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ABSTRACT

At a point in the future that is no longer remote, renewable energy will be a necessity. The construction of large renewable energy farms is central to a transition away from fossil fuels, but distributed renewable energy technologies—wind turbines in backyards and solar panels on roofs—are immediately essential as well. Widespread deployment of distributed renewable technologies requires rapid innovation led by renewable energy pioneers—individuals who act as market leaders and prove to their neighbors that these new energy devices are safe and worthy of use. Existing law and the very structure of governmental authority over energy is ill-suited to this energy transition and stifles the efforts of these pioneers. Public bodies must therefore embark upon a substantial overhaul of what we call land-energy rules*—legal requirements governing the construction and physical location of renewable technology. This Article assesses the relative institutional capacities of different levels of government to determine which will best ensure that land-energy rules enable a drive toward distributed renewable energy and concludes that the powers of municipal governments must be unleashed. Innovation will occur from the ground up, and municipalities must actively work to enable the next great energy transition in this country: a move toward energy produced from the sun, the wind, the earth's internal heat, and other renewable sources.*

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INTRODUCTION

The strength of a nation lies in its power—increasingly, not just its political power, but its access to energy. Without abundant energy, economies do not move,[1] progress slows, and inspiration stagnates. By these measures, American power is lagging behind the world,[2] and in many respects, we are moving backward. The antiquated American energy infrastructure needs

[1] Benjamin S. Warr et al., *Increase Supplies, Increase Efficiency: Evidence of Causality Between the Quantity and Quality of Energy Consumption and Economic Growth* 16–17 (INSEAD Soc. Innovation Ctr., Working Paper No. 2009/22/EPS/ISIC, 2009), *available at* http://knowledge.insead.edu/doc.cfm?cd=41726.

[2] Keith Bradsher, *A High-Speed Economy*, N.Y. TIMES, Feb. 13, 2010, at B1 ("Other countries aren't waiting," explained President Obama, discussing clean energy and high-speed rail developments. "They want those jobs. China wants those jobs. Germany wants those jobs. They are going after them hard, making the investments required." (internal quotation marks omitted)).

massive revision to establish a system powered substantially by renewable resources. We know that the fossil fuels on which the current system depends will be much more difficult to extract in the future;[3] we know that dependence on foreign fossil fuel sources creates international relations problems and national security risks;[4] and we increasingly accept the reality of the negative environmental impacts of extracting fossil fuels and converting them into power.[5] There is broad public support for some kind of governmental response to these problems, but that general sentiment for change is not tied to concrete policy initiatives;[6] thousands of small, technical regulatory questions must be addressed to bring about the large alterations of the national energy infrastructure required for salutary policy initiatives. But those inquiries cannot be fruitfully pursued until we have answered the more fundamental question of how the current, dysfunctional allocation of energy policy-making authority may be corrected. Against the conventional wisdom that the national scope of the energy problem requires a primarily centralized solution from the federal government, this Article argues that local governments—cities and towns—have one of the most significant roles to play in the transition to renewable energy, particularly in the near term as distributed renewable technologies are deployed. It concludes that municipalities working above a federal regulatory floor are best positioned to foster, through regulation, much of the innovation that will be necessary for this transition.

One critical regulatory role that local governments are well positioned to play in the short-term transition to renewables is facilitating the development and adoption of distributed renewable technologies that generate electricity

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[3] *See infra* notes 77–101 and accompanying text.

[4] *See U.S. Energy Facts*, ENERGY INFO. ADMIN., http://tonto.eia.doe.gov/energyexplained/index.cfm?page=us_energy_home#tab2 (last updated Nov. 22, 2010) (explaining that the United States relies on net imports for twenty-four percent of its energy).

[5] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), CLIMATE CHANGE 2007: SYNTHESIS REPORT 30 (Abdelkader Allali et al. eds., 2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf; *infra* note 63 and accompanying text; *see also* Henry Fountain, *U.S. Says BP Well Is Finally 'Dead*,*'* N.Y. TIMES, Sept. 20, 2010, at A14 (reporting that BP's failed oil well in the Gulf of Mexico released approximately 205 million gallons of oil into the Gulf).

[6] *See* Michael K. Heiman & Barry D. Solomon, *Power to the People: Electric Utility Restructuring and the Commitment to Renewable Energy*, 94 ANNALS ASS'N AM. GEOGRAPHERS 94, 107 (2004) (noting that "over half of Americans claim they are willing to pay a premium for 'green power,'" but arguing that market and regulatory failures have made that choice impracticable for most consumers); Anthony Leiserowitz, *Climate Change Risk Perception and Policy Preferences: The Role of Affect, Imagery, and Values*, 77 CLIMATIC CHANGE 45, 46 (2006) ("Since the year 2000, numerous public opinion polls demonstrate that large majorities of Americans are aware of global warming (92%) . . . and already view climate change as a somewhat to very serious problem (76%).").

close to the point of use—paradigmatically the backyard wind turbine and the rooftop solar panel;[7] this Article focuses on this role. Accordingly, the Article analyzes legal requirements governing the construction and physical location of distributed renewable devices—what we call *land-energy rules*. Beyond the distributed scale, renewable energy devices like solar panels and wind turbines may be installed in large "farms" that function like existing fossil-fuel-burning power plants in the sense that they generate large quantities of electricity in a single location and then send it over transmission lines to distant consumers.[8] Establishing these large facilities requires overcoming economic and regulatory complexities, however; renewable farms are costly, require integration into large-scale transmission grids, and may occupy territory that overlaps the borders of several states.[9] Distributed renewables, we argue, are just as essential[10] as large-scale installations to establishing a stable nationwide energy infrastructure powered substantially by renewable resources, but the distributed generation piece of the energy policy puzzle has been largely ignored by legal scholars.[11] This is harmful because distributed renewable energy projects face serious impediments that require immediate attention: consumer uncertainty about their effectiveness and practicality, the need for innovation to make existing technologies effective under a variety of geographic and sociopolitical conditions, and adverse local land use rules.[12] Local governments have a crucial role in overcoming regulatory barriers to

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[7] *See* RYAN FIRESTONE & CHRIS MARNAY, ERNEST ORLANDO LAWRENCE BERKELEY NAT'L LAB., DISTRIBUTED ENERGY RESOURCES FOR CARBON EMISSIONS MITIGATION (2007), *available at* http://eetd.lbl.gov/ea/emp/reports/62871.pdf; WADE CAN., 2010 GUIDE TO DECENTRALIZED ENERGY IN CANADA (2010), *available at* http://wadecanada.ca/doc_index/2010-Guide-to-DE-in-Canada.pdf.

[8] *See* PAUL BREEZE, POWER GENERATION TECHNOLOGIES 186–87, 198 (2005) (describing large solar plants); *id.* at 162–63 (describing wind farms).

[9] *See, e.g.*, Heiman & Solomon, *supra* note 6, at 100–08; Jim Rossi, *The Trojan Horse of Electric Power Transmission Line Siting Authority*, 39 ENVTL. L. 1015 (2009).

[10] *See* U.S. DEP'T OF ENERGY, THE SMART GRID (2009), *available at* http://www.oe.energy.gov/DocumentsandMedia/DOE_SG_Book_Single_Pages%281%29.pdf (noting that distributed generation, as part of an "islanding" system, can allow communities to generate power even when there is no power available from a utility); Hermann Scheer, *Solar City: Reconnecting Energy Generation and Use to the Technical and Social Logic of Solar Energy*, *in* URBAN ENERGY TRANSITION: FROM FOSSIL FUELS TO RENEWABLE POWER 1, 21 (Peter Droege ed., 2008) (arguing that "specific decentralized technologies . . . offer the optimum solution" because they help ameliorate our "outdated dependency on [existing energy] infrastructure"); *see also* Sara C. Bronin, *Solar Rights*, 89 B.U. L. REV. 1217, 1224 (2009) ("[W]e cannot depend on large installations . . . . [because] end users of large installations include only those people who live within the area that can be reached by transmission lines.").

[11] *But see* Bronin, *supra* note 10. *But see generally* Sara C. Bronin, *Curbing Energy Sprawl with Microgrids*, 43 CONN. L. REV. 547 (2010) (arguing for small-scale generation).

[12] *See* Heiman & Solomon, *supra* note 6, at 99; *infra* notes 136–44, 224–33, and accompanying text.

distributed renewables, and thus, in the larger transformation of the energy system.

Traditional theoretical treatments of environmental regulation suggest a centralized, federal solution to the problems facing distributed renewables. Subnational regulation is problematic, the argument goes, because it generates negative externalities and may create interjurisdictional "races to the bottom."[13] While these arguments carry important truths, regulatory scholars increasingly recognize the benefits of decentralizing policy-making authority in certain areas.[14] Devolving policy-making authority to subnational governments promises regulatory experimentation and the efficiencies generated by regulatory competition among jurisdictions. It also leverages a greater number of institutional resources (including, importantly, localized expertise and experience) and allocates policy-making authority to officials most familiar with distinctly regional or local harms.[15] Full devolvement to local authorities would not be effective, however, and we do not propose that here. An important counterweight to the enhanced local authority that we advocate will be the establishment of federal regulatory standards that constitute a mandatory minimum or "floor" to ameliorate the negative consequences of regulatory competition.[16]

The emerging academic consensus recognizes the potential benefits of state and local regulatory autonomy and therefore favors cooperative regimes that allocate regulatory authority among several levels of government. Indeed, this "cooperative federalism" approach is reflected in several major federal environmental protection statutes.[17] But the cooperative federalism literature tends toward generalization; it focuses on how the *federal and state* governments should share regulatory power. Local governments are typically

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[13] *See* Richard B. Stewart, *Pyramids of Sacrifice? Problems of Federalism in Mandating State Implementation of National Environmental Policy*, 86 YALE L.J. 1196, 1210–11 (1977). Races to the bottom involve states competing to attract industry by loosening regulation, thus dragging other competing states toward increasingly lax environmental protections. *See id.* at 1211–12.

[14] *See, e.g.*, *infra* note 297.

[15] *See* James E. Krier, Commentary, *The Irrational National Air Quality Standards: Macro- and Micro-Mistakes*, 22 UCLA L. REV. 323, 326–28 (1974); Richard L. Revesz, *Rehabilitating Interstate Competition: Rethinking the "Race-to-the-Bottom" Rationale for Federal Environmental Regulation*, 67 N.Y.U. L. REV. 1210, 1236–42 (1992).

[16] On this idea of federal regulatory floors, see generally William W. Buzbee, *Asymmetrical Regulation: Risk, Preemption, and the Floor/Ceiling Distinction*, 82 N.Y.U. L. REV. 1547, 1565–66 (2007).

[17] *See, e.g.*, Ann E. Carlson, *Iterative Federalism and Climate Change*, 103 NW. U. L. REV. 1097, 1102–03 (2009).

ignored or discussed only as an afterthought, and we argue that this must change.

State governments are increasingly important environmental regulators in practice. In the shadow of federal inaction on climate change,[18] state governments have responded to public demand for climate change initiatives in a number of ways—by enacting renewable portfolio standards (financial incentives to promote the adoption of renewable energy technology) and other energy efficiency programs. Some states have been far more aggressive than others, as one should expect from a system designed to foster experimentation and regulatory competition.[19] Yet as Table 1 demonstrates, local governments, too, have entered the sustainability arena with differing degrees of enthusiasm.[20] The result of these early cooperative regulation experiments is a patchwork of measures implemented by a multitude of institutions, but one that lacks the coherent macro-strategy for cooperative regulation that is needed to accomplish the dramatic infrastructural overhaul that will move the American energy system toward sustainability.[21]

With both the potential benefits of state and local government participation and the need for a broad strategy to shape and discipline a cooperative policy-making regime in mind, this Article reassesses central positions in the environmental federalism literature with an eye to the particular challenges facing distributed renewables. We propose that the distributed renewable energy macro-strategy should include a large role for local governments. We argue that local government institutions are best situated to manage and encourage the use of distributed renewables if empowered to operate above a federal regulatory "floor" of minimum standards. There are, however, few one-size-fits-all answers in our increasingly complex regulatory world; the optimal allocation of regulatory power among levels of government may

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[18] Kirsten Engel, *State and Local Climate Change Initiatives: What Is Motivating State and Local Governments to Address a Global Problem and What Does This Say About Federalism and Environmental Law?*, 38 URB. LAW. 1015, 1021 (2006); Stephen Lacey, *Prospects Fading for U.S. Climate Legislation in 2010*, RENEWABLE ENERGY WORLD (Jan. 14, 2010), http://www.renewableenergyworld.com/rea/news/article/2010/01/prospects-mixed-for-clean-energy-legislation-in-2010; *cf.* Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, 37 I.L.M. 22 (United States not a ratifier).

[19] *See* PEW CTR. ON GLOBAL CLIMATE CHANGE & PEW CTR. ON THE STATES, CLIMATE CHANGE 101: STATE ACTION (2006), *available at* http://www.pewclimate.org/docUploads/101_States.pdf; Carlson, *supra* note 17, at 1098–99; Engel, *supra* note 18, at 1016–20; *infra* notes 184–207 and accompanying text.

[20] *See infra* Table 1; *see also, e.g.*, JOHN BAILEY, INST. FOR LOCAL SELF-RELIANCE, LESSONS FROM THE PIONEERS: TACKLING GLOBAL WARMING AT THE LOCAL LEVEL (2007), *available at* http://www.newrules.org/sites/newrules.org/files/images/pioneers.pdf.

[21] *See* Heiman & Solomon, *supra* note 6, at 95–97.

therefore vary from one regulatory subject to another—including among different subjects of environmental and energy regulation.[22] We seek a realistic solution, and formulating one requires careful analysis of existing law and institutions to determine which modifications will both promote substantive policy goals and be plausibly implemented in light of institutional realities. We provide that analysis here.

In the first Part of this Article, we give a brief history of major American energy transitions. In Part I.B, we describe the current state of America's energy infrastructure and argue that the next great energy transition will involve a move toward electricity generation by renewables, including distributed renewables. In Part I.C, we identify similarities between the circumstances of earlier transitions and those surrounding current efforts to promote renewable energy. We identify two important factors involved in past infrastructural changes[23] that we argue may be significant drivers of the transition to distributed renewable energy in a well-structured regulatory regime. First, we discuss the critical role of energy "pioneers" or "entrepreneurs" whose critical initial successes have often required favorable action by local governments or even informal sub-local actors like neighborhoods. The second factor is technological innovation in the application of distributed renewables, which is also promoted when differing regulatory and physical environs encourage experimentation.

In Part II, we directly confront the question of regulatory strategy. We argue in Part II.A that the strategy for allocating regulatory authority over distributed renewables should focus on encouraging technological innovation and the efforts of energy entrepreneurs; in Part II.B, we analyze the relative capacities of the federal, state, and local governments to do those things. We conclude that federal leadership in the form of minimum standards and funding is necessary, but *local governments* rather than the states are the best potential partners for the federal government in pursuing the shift to distributed renewable energy; indeed, we conclude that laws precluding state interference with local efforts may be necessary. Local governments have traditional authority over land use rules, the modification of which is essential to the success of the renewable energy transition; they have the best access to information about the local geographic, economic, demographic, and social

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[22] *See* William W. Buzbee, *Contextual Environmental Federalism*, 14 N.Y.U. ENVTL. L.J. 108 (2005).

[23] An accurate identification of causes would require careful empirical analysis of these past events, which we do not attempt in this Article.

conditions that determine which distributed renewable technologies or mix of technologies will be effective in a particular place; and they are the most receptive forums for the appeals of renewables pioneers seeking the initial regulatory victories that will push the legal and social spheres toward change. The policy variation likely to result from conferring local government authority over distributed renewables also has the potential to spur technological innovation as distributed renewable energy device makers are forced to adapt to thousands of different local regulatory environments.

I. INNOVATION

Innovation in energy moves at the pace of an ancient steam engine running on the last bits of coal. Unlike new energy-consuming gadgets that appear on the market at a dizzying pace, energy production—the source for all of these appliances and personal electronic devices—is tied to a lumbering infrastructural system that has only changed within discrete periods of history. This Part describes important energy transitions that have occurred within the past two centuries in the United States and, building on observations from these past transitions, addresses two factors that will be necessary for the next great transition to renewables: first, innovation by renewables pioneers, and second, new land-energy rules—rules that dictate, direct, or constrain the construction and location of distributed technologies—to enable such innovation.

A. Past Energy Innovations

In addition to the advent of the steam engine[24] and the move from steam engines to electricity in the industrial sector, one of the first major energy transitions in the United States occurred in the last half of the nineteenth century when Americans began to make the infrastructural leap from portable lighting devices like whale oil lamps and tallow candles to gas lights and electricity.[25] In 1817, Washington Hall in Philadelphia glowed with 2,000 wax candles to light a late-night ball in celebration of George Washington's birthday;[26] by 1836, the city had established gas lighting in homes,[27] and by the

[24] *See, e.g.*, FRED BOSSELMAN ET AL., ENERGY, ECONOMICS, AND THE ENVIRONMENT (2d ed. 2006) (explaining the significance of the steam engine to the industrial revolution).

[25] LOUIS STOTZ & ALEXANDER JAMISON, HISTORY OF THE GAS INDUSTRY 6 (1938) ("During the first four decades of the nineteenth century, sperm oil and candles were the only illuminants used by the average city dwelling family.").

[26] *Id.* at 7.

late 1800s, this innovation was sufficiently affordable to out-compete portable oil lamps and candles.[28] Eventually, electricity—electrons produced by a magnet spinning near a wire[29]—began to power incandescent light bulbs in the homes of adventurous consumers, and small companies offered electric service in several major East Coast cities by the 1880s.[30] Gas lighting remained competitive during this transition,[31] but consumers increasingly bought the industry slogan that "[i]f it is not electric—it is not modern,"[32] thus slowly forcing gas companies out of the lighting business.

This transition was uniquely local in several respects. First, it was an innovative grassroots movement that only later became a large industry; it was inspired by individuals and grew within cities. Creative entrepreneurs began to use gas-lit lamps and then attempted to persuade other citizens to adopt this new technology.[33] Once a sufficient number of consumers believed in this "brilliant novelty,"[34] the next phase of the transition required tearing up streets and constructing pipes[35] to transport gas to homes and factories—and eventually, wires for delivery of electricity. The move from candles to gaslights to electricity therefore also relied upon the second uniquely local driver of energy transitions: favorable local land policy (and sometimes, in those days, a hearty dose of corruption).[36] Entrepreneurs organized small

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[27] *Id.* at 9.

[28] *Id.* at 7–8 (explaining that "[f]rom 1875 to 1885, and thereafter, the use of candles practically disappeared," as candles were replaced with kerosene lamps and then gas light systems).

[29] STEVEN W. BLUME, ELECTRIC POWER SYSTEM BASICS FOR THE NONELECTRICAL PROFESSIONAL 14 (2007) (explaining that "if one takes a coil of wire and puts it next to a moving or rotating magnet, a measurable voltage will be produced in that coil"—a simpler description of Faraday's Law, which represents "how electric generators produce electricity").

[30] STOTZ & JAMISON, *supra* note 25, at 111–12 (explaining that by 1890, "the electric light had already begun to find popular favor and was beginning to make a big dent in the gas lighting business"); Robert L. Bradley, Jr., *The Origins and Development of Electric Power Regulation*, *in* THE END OF A NATURAL MONOPOLY 43, 44 tbl.1 (Peter Z. Grossman & Daniel H. Cole eds., 2003) (showing electric service available in nine major cities between 1881 and 1890).

[31] STOTZ & JAMISON, *supra* note 25, at 117 ("[B]y 1914 there were 50 million incandescent gas mantle lamps in use . . . .").

[32] *Id.* (internal quotation marks omitted).

[33] George T. Brown, *The Gas Light Company of Baltimore: A Study of Natural Monopoly* 5, 9–12 (Johns Hopkins Univ. Stud. in Hist. & Pol. Sci., Ser. 54, No. 2, 1936) (describing individuals' experiments with gas lighting in America and their publicization of their products through newspaper advertisements and demonstrations).

[34] *Id.* at 10 (quoting FED. GAZETTE & BALT. DAILY ADVERTISER, Mar. 11, 1802).

[35] Bradley, *supra* note 30, at 54 (explaining the "tearing up [of] the streets" required for new gas mains and the above-ground poles and wires required for the new electricity (internal quotation marks omitted)).

[36] *See, e.g.*, *id.* at 48 (discussing early studies that advocated for state regulation of electricity, partially on the basis that the regulation would be "above 'big city political machines'").

corporations[37] and then lobbied city councils to pass ordinances that allowed for the installation of infrastructure.[38] These efforts eventually resulted in the establishment of local service companies that provided electricity to a small group of residents within close geographic proximity to the physical plant. In Chicago in 1907, about forty-five firms had franchises to sell electricity to the city's residents,[39] and some cities even had competing electric franchises along one street.[40]

A second important innovation that occurred at both the state and national levels, however, quickly reversed this local trend. Nikola Tesla introduced new technology in the late 1800s that allowed for the efficient transmission of electricity over long distances.[41] Samuel Insull—the great pioneer of electric delivery systems—then expanded his campaign to centralize energy,[42] and this model has dominated since. Under the centralized model of energy provision, large power plants send electricity over thousands of miles of transmission lines to a broad customer base.[43]

More than a century later, humans are now experiencing a new wave of energy innovation[44] as we slowly move toward renewable technologies. This transition will again be uniquely local. Like the move from candles to gaslights to electricity, the transition to renewable energy will depend on local factors: energetic entrepreneurs, willing investors, and supportive municipal land use regulation. Individual residents will need to experiment with renewable devices installed on their property by emerging "green" start-up

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[37] Brown, *supra* note 33, at 14 (describing how Rembrandt Peale, the father of the Gas Light Company of Baltimore, persuaded the editor of the *Federal Gazette & Baltimore Daily Advertiser* along with another "small group of men" to form the company).

[38] *Id.* at 15 (describing how Peale and the other investors persuaded the Baltimore City Council to pass an ordinance authorizing the laying of pipes on city property).

[39] Bradley, *supra* note 30, at 73 n.4.

[40] JOHN BAUER & PETER COSTELLO, PUBLIC ORGANIZATION OF ELECTRIC POWER 16 (1949).

[41] *See* Bradley, *supra* note 30, at 44; *see also* JILL JONNES, EMPIRES OF LIGHT 93–94 (2003) (describing how Tesla had his first "electrical epiphany" of alternating current in 1882, began developing a prototype of an AC induction motor in 1883, and had installed arc lighting on "certain major streets" and "a few factories" by 1886).

[42] JONNES, *supra* note 41, at 46–47.

[43] *Electric Power Industry Overview 2007*, ENERGY INFO. ADMIN., http://www.eia.doe.gov/cneaf/electricity/page/prim2/toc2.html (last visited May 1, 2011) ("[Two hundred ten] large . . . investor-owned electric utilities . . . own more than 38 percent of the Nation's generating capacity and serve about 71 percent of ultimate consumers.").

[44] *See* JEREMY RIFKIN, THE HYDROGEN ECONOMY 4, 9 (2002) (arguing that a "profound change is about to occur in the way we use energy" and defining the change as a move away from fossil fuels and toward "inexhaustible" hydrogen-powered fuel cells).

companies, and these pioneers will need to publicize their successes. If a critical mass of solar panels appears on neighborhood roofs and thousands of wind turbines spin in backyards, perhaps consumers, city-by-city and town-by-town, will begin to believe that "if it's not renewable, it's not modern."[45]

Although previous transitions involved largely independent local efforts to augment the efforts of energy pioneers, the modern regulatory and infrastructural landscape requires federal–local cooperation to spur the efforts of pioneers and technological innovators in the transition to renewables. Indeed, the federal government is already providing direct funding to some cities—bypassing the states—to implement limited distributed renewable programs.[46] The federal government purposefully has chosen to partner with cities because it believes that "cities have an important role to play as champions of progressive energy efficiency and renewable energy efforts."[47] In other energy areas, the federal government has funded entrepreneurs directly. The Department of Energy, for example, has offered a ten million dollar prize to the first entity that develops a more energy efficient lightbulb that meets that competition's high standards.[48]

Beyond innovation and federal–local partnerships to enable innovation, the adoption of distributed renewables will also be a distinctly local movement because it will partially reverse the consolidation and centralization of energy production that swallowed up the first local electric plants. The future of energy may meet the past as homes and businesses become new energy producers.

A successful transition to distributed renewable energy, however, will also require policymakers to recognize that America recently attempted a great push toward innovation in this field and failed. The mistakes of the past must not be repeated. In the 1970s, when severe fuel shortages reminded America of its heavy reliance on foreign fuels, policymakers rushed to the drawing

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[45] *See supra* note 32 and accompanying text (describing the similar phrase used by the electric industry).

