstances an enterprise will be found to be a public utility).

¹⁴⁷ *Id.*

¹⁴⁸ *Id.*

¹⁴⁹ *Id.* at 462; *Iowa State Commerce Comm’n v. N. Natural Gas Co.*, 161 N.W.2d 111, 114–15 (Iowa 1968); *Natural Gas Serv. Co. v. Serv-Yu Coop.*, 219 P.2d 324, 325–26 (Ariz. 1950).

¹⁵⁰ *SZ Enters.*, 850 N.W.2d at 455 (quoting *N. Natural Gas Co.*, 161 N.W.2d at 115).

¹⁵¹ See *id.* at 458 (listing the eight *Serv-Yu* factors).

¹⁵² *Serv-Yu*, 219 P.2d at 325–26 (internal citations omitted).

rhetorical step:

[1] We have little doubt that the transaction is an arms-length transaction between a willing buyer and a willing seller. There is no reason to suspect any unusual potential for abuse.

[2] [T]he installation is no more dedicated to public use than the thermal windows or extra layers of insulation in the building itself. The behind-the-meter solar generating facility represents a private transaction between Eagle Point and the city.

[4] Although some may wish it so, behind-the-meter solar equipment is not an essential commodity required by all members of the public. It is, instead, an option for those who seek to lessen their utility bills or who desire to promote “green” energy. You can take it or leave it, and, so far, it seems, many leave it.

[5] There is simply nothing in the record to suggest that Eagle Point is a six hundred pound economic gorilla that has cornered defenseless city leaders in Dubuque. Indeed, the nature of the third-party PPA suggests the opposite, as the city has entered into what amounts to be a low risk transaction—it owes nothing unless the contraption on its rooftop actually produces valuable electricity.

[6 & 7] Eagle Point is not producing a fungible commodity that everyone needs. It is not producing a substance like water that everyone old or young will drink, or natural gas necessary to run the farms throughout the county. More specifically, Eagle Point is not providing electricity to a grid that all may plug into to power their devices and associated “aps,” [sic] or, more prosaically, their ovens, refrigerators, and lights. Instead, Eagle Point is providing a customized service to individual customers. Whether Eagle Point can even provide the service will depend on a number of factors, including the size and structure of the rooftop, the presence of shade or obstructions, and the electrical use profile of the potential customer. Further, if Eagle Point decides not to engage in a transaction with a customer, the customer is not left high and dry, but may seek another vendor while continuing to be served by a regulated electric utility. These are not characteristics ordinarily associated with activity “clothed with a public interest.”¹⁵³

While the language of the preceding analysis is both convincing and entertaining, it is in the court’s analysis of the eighth *Serv-*

¹⁵³ *SZ Enters.*, 850 N.W.2d at 466–67.

Yu factor that things get really interesting. IUB had argued that Eagle Point was taking the incumbent utility's most profitable customers, skimming the cream off the top and leaving only the dregs, and was thus interfering with the regulated utility's business.¹⁵⁴ The court finds this argument theoretically convincing, and even posits that "[i]f the third-party-PPA movement gets legs in Iowa, it is conceivable that demand for electricity from traditional utilities will be materially impacted in the long run."¹⁵⁵ As no such evidence appears in the record, the concern is moot for the court's purposes.¹⁵⁶

Still, the court suggests that a strong enough presence of competition with regulated utilities could overwhelm the other seven factors combined: "[t]he fighting issue in this case is whether factor eight in the *Serv-Yu* litany trumps the preceding factors."¹⁵⁷ At what level of material impact to demand might such a jurisprudential tipping point occur? We cannot know from *SZ Enterprises*, but we fret that much litigation in coming years may center around this hole in the defenses of third-party-PPA solar as well as other distributed renewable energy business models, if legislatures do not act to protect disruptive, distributed technologies from the protectionist legal strategies of incumbent utilities and their deep-pocketed holding companies.¹⁵⁸ As such,

¹⁵⁴ *See id.* at 467–68 (explaining that should Eagle Point be permitted to hand select the most lucrative customers, the established, regulated utility will be impacted).