[46] U.S. Dep't of Energy, *Solar America Cities Special Projects*, SOLAR AM. COMMUNITIES (Feb. 15, 2011), http://www.solaramericacities.energy.gov/about/special_projects (describing the Solar America Cities program, which has already "launched partnerships with 25 large U.S. cities to develop comprehensive, city-wide approaches to accelerating solar energy adoption" and additional projects launched in 2009).

[47] U.S. Dep't of Energy, *Frequently Asked Questions*, SOLAR AM. COMMUNITIES (Dec. 30, 2010), http://www.solaramericacities.energy.gov/about/frequently_asked_questions/#6.

[48] U.S. DEP'T OF ENERGY, BRIGHT TOMORROW LIGHTING COMPETITION (L PRIZE™) 1 (2009), *available at* http://www.lightingprize.org/pdfs/LPrize-Revision1.pdf.

boards to solve America's energy problem.[49] One solution during this time was to encourage increased reliance upon nonrenewable American fuels. Congress proposed three bills between 1974 and 1980 attempting to force utilities to use coal (an abundant American resource), instead of oil or natural gas, and two of the three bills passed.[50] But federal agencies also started to think about energy production more creatively, and they pumped out mustard-yellow manuals on the siting and installation of renewable energy sources.[51] Congress, in turn, passed aggressive measures to persuade Americans to buy and use these novel technologies.[52] Enterprising individuals (motivated by generous federal incentives) hired technicians to install solar panels on their homes or geothermal heating systems in their basements.[53] By 1978, a bureaucratic director was sufficiently optimistic to predict that "with aggressive Federal support, there are realistic circumstances in which small-scale energy systems could compete favorably with conventional energy sources in many residential, commercial, and industrial applications by the end of the next decade."[54] A "high solar energy scenario" developed by a committee of the federally commissioned National Research Panel in 1979 imagined that a federal policy would "require, after 1990, adoption of solar energy for all new buildings . . . for which it is applicable,"[55] and President

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[49] *See* IGOR I. KAVASS & DORIS M. BIEBER, ENERGY AND CONGRESS: AN ANNOTATED BIBLIOGRAPHY OF CONGRESSIONAL HEARINGS AND REPORTS 1974–1978, at i–iv (1980) (describing 1974 as the year "when the concern about oil and other energy sources began to intensify in the United States Congress").

[50] CONGRESSIONAL QUARTERLY INC., ENERGY POLICY 66–67 (2d ed. 1981).

[51] *See, e.g.*, ALAN S. MILLER ET AL., ENVTL. LAW INST., LEGAL BARRIERS TO SOLAR HEATING & COOLING OF BUILDINGS: SOLAR ACCESS AND LAND USE: STATE OF THE LAW, 1977 (1977) (prepared for the Energy Research and Development Administration and highlighting the opportunities for solar energy and the legal barriers that will likely need to change).

[52] *See, e.g.*, Energy Tax Act of 1978, Pub. L. No. 95-618, sec. 101(a), § 44C(b)(2)(A), 92 Stat. 3174, 3175 (codified as amended at I.R.C. § 25D (2006)) (providing a "residential energy" tax credit of thirty percent of expenditures on a renewable energy system (up to $2,000)); ALTERNATIVE ENERGY: THE FEDERAL ROLE § 3.05, at 3–11 (Linda Elizabeth Buck & Lee M. Goodwin eds., 1982) (showing federal direct assistance for "solar energy systems," which ranged from $5,000 to $10,000 for residential owners, $2,500 per dwelling unit for multifamily residential buildings, and $100,000 per building for agricultural or commercial buildings).

[53] *See, e.g.*, Danny S. Parker, *Very Low Energy Homes in the United States: Perspectives on Performance from Measured Data*, 41 ENERGY & BUILDINGS 512, 512–13 (2009).

[54] Russell W. Peterson, *Foreword* to OFFICE OF TECH. ASSESSMENT, NTIS ORDER #PB-283770, APPLICATION OF SOLAR TECHNOLOGY TO TODAY'S ENERGY NEEDS, at iii (1978).

[55] SOLAR RES. GRP., SUPPLY & DELIVERY PANEL OF THE COMM. ON NUCLEAR & ALT. ENERGY SYS., THE NAT'L RESEARCH COUNCIL, SUPPORTING PAPER 6: DOMESTIC POTENTIAL OF SOLAR AND OTHER RENEWABLE ENERGY SOURCES 10 (1979).

Carter officially aimed to produce twenty percent of America's energy using solar technology by the year 2000.[56]

Prices for the familiar energy sources like gasoline and heating oil, however, eventually began to stabilize, and the popular fixation on energy independence and sustainability vanished nearly as quickly as the long lines at the gas pumps.[57] Historically, federal support for solar and wind peaked between 1980 and 1984 and then sharply declined, leveling off at a low degree of financial support before 1990 and only occasionally increasing through 2000.[58] Whether for financial reasons or a lack of innovation, American "installed capacity of renewable power has remained far below levels analysts believed would be in place by the early 21st century."[59] For example, by 2009, less than one percent of America's energy came from solar and wind sources.[60] America's renewable energy development has also lagged behind that of many other countries.[61] And this failure is not for lack of effort; as Donald Klass observes, "An integrated, large-scale, renewable energy industry has not been realized in modern times despite the major expenditures made to develop and scale-up renewable energy technologies."[62]

The brief and relatively uninfluential fervor for a new system of energy in the 1970s did not return to America until the rise of a new concern in recent years: the warming of the earth's surface temperature.[63] Although the

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[56] Alan S. Miller, *Energy Policy from Nixon to Clinton: From Grand Provider to Market Facilitator*, 25 ENVTL. L. 715, 717 (1995) (citing Springfield, Illinois Remarks to Lincoln Land Community College Students and Local Residents, 2 PUB. PAPERS 1862, 1864 (Sept. 22, 1980)); *see also Preface* to LEGAL ASPECTS OF SOLAR ENERGY, at vii (John H. Minan & William H. Lawrence eds., 1981) ("The federal government has established as a goal that by the year 2000, 20 percent of the nation's energy will be from the sun.").

[57] RIFKIN, *supra* note 44, at 4 ("The gasoline flowed and it was cheaper than ever [following the embargo]. The world got back to business as usual.").

[58] Peter H. Kobos et al., *Technological Learning and Renewable Energy Costs: Implications for US Renewable Energy Policy*, 34 ENERGY POL'Y 1645, 1646 (2006).

[59] *Id.* at 1645.

[60] ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, ANNUAL ENERGY REVIEW 2009, at 8 fig.1.2 (2009), *available at* http://www.eia.gov/FTPROOT/multifuel/038409.pdf.

[61] Kobos et al., *supra* note 58, at 1646 (describing Europe's and Japan's relative success with growth in renewables).

[62] Donald L. Klass, *A Critical Assessment of Renewable Energy Usage in the USA*, 31 ENERGY POL'Y 353, 353 (2003).

[63] The Intergovernmental Panel on Climate Change (IPCC) was established by the United Nations Environmental Program and the World Meteorological Organization "to provide the world with a clear scientific view on the current state of climate change." *Organization*, IPCC, http://www.ipcc.ch/organization/organization.htm (last visited May 1, 2011). It published its first report warning of warming in 1990. *See* IPCC, CLIMATE CHANGE: THE IPCC 1990 AND 1992 ASSESSMENTS 47 (1992), *available at* http://www.ipcc.ch/ipccreports/far/IPCC_1990_and_1992_Assessments/English/ipcc-90-92-assessments-full-

magnitude of the problem and the accuracy of risk calculations remain uncertain, a consortium of scientists from around the world has warned that we are heading down a path with potentially significant consequences—from rising seas, more severe storms, and longer droughts to higher extinction rates for animal and plant species.[64] Coupled with the growing menace of climate change is America's unhealthy dependence on foreign sources for more than a quarter of the energy that it consumes.[65] Federal, state, and local policymakers have thus returned to the arguments of the 1970s, calling for fresh ways of producing, using, and thinking about energy. The "new" renewables' current piece of the pie is stunningly low, but it is slowly growing.[66] At the large scale, states are encouraging the construction of solar and wind farms.[67] At the small scale, individual consumers are also moving toward renewables.[68] In 2006, individuals purchased "about 7,000 small wind turbines," for example.[69] By 2008, small wind turbine sales had increased to 10,500 units.[70] As America makes a second attempt to deploy a critical mass of distributed renewable systems of energy production, we must ask how we can ensure that as this movement rises, history will not repeat itself. We must identify the factors that

report.pdf. Its most recent report concludes: "Warming of the climate system is unequivocal . . . ." IPCC, *supra* note 5, at 30.

64 For a detailed discussion of these potential impacts, see IPCC, *supra* note 5, at 46–50.

65 *U.S. Energy Facts*, *supra* note 4 ("In 2008, net imported energy (imports minus exports) accounted for 26% of all energy consumed.").

66 Wind power accounted for about 0.05% and solar power comprised a trivial 0.09% of Americans' total energy consumption in 2008. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, RENEWABLE ENERGY TRENDS IN CONSUMPTION AND ELECTRICITY 2008, at 8 tbl.1.2 (2010), *available at* http://www.eia.doe.gov/cneaf/solar.renewables/page/trends/trends.pdf. In 2008 (all in units of quadrillion British thermal units, or Btus) Americans consumed 83.532 units of fossil fuels, 0.113 units of electricity net imports, 8.427 units of nuclear electric power, and 7.367 units of renewable energy. *Id.* Of the renewable energy component, the non-solar and wind components included 3.852 units of biomass, 2.512 units were conventional hydroelectric energy, and 0.360 units of geothermal energy. *Id.* Robert Gross and his co-authors define the "new" renewables as including technologies "such as solar, modern biomass and wind power," and they use this term to contrast the new renewables with "old" renewables with more negative environmental effects, such as "large hydroelectric schemes and the use of traditional biomass and agricultural waste in developing countries." Robert Gross et al., *Progress in Renewable Energy*, 29 ENV'T INT'L 105, 106 (2003).

67 *See, e.g.*, *Texas Renewable Portfolio Standard*, STATE ENERGY CONSERVATION OFFICE, http://www.seco.cpa.state.tx.us/re_rps-portfolio.htm (last visited May 1, 2011) (describing Texas's construction requirements).

68 *See* Miller, *supra* note 56, at 727.

69 Kristina Shevory, *Homespun Electricity, from the Wind*, N.Y. TIMES, Dec. 13, 2007, at F1.

70 RON STIMMEL, AM. WIND ENERGY ASS'N, AWEA SMALL WIND TURBINE GLOBAL MARKET STUDY 3 (2009), *available at* http://www.windtamerturbines.com/pdf/09_AWEA_Small_Wind_Global_Market_Study.pdf; *cf.* RON STIMMEL, AM. WIND ENERGY ASS'N, AWEA SMALL WIND TURBINE GLOBAL MARKET STUDY 3 tbl.1 (2010), *available at* http://www.awea.org/documents/2010_AWEA_Small_Wind_Turbine_Global_Market_Study.pdf (indicating that turbine sales have since declined slightly to 9,800 units sold in 2009).

will lead to real, sustained innovation in the sector of our economy that drives all other sectors.

B. The Need for a New Energy Transition

Before describing the innovations that will be necessary to spur a move toward distributed renewables and identifying the land-energy policies that currently apply to these innovations, this section will briefly explain why an energy transition to renewables—and particularly to distributed renewables such as wind turbines in backyards and solar panels on the roofs of homes—is essential.

1. Why Renewables?

At a point in the future that is no longer unimaginably remote, renewable energy will be necessary to human survival. Humans require energy for our every endeavor. But our vision remains locked to the near horizon. We prioritize the development of new technologies to scour our shales, coalbeds, and ocean floors for the last molecules of fuel,[71] searching for resources that, while vital to our current energy infrastructure, are ultimately unsustainable. Meanwhile, other nations forge ahead with massive leaps toward a future basket of plenty by developing efficient public transportation, commercially viable hydrogen fuel cells, advanced solar technologies, and domestic wind turbine manufacturing.[72] Many small towns in Germany and Austria are now entirely "energy autonomous" or on track to meet that goal, producing much of their power from the sun and wind;[73] some municipalities in the United States, on the other hand, continue to build coal-fired power plants, which provide

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[71] James W. Bunger et al., *Hubbert Revisited—5: Is Oil Shale America's Answer to Peak-Oil Challenge?*, OIL & GAS J., Aug. 9, 2004, at 16, 20 (discussing how Shell Oil is investing in a Colorado project, wherein it applies subsurface heaters to shales to convert kerogen to oil and gas); *see also* ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, ANNUAL ENERGY OUTLOOK 2009, at 35–37 (2009), *available at* http://www.eia.doe.gov/oiaf/aeo/pdf/0383(2009).pdf (discussing how producing more offshore resources "will require considerable time, in addition to financial investment" but predicting continued offshore development).

[72] Jonathan Adams, *Japan Leads the Race for a Hydrogen Fuel-Cell Car*, CHRISTIAN SCI. MONITOR, Feb. 1, 2010, at 11; Keith Bradsher, *China Leading Race to Make Clean Energy*, N.Y. TIMES, Jan. 31, 2010, at A1 ("China vaulted past competitors . . . last year to become the world's largest maker of wind turbines . . . .").

[73] Scheer, *supra* note 10, at 21 (describing the "large number of small towns or counties . . . which are striving to achieve or even have already achieved 100% energy autonomy" using solar and biofuels).

short-term fixes[74] and create long-term environmental and human health problems.[75]

America is running out of some fuels, and our willingness to accept the environmental and health-based consequences of extracting the unconventional sources of these fuels may be declining. The United States relies on fossil fuels for the bulk of its energy,[76] yet oil and natural gas are becoming more difficult to obtain, forcing us to expand unconventional modes of production.[77] Domestic coal, although offering a more substantial cushion than oil and gas, will be abundant for perhaps as few as 150 years longer.[78] Estimates of the point at which the costs of extraction will exceed the benefits of extracting these remaining nonrenewable sources vary widely.[79] Perhaps humans will choose to prioritize activities like mining huge blocks of shale and blasting them with heat to force out the last few drops of oil[80] over investing heavily in sustainable technologies. But at some point, the most creative extraction

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[74] Peter Bacqué & Rex Springston, *Should a Coal-Fired Power Plant Be Built in Surry? Yes: It's Good for the Economy*, RICHMOND TIMES-DISPATCH, May 17, 2009, at A8 (describing a then-proposed 750- to 1,500-megawatt coal-fired power plant in Surry County, Virginia).

[75] *See, e.g.*, Shaila Dewan, *Ash Flood in Tennessee Is Found to Be Larger than Initial Estimates*, N.Y. TIMES, Dec. 27, 2008, at A10 (describing a massive coal ash spill at a coal-fired power plant).

[76] ENERGY INFO. ADMIN., *supra* note 66, at 8 tbl.1.2 (showing that petroleum accounts for about 37% of total U.S. energy consumption, coal for 22%, and natural gas for 24%). Nuclear power, which is also nonrenewable, accounts for about 8% of annual U.S. energy consumption. *Id.*; *Nonrenewable Energy Sources*, ENERGY INFO. ADMIN., http://tonto.eia.doe.gov/energyexplained/index.cfm?page=nonrenewable_home (last visited May 1, 2011) (defining the mined uranium ore used in nuclear power production as a "nonrenewable fuel").

[77] Shahriar Shafiee & Erkan Topal, *An Econometrics View of Worldwide Fossil Fuel Consumption and the Role of U.S.*, 36 ENERGY POL'Y 775, 780–81 (2008) (concluding, based on Energy Information Administration and British Petroleum data, that "if the world continues to consume oil and gas at 2006 rates, the reserves of oil and gas will last a further 40 and 70 years, respectively"); *see also* ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, INTERNATIONAL ENERGY OUTLOOK 2010, at 58 (2010), *available at* http://www.eia.doe.gov/oiaf/ieo/pdf/0484(2010).pdf ("Worldwide, the reserves-to-production ratio [of natural gas] is estimated at 60 years."); Ben Casselman & Russell Gold, *Drilling Tactic Unleashes a Trove of Natural Gas—And a Backlash*, WALL ST. J., Jan. 21, 2010, at A1 (noting that "[t]oday, the industry estimates that 90% of all new gas wells are fractured" in reference to a method of unconventional natural gas extraction called hydraulic fracturing); *Natural Gas Supply*, NATURALGAS.ORG, http://www.naturalgas.org/business/supply.asp (last visited May 1, 2011) (noting that the Potential Gas Committee has estimated total future available domestic natural gas to "equal about 100 years of supply").

[78] *How Much Coal Is Left*, ENERGY INFO. ADMIN., http://tonto.eia.doe.gov/energyexplained/index.cfm?page=coal_reserves (last updated Feb. 19, 2010) (observing that if coal consumption increases at the projected growth rate, "U.S. recoverable coal reserves would be exhausted in about 146 years if no new reserves are added"). *But see id.* (explaining that without this assumed growth rate, "the U.S. recoverable coal reserves represent enough coal to last 234 years").

[79] Shahriar & Topal, *supra* note 77, at 776.

[80] J.O. Jaber & S.D. Probert, *Environmental-Impact Assessment for the Proposed Oil-Shale Integrated Tri-Generation Plant*, 62 APPLIED ENERGY 169, 171–72 (1999).

techniques may prove to be more difficult, expensive, and environmentally unpalatable than the renewable alternatives, and the exact number of years remaining for easy acquisition of nonrenewable fuels does not matter. The plain fact is that most of the energy sources upon which we currently rely—unlike renewable fuels—cannot be "regenerated on a human time scale."[81] Even enthusiasts for relatively clean-burning fossil fuels like natural gas have begun to recognize the inevitable "march towards sustainable renewable energy sources[;]"[82] they now stress the importance of natural gas as a filler to be relied upon during the slow transition to renewables and, more generally, to a sustainable energy system.[83]

Renewables are not only valuable in the long term as fossil fuels become increasingly scarce. They are overwhelmingly abundant, and once the infrastructure is in place to capture them, they offer an immediate partial[84] answer to concerns about energy shortages and reliance upon foreign fuel sources. Some optimistically calculate that the energy from the sun that hits the earth's land and waters is about "three thousand times more than the present power needs of the whole world."[85] The potential for onshore wind

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[81] Alicia Valero et al., *Inventory of the Exergy Resources on Earth Including Its Mineral Capital*, 35 ENERGY 989, 989 (2010).

[82] U.S. DEP'T OF ENERGY ET AL., MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES 6 (2009), *available at* http://www.netl.doe.gov/technologies/oil-gas/publications/EPreports/Shale_Gas_Primer_2009.pdf. The Ground Water Protection Council is a consortium of state regulators that has advocated, in some regulatory areas, against heightened federal regulation of new gas drilling techniques. *Id.* at ES-3 ("State regulation of the environmental practices related to shale gas development, usually with federal oversight, can more effectively address the regional and state-specific character of the activities, compared to one-size-fits-all regulation at the federal level."); Ground Water Protection Council, Resolution 03-5, Requesting Legislative Clarification of the Definition of "Underground Injection" in the Safe Drinking Water Act, *available at* http://www.gwpc.org/advocacy/documents/resolutions/RES-03-5.htm (last visited May 1, 2011) (asserting that the Council "supported and continues to support USEPA's position that hydraulic fracturing is not underground injection under the [federal] SDWA [Safe Drinking Water Act]"). We describe the Council as an "enthusiast" for natural gas because it argues in one document that natural gas is an "attractive energy source" that is "efficient and clean burning," and that "shale gas . . . will be vital to meeting future energy demand." Scott Kell, *Foreword* to U.S. DEPT OF ENERGY ET AL., *supra*.

[83] U.S. DEP'T OF ENERGY ET AL., *supra* note 82, at 6.

[84] *See generally* ELEC. POWER RESEARCH INST., THE POWER TO REDUCE CO_2 EMISSIONS (2007), *available at* http://my.epri.com/portal/server.pt?Abstract_id=000000000001015461 (discussing the energy "PRISM"—a concept that explains that a mix of measures, such as energy efficiency, carbon capture and storage, nuclear power, and others, including renewables, will likely be required to meet carbon reduction goals); *id.* at 2–5 (arguing that there is no one "silver bullet" to achieve carbon reduction goals).

[85] Valero et al., *supra* note 81, at 992 (citing Jan T. Szargut, *Anthropogenic and Natural Exergy Losses (Exergy Balance of the Earth's Surface and Atmosphere)*, 28 ENERGY 1047 (2003)). This estimate is based on an estimate of the sun's *exergy*. Exergy is a form of energy measurement that equalizes all fuels, thus allowing for easier comparison. *Id.* at 989. It is "a measure of [an energy form's] usefulness or quality or potential to

energy is, by some estimates, similarly large. Taking into account land uses that compete with turbines needed to capture the energy from wind, total wind resources well exceed "world demand for electricity,"[86] according to some studies. At the domestic level, estimates suggest that there may be sufficient solar radiation and wind in the United States to fulfill all of America's energy needs.[87] And one study concludes that solar energy systems could cover the electricity portion of America's energy needs using only about 0.6% of the total land area of the United States.[88]

Renewables, although a "nondepletable" source of energy characterized by relatively benign environmental effects,[89] do have flaws. The built infrastructure necessary to capture renewable resources does not currently exist,[90] and humans may not be willing or able to make the tradeoffs that would be necessary to develop this capacity. The sheer quantities of materials

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cause change." Alexandros Gasparatos et al., *A Critical Review of Reductionist Approaches for Assessing the Progress Towards Sustainability*, 28 ENVTL. IMPACT ASSESSMENT REV. 286, 295–96 (2008).

[86] BREEZE, *supra* note 8, at 153; *see also* Cristina L. Archer & Mark Z. Jacobson, *Evaluation of Global Wind Power*, 110 J. GEOPHYSICAL RES. D12110, 1 (2005), *available at* http://www.stanford.edu/group/efmh/winds/2004jd005462.pdf ("Even if only ~20% of [the 'global wind power generated at locations with mean annual wind speeds ≥ 6.9 m/s [meters per second] . . . for the year 2000'] could be captured, it could satisfy 100% of the world's energy demand for all purposes."); Gross et al., *supra* note 66, at 106 tbl.1 & n.a (concluding that wind produces 20,000 to 40,000 terawatt-hours of useful energy output annually—assuming that the wind was captured "using known technologies and allowing for physical constraints"). Global net generation of electricity in 2007 was 18.8 trillion kilowatt-hours, which is equal to 18,800 terawatt-hours. ENERGY INFO. ADMIN., *supra* note 77, at 4.

[87] In 2008, America consumed about 99.4 quadrillion Btus of energy. ENERGY INFO. ADMIN., *supra* note 60, at 13 tbl.1.5. United States wind energy potential is an estimated 10,000 billion kilowatt-hours annually. U.S. DEP'T OF ENERGY, WIND POWERING AMERICA: CLEAN ENERGY FOR THE 21ST CENTURY (2004), *available at* http://www.windpoweringamerica.gov/pdfs/wpa/35873_21century.pdf. This is equal to 34.12 quadrillion Btus of energy, or approximately one-third of total annual U.S. energy use. Vasilis Fthenakis and his co-authors estimate that solar energy could "satisfy 90% of the total energy needs of the US by 2100." Vasilis Fthenakis et al., *The Technical, Geographical, and Economic Feasibility for Solar Energy to Supply the Energy Needs of the US*, 37 ENERGY POL'Y 387, 396 (2009). This assumes that distributed photovoltaics, photovoltaic-compressed air energy storage, and concentrating solar power all would be deployed, with "about 90% of the solar production" occurring in the Southwest, *id.* at 397, and it is "contingent on a national commitment to a renewable-energy-based electricity production and distribution system," *id.* *But see* F. E. Trainer, *Can Renewable Energy Sources Sustain Affluent Society?*, 23 ENERGY POL'Y 1009, 1023 (1995) (concluding, based on costs, that "it is highly unlikely that renewable energy sources could sustain present rich world per capita levels of energy use").

[88] Paul Denholm & Robert M. Margolis, *Land-Use Requirements and the Per-Capita Solar Footprint for Photovoltaic Generation in the United States*, 36 ENERGY POL'Y 3531, 3539 (2008). This assumes that the efficiency of photovoltaic modules is 13.5%. *Id.* at 3534.

[89] Gary W. Frey & Deborah M. Linke, *Hydropower as a Renewable and Sustainable Energy Resource Meeting Global Energy Challenges in a Reasonable Way*, 30 ENERGY POL'Y 1261, 1262 (2002).

[90] *See, e.g.*, Fthenakis et al., *supra* note 87, at 389–91.

needed, from steel to silicon and rare metals,[91] as well as the land required for the infrastructure, inevitably create costs.[92] Renewables are also not as easily interchangeable, storable, and transportable as some nonrenewable fuels.[93] When the sun is behind clouds or the wind dies down, an energy-consuming source must rely upon a back-up stored energy source or traditional fuels that are burned to generate electricity, which then flows through the grid.[94]

Despite these limitations, renewables have fewer negative impacts on human health, security, and the environment than do traditional fuels. A European Commission study, for example, attempted to identify all of the relevant externalities of energy production, focusing on and quantifying "environmental impacts," "global warming impacts," "accidents" ("rare unwanted events in contrast to normal operation"), and "energy security" ("unforeseen changes in availability and prices of energy carriers").[95] Beneath these categories, in turn, researchers considered the effects of energy production on "health, crops, building materials, forests, and ecosystems," among other things.[96] The results suggest that renewable sources of electricity may have lower externality costs than nonrenewables, with the exception of nuclear power in some European countries.[97] Many other factors, of course, must be considered before concluding that renewables are the ideal energy solution. New technologies, for instance, are costly, and those costs fall

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[91] *See* Trainer, *supra* note 87, at 1018 (estimating that a tripling of "world steel, glass, and concrete production" could be required if renewable energy supplied global power needs); Katie Howell, *Imported Minerals, Metals Fuel U.S. Shift to Homegrown Power*, N.Y. TIMES, June 9, 2009, http://www.nytimes.com/gwire/2009/06/09/09greenwire-imported-minerals-metals-fuel-us-shift-to-home-57275.html.

[92] Fulvio Ardente et al., *Life Cycle Assessment of a Solar Thermal Collector*, 30 RENEWABLE ENERGY 1031, 1052 (2005) (discussing "direct emissions of metals" that occur when solar collectors are cut and welded and "indirect emissions" from the "production of raw materials" that go into the solar panels, but observing that "wastes are very low" from solar panel production); Craig K.R. Willis et al., *Bats Are Not Birds and Other Problems with Sovacool's (2009) Analysis of Animal Fatalities Due to Electricity Generation*, 38 ENERGY POL'Y 2067, 2067 (2010) ("[I]t is bats that face the most widespread and worrisome species-level conservation consequences from wind turbines.").

[93] Michael J. Economides & David A. Wood, *The State of Natural Gas*, 1 J. NAT. GAS SCI. & ENGINEERING 1, 2 (2009).

[94] *See* Benjamin K. Sovacool, *The Intermittency of Wind, Solar, and Renewable Electricity Generators: Technical Barrier or Rhetorical Excuse?*, 17 UTIL. POL'Y 288, 289 (2009) (describing the intermittency issues of renewables).

[95] EUROPEAN COMM'N, EXTERNE: EXTERNALITIES OF ENERGY 13–14 (Peter Bickel & Rainer Friedrich eds., 2005), *available at* http://www.externe.info/brussels/methup05a.pdf.

[96] *Id.* at 51, 53.

[97] *Results of ExternE (Figures of the National Implementation Phase)*, EXTERNE, http://www.externe.info (last visited Nov. 10, 2010); *see also* BREEZE, *supra* note 8, at 15 (summarizing the ExternE results).

disproportionately on low-income energy users.[98] The broader point is that renewables offer great promise and should not be dismissed as merely a minor contribution to an overwhelming energy challenge.

One could fill several volumes in attempting to pinpoint the optimal energy package for the short term as the United States responds to the need for a sustainable energy profile with a substantial renewables component. It is clear, however, that the ideal short-term energy profile would include a mix of renewable and nonrenewable sources that would prevent electricity rates from skyrocketing; provide a reliable, uninterrupted source of power; lower America's dependence on foreign energy resources; and reduce the current negative externalities of energy production. Here, we simply argue that renewable energy should become a reliable and substantial piece of America's total energy mix within several decades and should be a dominant part of the mix in the far future. The ultimate goal for the percentage of U.S. energy to be provided by renewables in the near term is not essential to our discussion, although state governments have suggested what a realistic percentage might be. Approximately thirty-three states have specified deadlines by which renewable or alternative energy must comprise a percentage of the state's electricity package,[99] ranging from eight percent in Pennsylvania[100] to as high as thirty-three percent in California.[101] Some cities have aimed even higher;

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[98] *See, e.g.*, Joseph P. Tomain, *"Steel in the Ground": Greening the Grid with the iUtility*, 39 ENVTL. L. 931, 959 (2009) (describing low-income consumers as "price-sensitive to energy costs").

[99] *See* Donald S. McCauley et al., *Renewable Portfolio Standards*, *in* CAPTURING THE POWER OF ELECTRIC RESTRUCTURING 175, 184–87 (Joey Lee Miranda ed., 2009).

[100] U.S. Dep't of Energy, *States with Renewable Portfolio Standards*, ENERGY EFFICIENCY & RENEWABLE ENERGY, http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm#chart (last updated June 16, 2009). Pennsylvania has an Alternative Energy Portfolio Standards Act. *See* 73 PA. CONS. STAT. ANN. §§ 1648.1–1648.8 (West 2010). The Act requires that "at least 8% of the electric energy sold by an electric distribution company or electric generation supplier to retail electric customers . . . in the 15th year after the effective date of this subsection is sold from Tier 1 alternative energy resources." *Id.* § 1648.3; *see also id.* § 1648.2 (defining "alternative energy source" and "Tier I alternative energy source"). Tier I alternative energy sources include "solar photovoltaic and solar thermal energy," "wind power," "low-impact hydropower," "geothermal energy," "biologically derived methane gas," "fuel cells," "biomass energy" ("organic material from a plant that is grown for the purpose of being used to produce electricity" and "any solid, nonhazardous cellulosic waste material that is segregated from other waste materials, such as waste pallets . . . landscape or . . . tree trimmings . . . and other crop by-products or residues"), and "methane gas emitting from abandoned or working coal mines." *Id.* § 1648.2.

[101] *See California Renewables Portfolio Standard*, CAL. PUB. UTIL. COMM'N, http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm (last visited May 1, 2011). Maine has a higher renewable percentage; by 2017, forty percent of Maine's electricity must be from renewable sources. *See* ME. REV. STAT. ANN. tit. 35-A, § 3210(3) (2010) (requiring that providers' portfolios consist of eligible renewables); *id.* § 3210-C (setting a goal for an incremental increase in the portfolio requirement, resulting in a 10% increase by 2017); 65-407-311 ME. CODE R. § 3 (LexisNexis 2010) (same). But Maine includes hydropower in its definition of renewable

San Jose, for example, endeavors to "[r]eceive 100 percent of [its] electrical power from clean renewable sources" by 2025.[102] Keeping this range of visions in mind, subsection 2 will explain why distributed renewables are an important piece of the near-term renewables goal.

2. *Why Distributed Renewables?*

Renewable energy exists at two scales. There are "farms," which are large, concentrated arrays of generating units that produce mass quantities of power, and "gardens," in the form of smaller, distributed systems. At the large scale, rows of space-age mirrors and solar parabolic troughs dot the southwestern landscape,[103] and wind turbines tower over the plains.[104] At the smaller scale, homes and businesses place solar panels on roofs, tap into geothermal resources in the subsurface, or install a wind turbine in a parking lot or backyard.

At the distributed scale, renewables fit an energy production model that has existed for thousands of years; energy is consumed close to its source.[105] This localized system enabled by distributed renewable technology offers unique opportunities for sustained local economic empowerment in even the smallest communities.[106] Homes, businesses, and factories become long-term generators of power and income. A distributed renewable structure that is placed on a lot can, with the proper transmission and distribution infrastructure and electricity metering policy, generate much of its own power and sell some back to the grid.[107] A group in Japan has captured this concept in a phrase that

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sources, and with hydro, it already meets this requirement. Therefore, the standard will not likely lead to much growth in the wind and solar sectors. McCauley et al., *supra* note 99, at 188.

[102] CITY OF SAN JOSE, 2009–2010 CLEAN TECH LEGISLATIVE AGENDA 2 (2009), *available at* http://www.sanjoseca.gov/mayor/goals/environment/SANJOSECLEANTECHAGENDA2009.pdf.

[103] *See, e.g.*, BREEZE, *supra* note 8, at 201 (describing the nine solar trough farms built in California in the 1980s and 1990s); Matthew L. Wald, *What's So Bad About Big?*, N.Y. TIMES, Mar. 7, 2007, at H1 (describing a solar power plant with "six rows of mirrors, each nearly a quarter-mile long").

[104] *A Leader in Texas Wind Power*, LOWER COLO. RIVER ASS'N, http://www.lcra.org/energy/power/renewable_energy/windpower.html (last updated Nov. 12, 2010) (explaining that "[w]ide open West Texas, where the winds whip across the plains, and the Gulf Coast region, are ideal locations for wind power projects, also called wind farms," and describing the farms that have been built).

[105] *See, e.g.*, Bernadette Del Chiaro & Rachel Gibson, *Government's Role in Creating a Vibrant Solar Power Market in California*, 36 GOLDEN GATE U. L. REV. 347, 354 (2006).

[106] RIFKIN, *supra* note 44, at 241 ("Were all individuals and communities in the world to become the producers of their own energy, the result would be a dramatic shift in the configuration of power: no longer from the top down but from the bottom up.").

[107] *See, e.g.*, Jeffrey Gangemi, *Selling Power Back to the Grid*, BUS. WEEK (July 6, 2006), http://www.businessweek.com/smallbiz/content/jul2006/sb20060706_167332.htm (discussing how a homeowner's

plays on the negatively phrased "Not in My Back Yard" or "NIMBY" land use ideology, defining the movement toward distributed renewables as "Energy In My Yard"—EIMY.[108]

Construction of additional renewable production facilities—both large and small scale—is necessary for proper growth of renewable energy capacity, and policies governing both scales will need to change. This Article, however, focuses on distributed renewables because they offer several distinct benefits over large projects. Large renewable projects, apart from the challenges of financing and antiquated state energy regulation,[109] face the extremely high barrier of the siting process. Droves of individual landowners, environmental groups, and other organized lobbies have voiced their concerns over the aesthetic and environmental impacts of tall wind turbines and acres of solar arrays,[110] and a push to build more and larger farms will only heighten these concerns.[111]

"rooftop solar power generation system pays him an extra $3,000 per year on top of producing all the energy he needs to power his New Jersey home for free"). *See generally* Bronin, *supra* note 11, at 547 (arguing for greater emphasis on "microgrids," or "small-scale distributed generation between neighbors of energy derived from sources such as solar collectors, wind power systems, microturbines, geothermal wells, and fuel cells").

[108] Hiroaki Niitsuma & Toshiko Nakata, *EIMY (Energy In My Yard)—A Concept for Practical Usage of Renewable Energy from Local Sources*, 32 GEOTHERMICS 767, 768 (2003).

[109] *See* Kenneth Westrick et al., *The Top 10 Least Exploited and Developed U.S. States*, 6 N. AM. WIND POWER 18, 23 (2009) (describing state programs like renewable portfolio standards (which, by requiring a percentage or specific quantity of the state's electricity to come from renewable sources, make wind energy more profitable), grid interconnection policies, and corporate tax incentives as important factors in wind energy development, but observing that ten states with high wind energy potential lack such policies).

[110] NAT'L COMM'N ON ENERGY POLICY, SITING CRITICAL ENERGY INFRASTRUCTURE 2 (2006), *available at* http://bipartisanpolicy.org/sites/default/files/Siting Critical Energy Infrastructure_448851db5fa7d.pdf ("The headlines are replete with examples of new, supposedly advanced facilities that continue to run into local opposition."); Alain Nadai & Dan van der Horst, Editorial, *Wind Power Planning, Landscapes and Publics*, 27 LAND USE POL'Y 181, 181 (2010) ("[P]rotests . . . have resulted in the delay and even abandonment of proposed wind farms and other renewable energy facilities . . . ."); Felicity Barringer, *Environmentalists in a Clash of Goals*, N.Y. TIMES, Mar. 24, 2009, at A17 (describing some environmental groups' opposition to solar and wind projects in places like the Mojave Desert and the Nantucket Sound).

[111] Further, as often occurs with actions that will affect state coffers, politicians are already fighting over who will pay for and receive the transmission that will connect renewable farms to consumers, meaning that those areas with the highest renewable potential may not be prioritized for development. *See* Matthew L. Wald, *Debate on Clean Energy Leads to a Regional Battle over Jobs*, N.Y. TIMES, July 14, 2009, at A13 (explaining that "[a]n influential coalition of East Coast governors and power companies fears that building wind and solar sites in the Midwest would cause their region to miss out on jobs and other economic benefits" and that the "[t]he East Coast advocates may have won a crucial first round" in the passage of a climate bill with transmission on clean energy provisions in the House, but observing that "a wind machine in North Dakota would produce more energy than the same machine in some Eastern states"). New regional governance processes that bring together local, state, and federal institutions to address the myriad issues posed by renewable farms will need to emerge, and some already have. *See, e.g.*, W. GOVERNORS' ASS'N & U.S. DEP'T OF ENERGY, WESTERN RENEWABLE ENERGY ZONES—PHASE 1 REPORT 2 (2009), *available at*

Small-scale renewables on rooftops, parking garages, factories, and in yards, on the other hand, are an immediate and substantial step toward increasing renewable energy capacity. A homeowner or business in an area with adequate enabling regulations for small-scale renewable electricity generation can have a system up and running in several months.[112] Distributed generation systems may also attract less political attention than wind and solar farms. Small-scale projects, often initiated by cities, are less likely to draw in the organized landowners and special interest groups that tend to successfully block higher profile, large-scale systems.[113] Indeed, some surveys have shown that the public holds a more favorable attitude toward small-scale renewables,[114] although there are still strong local zoning battles over their placement.[115]

A final benefit of distributed generation is that it could quickly reduce America's dependence on fossil fuels. Small-scale renewable generation systems, individually considered, generate relatively low quantities of electricity, but their contribution could be large in the aggregate. Electrical utilities face a unique challenge due to the characteristics of their product. Electricity cannot yet be effectively and economically stored in large quantities,[116] but it must be instantaneously available when demanded.[117] Many power plants therefore exist only to meet consumer demand for electricity when demand exceeds the normal base load. These plants power up

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http://www.westgov.org/wga/publicat/WREZ09.pdf. But there is much more work to be done in this area. The regional governance issues posed by solar farms are an immediate problem and, though beyond the scope of this Article, are the subject of a separate, forthcoming piece. *See* Hannah Wiseman, *Expanding Regional Renewable Governance*, 35 HARV. ENVTL. L. REV. (forthcoming 2011) (arguing that because utility-scale renewable technology must be placed in the areas of strongest wind and sunlight—ignoring existing jurisdictional lines on the ground—each renewable development may cross multiple jurisdictional lines and lead to regulatory commons and anticommons challenges).

112 *See, e.g.*, N.Y. STATE ENERGY RESEARCH & DEV. AUTH., A DETAILED GUIDE TO INSTALLING A SOLAR ELECTRIC SYSTEM, http://www.powernaturally.org/publications/consumermanual2-final.pdf (last visited Feb. 17, 2011) (showing that a typical photovoltaic system is "fully operational" within nineteen to twenty weeks).

113 *See supra* note 110.

114 A study in the United Kingdom concluded that "the public are generally more comfortable with the use of small-scale technologies in their locale." Jonathan Burton & Klaus Hubacek, *Is Small Beautiful? A Multicriteria Assessment of Small-Scale Energy Technology Applications in Local Governments*, 35 ENERGY POL'Y 6402, 6407 (2007).

115 *See* Abby Goodnough, *Turning to Windmills, but Resistance Lingers*, N.Y. TIMES, Sept. 13, 2009, at A25; *supra* note 109.

116 Joseph P. Tomain, *The Past and Future of Electricity Regulation*, 32 ENVTL. L. 435, 454 (2002).

117 *See* Paul Denholm & Robert M. Margolis, *Evaluating the Limits of Solar Photovoltaics (PV) in Traditional Electric Power Systems*, 35 ENERGY POL'Y 2852, 2853 (2007).

during times of "peak" electricity demand[118] such as hot summer days when air conditioners run at maximum capacity. Outside of the peak periods, these "peaker" plants sit idle or operate at low levels as spinning reserves.[119] This is where renewables, including distributed renewables, show one of their greatest strengths. By providing the additional electricity needed during peak times,[120] distributed renewables may have a disproportionately large effect on clean energy production[121] and could reduce the need for fossil-fuel-burning peaking plants.[122]

Distributed renewables, considered collectively, offer several unique advantages over centralized utilities. They can be built and deployed quickly, they may not face as much consumer or political opposition, and they reduce the need for fossil-fuel-fired energy. Much effort will be required, however, to move these promising technologies to a point of greater prominence within the energy system.

C. Requirements for Widespread Deployment of Distributed Renewables

This section addresses two connected components that will be required to move toward a world with more distributed renewables that are applied in a

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[118] *Id.*

[119] Susan Kelly & Elise Caplan, *Time for a Day 1.5 Market: A Proposal to Reform RTO-Run Centralized Wholesale Electricity Markets*, 29 ENERGY L.J. 491, 509 n.76 (2008).

[120] *Cf.* BREEZE, *supra* note 8, at 200 (explaining that "[i]t can, therefore, be argued that solar power is best deployed for peak power generation," but if utilities begin to better manage and even out consumer demand, peak demand level may decline, and the "marginal value of the solar output may fall").

[121] Denhlom & Margolis, *supra* note 117, at 2584 (explaining how during a particular week investigated, "PV generation provides significant benefits by reducing demand during peak periods"); *id.* at 2583–84 (showing a strong correlation between electricity demand and solar photovoltaic electricity generation in Texas in the summer); Sovacool, *supra* note 94, at 294 (explaining that an installed PV array in California reduced by half "the number of natural gas 'peakers' needed to ensure reserve capacity"); *see also* CHRISTY HERIG, NAT'L RENEWABLE ENERGY LAB., USING PHOTOVOLTAICS TO PRESERVE CALIFORNIA'S ELECTRICITY CAPACITY RESERVES 2 (2001), *available at* http://www.nrel.gov/docs/fy01osti/31179.pdf (providing the data on the reduced peak load in California described by Sovacool); *id.* at 4 fig. ("The correlation between PV output and load demand is normally high."); Jad Mouawad, *The Newest Hybrid Model*, N.Y. TIMES, Mar. 5, 2010, at B1 (explaining that a large array of solar panels at a Florida utility's gas-fired power plant will "provide extra power when it is most needed: when the summer sun is shining, Floridians are cranking up their air-conditioning and electricity demand is at its highest").

[122] *See* David Hodas, *Imagining the Unimaginable: Reducing U.S. Greenhouse Gas Emissions by Forty Percent*, 26 VA. ENVTL. L.J. 271, 289 (2008) (explaining that under Florida's proposed combination of "energy efficiency and renewable sources" policies, "[s]ummer peak demand would be reduced by 20,480 MW (the equivalent of roughly forty new 500 MW coal-fired power plants)"); Vance Little, Note, *Using the Commerce Clause to Short-Circuit States' Ability to Pass Power Costs onto Neighbors*, 2008 U. ILL. J.L. TECH. & POL'Y 149, 154–55 ("[N]etwork designers have come to rely on smaller natural gas or diesel plants for shorter peaks in load at various times throughout the day . . . .").

greater variety of contexts. First, innovative entrepreneurs will need to install distributed generation and actively promote it within their communities. Second, in order to allow renewables "pioneers" or "entrepreneurs" to embark upon their projects, municipal governments must be free to enact all local land use regulations and standards, including building codes and zoning, necessary to encourage and ensure relatively predictable regulation of the installation of renewables. We will refer to these as *land-energy rules*.

1. Energy Entrepreneurs

Distributed renewable generation so far remains an intriguing anomaly in a primarily centralized system of nonrenewable energy production,[123] and it will stay that way if innovative homeowners and renters—the entrepreneurial pioneers of the renewable energy world—do not take an active role in installing and using it. In a world increasingly dominated by corporations and powerful special interests, this claim may sound far-fetched, but distributed renewables are indeed dependent upon individuals, not just groups with larger stakes in the issue. Corporations produce the technology, but the success of any distributed renewable business wholly depends upon *individuals'* willingness to install the technology and to persuade others of its usefulness. The entrepreneurs required here are individual residents and businesses who are willing to place small infrastructure on their property. The effort will not succeed without individual effort, which, in the aggregate, makes the manufacturing of distributed renewable technology economically feasible.

Further, entrepreneurs must operate within conducive regulatory contexts. The transition toward distributed renewables is like the introduction of any other new technology, but it has more significant implications due to the infrastructural investment required. It requires enthusiastic inventors of the product to experiment with and perfect the technology and for the users of the product to demonstrate by doing. In the case of distributed renewables, much of the product perfection is already occurring.[124] A partnership between Edinburgh, Scotland, and Michigan has introduced a roof wind turbine to

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123 *See supra* text accompanying note 60.

124 *See, e.g.*, John Casey, *Technology Smooths the Way for Home Wind-Power Turbines*, N.Y. TIMES, Apr. 15, 2008, at F3 (quoting the President of the New York State Energy Research and Development Authority, who observed that "the technology has improved, and the cost per project is coming down" and that "[t]urbines for farms and residential applications are seeing much more activity" (internal quotation marks omitted)).

America,[125] for example, and the National Renewable Energy Laboratory has developed high-efficiency, thin-film solar cells, which are more affordable than traditional cells and can be placed on "roof shingles, windows, [and] siding."[126] But still more progress can be made in solar and wind technologies if consumers begin to demand more and better technologies and operate them in a variety of physical environments and regulatory contexts. The immediate work that is needed, the "product" that must be advertised so to speak, is the entire package—the proof that a solar panel or wind turbine, as installed, can fulfill a family's or business's energy needs.

As we will describe in more detail below, the eccentric businessman Rembrandt Peale initially succeeded in persuading Baltimore to switch to gas lighting not by inventing a gas lamp (others had already done that[127]), but by installing it in a museum, advertising the innovation, and proving to local citizens that it worked.[128] Gas lighting later expanded in part due to local laws enabling infrastructural change. Similarly, when air conditioners were first introduced to cities around the mid-1900s, an informal survey conducted by *Fortune* magazine suggested that the most effective advertising for this new technology—the proof that it worked and was worth purchasing and installing—came from the "advertisements" of neighbors.[129] *Fortune* chose the air conditioner to satisfy its curiosity about effective marketing techniques because this relatively novel technology was, in 1954, "climbing up the acceptance curve from the luxury to the necessity category."[130] The air conditioner (like today's solar panels and wind turbines) was also "highly visible, and thus provide[d] a convenient index of how people are influenced by one another."[131] *Fortune* toured Philadelphia neighborhoods to locate the areas that tended to have more air conditioners.[132] Once it identified these neighborhoods,[133] it noticed that the number of air conditioners differed

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[125] Anne Eisenberg, *Wind Blows, and the Electric Meter Spins Backward*, N.Y. TIMES, Feb. 15, 2009, at BU4.

[126] Press Release, Nat'l Renewable Energy Lab., Record Makes Thin-Film Solar Cell Competitive with Silicon Efficiency (Mar. 24, 2008), *available at* http://www.nrel.gov/news/press/2008/574.html.

[127] David Melville and Dr. Charles Kugler patented gas lighting in America. Brown, *supra* note 33, at 11–12.

[128] *See infra* notes 143–50 and accompanying text.

[129] William H. Whyte, Jr., *The Web of Word of Mouth*, FORTUNE, Nov. 1954, at 140, 140; *see also* BILL BISHOP, THE BIG SORT: WHY THE CLUSTERING OF LIKE-MINDED AMERICA IS TEARING US APART 191 (2008) (discussing the *Fortune* article).

[130] Whyte, *supra* note 129, at 140.

[131] *Id.*

[132] *Id.* at 142.

[133] *Id.*

substantially block-by-block, and the blocks with the most air conditioners were those with house walls along the alleyways—the socially frequented portions of the neighborhood where children played and mothers watched for their safety.[134] *Fortune* concluded that once a social group coalesced, all that was necessary to cause air conditioners to spread like wildfire along a block was the "catalytic influence of a leader," such as a mother with a recently installed air conditioner who would trumpet her happy experiences with the technology to the group, which would then pass on the experience through word of mouth.[135] While the new technology to be promoted is no longer gas lighting or the air conditioner, the same sort of demonstrated and individually advertised application of a new technology will be required to convince large numbers of individuals to adopt distributed renewables.

The switch to a new source of electricity, however, has broader implications than most technology transitions. The introduction of new renewable energy devices sparks individuals' fear of the unknown in every aspect of their lives.[136] They may worry that the heat will stop working on the coldest day of the winter or the smart phone will not charge just when a crucial message must be conveyed. The switch to renewables also requires a higher up-front commitment, both mentally and financially. The financial layout for a renewable-energy-generating device is in some cases one-quarter to one-half as large as the purchase of a modest $100,000 home,[137] which is the largest investment that a typical individual will ever make.[138] And it requires, in many respects, a spirited adherence to social do-goodedness.[139] With high up-front

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134 *Id.* at 143.

135 *Id.*

136 *See* William H. Lawrence & John H. Minan, *Product Standards and Solar Energy*, *in* LEGAL ASPECTS OF SOLAR ENERGY, *supra* note 56, at 153, 160 ("The novelty of the equipment [used in solar projects] leaves many consumers with fears about its performance reliability.").