¹⁵⁵ *Id.* at 468.

¹⁵⁶ *See id.* (indicating that nothing presented in the record of the case indicated any means of gauging the likelihood of such material impact, and emphasizing that there is no indication that Eagle Point's services will be used by customers of traditional electric suppliers).

¹⁵⁷ *Id.*

¹⁵⁸ The Iowa Utilities Board was joined in *SZ Enterprises* case by the Interstate Power and Light Company (the investor-owned utility serving the City of Dubuque), as well as its holding company Mid-American Energy, which recently changed its name to reflect its own holding company, Berkshire Hathaway, Inc. *See id.* at 444 (listing Interstate Power and Light Company and Mid-American Energy as appellants, and indicating that Interstate is the exclusive electricity service for Dubuque). Food for thought, as the implications of this information go well beyond the contours of this article; the new Berkshire Hathaway Energy boasted profits of \$1.64 billion in 2013 on revenues of \$12.74 billion, or 12.9 percent. It has \$70 billion in assets, serves 8.4 million customers, includes numerous subsidiaries, including PacifiCorp in the Pacific Northwest, and recently acquired NV Energy in Nevada for \$5.6 billion. Jonathan Stempel, *Buffett's MidAmerican Energy Adopts Berkshire Name*, REUTERS (Apr. 30, 2014, 3:07 PM), <http://www.reuters.com/article/2014/04/30/berkshirehathaway-midamerican-namechange-idUSL2N0NM21620140430>. Why is it so afraid of third-party-PPA solar?

2015] SOLAR DISTRICT HEATING IN THE U.S. 207

the decision marks an early battle in the war for retail energy provision between new market entrants and incumbent electric and gas utilities: an initial victory for profitable third-party-financing of distributed renewable energy, but an ambiguous one, as the decision also hands incumbent utilities a powerful weapon for limiting the growth of distributed renewable energy competitors in the future.

How does our hypothetical SDH system fare under the *Serv-Yu* factors? Does it serve the public and thus subject itself to utility regulation in Arizona, Hawaii, New Mexico, North Carolina, and Nevada? If we follow similar reasoning to that employed in *SZ Enterprises*, we can tick off various factors in favor of non-utility status that the court found dispositive: an arms-length transaction between home-buyers and housing developers, as well as between housing developers and SDH developers; a private transaction that could easily be conceptually bundled with thermal windows and extra insulation; a “non-essential,” green-energy commodity not used by everyone; no economic power imbalance between home-buyers and system or home developers—quite the opposite, as developers must sell homeowners on the technology’s higher up-front costs with the promise of lower bills and environmental goodwill, and homeowners could always purchase electric or gas furnaces in the future if they are dissatisfied with the SDH system; and a customized service provided to a particular type of home-buyer.¹⁵⁹

And yet, *Serv-Yu* factor eight looms. SDH systems possess massive potential for large reductions in electricity or gas demand at neighborhood or district scale.¹⁶⁰ Might these reductions be large enough to constitute the material impact on demand to which the *SZ Enterprises* court alludes?¹⁶¹ SDH systems, if scaled to sufficient size over a number of decades, could constitute a threat to incumbent utilities, especially in areas served by natural gas utilities, such as the Western United States.¹⁶² How might utilities, be they gas or electric, respond to

¹⁵⁹ See *SZ Enters.*, 850 N.W.2d at 447–49 (outlining the factors utilized by the district court in determining whether Eagle Point should be classified as a public utility).

¹⁶⁰ See discussion *supra* Part I (explaining that solar district heating can achieve lower per-unit costs by meeting the energy needs of multiple dwellings).