137 *See* Del Chiaro & Gibson, *supra* note 105, at 364 ("[A] typical 2.5 kW [solar power] system—a size that typically would be expected to generate at least half of the home's electricity needs—is estimated to cost approximately $20,000."); Shevory, *supra* note 69 (indicating that residential turbines "cost between $12,000 and $55,000").

138 *See* WILLIAM A. FISCHEL, THE HOMEVOTER HYPOTHESIS: HOW HOME VALUES INFLUENCE LOCAL GOVERNMENT TAXATION, SCHOOL FINANCE, AND LAND-USE POLICIES 9 (2001) (describing how a home is often an individual's only asset aside from retirement assets).

139 *See* R. Cooke et al., *Alternative Energy Technologies in Buildings: Stakeholder Perceptions*, 32 RENEWABLE ENERGY 2320, 2325–26 (2007). One respondent in a survey of alternative energy stakeholders in the United Kingdom explained: "From the clients [sic] point of view we ask them to consider renewables in the long term to save money and save the planet." *Id.* at 2325. "[T]he main reasons for using [alternative energy technologies] in building projects are perceived to be (a) long-term economic benefits, (b) the availability of subsidies, (c) image benefits, (d) the desire to reduce environmental impacts and (e) corporate social responsibility (CSR)." *Id.* at 2325–26; *see also id.* at 2326 fig.1.

costs, many renewables do not pay off, in terms of the energy savings exceeding the costs of purchasing and construction, for at least a decade.[140] In a highly mobile society,[141] those who invest are unlikely to stay long enough to see this payoff. Finally, the transition to distributed renewable technology requires consumers to overcome negative perceptions of the product. As one respondent in a series of alternative-energy-focused interviews in the United Kingdom stated, clients "need to be convinced that these systems will work and will not have to be replaced with expensive traditional replacements after occupancy."[142]

In past large energy transitions from candles to gas lighting and electricity and then to centralized energy production, these many barriers to energy innovation were breached. And, interestingly, these surges forward were influenced by individual, charismatic entrepreneurs aided by local government policies. Baltimore, for example—one of the first American cities to receive gas light service—was the home of Rembrandt Peale,[143] an eccentric museum owner who displayed various paintings, stuffed fishes, and animals to the public.[144] As historians tell the story, Peale enhanced his collection after his father funded a successful expedition to unearth the first mammoth skeleton found in the United States, and Peale discovered in displaying this archaeological attraction that "catering to the public curiosity" could be a profitable business venture.[145] As a new curiosity, he decided to purchase a gas-making machine for his museum and to produce light, thus introducing a novelty to the public and at the same time attempting to condition the public to a new form of energy, which he hoped would be a successful business venture[146]:

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[140] *See* Del Chiaro & Gibson, *supra* note 105, at 364 ("Over a 30-year time period [in California], the average benefit in terms of cumulative cash flow is approximately $4,500 and 'simple payback' (the time it takes for an investment to 'pay for itself') can be expected within ten to twelve years.").

[141] Between 1995 and 2000, nearly half (49.5%) of the U.S. population aged five and over moved. U.S. CENSUS BUREAU, MIGRATION AND GEOGRAPHIC MOBILITY IN METROPOLITAN AND NONMETROPOLITAN AMERICA: 1995 TO 2000, at 2 (2003), *available at* http://www.census.gov/prod/2003pubs/censr-9.pdf.

[142] Cooke et al., *supra* note 139, at 2325.

[143] STOTZ & JAMISON, *supra* note 25, at 13.

[144] *See id.*

[145] *Id.*

[146] *Id.* at 14.

GAS LIGHTS

WITHOUT OIL, TALLOW, WICKS OR SMOKE

> It is not necessary to invite attention to the gas lights by which my salon of paintings is now illuminated; those who have seen the ring beset with gems of light are sufficiently disposed to spread their reputation; the purpose of this notice is merely to say that the Museum will be illuminated every evening until the public curiosity shall be gratified.[147]

A day earlier, Peale had similarly dangled a temptation before his audiences, explaining,

> Yesterday evening, for the first time, the citizens who attended at the Baltimore Museum were gratified by seeing one of the Rooms lighted by means of CARBURETTED HYDROGEN GAS. . . . We are much pleased to find that the illumination by GAS will be continued every evening for some time . . . that each citizen may have an opportunity of being convinced how much superior it is to every other kind of artificial light.[148]

In installing the gaslight system and publishing these advertisements, Peale was doing exactly what today's pioneers of solar and wind energy must do. That is, they must lead by example, applying the new and novel energy system and proving to the public that it works—ensuring that the "public curiosity" is not only "gratified," but that the new form of energy production becomes an accepted part of modern society. And the laws must allow these entrepreneurs to follow this course.

The road to centralized electricity production—another great energy transition of the last two centuries enabled in part by local policies—was paved by another particularly enterprising individual, Samuel Insull.[149] This was not an easy route; Insull encountered "inertia which . . . could be overcome best by individual initiative and persistent effort. The new energy had to fight its way against [e]ntrenched interests" like gas lighting.[150] "The people were already served with light, heat, and power, according to then-prevailing standards. Only enthusiasts had a glimpse of the future position of the new energy."[151] Insull embarked upon a campaign to persuade America and its governing

147 Brown, *supra* note 33, at 14 (quoting FED. GAZETTE & BALT. DAILY ADVERTISER, June 13, 1816).
148 *Id.* (quoting FED. GAZETTE & BALT. DAILY ADVERTISER, June 12, 1816).
149 *See* Bradley, *supra* note 30, at 46 (describing Insull's support of centralized energy production).
150 BAUER & COSTELLO, *supra* note 40, at 14.
151 *Id.*

institutions, however, that centralized energy producers regulated as natural monopolies would form an ideal system of electricity provision, arguing that "[t]he best service at the lowest possible price can only be obtained . . . by exclusive control of a given territory being placed in the hands of one undertaking."[152] By 1933, approximately twenty-two companies ran the bulk of the American electric industry.[153] The transition to centralized energy surely was driven in part by the invention of improved transmission technology.[154] However, the efforts of entrepreneurial individuals like Peale were important as well.

Once individuals pave the way to a new form of energy production or delivery, proving that the new technology is effective and convenient, a larger economy must form around this new innovation to ensure that it is available to the public, and laws must be revised to allow for its widespread dispersal. To achieve these goals, the initial individual efforts must expand to collective endeavors. Others have recognized this need for group action in advocating for sweeping changes in the energy system. In a 1949 book arguing for the formation of local public leagues to provide electricity, for example, the director of the American Public Utilities Bureau argued that in the "first step" necessary for this type of change—"legislative action by the city council"—individuals were needed:

> [O]fficial leadership is necessary, and usually depends upon the mayor and prominent members of the council. Ordinarily such persons will be reluctant to initiate the proposal and to "stick out their necks," unless there is substantial support or pressure. If there is a vigorous local league with a large membership, official leadership will emerge and legislative action is likely to follow.[155]

Indeed, this movement toward a larger group to advocate for new energy technologies and their associated infrastructure emerged during the transitions to gas lighting and later to centralized electricity. Rembrandt Peale persuaded a group of investors to form the Gas Light Company of Baltimore,[156] and three

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[152] Bradley, *supra* note 30, at 46 (second alteration in original) (quoting Samuel Insull, President's Address (June 7, 1898), *in* NATIONAL ELECTRIC LIGHT ASSOCIATION: TWENTY-FIRST CONVENTION 14, 27 (Samuel Insull ed., 1898)).

[153] BAUER & COSTELLO, *supra* note 40, at 22 (citing U.S. FED. POWER COMM'N, NATIONAL POWER SURVEY, POWER SERIES NO. 2, PRINCIPAL ELECTRIC UTILITY SYSTEMS IN THE UNITED STATES (1936)).

[154] *See supra* text accompanying note 41.

[155] BAUER & COSTELLO, *supra* note 40, at 244–45.

[156] Brown, *supra* note 33, at 14 ("By Friday, June 14, 1816 a small group of men, convinced by the demonstration at the Museum, had banded themselves into the Gas Light Company of Baltimore . . . .").

days after the company formed, the Baltimore City Council passed an ordinance to "provide for the more effectually lighting the streets, squares, lanes and alleys of the city of Baltimore" using carburetted hydrogen gas, and to empower Peale's new companies to lay pipes throughout the city for this purpose.[157] Without local government laws enabling the infrastructure necessary to technological change, these energy transitions might never have occurred.

In the modern energy transition to renewables, before groups rally around this relatively new form of energy—thus enabling substantial investment and stronger lobbying power—the renewables pioneers must pave the way for a new industry oriented around this energy form. And to do this, the pioneers will need amenable land energy rules in addition to monetary incentives and a general spirit of adventurousness and desire for social change. Unfortunately, these rules in their current form are wholly inadequate.

2. Existing Local Land-Energy Rules

Individual entrepreneurs will not be able to install wind turbines and solar panels without zoning laws and building codes that allow these devices, yet in many regions, such felicitous land-energy rules do not exist. This was starkly illustrated in 2009 when the planning board of Bourne, Massachusetts, twice blocked a homeowner's attempts to install a backyard wind turbine, and the superior court affirmed the board's decisions.[158] The need to enable (or, in some cases, command[159]) local governments to reshape land use laws to accommodate distributed renewables—to create land-energy rules, in other words—was well documented during the failed push toward renewables in the 1970s, and the literature generated useful suggestions for improvement. In 1977, for example, the federal Energy Research and Development Administration suggested legal solutions to enable the solar heating and cooling of buildings in many contexts, from ensuring that buildings have adequate access to sunlight[160] to encouraging the installation of solar

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[157] *Id.* at 15 (internal quotation marks omitted) (explaining that the ordinance was passed on Monday, June 17, 1816).

[158] Goodnough, *supra* note 115.

[159] WILLIAM A. THOMAS ET AL., OVERCOMING LEGAL UNCERTAINTIES ABOUT USE OF SOLAR ENERGY SYSTEMS 12 (1978) (suggesting that "[f]ailure by state or local governments to protect skyspace will discourage solar energy use" and concluding that "Constitutional Protection of unobstructed solar skyspace" is therefore critical (emphasis omitted)).

[160] Miller, *supra* note 51, at 39–40.

technology on mobile homes.[161] The following year, the American Bar Foundation attempted to identify possible "legislative remedies" at the federal, state, and local levels to reduce "legal barriers to the use of solar energy systems,"[162] including building code and zoning-related barriers.[163] In 1981, law professors from San Diego and Villanova edited a book that offered an even more comprehensive view of the "legal issues in solar heating and cooling and in solar photovoltaics," and they attempted to resolve some of these issues,[164] suggesting model ordinances for solar rights[165] and improved technology standards and building codes for solar installation.[166] Other recent legal scholarship has proposed structures for local laws to enable the use of renewables, such as regulations or landowner agreements that create access to sunlight.[167] In Part II, this Article will make proposals for necessary renewable energy rules from a broader perspective; it will describe and defend the governance level at which land-energy rules must be written and revisited. We hope that this will inspire further discussion about specific rules that should be implemented.

To set the stage for our approach to fostering the transition to distributed renewables, the following sub-subsection provides a sampling of the land-energy laws that have been implemented to date—some of which reflect the suggestions of the literature from the 1970s through today. Because solar access laws, which are a key part of land-energy rules, have been thoroughly discussed in the literature,[168] it will focus on the zoning and building codes that address distributed renewables. It will work from the top down, investigating some of the federal, state, and local efforts that have directly impacted the development, content, and application of land-energy rules.

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161 *Id.* at 165–70.

162 THOMAS ET AL., *supra* note 159, at 1.

163 *Id.* at 16, 19–27.

164 *Preface* to LEGAL ASPECTS OF SOLAR ENERGY, *supra* note 56, at xiii.

165 Melvin M. Eisenstadt & Albet E. Utton, *Access to Sunlight: A Legislative Approach*, *in* LEGAL ASPECTS OF SOLAR ENERGY, *supra* note 56, at 45, 51–64.

166 Lawrence & Minan, *supra* note 136, at 168–75.

167 *See generally* Sara C. Bronin, *Modern Lights*, 80 U. COLO. L. REV. 881 (2009).

168 *See, e.g.*, *supra* notes 11, 167.

a. Federal Land-Energy Policy

Most federal policy that has encouraged (or frustrated) renewables innovation has focused on finance.[169] Generally, the government has provided financial incentives for energy technologies and fuels; while these economic policies do not fall within the land-energy realm, they have strongly influenced renewables innovation and thus merit brief discussion. Many federal financial incentives have negatively influenced renewables innovation by encouraging a continued reliance upon nonrenewable technologies and fuels. By 1981, the U.S. government had already "expended approximately $217.4 billion to stimulate the production of nuclear, oil, coal, and other energy sources."[170] But beginning in 1978, incentives directed at renewable energy technology began to compete with the public money flowing to fossil fuels with the passage of the Public Utility Regulatory Policies Act (PURPA)[171] and the Energy Tax Act.[172] PURPA required utilities to buy power generated by small qualifying facilities at the amount that it would have cost the utility to generate or purchase the power from another source;[173] this forced utilities to treat small electricity generators, including renewables, as equal market players.[174] The Energy Tax Act, in turn, provided a tax credit for expenditures on residential solar, wind, and geothermal energy.[175] These incentives have continued to flow over the years and have, in some cases, expanded.[176] As of 2010, several incentives specifically directed toward distributed generation remain active.

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169 *See* Ronald H. Rosenberg, *Diversifying America's Energy Future: The Future of Renewable Wind Power*, 26 VA. ENVTL. L.J. 505, 532 (2008) (noting that, as a result of a lack of national control over private investment in electricity production, the government's provision of financial incentives is critical to the development of renewables).

170 John H. Minan & William H. Lawrence, *State and Federal Tax Incentives to Promote Solar Use*, *in* LEGAL ASPECTS OF SOLAR ENERGY, *supra* note 56, at 69, 69.

171 *See* McCauley et al., *supra* note 99, at 177 (describing the development of PURPA as a response to oil embargoes).

172 Minan & Lawrence, *supra* note 170, at 69.

173 McCauley et al., *supra* note 99, at 177.

174 *See id.* (discussing how new contracts based on expected avoidance costs created a constant revenue stream for qualified facilities, which include small renewables).

175 Energy Tax Act of 1978, Pub. L. No. 95-618, sec. 101(a), § 44C(a)(2), (b)(2), 92 Stat. 3174, 3175 (repealed 1990).

176 *See* ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, POLICIES TO PROMOTE NON-HYDRO RENEWABLE ENERGY IN THE UNITED STATES AND SELECTED COUNTRIES 7 (2005) (discussing extensions of the Energy Policy Act's tax credit and the concomitant increase in the number of renewable technologies covered). The Energy Policy Act of 1992, for example, provided a production tax credit for wind energy and biomass plants. *Id.* "The incentive expired in 1999" but has been consistently renewed and remains in place today. *Id.*; *cf.* I.R.C. § 45(d) (2006 & Supp. II 2008) (showing the continuation of a production tax credit for electricity from renewables).

The Tax Code provides a thirty-percent credit for the cost of expenditures by individuals on qualified residential solar, small wind, fuel cell, and geothermal technologies,[177] as well as for the tax basis of a business's renewable energy property.[178] The 2009 federal stimulus package converted these business tax credits for renewable technology to grants, provided the renewable property was placed in service or construction began in 2009 or 2010.[179] The federal government has also funded research, development, demonstration, and deployment efforts to expand and improve renewable energy and, since the 1980s, has shared the costs of these efforts with industry partners.[180] The results include "higher efficiency" solar panels, heating systems, and architectural designs for solar-heated homes, as well as "advanced wind turbine designs,"[181] among other advances. Finally, ongoing direct funding for the adoption of renewable technologies has been provided to cities through programs like the Department of Energy's "Solar America Cities."[182]

Programs like Solar America Cities, in addition to their financial stimulus for renewables, also represent "soft" efforts by the federal government to influence local land-energy laws in order to increase opportunities for the installation of renewables technologies. The Department of Energy views current local laws that fail to adequately address issues such as solar permitting, "solar rights ordinances," and "infrastructure planning," as some of the "key barriers" to the acceleration of the solar market.[183] In this way, the federal government influences local land-energy policies by doling out funds to municipalities and suggesting changes in local laws to reduce these barriers. With the exception of programs like Solar America Cities, however, the federal government has had little direct influence in local land-energy rules.

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177 I.R.C. § 25D(a).

178 *See generally id.* § 38(a)–(b)(1) (2006) (providing a business credit, to include an "investment credit determined under section 46"); *id.* § 46 (including an "energy credit" within the "investment credit"); *id.* § 48 (a)(1)–(2)(A) (2006 & Supp. II 2008) (defining the energy credit).

179 American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, § 1603 (a), (d), 123 Stat. 115, 364–65 (providing a grant in lieu of a tax credit for geothermal and solar property as defined in § 48(a)(3)(A) of the Internal Revenue Code and small wind energy property in § 48(c)(4) of the Code).

180 ENERGY INFO. ADMIN., *supra* note 176, at 7.

181 Klass, *supra* note 62, at 365.

182 SOLAR AM. COMMUNITIES, U.S. DEP'T OF ENERGY, SOLAR POWERING YOUR COMMUNITY: A GUIDE FOR LOCAL GOVERNMENTS 1–2 (2d ed. 2011), *available at* http://solaramericacommunities.energy.gov/pdfs/Solar-Powering-Your-Community-Guide-For-Local-Governments.pdf.

183 Hannah Muller, U.S. Dep't of Energy, Accelerating Solar Energy at the Local Level (June 11, 2009) (PowerPoint presentation), *available at* http://www.epa.gov/statelocalclimate/documents/pdf/6_solar_america_hannah_muller.pdf; *see also* SOLAR AM. COMMUNITIES, *supra* note 182, at 60, 64.

b. State Directives

States have been forceful drivers of the recent rise in renewable innovation. Like the federal government, they have influenced distributed renewables innovation through financial incentives, but they have also enacted important land-energy rules. On the financial side, New York and California provide cash incentives for the installation of solar technologies on buildings;[184] Illinois pays thirty percent of the cost when individual residents and businesses install wind and solar technology;[185] and Pennsylvania has given free solar technology systems to twenty municipalities that committed to consuming twenty percent of their energy from "clean" sources by 2010.[186] More than twenty-four states also offer indirect financial incentives for renewables through a variety of tax schemes,[187] and more than thirty states have passed renewable portfolio standards, which require utilities to generate or purchase renewable energy.[188] At least three states (Arizona, Colorado, and New Mexico) require a portion of this percentage to come from distributed renewables,[189] and several give more credit—through the use of multipliers—to electricity produced through distributed generation.[190]

States have also effected innovation in distributed renewable technology through land-energy rule making. State laws in this area do not typically require the installation of distributed renewables and the infrastructure necessary to support them; only New Jersey comes close by requiring that a

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[184] *Compare The California Solar Initiative—CSI*, GO SOLAR CAL., http://www.gosolarcalifornia.ca.gov/csi/index.html (last visited May 1, 2011), *and California's Renewable Energy Programs*, CAL. ENERGY COMM'N, http://www.energy.ca.gov/renewables/index.html (last updated Nov. 10, 2010), *with PV Incentives*, POWER NATURALLY, http://www.powernaturally.org/programs/solar/incentives.asp (last visited May 1, 2011).

[185] *Solar and Wind Energy Rebate Program*, ILL. DEP'T OF COMMERCE & ECON. OPPORTUNITY, http://www.commerce.state.il.us/dceo/Bureaus/Energy_Recycling/Energy/Clean+Energy/01-RERP.htm (last visited May 1, 2011).

[186] *Pennsylvania Clean Energy Communities Program*, THE REINVESTMENT FUND, http://communities.trfund.com (last visited May 1, 2011).

[187] Bronin, *supra* note 167, at 883.

[188] McCauley et al., *supra* note 99, at 175, 184–87 tbl.3.2.

[189] ARIZ. ADMIN. CODE § R14-2-1804(A)–(B) (2007); COLO. REV. STAT. § 40-2-124(1)(c)(I) (2010); N.M. STAT. ANN. § 62-16-4(A)(1) (LexisNexis 2010) (requiring that twenty percent of retail electricity sales come from renewables by January 1, 2020); N.M. CODE R. § 17.9.572.7 G (LexisNexis 2010) (requiring, for 2011 through 2014, that at least one-half percent of the electricity from renewables come from distributed generation and that this percentage rise to three percent beginning in 2015).

[190] *See* Ryan Wiser & Galen Barbose, Lawrence Berkeley Nat'l Lab., State of the States: Update on RPS Policies and Progress 13 (Nov. 18, 2009) (PowerPoint presentation), http://www.cleanenergystates.org/Meetings/RPS_Summit_09/WISER_RPS_Summit2009.pdf (showing that Washington and Nevada have multipliers for distributed generation).

developer of a new home offer to install or have someone else install a solar energy system for a prospective owner.[191] Instead, the few state land-energy policies that address distributed renewables clarify that *municipalities* have authority to regulate renewables, require the accommodation of renewables through local codes, or, in some cases, direct the content of local renewable energy regulation. Wisconsin's approach, for example, is aggressive: it prohibits any political subdivision from placing "any restriction, either directly or in effect, on the installation or use of a wind energy system that is more restrictive than the rules promulgated" by the state.[192] New York, more moderately, delegates discretionary authority to cities to pass regulations designed for "the accommodation of solar energy systems and equipment and access to sunlight necessary therefor."[193] This is important because the traditional understanding of local government zoning authority characterizes local governments as arms of the state that derive all of their powers from their state "parent."[194] Although all states have provided their local governments with some zoning authority through State Zoning Enabling Acts,[195] those statutes may not clearly confer municipal authority to regulate renewable energy technologies.[196]

A few states have begun to clarify local zoning powers regarding the installation of distributed renewables. California, for example, provides that if municipalities require approval of a solar energy system installation, they must follow the process that they apply to an "architectural modification of the property," and that the solar approval "shall not be willfully avoided or delayed."[197] The regulation also subjects solar energy systems to state and federal standards, requiring, for example, that they meet applicable state and local "health and safety standards and requirements" and national safety and performance standards within model codes, and that certain solar energy

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191 N.J. STAT. ANN. § 52:27D-141.4(a) (West 2010).

192 WIS. STAT. ANN. § 66.0401(1m) (West Supp. 2010).

193 N.Y. GEN. CITY LAW § 20 (McKinney 2003).

194 Richard Briffault, *Our Localism: The Structure of Local Government Law* (pt. 1), 90 COLUM. L. REV. 1, 7–9 (1990) (describing how conventional theory sees the local government as "a creature of the state" and how under Dillon's Rule, which only allows local governments to exercise expressly granted powers, "[t]he scope of local power is further affected").

195 Francesca Ortiz, *Zoning the Voyeur Dorm: Regulating the Home-Based Voyeur Web Sites Through Land Use Laws*, 34 U.C. DAVIS L. REV. 929, 939 n.44 (2001) ("All states have adopted enabling acts modeled after the Standard State Zoning Enabling Act . . . .").

196 *See* David J. Barron, *Reclaiming Home Rule*, 116 HARV. L. REV. 2255, 2346 (2003) (describing the limits of zoning enabling acts).

197 CAL. CIV. CODE § 714(e)(1) (West Supp. 2010).

systems be certified by national rating corporations.[198] The state adds teeth to these rules by prohibiting municipalities who fail to comply from receiving state-funded solar grants or loans.[199]

California, unlike the few states that have addressed distributed renewables and have focused primarily on solar permitting, also dictates a wind turbine permitting process for counties. It allows counties to adopt ordinances "provid[ing] for the installation of small wind energy systems located outside an urbanized area, but within the county's jurisdiction,"[200] and it requires the counties, in approving applications under the ordinance, to follow streamlined permitting procedures.[201] County ordinances may establish specific requirements for the distance between the turbine and the property line, turbine height, and "view protection, aesthetics, aviation, and design-safety requirements,"[202] but the state also partially restricts counties' powers. Counties may only allow turbines of a certain height (conditioned upon the acreage of the property), minimum setback distances may generally only match the height of the tower, the system "shall not substantially obstruct views of adjacent property owners," and turbine noise shall not exceed 60 decibel levels, or a lower decibel level required within a general zoning plan.[203] Through these regulations, California has granted a good deal of authority over the installation of distributed generation to counties operating outside of city and town lines but has cabined these powers within state land-energy standards.

Arizona does not address permitting for wind turbines but does specify standards for municipal issuance of solar permits.[204] It directs cities and towns to require that construction plans show the location of the solar energy system, for example, and to require that installation plans show how the panel will be attached to the structure.[205] It also limits the standards that municipalities may impose—preventing them from requiring official approval of a solar energy system from a professional engineer unless "necessary," for instance.[206]

198 *Id.* § 714(c)(1)–(3).
199 *Id.* § 714(h)(1).
200 CAL. GOV'T CODE § 65896(a) (Deering 2010).
201 *Id.* § 65896(b).
202 *Id.*
203 *Id.*
204 ARIZ. REV. STAT. ANN. § 9-468 (Supp. 2009).
205 *Id.* § 9-468.A.1(a)–(b).
206 *Id.* § 9-468.A.1(e).

Further, a municipality in Arizona may only assess building or permit fees for any solar permits required to defray the cost of issuing the permit.[207]

In sum, several states have either inserted themselves into the land-energy rule-making process or have directed municipalities to enable distributed renewables through their own land-energy rules. Just as much or more action, however, has occurred at the local level.

c. Local Initiatives and Barriers

Local governments, perhaps more than their federal and state counterparts, have represented the extremes in land-energy rules. Some have banned distributed renewables, and others have actively encouraged them. Many cities are acting as their own renewables pioneers. Chicago,[208] Houston,[209] Phoenix,[210] Dallas,[211] San Diego,[212] and San Jose,[213] for example, have all installed or are in the process of installing solar panels on city buildings and structures. Phoenix wants fifteen percent "of the energy used by the city [to] come from renewable energy sources" by 2025 and aims to achieve this goal "through city-owned and city-sponsored projects, primarily through public-private projects."[214] And in 2009, the City of San Jose declared that it would "[r]eceive 100 percent" of its electrical power "from clean renewable sources"

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[207] *Id.* § 9-468.B.

[208] *Future Initiatives*, CHI. CLIMATE ACTION PLAN, http://www.chicagoclimateaction.org/pages/future_initiatives/51.php (last visited May 1, 2011).

[209] *Sustainability Projects—Energy Sources*, GREEN HOUS., http://www.greenhoustontx.gov/epr-energysources.html (last visited May 1, 2011).

[210] *Solar and Other Renewable Energy Projects*, CITY OF PHX., http://phoenix.gov/greenphoenix/sustainability/solarproj.html (last visited May 1, 2011).

[211] Dallas City Hall, Toward a Sustainable Dallas 24 (Oct. 17, 2007) (PowerPoint presentation), http://www.greendallas.net/pdfs/SustainableDallas_101707.pdf.

[212] In 2006, "[t]hree new solar panel systems were commissioned"—one on a recreation center, and two on city libraries. *City Energy Accomplishments 2006*, CITY OF SAN DIEGO, http://www.sandiego.gov/environmental-services/energy/programsprojects/accomplishments/2006.shtml (last visited May 1, 2011). In 2005, the city produced a total of 153,000 megawatt-hours of renewable electricity annually. *City Energy Accomplishments 2005*, CITY OF SAN DIEGO, http://www.sandiego.gov/environmental-services/energy/programsprojects/accomplishments/2005.shtml (last visited May 1, 2011). Some of this was from photovoltaic panels on eleven city buildings. *Id.*

[213] Memorandum from John Stufflebean, Dir., Envtl. Servs., to Transp. & Env't Comm., City of San Jose 3 (Aug. 17, 2007), *available at* http://www.sanjoseca.gov/clerk/CommitteeAgenda/TE/082707/TE082707_4.pdf.

[214] CITY OF PHX., PHOENIX: LIVING LIKE IT MATTERS! ENVIRONMENTAL SUSTAINABILITY PROGRAM 28 (2008), *available at* http://phoenix.gov/webcms/groups/internet/@inter/@env/@sustain/documents/web_content/021142.pdf.

within fifteen years by working "in tandem with its residents and businesses."[215]

In zoning and building codes, cities and towns are also slowly moving toward rules that enable a smooth permitting and installation process for distributed renewables. Woodbury, Minnesota, includes residential wind turbines as a "permitted accessory use" in several zoning districts and clearly outlines safety standards and aesthetic requirements for the turbines.[216] Winnebago County, Illinois, recently passed an ordinance "designating wind farms in the county as a permitted use," meaning that individuals and developers wishing to install one or more wind turbines will not need to obtain individualized special-use approval for their projects.[217] Wayne, New Jersey, has established "minimum standards to which a small wind energy system is to be installed."[218] On the distributed solar front, Austin, Texas, includes "solar collectors" as a permitted "accessory use" in residential districts[219] and adds its own construction- and safety-related requirements[220] to the Uniform Solar Energy Code,[221] which it adopts in large part.[222] Despite these encouraging efforts, a search through large cities' municipal codes demonstrates that most barely acknowledge the existence of distributed renewables. Their building codes do not contain minimum standards for the construction or installation of these technologies. They do not describe how solar panels are to be mounted on roofs, for example, or minimum cable strengths required to secure wind turbines. Their zoning codes also generally fail to include wind turbines or solar panels within permitted accessory uses or to place minimum setback or maximum height requirements on wind turbines. This leaves renewables pioneers in the difficult position of guessing, only to be rebuffed by the planning board and courts,[223] often after having invested a substantial sum of money in a renewables project.[224]

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215 CITY OF SAN JOSE, *supra* note 102, at 2.

216 WOODBURY, MINN., MUN. CODE § 24-405 (2010), *available at* http://library1.municode.com/default-now/home.htm?infobase=14365&doc_action=whatsnew.

217 *Illinois Board Passes Ordinance*, 6 N. AM. WIND POWER 47 (2009).

218 TOWNSHIP OF WAYNE, N.J., MUN. CODE § 211-126(2) (2009), *available at* http://ecode360.com/?custId=WA0473.

219 AUSTIN, TEX., MUN. CODE § 25-2-893 (2010), *available at* http://www.amlegal.com/nxt/gateway.dll/Texas/austin/thecodeofthecityofaustintexas?f=templates$fn=default.htm$3.0$vid=amlegal:austin_tx$anc=.

220 *Id.* § 25-12-191.

221 INT'L ASS'N OF PLUMBING & MECH. OFFICIALS, UNIFORM SOLAR ENERGY CODE (2009).

222 AUSTIN, TEX., MUN. CODE § 25-12-193.

223 *See, e.g.*, Goodnough, *supra* note 115, and accompanying text.

224 *See* Goodnough, *supra* note 115. The landowner had spent about $30,000 in preparatory construction work for the wind turbine project, which was denied by the town planning commission. *Id.*

Although many municipalities have failed to address the distributed renewables issue at all—thus leaving a void for the renewables pioneers—others have approached the issue from opposite extremes, either providing clear standards for how and where renewable technologies may be constructed, or, alternatively, banning the technologies or severely limiting their use.[225] Given the current landscape of land-energy rules, the important theoretical question that follows is about what should be done to move forward: Which level of government, regardless of its current approach to renewable energy, is best suited to encourage innovation in distributed renewables technology and should therefore be empowered to regulate it? We take up this question in the next Part.

II. INSTITUTIONS

Increasing total distributed renewable energy generation and the adoption rate of distributed technologies—which we have argued is essential to America's future energy infrastructure—requires a substantial policy shift to encourage promulgation of renewables-supporting land-energy rules. Yet the substantive benefits of a policy proposal seldom provide sufficient independent justification for adoption. Implementation must also be considered, and we turn to implementation questions now. The complexities of America's multilayered federal system raise two categories of questions. First, there are questions about which level of government—federal, state, local, or some combination of these—will be, as a matter of relative institutional competence, most likely to facilitate the operation of energy entrepreneurs, spur innovation in distributed renewable technologies, and promote increased use of distributed renewables if given authority for implementing energy policy. Second, there are constitutional and other legal questions about the permissibility of actually allocating implementation authority and costs in the way that comparative institutional analysis suggests would be optimal. We address both sets of questions in this Part.

A. Theoretical Dilemmas

The ideal level of governance for land-energy rules that support the implementation of distributed renewables is best determined by looking to the

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[225] Patricia E. Salkin, *New York Climate Change Report Card: Improvement Needed for More Effective Leadership and Overall Coordination with Local Government*, 80 U. COLO. L. REV. 921, 946 (2009) (explaining that some New York municipalities are banning wind turbines through their zoning codes).

broader literature of environmental regulation. Renewables are, after all, inherently connected to pressing natural resource issues. Siting renewable production devices impacts scarce land resources,[226] and the use of renewable fuels reduces the quantities of greenhouse gases and other pollutants emitted in the production of energy.[227]

Analysis of the intergovernmental dynamics of environmental regulation has gained nuance since the push for centralized federal pollution control legislation in the 1970s and 1980s.[228] A natural reaction to a salient environmental crisis like global climate change may be to demand direct intervention from the highest level of government, and the importance of federal leadership in environmental regulation cannot be overstated. But a moment's reflection reveals that environmental problems are everyone's problems; it therefore makes sense that all levels of government should be involved in solving them. As Daniel Rodriguez has noted, "The necessity of inter-governmental collaboration is a settled principle in the emerging literature on biodiversity protection,"[229] and, increasingly, the broader environmental literature recognizes the importance of cooperative intergovernmental solutions, including regimes of federal–local government cooperation.[230] Existing law reflects this trend, as many major federal

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[226] *See, e.g.*, Theocharis Tsoutsos et al., *Environmental Impacts from the Solar Energy Technologies*, 33 ENERGY POL'Y 289, 291 tbl.2 (2005) (summarizing some of the land use impacts of solar technologies, such as "[r]eduction of cultivable land" and "[i]mpact on ecosystems"). *But see* Denholm & Margolis, *supra* note 88, at 3541 (estimating that for the United States to supply all of its electricity using solar generation, only 0.6% of total U.S. land area would be required).

[227] *See, e.g.*, Tsoutsos et al., *supra* note 226, at 290 (summarizing the carbon dioxide emissions savings of solar compared to combined-cycle and coal-fired power plants).

[228] *See, e.g.*, Stewart, *supra* note 13 (setting out seminal economic arguments for centralized federal environmental regulation); Richard B. Stewart, *The Development of Administrative and Quasi-Constitutional Law in Judicial Review of Environmental Decisionmaking: Lessons from the Clean Air Act*, 62 IOWA L. REV. 713, 747 (1977) (summarizing similar arguments). *But see* Revesz, *supra* note 15, at 1210 (critiquing Stewart).

[229] Daniel B. Rodriguez, *The Role of Legal Innovation in Ecosystem Management: Perspectives from American Local Government Law*, 24 ECOLOGY L.Q. 745, 747–48 (1997).

[230] *See, e.g.*, David E. Adelman & Kirsten H. Engel, *Reorienting State Climate Change Policies to Induce Technological Change*, 50 ARIZ. L. REV. 835, 840 (2008) (arguing for both a federal and state role in regulating to reduce greenhouse gas emissions); Buzbee, *supra* note 22, at 108 (emphasizing "the benefits of regulatory overlap, cooperative federalism structures, and redundant enforcement mechanisms" in environmental regulation); Carlson, *supra* note 17, at 1106–08 (noting "cooperative federalism" regimes operate in a number of substantive environmental areas and a turn in the literature toward more "contextual" or "dynamic" conceptions of intergovernmental relations); Robert L. Glicksman, *Climate Change Adaptation: A Collective Action Perspective on Federalism Considerations*, 41 ENVTL. L. (forthcoming 2011) (manuscript at 6–10), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1667533 (analyzing several models for intergovernmental collaboration in regulatory efforts to foster adaptation to climate change); John R. Nolon, *In*

environmental statutes—the federal Clean Air and Clean Water Acts, for example—require the cooperation of state and local governments for implementation.[231] But the best specific allocation of regulatory roles among the levels of government in the distributed renewable energy context has not been explored. We seek to fill that gap in this Part.

We begin in this section with an examination of central debates in two relevant, but abstract, fields: the economic analysis of law and positive political theory. Working through these debates does not yield a clear answer to the question of the optimal allocation of regulatory authority over distributed renewable energy issues. Both strands of theory suggest, at most, that a mixed regime involving more than a single level of government likely will be more effective than unilateral action. However, and importantly, examining the relevant theses in these literatures yields critical insight into the kinds of considerations that must be addressed in the project of constructing a potentially fruitful allocation of authority in this context. In the next section, we consider additional factors, unique to the distributed renewables context, which also impact the proper allocation of distributed renewable authority.

1. The Efficiency Debate

One challenge in determining an optimal level of land-energy governance for distributed renewables arises from the ongoing centralization versus decentralization debate in the law and economics literature on environmental regulation.[232] A familiar argument for centralized environmental regulation is

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Praise of Parochialism: The Advent of Local Environmental Law, 26 HARV. ENVTL. L. REV. 365, 372–77, 410–13 (2002) (canvassing local environmental initiatives, arguing for collaboration among federal, state, and local environmental policymakers); Patricia E. Salkin, *Smart Growth and Sustainable Development: Threads of a National Land Use Policy*, 36 VAL. U. L. REV. 381, 392 (2002) (noting federal-local cooperation in brownfield redevelopment); A. Dan Tarlock, *Local Government Protection of Biodiversity: What Is Its Niche?*, 60 U. CHI. L. REV. 555, 581–82 (1993) [hereinafter Tarlock, *Biodiversity*] (federal-local collaboration in management of sensitive wetlands); A. Dan Tarlock, *The Potential Role of Local Governments in Watershed Management*, 20 PACE ENVTL. L. REV. 149, 149 (2002) (similar); *see also* Timothy F. Malloy, *The Social Construction of Regulation: Lessons from the War Against Command and Control*, 58 BUFF. L. REV. 267, 269 (2010) (arguing that even academic commentary on the proper allocation of regulatory authority among the levels of government is insufficiently attentive to context-dependent considerations).

[231] *See* Clean Water Act, 33 U.S.C. § 1342 (2006 & Supp. II 2008); Clean Air Act, 42 U.S.C. §§ 7409–7410 (2006); Buzbee, *supra* note 16, at 1565–66; Carlson, *supra* note 17, at 1106–07.

[232] *See generally* Stewart, *supra* note 13 (setting out the classical race to the bottom argument for centralized environmental standard-setting); Stewart, *supra* note 228 (similar); Revesz, *supra* note 15 (mounting a seminal critique of classical law and economics justifications for federal, rather than state, authority in environmental regulation); Kirsten H. Engel, *State Environmental Standard-Setting: Is There a "Race" and Is It "to the Bottom"?*, 48 HASTINGS L.J. 271 (1997) (critiquing Revesz's work); Daniel C. Esty,

the risk that absent federal control, state regulation will generate negative interstate externalities. Environmentally harmful activities often have effects that cross state lines, and individual states will have incentives to regulate only to the extent that in-state benefits captured offset the costs of regulation—political capital costs, remediation costs, jobs and other economic benefits lost when tough environmental laws drive away industry.[233] In other words, individual states with discretion over environmental regulation will lack sufficient incentive to regulate optimally to reduce harm to their own citizens as well as to the citizens of "downwind states."[234] This argument is particularly salient—and correct, we believe—for regulations addressing air pollutants (including greenhouse gases) and water pollutants that harm transboundary aquifers, rivers, or other water bodies. In these cases, the physical pollutants *and* their effects are unconstrained by geographic boundaries and are, at least with respect to providing a regulatory floor to prevent harm to the natural resources and human health, best addressed at a federal level. Another traditional argument for federal control is a version of

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Revitalizing Environmental Federalism, 95 MICH. L. REV. 570 (1996) (same); Scott R. Saleska & Kirsten H. Engel, *"Facts Are Stubborn Things": An Empirical Reality Check in the Theoretical Debate over the Race-to-the-Bottom in State Environmental Standard-Setting*, 8 CORNELL J.L. & PUB. POL'Y 55 (1998) (same); Daniel A. Farber, *Environmental Federalism in a Global Economy*, 83 VA. L. REV. 1283 (1997) (defending decentralization); Henry N. Butler & Jonathan R. Macey, *Externalities and the Matching Principle: The Case for Reallocating Environmental Regulatory Authority*, 14 YALE L. & POL'Y REV. 23 (1996) (same); Richard B. Stewart, *Environmental Regulation and International Competitiveness*, 102 YALE L.J. 2039 (1993) (critiquing Revesz's rationale for decentralization).

233 Frank H. Easterbrook, *Antitrust and the Economics of Federalism*, 26 J.L. & ECON. 23, 29 (1983) ("One of the common justifications for federal air pollution legislation is that, because no one state's residents can collect all the benefits of cleaner air (which, after all, drifts east, while dirty air comes in with the breeze), the states lack the proper incentives to legislate."); Stewart, *supra* note 13, at 1211–16 ("Given the mobility of industry and commerce, any individual state or community may rationally decline unilaterally to adopt high environmental standards that entail substantial costs for industry . . . for fear that the resulting environmental gains will be more than offset by movement of capital to other areas with lower standards. If each locality reasons in the same way, all will adopt lower standards of environmental quality than they would prefer if there were some binding mechanism that enabled them simultaneously to enact higher standards, thus eliminating the threatened loss of industry or development." (footnote omitted)).

234 *See* HENRY N. BUTLER & JONATHAN R. MACEY, USING FEDERALISM TO IMPROVE ENVIRONMENTAL POLICY 17 (1996) (arguing against the significance of these phenomena and advocating decentralization); Carlson, *supra* note 17, at 1104 (summarizing the race to the bottom argument); Revesz, *supra* note 15, at 1222 (noting, but critiquing, the economic assumptions supporting the environmental race to the bottom scenario); Stewart, *supra* note 13, at 1211–16 (providing the canonical formulation of economic-theory-based concerns about autonomous state environmental policy making); Peter P. Swire, *The Race to Laxity and the Race to Undesirability: Explaining Failures in Competition Among Jurisdictions in Environmental Law*, 14 YALE L. & POL'Y REV. 67, 99–100 (1996) (reviewing these arguments).

the prisoner's dilemma from noncooperative game theory.[235] The claim is that, absent federal regulation, failures in the national market for "industrial firm location" provide economic incentives for state governments to "race to the bottom"—competing to attract industry by decreasing the stringency of environmental requirements.[236]

One response supporting *decentralizing* environmental regulatory authority draws on Charles Tiebout's argument that competition among jurisdictions for residents through the provision of varying packages of regulation and taxation resembles competition in private markets.[237] Wallace Oates and Robert Schwab, for example, argue that states' or municipalities' potential loss of residents could in some circumstances offset industrial gains from laxer environmental standards, reducing the risk of races to the bottom.[238] Indeed, Oates and Schwab concluded, when modeled on a particular set of assumptions, that intergovernmental competition might produce socially optimal levels of environmental regulation.[239] Richard Revesz has argued that this analysis supports a default rule of decentralized rather than centralized environmental authority.[240]

Theoretical projections about efficiency in environmental regulation purport to predict which level of government will, in fact, be most efficient in providing regulatory goods.[241] Some base normative claims on such predictions—Revesz, for example, argues that we should redistribute primary regulatory authority to the level of government that will regulate most efficiently.[242] He predicts that, most of the time, this will be the state governments.[243] But claims about the efficiency of decentralizing

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235 Saleska & Engel, *supra* note 232, at 55–56. On the prisoner's dilemma, see generally ROBERT AXELROD, THE EVOLUTION OF COOPERATION 7–11 (1984), and SHAUN P. HARGREAVES HEAP & YANIS VAROUFAKIS, GAME THEORY 146–66 (1995).

236 *See* Revesz, *supra* note 15, at 1213–20; Stewart, *supra* note 13, at 1210–12.

237 *See* Carlson, *supra* note 17, at 1104–05 (drawing on Tiebout's theorem to argue for state environmental authority); Revesz, *supra* note 15 (same). *See generally* Charles M. Tiebout, *A Pure Theory of Local Expenditures*, 64 J. POL. ECON. 416 (1956).

238 Wallace E. Oates & Robert M. Schwab, *Economic Competition Among Jurisdictions: Efficiency Enhancing or Distortion Inducing?*, 35 J. PUB. ECON. 333, 335–42 (1988).

239 *Id.* at 342.

240 *See* Revesz, *supra* note 15, at 1253 ("[F]orces of interstate competition, far from being conclusively undesirable, are at least presumptively beneficial.").

241 *See* Saleska & Engel, *supra* note 232, at 60 (noting that the question of whether races to the bottom in fact occur "is, at bottom, an empirical question").

242 *See* Revesz, *supra* note 15, at 1211–12; Saleska & Engel, *supra* note 232, at 58–59.

243 *See* Revesz, *supra* note 15, at 1253–54.

environmental regulatory power have met with stiff criticism.[244] Aside from methodological critiques, the day-to-day uncertainties and information deficits that policymakers face render the "assumptions of perfect measurement" made in the underlying economic model on which Revesz relies contestable and thus not supportive of a *general* normative claim.[245]

Beyond the theory, an empirical study addressing the race to the bottom suggests that, although substantial evidence shows that relaxing environmental standards does little or nothing to enhance a state's economic performance or attract new industry,[246] state policymakers nevertheless appear to erroneously believe that lowering environmental standards will yield such benefits; some risk of races to the bottom therefore remains.[247] It is common to regard cities as economic "growth engines"—they have perhaps the strongest set of incentives of any level of government to pursue policies aimed at enhancing the local economy[248]—so the risk of races to the bottom driven by the desire to attract industry seems real, perhaps even heightened, at the local government level. Nevertheless, the broader empirical question of which option—centralization or decentralization of environmental regulation (including land-energy rules)—is generally most efficient remains unresolved.[249] And the emerging scholarly consensus appears to be that these broad questions are simply the wrong questions. Instead, perhaps, we should assess interjurisdictional regulatory competition in different environmental policy

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244 *See, e.g.*, Engel, *supra* note 232; Esty, *supra* note 232; Saleska & Engel, *supra* note 232, at 57 (noting that Revesz's arguments are rooted in neoclassical economic theory, while the race to the bottom argument rests in noncooperative game theory).

245 The contestable assumptions include assumptions that state regulators know how much new business they may attract by lowering environmental standards, how many jobs will be created or wages increased, how much environmental harm will result, and the preferences of their constituents. *See* Swire, *supra* note 234, at 95–96; *see also* Carlson, *supra* note 17, at 1106 (calling Swire's critique of Revesz "[a]mong the most cogent").

246 Saleska & Engel, *supra* note 232, at 66–69 & tbl.1 (competitive environmental standard-setting does not enhance state economic performance); *id.* at 74 (industry mobility unaffected by relaxation of state environmental standards); *see also* Engel, *supra* note 232, at 346 (same).

247 Saleska & Engel, *supra* note 232, at 74–76; *see also* Engel, *supra* note 232, at 340 (noting potential political reasons why state officials might overstate the risk of industry relocation in standard-relaxation deliberations).

248 *See* PAUL E. PETERSON, CITY LIMITS 22–38 (1981).

249 *See* Carlson, *supra* note 17, at 1105; Barry G. Rabe et al., *State Competition as a Source Driving Climate Change Mitigation*, 14 N.Y.U. ENVTL. L.J. 1, 6 (2005) ("[I]t has been easy for federal policy advocates to show that state policy is often ineffective and/or ill-advised, but more difficult to show that its irrationality would skew state policy in one direction (toward deregulation) . . . ." (footnote omitted)).

areas to better understand the level of government that would most efficiently regulate various types of environmentally harmful activity.[250]

In the end, then, the efficiency debate leaves us with no general answer to the institutional-choice question in the context of distributed renewables. Leaving aside the observation that efficiency in the "provision of environmental goods" may not be the best criterion for evaluating environmental policy,[251] there simply is no economic justification for lodging all environmental regulatory power at any one level of government. At best, the literature shows that the question of efficiency in the allocation of regulatory power is complex, that the proper allocation likely varies from one environmental policy area to another—air and water pollutants with effects beyond state boundaries clearly merit federal regulation, for example—and that races to the bottom remain a risk at the subnational level. Although there is no empirical evidence to suggest that the economic dynamics differ substantially from the general field of environmental regulation to the specific subject of distributed renewables policy, differences in the nature of technologies and business interests may raise distinct issues.[252] For now, we assume relative similarity between environmental and distributed renewables regulation and that decentralizing regulatory authority to the state or local government level risks a race to the bottom. We address remedies for that risk in Part II.B, below.

2. The Politics Debate

A second theoretical dilemma in identifying an optimal level of land-energy governance cautions against too hasty a leap toward vesting primary regulatory authority in state or local governments. This dilemma arises from the literature applying public choice theory to environmental regulation.[253] Public choice theory holds that government policy is disproportionately shaped

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[250] *See, e.g.*, Buzbee, *supra* note 22, at 112–13; Carlson, *supra* note 17, at 1107; Kirsten H. Engel, *Harnessing the Benefits of Dynamic Federalism in Environmental Law*, 56 EMORY L.J. 159, 163–64 (2006) (contrasting "static economic models used to justify a preferred allocation of regulatory authority between the states and the federal government" with "the modern scholarly debate over environmental federalism[, which] seeks to determine the proper allocation of regulatory authority . . . with respect to specific environmental problems"); Rodriguez, *supra* note 229, at 746.