¹⁶¹ See *SZ Enters.*, 850 N.W.2d at 468 (positing that the demand for electricity from traditional utilities will be affected should the third-party PPA movement begin in Iowa).

¹⁶² See U.S. ENERGY INFO. ADMIN., *supra* note 60 (showing that in 2009, the

such a development? The experience of third-party solar PV provides a possible preview.¹⁶³ The IUB and its allies argued that “the activities of PPAs reduce the demand for the product of regulated monopolies, thereby reducing the utilities’ ability to recover the reasonable costs of providing service the public,” suggesting that “the shortfall must be recovered from other retail customers at higher rates.”¹⁶⁴ IUB also argued that non-utility status for third-party-solar-PPAs would allow such companies to “cherry-pick” large customers, upsetting incumbent utilities’ investment-backed expectations.¹⁶⁵ Could such arguments apply to providers of solar heat, even when no electricity is produced?

It would be unusual for regulators to limit competition between utilities across commodities. Indeed, electric and gas utilities serve the same customers, even though electric furnaces compete with gas furnaces. Thus a solar heat provider might escape the restraints on competition that threaten third-party-solar-PPA systems by virtue of the fact that it does not produce the same commodities as incumbent electric and gas utilities. But while SDH may enjoy immunity from state utility regulation in a number of states now, there is no guarantee that such immunity is permanent. There is no bar that would preclude future legislation from regulating SDH systems in the same way as electric and gas utilities,¹⁶⁶ nor is there a bar that would preclude

Western U.S. utilized a greater proportion of natural gas as a household heating fuel than electricity, heating oil, propane, wood, and kerosene or other type combined). This is because the space and water heating loads that SDH might serve constitute the majority of load currently served by natural gas. See U.S. DEPT OF ENERGY, *supra* note 4, at 1-2 (indicating that space and water heating in the U.S. are served by natural gas more than fuel oil, renewable energy, and other fuel types). Electricity, on the other hand, derives an increasing portion of its load from electronics and appliances, such as televisions and computers. See U.S. ENERGY INFO. ADMIN., *Heating and Cooling No Longer Majority of U.S. Home Energy Use*, TODAY IN ENERGY (Mar. 7, 2013), <http://www.eia.gov/todayinenergy/detail.cfm?id=10271> (illustrating that the percentage of energy consumption in “occupied primary housing units” from appliances, electronics and lighting rose from 24 percent in 1993 to 34.6 percent in 2009).

¹⁶³ See *SZ Enters.*, 850 N.W.2d at 453–54 (describing the process by which third-party solar PV enter into purchase agreements in order to combat the stifling effect of unpredictable electricity price fluctuations on installation of on-site solar energy facilities).

¹⁶⁴ *Id.* at 461–62.

¹⁶⁵ *Id.* at 462.

¹⁶⁶ Indeed, we can see inverse evidence of this in the fact that some state laws explicitly exempt geothermal or solar heat providers from public utility regulation; all that would be required to bring those systems under regulation

restraints on SDH competition with existing electric and gas utilities in the interest of the continued financial viability of incumbent utilities.¹⁶⁷

V. CONCLUSION

While this article has centered around a particular technology that the authors find promising, it is plain to see that the issues raised in consideration of that technology's growth point to a more universal discussion. What does the future of renewable energy look like? Will growth occur primarily within the established utilities, by constructing utility-scale solar and wind farms and transmitting electricity over vast distances?¹⁶⁸ Or will distributed technologies, emerging outside the utility business model, prove sufficiently disruptive to fundamentally alter the energy landscape? Of course, there is also the possibility that neither of these things will happen at scale or in time to meaningfully address the threats of climate change.¹⁶⁹

In any case, the *SZ Enterprises* case draws the battle lines between traditional utilities, which have invested in long-term, fossil-fuel dependent infrastructures for energy collection,

would be the repeal of such exemptions. *See, e.g., infra* note 167 and accompanying text (suggesting that if SDH systems were classified as public utilities, utility regulations consisting of limitations on territorial service areas could be constitutional).