[251] *See* Carlson, *supra* note 17, at 1106–07 (criticizing the emphasis on efficiency in light of a more contextual framework); Swire, *supra* note 234, at 75–76 (criticizing the use of efficiency as the measure of sound environmental policy).

[252] We will take up this question again in later work.

[253] *See* Carlson, *supra* note 17, at 1104.

by the preferences of concentrated interest groups that provide significant electoral support for representatives and thereby secure access and influence over those representatives' decisions.[254] It thus highlights the importance of understanding the alignment and actions of relevant interest groups in describing the causes of past policy outcomes and predicting future outcomes.[255] The classical objection is that interest groups that favor lax environmental regulation and have high individual stakes in regulatory outcomes—paradigmatically industry groups—tend to be small and cohesive, but groups favoring stricter environmental regulation tend to be more diffuse and less organized.[256] This disparity in political power, from the perspective of economies of scale in political organization and advocacy of the two camps, is exacerbated at the state and local government levels.[257] Diffuse environmental interests may muster the resources to organize and act within a single political forum, but organizing at multiple state or government locations would be too taxing upon their relatively undisciplined and typically underfunded infrastructures.[258] Interests favoring laxer regulation, by contrast, are thought to possess relatively greater capacity to organize and advocate in multiple

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254 *See generally* DANIEL A. FARBER & PHILIP P. FRICKEY, LAW AND PUBLIC CHOICE (1991).

255 Some think that interest group influence is the dominant force in shaping legislative outcomes generally. *See, e.g.*, Jonathan R. Macey, *Promoting Public-Regarding Legislation Through Statutory Interpretation: An Interest Group Model*, 86 COLUM. L. REV. 223, 229 (1986). But this view has its detractors, too. *See, e.g.*, FARBER & FRICKEY, *supra* note 254, at 22–23.

256 *See, e.g.*, Esty, *supra* note 232, at 597–98 ("[T]he costs of environmental regulation are generally more concentrated and tangible than the benefits. Costs are often borne by particular industries or enterprises, and are translated readily into monetary terms. Benefits, however, accrue to the general public in ways that are hard to discern and monetize." (footnote omitted)); Saleska & Engel, *supra* note 232, at 64 ("According to the economic theory of regulation, laws tend to respond to the wants of small, cohesive special interest groups, such as industry, at the expense of the wants of the larger, more diffuse public. The public, which is the intended beneficiary of stringent regulation, is often in a weaker political position than industry, which is the primary beneficiary of less regulation." (footnote omitted)); Stewart, *supra* note 13, at 1213 (similar); Swire, *supra* note 234, at 101.

257 *See* Esty, *supra* note 232, at 598; Richard L. Revesz, *Federalism and Environmental Regulation: A Public Choice Analysis*, 115 HARV. L. REV. 553, 559–61 (2001) (describing this as the "dominant claim among supporters of federal regulation on public choice grounds"); Joshua D. Sarnoff, *The Continuing Imperative (but Only from a National Perspective) for Federal Environmental Protection*, 7 DUKE ENVTL. L. & POL'Y F. 225, 285–86 (1997).

258 *See, e.g.*, Sarnoff, *supra* note 257, at 285–86 (arguing that interests seeking stricter environmental protection, because of their nature and composition, "may be more successful than 'concentrated' compliance interests in affecting legislative and bureaucratic policy at the federal level than at the state level" due to "economies of scale and reduced transaction costs for organizing and lobbying" (footnote omitted)); Esty, *supra* note 232, at 650–51 & n.302 (similar); Stewart, *supra* note 13, at 1213 (similar).

government forums and thus enjoy a comparative advantage.[259] Comparative institutional analysis thus suggests that federal environmental authority is preferable to state or local authority because the federal level is the most efficient receiver of broadly shared but often under-organized public interests in environmental protection, which are needed to counterbalance industrial interests that would otherwise dominate the political process and impose their narrow interests on the unwitting public.[260]

The public choice claim is a sophisticated version of the traditional "tragedy of the commons" argument,[261] and it is typically tied to Mancur Olson's work on collective action problems. Olson suggested that individuals generally will prefer to pursue their own interests where they conflict with common goals of the group, that cohesive interest groups—industry groups, for example—will push their own agendas as far as their influence allows even where doing so diminishes the public good, and that disparities in interest group influence explain many policy outcomes.[262] As with general claims from the law and economics literature, the emerging consensus among scholars is that the complexities of interjurisdictional environmental policy require more nuanced analysis.[263] For one thing, Olson's account does not directly suggest that federal regulatory power is the solution to the disparity in

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[259] *See, e.g.*, Stewart, *supra* note 13, at 1213–14 ("Centralized decisionmaking may imply similar scale economies for industrial firms, but these are likely to be of lesser magnitude—particularly if such firms are already national in scope.").

[260] *See* Revesz, *supra* note 257, at 560–61.

[261] As Dan Rodriguez summarizes it, "[T]he 'tragedy of the commons[]' . . . is[] basically the idea that individual landowners have incentives to exploit natural resources to fulfill their own private interests at the expense of the long-term interests of the commonwealth." Rodriguez, *supra* note 229, at 748–49. *See generally* ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 1–8 (James E. Alt & Douglass C. North eds., 1990); Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968). In the context of comparative organizational capacity among interests, the lax-regulation-seeking industry groups influence the political process in a manner designed to facilitate their exploitation of natural resources at the expense of the public interest which is too diffuse and intangible to serve as an effective rallying point for opposing interest-group mobilization.

[262] *See generally* MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS (1971) [hereinafter OLSON, GROUPS] (providing an account of the factors that cause individual group members to act in their own interests even when such action hampers the promotion of interests common to the group); MANCUR OLSON, THE RISE AND DECLINE OF NATIONS: ECONOMIC GROWTH, STAGFLATION, AND SOCIAL RIGIDITIES (1982) [hereinafter OLSON, NATIONS] (developing his account of group dynamics to posit an explanation for economic decline in developed countries as attributable in part to the growth of politically powerful interest groups with diverging interests). *See also* Glicksman, *supra* note 230 (manuscript at 14–18) (discussing the implications of Olson's and related work for allocating climate regulatory authority among levels of American government).

[263] *See* Carlson, *supra* note 17, at 1104 (noting that the public choice case for or against centralized federal regulatory power is unsettled); Revesz, *supra* note 257, at 576–77; sources cited *supra* note 250.

influence between industry and environmental groups.[264] Several factors suggest that subnational governments may in fact constitute forums in which industry and environmental interests might be more evenly matched than at the federal level. First, advocacy groups at the subnational level are likely to be smaller in size, and smaller groups will have fewer free riders; cost-bearing members of the group may be more likely to have sufficient incentives to counterbalance the costs of acting and maintaining the organization.[265] Second, action by smaller groups in subnational governmental proceedings presents lower organizational and political entry costs, making it cheaper for interest groups to coalesce and achieve initial policy victories that can enhance cohesion and lower organizational costs over time.[266] And third, smaller groups representing a geographically discrete set of interests are likely to have greater interest-homogeneity among members, which may also enhance group cohesiveness, reduce the number of free riders, and channel group resources into clear policy initiatives.[267] These factors suggest that the best forum for advocates of stricter environmental regulation (including regulation that encourages distributed renewables) is the state or local level, not the federal level.[268] They mesh well with the traditional hypothesis, found in the technical literature on social movements, that individual policy entrepreneurs alter the

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264 *See* Revesz, *supra* note 257, at 560–71.

265 *See* OLSON, GROUPS, *supra* note 262, at 21–22 (describing the free-rider problems endemic to all groups, regardless of size, but suggesting that they may be less detrimental in smaller groups); Revesz, *supra* note 257, at 560–61.

266 *See* Revesz, *supra* note 257, at 561–62; *see also* OLSON, GROUPS, *supra* note 262, at 22 (discussing the unusually high cost of obtaining a group's first unit of shared benefit).

267 *See* Revesz, *supra* note 257, at 563 ("[N]ational aggregation of environmental interests results in the loss of homogeneity of interests . . . . [E]nvironmentalists in Massachusetts may care primarily about air quality, whereas environmentalists in Colorado may care more about limitations on logging on public lands. [All else] equal, state-based environmental groups seeking, respectively, better air quality in Massachusetts and more protection of public lands in Colorado are likely to be more effective than a national environmental group seeking both improvements at the federal level."); *see also* OLSON, NATIONS, *supra* note 262, at 24 (arguing that "socially heterogeneous groups . . . are less likely to agree on the exact nature of whatever collective good is at issue or on how much of it is worth buying," so that, in such groups, "collective action can become still less likely"); William W. Buzbee, *Urban Sprawl, Federalism, and the Problem of Institutional Complexity*, 68 FORDHAM L. REV. 57, 132 (1999) (highlighting the importance of policy wins to interest groups, whose "ongoing existence depends on success in furthering their agenda"); Daniel A. Farber, *Politics and Procedure in Environmental Law*, 8 J.L. ECON. & ORG. 59, 70–75 (1992) (noting that environmental interest groups benefit from policy success since "the passage of environmental legislation creates a new set of environmental entitlements," which, when under-implemented or otherwise threatened, provide groups with additional means to "spark increased organizational involvement").

268 *See* Revesz, *supra* note 257, at 578–626 (highlighting progressive state government environmental regulatory efforts as evidence suggesting environmental interests do succeed at the state government level and that the public choice justification for any particular allocation of regulatory power will be substantially more complicated than the standard, pro-centralization claim).

social and political dynamics surrounding certain issues.[269] We return to this point in the next section.

Despite these theoretical contentions, empirical analysis of the attitudes of state regulators and legislators, aimed at explaining the continuing risk of races to the bottom, appears to support the initial public choice critique of decentralization.[270] State environmental regulators—bureaucrats—tend to come closer to correctly approximating the low relative value of relaxing environmental standards to attract industry and enhance economic performance[271] than do state legislators, who tend to *overvalue* lax environmental standards.[272] The dominant influence of state legislators in state environmental policy means that incorrect beliefs in the statehouses may explain why race to the bottom dynamics persist despite the absence of any real economic benefit.[273] Legislative misperception of the economic benefits of under-regulation may result from ignorance, but it may also represent a rational calculation; state legislators have incentives to deliver policy benefits to their supporters, and concessions in the form of relaxed environmental standards, like monetary subsidies, constitute visible "deliverables" that legislators are motivated to provide.[274] In addition, even if the industry-attracting potential is uncertain, the opportunity to claim a visible policy win if industry does decide to move into the state—and to avoid the blame that would flow from having declined to relax environmental standards if industry stays away—provides powerful motivation for legislators to relax environmental standards.[275] For example, in 2003 the Ohio legislature rejected bills that would have required utilities to gradually increase the portion of electricity generated from renewable sources.[276] The concern, according to the chair of

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269 *See infra* Part II.B.2.a.

270 On the continuing risk of races to the bottom, see *supra* notes 246–49 and accompanying text.

271 Saleska & Engel, *supra* note 232, at 76–77.

272 *Id.* at 78–79.

273 *Id.* at 78; Scott P. Hays et al., *Environmental Commitment Among the States: Integrating Alternative Approaches to State Environmental Policy*, PUBLIUS: J. FEDERALISM, Spring 1996, at 41 (highlighting state legislative influence in environmental policy making).

274 *See* Saleska & Engel, *supra* note 232, at 79, 83.

275 *Id.* at 79–80 (comparing relaxation of environmental standards to relocation subsidies and arguing that "a politician is better off providing industry with a location subsidy than not providing such a subsidy since, by offering the subsidy, she can claim credit for the siting of new industry if a new plant does in fact choose to site locally, and can avoid blame if industry ends up siting somewhere else"); *id.* at 80 ("The relaxation of environmental standards may reduce a state's overall social welfare, yet, at the same time, it may accrue sizable political benefits to the politician who claims credit for industry siting within the state.").

276 *See* Tom Henry, *New Sources of Power: Proposals Seek to Tap Ohio's Renewable Energy Potential*, TOLEDO BLADE, Nov. 14, 2004, at B1.

the committee in which the bills died, was that "driv[ing] the cost of energy higher [would] make it less likely that industries will locate in Ohio."[277]

The same kinds of incentives likely motivate local policymakers, since they, too, may accrue substantial political benefits from industrial siting and economic development. Although national legislators also have geographically bounded constituencies to whom they might "sell" industrial siting as a political win, the necessity of building coalitions among representatives of a variety of different areas to pass legislation makes such motivations less likely to succeed in shaping enactments at the national level.[278]

These observations weaken the claim that recent state environmental decisions show that state legislative forums provide better access to environmental interests than does Congress.[279] The "receptiveness" of a governmental forum to environmental interests is in part a function of where those interests choose to concentrate their political resources, and that choice may vary with the political valence of various levels of government:

> Recent state enforcement activism proves little about inherent state environmentalism but instead reflects political opportunities opened up by a more anti-environmental shift in federal policy. As long as our country at all levels is ruled by a system of elected government, then the degree of environmental fervor at each level will inevitably fluctuate.[280]

And such events do not undermine the broader observation that most real environmental progress in the United States has required some form of federal leadership.[281]

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[277] *Id.* (quoting then-Ohio Representative Lynn Olman) (internal quotation mark omitted); *see also* Benjamin K. Sovacool & Christopher Cooper, *The Hidden Costs of State Renewable Portfolio Standards (RPS)*, 15 BUFF. ENVTL. L.J. 1, 10 (2007–2008) (discussing the Ohio proposals).

[278] *See* Saleska & Engel, *supra* note 232, at 83–84 (noting that the perverse incentives generated by industrial siting politics at the state level "are less likely to exist in federal environmental standard setting" because "[t]he uniform nature of most federal standards provides less opportunity for state representatives at the national level to use environmental standards to attract industry to particular states or localities").

[279] *See* Revesz, *supra* note 257, at 583–626, 630–41; *see also infra* notes 382–89 and accompanying text.

[280] Buzbee, *supra* note 22, at 113. This dynamic is just what modern federalism theory predicts in more general terms. *See* Engel, *supra* note 250, at 180–81; Ernest A. Young, *Just Blowing Smoke? Politics, Doctrine, and the Federalist Revival After* Gonzales v Raich, 2005 SUP. CT. REV. 1, 33.

[281] *See* Rodriguez, *supra* note 229, at 749 ("As hopeful as we might be about the prospects of 'bottom-up' local initiatives, the modern history of environmental regulation suggests that any real progress has taken place only where federal and state decisionmakers have pursued strategies either in tandem with local efforts or else as regulatory ushers of some sort.").

Specific public choice dynamics from the environmental realm, however, suggest that environmental groups may benefit from operating at the local level; these dynamics are therefore relevant to evaluating the benefits of allocating authority over distributed renewables regulation to local governments. First, local governments, compared to the state and federal governments, appear less likely to be targeted by the influential utility and carbon fuel lobbies that might vehemently resist a push for more renewable energy.[282] These groups, although well established, entrenched, and influential at the federal and state government levels, nevertheless are limited in their capacity.[283] They cannot be everywhere all of the time. As a result, like any other organization, they must rely to some degree on "fire alarm" rather than "police patrol" monitoring of regulatory activity to alert them to initiatives on which their interests require intervention.[284] Local government actions, because of their lower political profile, seem less likely to capture these lobbies' attention as often as would state or federal actions.[285] And given the small scale of the effects of local government actions, such groups may view losses at the local level as less consequential than higher level actions and accordingly allocate fewer resources to resisting local initiatives.[286]

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[282] *See* Santiago Bañales-López & Vicki Norberg-Bohm, *Public Policy for Energy Technology Innovation: A Historical Analysis of Fluidized Bed Combustion Development in the USA*, 30 ENERGY POL'Y 1173, 1176 (2002) ("Several sources suggest the conservatism of the traditional utility business works against taking risks with new technologies . . . ."); Bronin, *supra* note 11, at 568–70 (discussing utility resistance to renewable energy initiatives generally, noting that utilities are likely to resist microgrid programs—which allow individuals to supply energy to others—more strongly than laws that enhance individuals' capacity to use distributed renewable devices for personal energy consumption); Heiman & Solomon, *supra* note 6, at 101 ("[E]arly dedication [to renewable energy was] unraveled by the mid-1980s during an era of cheaper fossil fuels and overt hostility to renewable energy from the utility and energy industries."); *cf.* Robert R.M. Verchick, *Why the Global Environment Needs Local Government: Lessons from the Johannesburg Summit*, 35 URB. LAW. 471, 476 n.24 (2003) ("[O]ne imagines that even those forces [that are powerful at the local level] can be unseated more easily by concentrated local opposition than is possible with, say, the aerospace or petroleum lobbies at the national level.").

[283] Oil lobby influence in federal and state politics is well documented. *See, e.g.*, Benjamin K. Sovacool & Kelly E. Sovacool, *Preventing National Electricity-Water Crisis Areas in the United States*, 34 COLUM. J. ENVTL. L. 333, 385–86 & nn.294–95 (2009) ("During important elections . . . [Greenpeace estimated that] oil and gas companies contributed about $255 million to political campaigns and electric utilities an additional $20 million for the 2004 election cycle. From 2003 to 2006, fossil fuel lobbyists contributed about $58 million to state-level campaigns alone. Over the same period, renewable energy lobbyists spent just over $500,000.").

[284] *See generally* Mathew D. McCubbins & Thomas Schwartz, *Congressional Oversight Overlooked: Police Patrols Versus Fire Alarms*, 28 AM. J. POL. SCI. 165 (1984).

[285] *Cf.* Bronin, *supra* note 107 (manuscript at 28–29) (suggesting that while utilities constitute a major source of political opposition to alternative energy programs at the state government level, the primary source of such opposition in local government settings is "neighbors").

[286] *See supra* notes 113–17 and accompanying text.

Incidents like the "Seaweed Rebellion" suggest that political interests contrary to those of carbon fuel groups may succeed at the local government level even if they are blocked at the federal and state levels.[287] The Seaweed Rebellion involved citizens in a number of California cities who, dissatisfied with federal and state regulation of offshore drilling, overwhelmingly and successfully backed local zoning measures that prohibited the placement of necessary onshore processing facilities.[288] Less frequent and intense adversarial lobbying efforts by the hostile industries at the local level, then, is one comparative advantage to allocating regulatory authority over renewables-related land-energy decisions to local governments.

Second, there is a sort of structural endowment effect that arises from the connection between deploying distributed renewable devices and land use regulation, which favors local authority. The fact that local governments have exercised authority over land use issues for most of our history aids existing local groups.

> [It] ensures that there are durable interest groups in the form of both property owners and local decisionmakers who have a stake in preserving existing patterns of land use regulation and management. Even where property owners find themselves on the short end of the regulatory stick, their investment in relationships and patterns of influence in the processes of land management makes preservation of the status quo regulatory arrangements in their long-term interest.[289]

Where private property owners are also environmental advocates, their interests will be more readily advanced if they can align their environmental goals with local governments' and property owners' interests in the stability of local land use regulatory authority. Fostering distributed renewable energy technology in a community inevitably requires modification of land-energy rules. Accordingly, property-owning advocates will have incentives to pursue strategies that maintain local government decision-making authority on the land use questions even if they wish to alter the substantive outcomes of those

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[287] *See* EDWARD A. FITZGERALD, THE SEAWEED REBELLION: FEDERAL-STATE CONFLICTS OVER OFFSHORE ENERGY DEVELOPMENT 1–2, 28 (2001) (giving the history of the conflict).

[288] ROBERT SOLLEN, AN OCEAN OF OIL: A CENTURY OF POLITICAL STRUGGLE OVER PETROLEUM OFF THE CALIFORNIA COAST 12, 169–71 (1998); *see also* Edward A. Fitzgerald, California Coastal Commission v. Norton*: A Coastal State Victory in the Seaweed Rebellion*, 22 UCLA J. ENVTL. L. & POL'Y 155, 155 (2004) (describing how local resistance to offshore drilling has affected the extent to which statutes, regulations, and judicial decisions create roles for state or local governments in regulating offshore activities).

[289] Rodriguez, *supra* note 229, at 751.

decisions.[290] The potential for these sets of interests to converge on shared policy outcomes also suggests that distributed renewable technology advocates may be most effective if they concentrate their efforts at the local, rather than federal, level.

But the connection between distributed-renewables implementation and land use rules raises a particular worry, too, that cuts back against the case for local government authority. In local governments, our hypothetically progressive, distributed-renewables-favoring property owner will face opposition from a set of influential and entrenched interests with incentives to maintain the substance of status quo land-energy rules.[291] Opponents likely will include developers and transportation- and utility-related businesses, who tend to exercise significant influence in local land use decision making and favor policies that grant them flexibility in carrying out their operations.[292] These groups may be predisposed to resist changes to land-energy rules designed to foster distributed renewables, since such changes likely will be viewed as disruptive alterations to business as usual, requiring large up-front investments.[293] Powerful "homevoters," in turn, will make aesthetic arguments against land-energy rules that accommodate the installation of distributed renewable generation.[294] If renewable energy interests face entrenched

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[290] *See id.* at 751–52 ("[T]he municipality/property owner relationship is one of mutual interdependence. To the extent that private property owners' and public officials' interests converge, there is a combination formed that has very strong incentives to resist relinquishing control to other, more central authorities.").

[291] *See* Hannah J. Wiseman, *Public Communities, Private Rules*, 98 GEO. L.J. 697, 726, 734–36 (2010) (discussing the influence of developers and other business interests in local land use decision making).

[292] *See id.* at 726 (discussing developers' incentives to favor land use policies that enhance their own discretion); Buzbee, *supra* note 267, at 81–82.

[293] *See* Wiseman, *supra* note 291, at 726, 735–36; Buzbee, *supra* note 267, at 81–82. This kind of political dynamic seems likely to be at work in those cities that have gone nowhere, or even backward, on the renewable energy front. *See* Sara C. Bronin, *The Quiet Revolution Revived: Sustainable Design, Land Use Regulation, and the States*, 93 MINN. L. REV. 231, 249–55 (2008) (discussing examples of local inaction on and resistance to green building initiatives, suggesting "homevoter" resistance as one causal factor); *supra* notes 223–27 and accompanying text (noting local resistance to, or inaction on, renewable energy initiatives).

[294] *See, e.g.*, Goodnough, *supra* note 115 (describing how some homeowners object to the aesthetics of backyard wind turbines); Bronin, *supra* note 11, at 570–72 (discussing the political influence of neighbors and their tendency to resist alternative energy initiatives). Professor Bronin suggests that, together, utility and homevoter opposition may be insurmountable and that reform at the state level may be most capacious for fostering microgrid development. *See id.* at 574–84. We do not disagree that these sources of political opposition are powerful; we argue, however, that political opposition at the local level may be somewhat diffused by the possibility of interest convergence and that the costs of overcoming local opposition are largely offset by the benefits that local governments provide in the form of access for renewables entrepreneurs. In any event, Professor Bronin's suggestions for state-level reforms are additional, welcome correctives to the conventional thinking about energy regulation.

political opposition at the local level, a public choice analysis might favor action at the state or federal level instead.[295]

The discussion thus far reveals few if any general justifications for claiming that one level of government is a preferable administrator of environmental policy. The efficiency debate yielded mixed conclusions: Although decentralized control may efficiently distribute environmental protection, the risk of a race to the bottom persists and may be heightened where authority is allocated to local governments rather than states. The politics debate is similarly murky. Environmental interests may fare better at the federal level, but the literature on small-group dynamics suggests that they may also succeed in local government settings. State governments appear to be the least favorable forum, based on the large influence of carbon-fuel interests in state government decision making and the organizational advantages that these industry interests enjoy relative to more diffuse environmental interests. On the whole, these broad theoretical debates are unresolved and fail to support any normative claim that there is a clear first-best level of government to which we should allocate environmental regulatory (and hence land-energy) authority.[296] It appears that each level of government offers certain benefits and costs, which suggests that the best solution may involve a combination of governmental institutions wielding land-energy rule-making authority. We consider additional factors that may point more clearly to an answer in the next section.

B. Allocating Authority for Distributed Renewables

Our conclusions in the previous section are consistent with the emerging consensus in the modern environmental regulation and environmental federalism literatures that, most often, a cooperative interjurisdictional strategy will be the optimal approach to allocating regulatory authority for distributed

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[295] *See, e.g.*, Buzbee, *supra* note 267, at 81 (noting the possibility of corrupt over-influence of business interests in city planning as a possible factor in the growth of urban sprawl); Paul H. Sedway, Commentary, *Plan-Based Administrative Review: A Planning and Zoning Debate*, *in* LAND USE LAW: ISSUES FOR THE 80S, at 95 (Edith Netter ed., 1981) (describing zoning as "corrupt, and usually subject to derision," as well as "unfair[,] . . . self-serving[,] . . . [and] poorly administered"). On industry capture of regulatory institutions, see generally Richard B. Stewart, *The Reformation of American Administrative Law*, 88 HARV. L. REV. 1667, 1684–88 (1975).

[296] *See* Carlson, *supra* note 17, at 1107; Revesz, *supra* note 257, at 578–626; Rodriguez, *supra* note 229, at 746–47.

renewables.[297] Cooperative regulatory regimes may capture the benefits of decentralization while avoiding the theoretical problems—imposing a federal minimum standard may offset some public choice pathologies and prevent subnational governments from racing to the bottom.[298] A concomitant delegation of regulatory discretion to state or local governments to experiment "above the federal floor" can leverage their familiarity with local problems and resources into tailored standards that avoid the problems of a uniform national rule.[299] This reflects a general trend in current federalism theory toward more "interactive" or "dynamic" accounts of the relationship and proper allocation of power between the federal and state governments.[300] And it better reflects the reality of environmental regulatory practice.[301] For something as sprawling and multifaceted as the distributed renewable energy problem, the best strategy will involve action by multiple levels of government,[302] but the optimal mix of actors may vary from that for other environmental issues. Drawing from the

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[297] *See, e.g.*, Randall S. Abate, *Kyoto or Not, Here We Come: The Promise and Perils of the Piecemeal Approach to Climate Change Regulation in the United States*, 15 CORNELL J.L. & PUB. POL'Y 369 (2006); Donald A. Brown, *Thinking Globally and Acting Locally: The Emergence of Global Environmental Problems and the Critical Need to Develop Sustainable Development Programs at State and Local Levels in the United States*, 5 DICK. J. ENVTL. L. & POL'Y 175 (1996); Ann E. Carlson, *Implementing Greenhouse Gas Emissions Caps: A Case Study of the Los Angeles Department of Water and Power*, 55 UCLA L. REV. 1479 (2008); Engel, *supra* note 18; Engel, *supra* note 250; Alice Kaswan, *Climate Change, Consumption, and Cities*, 36 FORDHAM URB. L.J. 253 (2009); Hari M. Osofsky, *Is Climate Change "International"? Litigation's Diagonal Regulatory Role*, 49 VA. J. INT'L L. 585 (2009); Robert B. McKinstry, Jr., *Laboratories for Local Solutions for Global Problems: State, Local, and Private Leadership in Developing Strategies to Mitigate the Causes and Effects of Climate Change*, 12 PENN. ST. ENVTL. L. REV. 15 (2004); Rodriguez, *supra* note 229; Richard B. Stewart, *States and Cities as Actors in Global Climate Change Regulation: Unitary vs. Plural Architectures*, 50 ARIZ. L. REV. 681 (2008); sources cited *supra* note 230.

[298] *Cf.* Glicksman, *supra* note 230 (manuscript at 18–23) (arguing that race to the bottom and collective-action problems justify federal "floor" regulation in the related field of climate change adaptation).

[299] *See supra* notes 230–33 and accompanying text; *see also, e.g.*, Carlson, *supra* note 17, at 1102; Rodriguez, *supra* note 229, at 757–58.

[300] *See, e.g.*, J.B. Ruhl, *General Design Principles for Resilience and Adaptive Capacity in Legal Systems: Applications to Climate Change Adaptation Law*, 89 N.C. L. REV. (forthcoming 2011) (manuscript at 22–23), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1694187 (noting that "the emerging theory of dynamic federalism has captured the attention of environmental law scholars . . . . [and] calls for overlapping federal and state (and through states, local) jurisdictions" and canvassing the "dynamic federalism" literature (footnote omitted)); Heather Gerken, The Supreme Court 2009 Term Foreword: *Federalism All the Way Down*, 124 HARV. L. REV. 4, 18–20 (2010) (canvassing the literature on cooperative federalism, which Gerken calls "federalism all the way down"); Erwin Chemerinsky, *Empowering States: The Need to Limit Federal Preemption*, 33 PEPP. L. REV. 69 (2005); Engel, *supra* note 250, at 176; Robert A. Schapiro, *Justice Stevens's Theory of Interactive Federalism*, 74 FORDHAM L. REV. 2133 (2006); Robert A. Schapiro, *Polyphonic Federalism: State Constitutions in the Federal Courts*, 87 CALIF. L. REV. 1409 (1999).

[301] *See* Carlson, *supra* note 17, at 1106–07; Engel, *supra* note 250, at 166.

[302] As we observed, every level of government currently engages distributed renewables in some way. *See supra*, Part I.C.2.a–c. The problem, we think, is that the current approach lacks coherence and amounts to a counterproductive patchwork.

literature on interjurisdictional cooperation and the "microanalysis of institutions,"[303] we discuss in more detail the ideal allocation of land-energy law-making authority for distributed renewables in this section.

Our analysis departs from the literature in two important ways. First, most of the cooperative strategies that have been suggested involve federal–*state* cooperation and suggest ways to enhance *state* government decision-making authority.[304] This appears to be an intellectual leftover from the now-defunct "dual federalism" account of the American governmental structure as comprising two distinct, sovereign "spheres" of authority, federal and state.[305] Many analysts of intergovernmental relations continue to view the federal structure this way, despite the now nearly complete overlap of state and federal authority on most subjects.[306] We instead emphasize the importance of federal–*local* cooperation and argue that state authority regarding land-energy rules is detrimental to the goal of fostering distributed renewables.

Second, the classic "policy laboratories" argument for empowering subnational governments typically trumpets the potential for regulatory pluralism to generate, through trial and error over time, first-best solutions that may then be imposed uniformly from the national level.[307] While we do

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[303] *See* Buzbee, *supra* note 22, at 113; Edward L. Rubin, Commentary, *The New Legal Process, the Synthesis of Discourse, and the Microanalysis of Institutions*, 109 HARV. L. REV. 1393, 1433–37 (1996).

[304] *See, e.g.*, Buzbee, *supra* note 22; Carlson, *supra* note 17; Engel, *supra* note 250. While some commentators explicitly address local governments, *see, e.g.*, Michael Burger, *Empowering Local Autonomy and Encouraging Experimentation in Climate Change Governance: The Case for a Layered Regime*, 39 ENVTL. L. REP.: NEWS & ANALYSIS 11,161 (2009), most treat the role of municipalities as less significant than that of both the federal and state governments.

[305] *See* Gerken, *supra* note 300, at 11–14 (discussing the "ghost" of the dual-federalism idea of state "sovereignty" that haunts modern federalism scholarship). For the canonical discussion of "dual federalism" and its "death" with the Supreme Court's expansive New Deal-era interpretation of the Commerce Clause, which entailed the view that national and state regulatory power are largely concurrent (extending dualism, by contrast, would mean that the state "sphere" had shrunk to nothing), see generally Edward S. Corwin, *The Passing of Dual Federalism*, 36 VA. L. REV. 1 (1950).

[306] *See* Nestor M. Davidson, *Cooperative Localism: Federal-Local Collaboration in an Era of State Sovereignty*, 93 VA. L. REV. 959, 965–66 (2007). Even those who argue for increased local government power tend to conflate the state and local governments in debates about federalism. *See* Clayton P. Gillette, *The Exercise of Trumps by Decentralized Governments*, 83 VA. L. REV. 1347, 1351–52 (1997) (arguing that current scholarship pays insufficient attention to distinctions between state and local governments in federalism).

[307] The "laboratories" argument is traced back to Justice Brandeis's famous statement that "a single courageous State may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country." New State Ice Co. v. Liebmann, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting). For arguments that decentralization is justified on the laboratories rationale because it can eventually lead to better national policy making, see, for example, Robert R. Kuehn, *The Limits of*

advance a version of the "laboratories" justification to support empowering local governments in the distributed renewables field, we advocate regulatory diversity for certain instrumental reasons other than the possibility of discovering one "correct" or "optimal" national solution. While we think that local variation may be beneficial in raising the profile of distributed renewables issues and sparking debate at the state and national levels,[308] we view diversity primarily as valuable to the goal of fostering broader adoption of distributed renewables, owing to the variety of different kinds of land-energy rules that will be needed to develop these technologies in different locations. Allowing local governments to create various regulatory strategies for the renewables industry to grapple with will also drive innovation in distributed renewables technology, although wholly unconstrained variation will be cumbersome and impede progress. Scholars argue that creating a meaningful role for state and local authority within environmental regulatory structures may enhance those structures' capacity to adapt to changing circumstances[309] and to avoid potentially disastrous regulatory failures.[310] While we do not discuss these important additional benefits at length, our suggestion is consistent with, and supported by, these observations as well as the benefits of local institutional competence, increased opportunity and motivation for energy entrepreneurship, and the potential for faster technological innovation.

Our suggestion, then, is that the federal government should first establish some minimum standard—most likely a simple prohibition on state and local regulations that impede renewables siting—for fostering the adoption of distributed renewable energy technologies and should allocate *primary*

Devolving Enforcement of Federal Environmental Laws, 70 TUL. L. REV. 2373, 2383 (1996), and McKinstry, *supra* note 297, at 16.

[308] *See* Gerken, *supra* note 300, at 10, 17 (noting that local policy-making efforts may "serve as staging grounds for national debates" as local decisions "feed back into national policymaking" in the integrated system of regulatory federalism).

[309] *See* Ruhl, *supra* note 300 (manuscript at 13–26) (discussing the concept of "adaptive capacity"—a system's capacity to absorb changed circumstances without collapsing—as applied to legal systems and deriving principles of regulatory design to foster adaptive capacity; noting that collaborative intergovernmental climate change regulation is desirable for fostering adaptability).

[310] *See* William W. Buzbee, *Climate Change as an Innovation Imperative: Federalism, Institutional Pluralism and Incentive Effects* 10–12 (Emory Univ. Sch. of Law Pub. Law & Legal Theory Research Paper Series, Paper No. 10-125, 2010), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1694166 (discussing the relatively greater resistance of cooperative intergovernmental regulatory regimes to common causes of regulatory failure; noting, for example, that "a diffused regulatory environment is akin to a fabric with many different threads providing strength[; t]o destroy that web of laws would require many successful political attacks, not just intense federal lobbying or a sympathetic president").

authority for implementation and regulation, with substantial discretion, to local governments.[311] Since land-energy regulations enabling the use of distributed renewable energy may raise business costs in the short term and may at least appear capable of deterring industrial siting, we contend that a federal minimum standard is necessary to prevent local governments from engaging in races to the bottom.[312] A federal minimum requirement for implementing policies designed to promote the adoption of distributed renewables also should offset the local-level public choice problems that we have mentioned[313] and thereby help to avoid "negative experiments" in which cities empowered with land-energy rule-making authority respond disproportionately to anti-renewables interests and stifle the adoption of distributed renewables.[314]

In one sense, this is similar to other "federal leadership with subnational government implementation" regimes that are characteristic of environmental federalism.[315] But there is one crucial difference. To truly empower local governments to exercise regulatory authority and discretion in the manner that will be most beneficial, the traditional power of state governments to preempt local government authority must be eliminated in this regulatory context. Perhaps paradoxically, then, establishing a stable regime of decentralized local regulatory authority requires, in addition to a federal minimum standard, federal preemption of state power to interfere with local decision making. Our analysis is context dependent; we do not suggest that this form of federal–local cooperation is optimal in every environmental regulatory context. Our argument is rooted in the particular dynamics of the regulation of distributed renewable energy technology. We first explain our reasons for preferring to lodge primary regulatory authority over distributed renewables with local rather than state governments and then briefly discuss theoretical and doctrinal issues concerning the legality of our proposed cooperative regulatory scheme.

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311 A recent version of the stalled federal climate change legislation would establish a national renewable energy portfolio standard that expressly preserves from preemption stricter state renewable energy requirements. *See* American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. §§ 101, 610(i) (as passed by House, June 26, 2009); Burger, *supra* note 304, at 11,168 (discussing these provisions). We would argue for the addition of specific distributed renewables targets, language empowering local governments to pursue those targets via land-energy rule making, and a similar prohibition on both federal and state preemption of local efforts.

312 *See supra* notes 249–52, 270–80, and accompanying text.

313 *See supra* notes 291–97 and accompanying text.

314 *See supra* notes 223–27 and accompanying text.

315 *See supra* note 231 and accompanying text.

1. Local Institutional Advantages

The nature of environmental problems and the costs associated with their remediation varies greatly from place to place, and regulatory solutions must be adapted accordingly.[316] As James Krier noted three decades ago in the context of pollution control, "[A]esthetic costs and materials losses will be functions of the varying resource endowments, degrees of development, and human attitudes that exist in different regions. Even health costs . . . vary from place to place."[317] This variability of local conditions cautions against uniform, one-size-fits-all programs that are characteristic of federal action,[318] and it highlights the important role for state or local governments, whose greater familiarity with and expertise regarding local conditions can improve regulation.[319]

Sensitivity to differing local conditions is particularly important in strategies to promote the adoption of distributed renewable energy technologies. Variables including the nature of cities' primary energy sources, local climate and weather patterns, the nature of the built environment, zoning plans, growth plans, population, and local economic conditions are all directly relevant to the choice of one or more distributed renewable technologies and

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316 *See* James E. Krier, *supra* note 15, at 326–27; Richard L. Revesz, *The Race to the Bottom and Federal Environmental Regulation: A Response to Critics*, 82 MINN. L. REV. 535, 536–37, 547–48 (1997) (highlighting local variation in the goals and costs of environmental regulation as an independent justification for decentralized regulatory power).

317 Krier, *supra* note 15, at 327 (footnote omitted).

318 *See* Krier, *supra* note 316, at 327; James E. Krier, *On the Topology of Uniform Environmental Standards in a Federal System—And Why It Matters*, 54 MD. L. REV. 1226 (1995); Jonathan H. Adler, *Jurisdictional Mismatch in Environmental Federalism*, 14 N.Y.U. ENVTL. L.J. 130, 133, 158–60 (2005); Butler & Macey, *supra* note 232, at 25.

319 Revesz, of course, argues that devolving regulatory authority to *state* governments is independently justifiable, all else equal, because of the variable quality of environmental harms and remediation costs. *See* Revesz, *supra* note 316, at 547–48. In a sense though, as we will argue more fully below, this may simply replicate the problem if there is sufficient variation in environmental problems and costs at the sub-state level, which suggests that local government control is preferable over federal or state authority. Biodiversity protection initiatives, for example, seek to deal with environmental problems that are incredibly local in character and thus would seem to be best suited to the expertise of local governments. *See, e.g.*, Tarlock, *Biodiversity*, *supra* note 230, at 574–83. Promotion of distributed renewables, in large part because of its similar linkage to local land law in the form of land-energy rules, may present similar sub-state variation problems. *See generally* Richard Briffault, *The Local Government Boundary Problem in Metropolitan Areas*, 48 STAN. L. REV. 1115, 1124 (1996) (championing local governments' capacity to provide regulatory goods that "match distinctive local conditions and preferences"); Verchick, *supra* note 282, at 475 (emphasizing the local nature of many environmental problems).

the means of deployment.[320] For example, revising local land-energy rules to enable deployment of small wind turbines requires consideration of a variety of site-specific conditions, including wind-shadowing; local wind and gust patterns; size and layout of the surrounding built environment; turbines' noise output and neighbors' tolerance for it; the location of potential obstructions like utility poles, power lines, and trees; and local aesthetic preferences, among other things.[321] So, too, with considering distributed solar energy technologies: typical roof sizes, slopes, composition, and load-bearing capacities, along with shade patterns created by surrounding trees or buildings, local weather conditions, sizes of yards if panels are to be installed on poles separate from the main building structure, the availability of porch or garage roofs as alternative locations, and, again, local aesthetic preferences are all relevant to deployment decisions.[322] Similarly, variable local conditions affect the deployment and productivity of distributed renewable energy technologies.[323] These devices are intended to mesh with residential and commercial buildings and neighborhoods; by design, they are meant to be adopted by reference to what is appropriate in the particular circumstances of the location. On the city or community planning level, differences in wind or shade patterns, the size and shape of buildings, and aesthetic preferences from neighborhood to neighborhood or even block to block will require communities to adopt carefully tailored land-energy rules to promote various different "packages" of renewable technologies that fit the local conditions. And efforts to integrate renewable energy technologies into broader "green" or "zero emissions"

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320 *See* JON CREYTS ET AL., MCKINSEY & CO., REDUCING U.S. GREENHOUSE GAS EMISSIONS: HOW MUCH AT WHAT COST? 22, 67–68 (2007), *available at* http://www.mckinsey.com/en/Client_Service/Sustainability/Latest_thinking/~/media/McKinsey/dotcom/client_service/Sustainability/PDFs/Reducing US Greenhouse Gas Emissions/US_ghg_final_report.ashx (emphasizing the substantially different costs of various greenhouse gas reduction strategies stemming from "regional differences in population growth and/or density, carbon intensity of local power generation portfolios, energy productivity, climate, availability of renewable energy sources, forest cover, agricultural orientation, concentration of industrial activities, and other factors"); Kaswan, *supra* note 297, at 284–85 (arguing for local government decision-making authority over energy demand reduction strategies, in part, based on the way that local variation makes proper solutions location specific); Rodriguez, *supra* note 229, at 750–51 (arguing that traditional local authority over land use decision making is justified in part by local governments' comparatively greater familiarity with local conditions and comparatively greater capacity to leverage local knowledge in regulatory decision making); Buzbee, *supra* note 267, at 83 (same).

321 *See, e.g.*, Christopher W. Fry, Comment, *Harvesting the Sky: An Analysis of National and International Wind Power*, 19 COLO. J. INT'L ENVTL. L. & POL'Y 427, 437, 449–50 (2008); Jim Green, Nat'l Renewable Energy Lab., Installer Issues: Integrating Distributed Wind into Local Communities (June 4–7, 2006) (PowerPoint presentation), http://www.nrel.gov/docs/fy06osti/40096.pdf.

322 *See, e.g.*, CAL. ENERGY COMM'N, A GUIDE TO PHOTOVOLTAIC (PV) SYSTEM DESIGN AND INSTALLATION (2001), *available at* http://www.energy.ca.gov/reports/2001-09-04_500-01-020.PDF.

323 *See, e.g.*, Trainer, *supra* note 87, at 1011–12 (explaining that "performance in the field . . . is some 10–30% below rated capacity" for some solar panels).

residential and commercial building projects introduce a host of additional issues that will vary dramatically with local conditions.[324]

The familiar idea that empowering subnational governments allows for a greater influence of state or local preferences in policy and enhances the democratic responsiveness of the federal system is also relevant here.[325] In federalism scholarship, it is commonly claimed that state governments are "closer"—that is, more accessible and accountable—to citizens than the federal government.[326] The characteristics of state governments that support this claim—their smaller electorates, greater transparency and access to elected officials, and greater opportunities for citizen participation in governance—suggest that local governments are *closest* to the people.[327] Local "elected officials tend to be more responsive to voter demands because it is easier . . . to monitor politicians and it is easier for new politicians to challenge unpopular incumbents[,] . . . smaller political units allow for more deliberation and consensus building among members," and "[p]olitics on a small scale . . . enables less affluent grassroots organizations to promote their interests through marches, speeches, and creative forms of activism that would not work on a national or regional scale."[328] In the distributed renewables area, this means that yet another argument against primarily federal-level action is that people in different locations may have different ideas about how much and what kind of renewable energy they want, and, as far as our broad energy

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[324] *See, e.g.*, P. TORCELLINI ET AL., NAT'L RENEWABLE ENERGY LAB., LESSONS LEARNED FROM CASE STUDIES OF SIX HIGH-PERFORMANCE BUILDINGS, at vii–viii (2006), *available at* http://www.nrel.gov/docs/fy06osti/37542.pdf (emphasizing that "the six commercial buildings we studied [have] a unique purpose and function, but all have commonalities," and that whole-building energy efficient design projects are owner-driven and develop according to owner design preferences, many of which "are not motivated by cost"); *Buildings Research: Residential Building Design and Performance*, NAT'L RENEWABLE ENERGY LAB., http://www.nrel.gov/buildings/res_building_design.html (last updated Oct. 3, 2010) (noting that energy-efficient building design packages must be designed "for specific savings levels in various climate zones," and that relevant considerations include "energy savings, but also . . . non-energy issues important to builders, such as cost, code issues, occupant comfort, and marketability of energy features").

[325] *See generally* Ernest A. Young, *The Rehnquist Court's Two Federalisms*, 83 TEX. L. REV. 1, 53–58 (2004).

[326] *See* DAVID L. SHAPIRO, FEDERALISM 91–92 (1995) ("[T]o the extent the electorate is small, and elected representatives are thus more immediately accountable to individuals and their concerns, government is brought closer to the people, and democratic ideals are more fully realized."); Young, *supra* note 325, at 58–59.

[327] Shapiro's arguments, for example, are not limited to state governments in particular. *See* SHAPIRO, *supra* note 326, at 91–92.

[328] Verchick, *supra* note 282, at 475–76; *see also* Deborah Jones Merritt, *The Guarantee Clause and State Autonomy: Federalism for a Third Century*, 88 COLUM. L. REV. 1, 7 (1988).

transition goals and the need to encourage citizens to do their part will allow, we should do what we can to honor those preferences.[329]

Local governments may also have unique expertise in the renewables area, particularly at the deployment stage. Typically cited institutional advantages of federal administrative agencies include economies of scale in regulation and federal regulators' access to high-quality information, which allows for rapid accumulation of expertise, relevant research, and informed decision making.[330] Federal agencies have been and remain essential authorities with respect to development-stage technological issues; the National Renewable Energy Laboratory (NREL) in particular has been instrumental in producing cutting-edge renewable technologies.[331] But when distributed renewable devices are actually installed, the substantial variance in local conditions must generally drive deployment-stage regulatory strategy. Federal agencies thus seem to lose the institutional advantage at deployment stage.[332] Local governments have long held primary land use rule-making authority, and their expertise in that field is directly relevant to the modification of land-energy rules to foster distributed renewables.[333] And cities are rapidly building relevant technical and regulatory expertise in dealing with varied local conditions through participation in cooperative initiatives like the U.S. Mayor's Climate Protection Agreement, in which over 350 cities have agreed to pursue greenhouse gas reduction goals.[334] "The number of communities involved promises a diversity of strategies and a steep learning curve as communities learn from one another what works, and what doesn't work."[335] Internationally, approximately 850 cities cooperate to achieve climate goals

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329 *See* Carlson, *supra* note 17, at 1106; Kaswan, *supra* note 297, at 285; Krier, *supra* note 15, at 327–28; Revesz, *supra* note 316, at 547–48.

330 *See* Carlson, *supra* note 17, at 1104; Esty, *supra* note 232, at 573.

331 *See generally* NAT'L RENEWABLE ENERGY LAB., FY 2009 ANNUAL REPORT: A YEAR OF ENERGY TRANSFORMATION (2009), *available at* http://www.nrel.gov/about/pdfs/annual_report_fy09_45629.pdf (describing technological advances made in 2009).

332 Federal support is still imperative to the deployment of renewable technology. Once again, the NREL is currently a pivotal actor here. *See Applying Technologies*, NAT'L RENEWABLE ENERGY LAB., http://www.nrel.gov/applying_technologies (last updated Nov. 15, 2010) (explaining the laboratory's "clean energy technology deployment projects").

333 *See* Alexandra B. Klass, *Property Rights on the New Frontier: Climate Change, Natural Resource Development, and Renewable Energy*, 38 ECOLOGY L.Q. (forthcoming 2011) (manuscript at 10–23), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1690564 (surveying the historical relationship between resources and property rights, and emphasizing the key role of local property law in the development of a sustainable energy infrastructure); *supra* notes 289–97 and accompanying text.

334 *See* BAILEY, *supra* note 20, at 4.

335 *See id.*

and share information through the Large Cities Climate Leadership Group and the Cities for Climate Protection Campaign.[336] With respect to expertise, capacity to generate expertise, and knowledge of conditions relevant to regulatory strategies, then, local governments possess important resources that federal institutions lack.

To the extent that state governments generally possess advantages in administrative capacity relative to local governments, local government competence on the specific local issues relating to deploying distributed renewables nevertheless makes municipal control the superior choice. State governments are "closer" to the facts on the ground than the federal government, to be sure, and they will have greater familiarity with some of the geographic, economic, social, and political particularities of their polities. But state government initiatives by nature answer to statewide preferences and thus often will reflect compromises among geographically dispersed local interests. The "scale" or "matching" problem associated with federal control exists for state governments, too, and cuts against their institutional suitability to address local land-energy decisions.[337] Local governments appear to possess the most relevant experience, likely will incur the lowest costs in accessing relevant information and gaining needed expertise, and are generally the best-positioned institutions to exercise the primary regulatory role in distributed renewables promotion.[338]

2. Local Political and Technological Dynamics

There are two additional reasons to prefer local government authority rather than state or federal control in the distributed renewables context. First, local governments provide the best political forum for critical energy entrepreneurs to successfully express their interests and secure regulation consistent with their distributed renewables goals. Large energy interests that tend to oppose

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[336] *See* Michele M. Betsill & Harriet Bulkeley, *Cities and the Multilevel Governance of Global Climate Change*, 12 GLOBAL GOVERNANCE 141 (2006); C40 CITIES CLIMATE LEADERSHIP GRP., http://www.c40cities.org (last visited May 1, 2011) ("C40 Cities Climate Leadership Group" is an alternate name for the Large Cities Climate Leadership Group); *Climate*, ICLEI–LOCAL GOV'TS FOR SUSTAINABILITY, http://www.iclei.org/index.php?id=800 (last visited May 1, 2011).