¹⁶⁷ Courts have long upheld robust state regulation of utilities in the public interest, defined broadly. *See* *Munn v. Illinois*, 94 U.S. 113, 126 (1876) (explaining that the King's authority to control public promotes the public welfare). Thus if SDH systems were classified as public utilities under the jurisdiction of state regulators, legislatively-directed restraints on service territories based on existing service territories of other utilities would—though perhaps unusually—be perfectly permissible within the outer constitutional limits of utility regulation even if they provided different commodities.

¹⁶⁸ *See* ANDREW MILLS ET AL., THE COST OF TRANSMISSION FOR WIND ENERGY: A REVIEW OF TRANSMISSION PLANNING STUDIES vii-xii (Feb. 2009), <http://emp.lbl.gov/sites/all/files/REPORT%20lbl-1471e.pdf> (describing the financial and technological implications of expanding transmission of wind power).

¹⁶⁹ *See* JEFFREY SACHS ET AL., PATHWAYS TO DEEP DECARBONIZATION: 2014 REPORT viii (Sept. 2014), http://unsdsn.org/wp-content/uploads/2014/09/DDPP_Digit.pdf (“While awareness of climate change is rising, and a large and growing number of countries, cities, and corporations have pledged to reduce their GHG emissions, these pledges taken together are not sufficient to stay within the 2°C limit. The IPCC AR5 Working Group 3 (WG3) calculates that in the absence of additional commitments to reduce GHG emissions, the world is on a trajectory to an increase in global mean temperature of 3.7°C to 4.8°C compared to pre-industrial levels. When accounting for full climate uncertainty, this range extends from 2.5°C to 7.8°C by the end of the century.”).

production, and delivery, and an emergent distributed energy industry that bypasses infrastructures and captures energy directly from its source. Even as traditional utilities become more engaged in renewable energy production, this conflict is likely to persist as public demand for renewable energy and dissatisfaction with a deliberative, lumbering utility industry grows. As the costs of distributed renewable energy continue to decline, it will intensify.

The equities of the conflict suggest grandiose, perhaps hyperbolic, moral themes. Should traditional utilities that have served society for over a century be left to rot, their lines and plants fading into ruin and their investment-backed expectations dashed? Should we sacrifice some portion of the global population to the ravages of climate change in order to protect the economies and fortunes of those countries whose own wealth and conspicuous consumption have created the crisis? Such positions encourage a binary and adversarial stance that may further entrench parties within their positions: clean energy against dirty, poor countries against rich ones, history against the future.

In the alternative, we might imagine a more collaborative approach. In the face of new environmental regulations such as the Environmental Protection Agency's Clean Power Plan proposed rule, distributed energy might prove a blessing in disguise to utilities, allowing them to retire assets that would become uneconomic under new low-carbon standards and focus on building a cleaner generation fleet without failing to meet rising demand.¹⁷⁰ Renewable thermal energy applications such as geothermal heat pumps, solar thermal, and SDH—all of which provide energy during peak load times—could allow utilities to adjust demand forecasts to respond to these regulatory changes more effectively. We can hope, in any case.

“Oh Jake,” Brett said, “[W]e could have had such a damned good time together.”

Ahead was a mounted policeman in khaki directing traffic. He raised his baton. The car slowed suddenly pressing Brett against me.

¹⁷⁰ See Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 79 Fed. Reg. 34830 (June 18, 2014) (to be codified at 40 C.F.R. pt. 60) (outlining goals for mitigating carbon dioxide emissions from existing power plants using fuel).

2015] SOLAR DISTRICT HEATING IN THE U.S. 211

“Yes,” I said. “Isn’t it pretty to think so?”¹⁷¹

¹⁷¹ ERNEST HEMINGWAY, *THE SUN ALSO RISES* 215 (1926).