[337] The "matching" principle is the idea that comparative institutional analysis and suggestions for allocating regulatory authority should attempt to "match" the level of government with the relative "size" of the regulatory subject. *See generally* Butler & Macey, *supra* note 232.

[338] *See, e.g.*, NAT'L RESEARCH COUNCIL, EVALUATING PROGRESS OF THE U.S. CLIMATE CHANGE SCIENCE PROGRAM 5 (2007) ("Information at regional and local scales is most relevant for state and local resource managers and policy makers, as well as for the general population . . . .").

renewables for fear of competition will invest less in lobbying efforts at the local government level. Second, the great degree of variation that we expect to see from discretionary local decision making about land-energy rules and distributed renewables will, we think, stimulate innovation in renewable energy technologies, expanding their applicability and furthering the goal of increased adoption—provided, of course, that local rules are not so diverse as to impede the economies of scale offered by uniform technology production or to make installation economically infeasible.

a. Entrepreneurs

A general concern about implementation of distributed renewables programs—regardless of the level of government to which the task is assigned—is the need to overcome individuals' initial hesitation, fear, and resistance and motivate them to make the investments in time, money, and lifestyle changes that are required to integrate distributed renewables into everyday life.[339] We have said that overcoming these barriers of individuals' unwillingness to embrace renewable technologies requires the intervention of "energy entrepreneurs."[340] Rembrandt Peale overcame individual fears about gas lighting first at the level of Baltimore's city government; consumers of air conditioning similarly initiated technological deployment that sparked widespread adoption at the local government level.[341] So too, local government action paved the way for the transition from local to centralized electricity production.[342] These changes in individual preferences in response to the actions of motivated energy entrepreneurs resemble social movements,[343] and the technical literature on social movements both

339 *See* WILLIAM ANDREEN ET AL., CTR. FOR PROGRESSIVE REFORM, COOPERATIVE FEDERALISM AND CLIMATE CHANGE 11 (2008), *available at* http://www.progressiveregulation.org/articles/federalismClimateChange.pdf (arguing that the question of allocating implementing authority for climate change remediation initiatives generally must determine which institutions are "better suited to motivate the lifestyle changes among their citizens that will prove essential to an effective climate change policy over the long run"); Nicholas Lutsey & Daniel Sperling, *America's Bottom-Up Climate Change Mitigation Policy*, 36 ENERGY POL'Y 673, 674 (2008) (effective climate change mitigation requires "local commitment, down to individuals, to accomplish the type of economic and societal transformations that will be necessary to achieve very large reductions in carbon"); *supra* notes 112–17, 136–44, and accompanying text.

340 *See supra* Part I.C.1.

341 *See supra* notes 127–37, 143–50, and accompanying text.

342 *See supra* notes 150–59 and accompanying text.

343 *See* Glenn R. Carroll, *Long-term Evolutionary Change in Organizational Populations: Theory, Models, and Empirical Findings from Industrial Demography*, 6 INDUS. & CORP. CHANGE 119 (1997); Michael V. Russo, *The Emergence of Sustainable Industries: Building on Natural Capital*, 24 STRATEGIC

substantiates the dynamic represented by our historical anecdotes and provides a causal account.[344] Here again, theory suggests that local governments should possess primary authority to make land-energy rules that promote distributed renewables. The characteristics of local governments make them particularly likely forums for energy pioneers—this time installing wind turbines and solar panels rather than gas lamps—to achieve critical early successes.[345]

Legal rules and structures can be designed to facilitate the formation, growth, and success of movements primarily by providing opportunities for access and the chance to secure the critical initial policy "deliverables" that can spark widespread acceptance.[346] The building of organizational resources proceeds incrementally, and entrepreneurs are required to get organizations off the ground initially[347]: "A policy entrepreneur needs some sort of organizational structure to solicit funds or obtain voluntary efforts. . . . But the more money and funds and effort she obtains, the greater her ability to solicit further money and effort."[348] Resources need not flow solely from members of the organization, though

> the interactive nature of government in the United States . . . provides innumerable opportunities for organized groups to influence elections, lobby elected officials between elections, and lobby appointed officials. Any impact upon elections or public decision

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MGMT. J. 317, 318 (2002) (noting that the "strong social and institutional elements to the push toward greening" result in "green" industries beginning to look "like social movements").

344 *See generally* OLSON, GROUPS, *supra* note 262; DONATELLA DELLA PORTA & MARIO DIANI, SOCIAL MOVEMENTS (2d ed. 2006); Bert Klandermans, *The Formation and Mobilization of Consensus*, *in* 1 INTERNATIONAL SOCIAL MOVEMENT RESEARCH: FROM STRUCTURE TO ACTION 173 (Bert Klandermans et al. eds., 1988); John D. McCarthy & Mark Wolfson, *Consensus Movements, Conflict Movements, and the Cooptation of Civic and State Infrastructures*, *in* FRONTIERS IN SOCIAL MOVEMENT THEORY 273 (Aldon D. Morris & Carol McClurg Mueller eds., 1992); John D. McCarthy & Mayer N. Zald, *The Trend of Social Movements in America: Professionalization and Resource Mobilization*, *in* SOCIAL MOVEMENTS IN AN ORGANIZATIONAL SOCIETY 337, 377–79 (Mayer N. Zald & John D. McCarthy eds., 1987); Edward L. Rubin, *Passing Through the Door: Social Movement Literature and Legal Scholarship*, 150 U. PA. L. REV. 1, 29 (2001).

345 *Cf.* Gerken, *supra* note 300, at 17 ("[P]olitical entrepreneurs . . . routinely use local sites as staging grounds for national debates.") (citing Judith Resnik, *Law's Migration: American Exceptionalism, Silent Dialogues, and Federalism's Multiple Ports of Entry*, 115 YALE L.J. 1564 (2006)).

346 *See* John D. McCarthy et al., *The Institutional Channeling of Social Movements by the State in the United States*, *in* 13 RESEARCH IN SOCIAL MOVEMENTS, CONFLICTS AND CHANGE 45 (Louis Kriesberg & Metta Spencer eds., 1991); Rubin, *supra* note 344, at 30.

347 Jose Goldemberg et al., *Energy for the New Millennium*, 30 AMBIO 330, 336 (2001) (stressing the importance of energy entrepreneurs); Klandermans, *supra* note 344, at 184; McCarthy & Zald, *supra* note 344, at 22; Rubin, *supra* note 344, at 28.

348 Rubin, *supra* note 344, at 29 (footnote omitted).

> making becomes a "deliverable" that policy entrepreneurs can use to increase the number of commitment level of their membership.[349]

Local governments are the forum in which the transaction costs entrepreneurs have to pay for political entry are lowest—both because the campaigns are smaller in scale and because the institutions already possess land-energy rule-making authority, allowing for direct changes to promote distributed renewables. And the theory of group dynamics suggests that small-scale organization and action are more conducive to member cohesiveness, dedication, and group longevity, all of which are critical to success.[350]

The flexibility of local governments' internal institutional structures also enhances opportunities for access by renewables pioneers and their supporters. Public and private interests cooperate on an ad hoc basis at the local government level and partner in more permanent advisory bodies within local governments.[351] Such cooperative local government structures have been used to "bring public and private interests together to consider pollution-control or land-management decisions made pursuant to statutory or regulatory law."[352] These characteristics of local governments—which make them particularly conducive to the influence of newly formed, local social movements and political groups with local goals—provide the tools that energy entrepreneurs need to overcome both the problems of deficient public understanding of renewable energy technology and the public choice worries that flow from the adverse political interests at the local level.[353] Local governments' endorsement of renewables may help overcome individuals' worries about and distrust of new energy technologies by adding a "stamp of approval" that people trust.[354] And emerging renewable energy businesses, through cooperation with local governments, may gain access to resources and

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[349] *Id.* at 30; *see also* Russo, *supra* note 343, at 328–29 (noting the importance of conducive government institutional environments to the development of renewable energy and other "green" industries).

[350] *See supra* notes 264–71 and accompanying text.

[351] *See* Verchick, *supra* note 282, at 476; *infra* notes 354–61 and accompanying text.

[352] Verchick, *supra* note 282, at 476.

[353] *See supra* notes 291–97 and accompanying text.

[354] MERRIAN C. FULLER ET AL., RENEWABLE & APPROPRIATE ENERGY LAB., UNIV. OF CAL., BERKELEY, GUIDE TO ENERGY EFFICIENCY & RENEWABLE ENERGY FINANCING DISTRICTS FOR LOCAL GOVERNMENTS 7 (2009), *available at* http://erg.berkeley.edu/news/2009news/FullerKunkelKammen-MunicipalEnergyFinancing2009.pdf ("Local governments are an objective source of information, providing tools and resources to enable residents and businesses to take action. For example, local governments can offer a single source of information on how to get started with clean energy upgrades, and many local governments provide educational workshops about the options available to their constituents.").

information about local conditions and preferences that could prove essential to their economic success.[355]

An example of a cooperative structure in which local government and renewable energy businesses partner to share local information and to plan for renewables deployment is found in Sebastopol, California. The "Solar Sebastopol" program is "a co-operative agreement between the city, private photovoltaic . . . vendors, the energy technology program at Sonoma State University, and individual citizens" that "provides a database of rooftops in Sebastopol that are good candidates for PV installation and free appraisal by the PV companies."[356] Larger cities also have implemented cooperative renewable energy advisory and deployment structures. Chicago's Green Ribbon Committee, for example, advises the city on progress under its Climate Action Plan, which includes a substantial renewable energy installation component and involves representatives of a variety of business and community interests.[357] Local government experiments with Energy Financing Districts (EFDs)—like those that have been initiated in Berkeley and Palm Desert, California; Boulder, Colorado; and Babylon, New York—are another kind of example of local cooperation in the renewables field.[358] EFDs appropriate extant local institutional processes to fund renewables—they "tap into existing mechanisms that local governments are already familiar with, such as special tax districts or assessment districts . . . to support clean energy projects."[359] This approach leverages local familiarity with and control over land use rules to foster renewable adoption while maximizing individual choice. For example, city financing for a renewable device may be "repaid

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[355] *See* Russo, *supra* note 343, at 320–21 (emphasizing the importance of "site-specific" information about relevant "natural capital," like wind patterns, shade patterns, etc., to the viability of newly formed renewable energy concerns).

[356] Jennifer Bresee & David Room, *Powering Down America: Local Government's Role in the Transition to a Post-Petroleum World*, ENERGY BULL. (Oct. 20, 2005), *available at* http://www.energybulletin.net/node/9999; *see also* SOLAR SEBASTOPOL, http://www.solarsebastopol.com (last visited May 1, 2011). The program was successful enough to receive a grant funding its expansion to a countywide effort. *See Solar News: Solar Sebastopol Wins Grant to Expand Countrywide*, SOLAR SEBASTOPOL, http://www.solarsebastopol.com/news.html (last visited May 1, 2011).

[357] *See Clean & Renewable Energy Sources*, CHI. CLIMATE ACTION PLAN, http://www.chicagoclimateaction.org/pages/renewable_energy_sources/13.php (last visited May 1, 2011); *Green Ribbon Committee*, CHI. CLIMATE ACTION PLAN, http://www.chicagoclimateaction.org/pages/partners__green_ribbon_commitee/60.php (last visited May 1, 2011); *supra* note 208 and accompanying text.

[358] *See generally* FULLER ET AL., *supra* note 354, at 16–18 (describing the Berkeley Financing Initiative for Renewable and Solar Technology; the Palm Desert Energy Independence Program; Boulder's ClimateSmart Loan Program; and Babylon's Long Island Green Homes Program).

[359] *Id.* at 6.

over a set number of years through a 'special tax' or 'assessment' on the property tax bill of only those property owners who choose to participate in the program" with "little or no up-front cost to the property owner."[360]

A system of regulatory authority that promotes site-specific, locally chosen distributed renewable energy technologies seems likely to maximize energy entrepreneurs' access to social capital, which only enhances the odds that the technologies that they advocate will be adopted. Local interpersonal communication networks—social groups, neighborhoods, community organizations, and the like—have their own internal norms that encourage uniformity in certain kinds of member behavior. Accumulating social capital by accessing these networks is recognized as an important strategy for innovative sustainable businesses.[361] Individuals who are satisfied by location-specific technical solutions will share information about their success with new technologies through these informal communication networks, helping overcome consumers' uncertainties and motivate broader adoption.[362] And, in many cases, interpersonal norms operating in these networks will encourage adoption even by those who remain skeptical about new devices by punishing outliers in various ways.[363]

Since local government discretion seems to be the interjurisdictional allocation strategy most likely to foster location-specific renewable technology, it also likely will enhance energy entrepreneurs' chances of gaining currency with important local networks of interpersonal influence. Opportunities to match energy technologies and policies with the preferences of individuals and communities through local government processes will increase renewable energy advocates' chances to find political and economic common ground with developers and landowners—groups traditionally opposed to progressive changes in land-energy rules.[364] They, too, must answer to local preferences, and the potential payoff from "greening"

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360 *Id.*

361 *See* Russo, *supra* note 343, at 321–22.

362 *Id.*

363 *See* DEBIKA SHOME & SABINE MARX, CTR. FOR RESEARCH ON ENVTL. DECISIONS, THE PSYCHOLOGY OF CLIMATE CHANGE COMMUNICATION 30–32 (2009), *available at* http://www.cred.columbia.edu/guide/pdfs/CREDguide_low-res.pdf (advising climate change advocates to tie sustainability goals to individuals' group affiliations because "[g]roup affiliation can activate social goals (i.e., concern for others, maximizing the good of the group)," and "[p]articipating in a group allows group norms to exert a stronger influence on individuals"); Jason F. Shogren, *Micromotives in Global Environmental Policy*, INTERFACES, Sept.–Oct. 2002, at 47, 53.

364 *See supra* notes 293–99 and accompanying text.

businesses, homes, and commercial buildings in a manner that fits with community values may bring these powerful local interests into the renewables camp, or at least dilute their opposition.[365]

b. Innovation

Alongside the actions of energy entrepreneurs, a second important mechanism to promote renewable adoption is to foster innovation in distributed renewables technology. The basic reason is clear: Widespread adoption of these technologies requires that they be modified to function under different sets of local conditions. Making local governments the primary regulators will increase the number of different sets of regulatory environments to which renewable technologies will need to adapt in order to capture market share and will naturally promote this sort of low-level, "learn by doing" innovation. In the state context, scholars have similarly noted that innovation in energy technology may be enhanced by decentralizing regulatory power over energy to the state governments:

> State programs can generate a diversity of approaches by virtue of their multiplicity and differing mixes of socioeconomic, environmental, and political factors. For example, within the field of renewable energy, some states require that solar power constitute a specific share of an electricity provider's portfolio, while others emphasize wind or geothermal resources.[366]

The local level, of course, promises even greater diversity. A variety of regulatory packages creates a variety of geographic "clusters" in which renewable technologies must be deployed. This enhances the likelihood of innovation because "technological change occurs most readily at small geographic scales,"[367] and, more importantly:

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[365] Some call this the "Baptists and Bootleggers" dynamic: where public interests converge with business interests, not substantively, but because a public-spirited policy proposal presents local business with the chance to disadvantage the competition. *See* Revesz, *supra* note 257, at 577–78; Jonathan B. Wiener, *Think Globally, Act Globally: The Limits of Local Climate Policies*, 155 U. PA. L. REV. 1961, 1966 (2007). Renewable energy entrepreneurs may ally themselves with industry groups that want to take advantage of state or local subsidies for renewables installation, green building programs, or the increasing competitive advantages that flow from consumer perception that a business is "green." Palm Desert's EFD program, for example, is jointly funded by the city, the Southern California Gas Company, and Southern California Edison. FULLER ET AL., *supra* note 354, at 16; *see also* Burger, *supra* note 304, at 11,164–66 (discussing the increasing significance of "green" branding for businesses).

[366] Adelman & Engel, *supra* note 230, at 851.

[367] *Id.* at 852.

> [I]nnovation is enhanced in geographic clusters (e.g. the Silicon Valley phenomenon) because spatial concentrations allow inventors to access knowledge externalities that reduce the costs of research, development, and commercialization. These externalities are dominated by "tacit knowledge," which is "vague, difficult to codify and often only serendipitously recognized," and thus by definition cannot be formalized or written down. These characteristics . . . limit the spread of tacit knowledge to the kinds of frequent face-to-face interactions that occur most efficiently in small geographic areas.[368]

In short, technological innovation will be enhanced by a regulatory allocation scheme that enables the kinds of small-group dynamics and informal communication networks that we have argued are best accommodated in local government settings.[369]

The reasons for favoring state over federal authority with respect to spurring innovation suggest that local authority, which adds thousands of additional variations in policy to the landscape and requires renewable energy firms to adapt their technologies to local conditions, would be better still.[370] Economists have found that, in general, "diversity across complementary economic activities sharing a common science base is more conducive to innovation than is specialization."[371] Furthermore, it is recognized that "adoption (or diffusion) of existing technologies," even without increased investment in research and development, can "produce innovation through 'learning by doing' as experience is gained with the use and production of a technology."[372] Government policies that engage the renewables industry cooperatively, toward the end of facilitating community acceptance of new technologies, can provide location-specific information to guide this sort of innovation.[373] To the extent that such innovation will expand the range of possible applications for existing technologies and drive down costs, this factor may further reduce consumer uncertainty and facilitate broad adoption.[374] And

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368 *Id.* (quoting David B. Audretsch & Maryann P. Feldman, *Knowledge Spillovers and the Geography of Innovation*, *in* 4 HANDBOOK OF REGIONAL AND URBAN ECONOMICS 2713, 2718 (Handbooks in Econ., Vol. 7, J. Vernon Henderson & Jacques-François Thisse eds., 2004)).

369 *See supra* notes 316–31, 339–65, and accompanying text.

370 *See supra* notes 318–28 and accompanying text.

371 Audretsch & Feldman, *supra* note 368, at 2726.

372 Adelman & Engel, *supra* note 230, at 847 (citing Richard G. Newell et al., *The Effects of Economic and Policy Incentives on Carbon Mitigation Technologies*, 28 ENERGY ECON. 563, 564–66 (2006)).

373 *See* Russo, *supra* note 343, at 321.

374 Increasing the applicability of distributed renewable devices under different conditions—along with overcoming consumers' "lack of information about costs and benefits" and "high implicit consumer discount rates (potential benefits tend to be strongly discounted by individuals who have to invest time and money up

decreasing costs, of course, stimulates demand. If this sort of innovation dynamic is desirable, as we think it is, then local government authority seems optimal.[375]

3. *Local–State Dynamics*

The argument for empowering local governments to inspire innovation and support pioneers in the distributed renewables field requires a consideration of the states, to which all local governments are ultimately accountable. The politics of climate change regulation are a useful place to start, as they have inverted the usual situation in environmental regulation. Rather than federal leadership to initiate state implementation, the federal government has notoriously refused to lead on climate change.[376] Instead, in the shadow of federal refusal to ratify the Kyoto Protocol[377] and subsequent inaction, state governments have been the primary sources of regulation aimed at mitigating the causes and effects of climate change.[378] These are important proactive efforts, but our concerns about state implementation and our preference for local authority in the distributed renewables context flow from potential public choice problems at the state level; these public choice concerns arise in part from observing the ongoing, intense efforts of carbon fuel, private utility, and business interests to influence state policy making, which might undermine optimal implementation.[379] Regulatory scaling issues that arise from state governments' relative insensitivity to the local considerations involved in the promotion of distributed renewables also contribute to our preference for local authority over land-energy rules.[380]

Currently, many states have chosen to adopt policies that empower local governments to experiment with a variety of different approaches to increase

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front in order to realize long-term savings)," will eventually drive down real costs of these devices. Goldemberg et al., *supra* note 347, at 336; *see also supra* notes 109–13, 136–44, and accompanying text. *See generally* Shogren, *supra* note 363 (discussing the economic considerations affecting individuals' decision-making processes regarding climate change).

375 *See* Goldemberg et al., *supra* note 347, at 336 ("Strong government-private sector collaboration has been a key feature of many successful market development programs" for energy technology.); Verchick, *supra* note 282, at 476; *supra* notes 347–53 and accompanying text.

376 Engel, *supra* note 18, at 1021.

377 Kyoto Protocol to the United Nations Framework Convention on Climate Change, *supra* note 18.

378 ANDREEN ET AL., *supra* note 339, at 3–4; Engel, *supra* note 18, at 1015–16.

379 *See* Heiman & Solomon, *supra* note 6, at 105–08 (describing private utilities' successful attempts to influence state legislatures to prevent the establishment of local public utilities); *supra* notes 270–89 and accompanying text.

380 *See supra* notes 330–40 and accompanying text.

the use of renewable energy. But they need not adopt such policies, and they may change course in the future.[381] State-level efforts like the New York, California, and Illinois incentive programs that complement local efforts and empower local governments through subsidies and other programs are laudable.[382] Existing statewide programs, however, present problems of scale and generally are not designed to foster distributed renewables in particular.[383] State renewable portfolio standards represent significant steps toward reforming the energy infrastructure but aim mainly to change the sources of power that large-scale utilities send to consumers over centralized grids.[384] Consumer-generated renewable power sold back to utilities may count toward the requirement, but distributed generation currently is insufficient to provide utilities with all of the power that they need to comply.[385] That, and the tendency for utilities and other influential interests to prefer centralized over distributed generation, make it likely that state RPS programs will drive growth in large scale renewable "farms" that can satisfy utilities' power requirements soon, and in large chunks.[386] This is an important step, but it does not directly aid the cause of distributed renewables, which we argue are a necessary component of a move toward a more sustainable energy future.

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381 *See supra* notes 184–207 and accompanying text (describing state distributed renewables/climate change efforts).

382 *See supra* notes 184–88 and accompanying text.

383 *See supra* notes 184–207, 330–40, and accompanying text.

384 *See* ELIZABETH DORIS ET AL., NAT'L RENEWABLE ENERGY LAB., STATE OF THE STATES 2009: RENEWABLE ENERGY DEVELOPMENT AND THE ROLE OF POLICY 92 (2009), *available at* http://www.nrel.gov/docs/fy10osti/46667.pdf ("RPS[] policies require utilities to own or acquire renewable energy or renewable energy certificates to account for a certain percentage of their retail electricity sales, or a certain amount of generating capacity[—that is, they must make renewable sources part of the sources of electricity they send out to their consumers over the grid—]within a specified timeframe.").

385 *See supra* text accompanying note 60 (showing that renewables as a whole—including renewable farms—currently make up less than one percent of U.S. energy production); *supra* text accompanying notes 100–03 (describing how more than thirty states require from eight percent to more than thirty percent of electricity come from renewable sources).

386 *See, e.g.*, ERIC WANLESS ET AL., NAT'L RES. DEF. COUNCIL, A GOLDEN OPPORTUNITY: CALIFORNIA'S SOLUTION FOR GLOBAL WARMING 9 (2007), *available at* http://www.nrdc.org/globalwarming/ca/ca.pdf ("California's Renewable Portfolio Standard has helped to grow the market for and interest in large-scale wind farms."); Douglas A. Codiga, *Hawaii Clean Energy Law and Policy*, HAW. B.J., Sept. 2009, at 4, 6 (describing an agreement between the state government and utility companies seeking to, among other things, "integrate up to 400 MW of wind power into the Oahu electrical system from one or more wind farms on Lanai or Molokai and transmitted to Oahu via an undersea cable system"). On utilities' propensity to favor "large, centralized plants" over "small, decentralized units," see Benjamin K. Sovacool, *Distributed Generation (DG) and the American Electric Utility System: What Is Stopping It?*, 130 J. ENERGY RESOURCES TECH. 012001-1, 012001-6 (2008).

To maximize the degree of location-specific variation that is so important to distributed renewables, future state actions that would diminish local discretion or, worse, contravene local decisions about distributed renewables in favor of uniform state-level solutions should be precluded.[387] State governments have a somewhat sordid history when it comes to allowing local policy preferences to stand over time. In the field of environmental regulation, states have repeatedly legislated out statewide policies that preempt more environmentally protective local rules.[388] Examples include the Massachusetts Pesticide Control Act's preemption of stricter local pesticide restrictions;[389] the California Water Equipment and Control Act's preemption of stricter local restrictions on the use of water-softening devices that increase the salinity of wastewater;[390] and multiple states' preemption of local hazardous waste rules that are more restrictive than statewide standards.[391] Even ignoring preemption, seemingly progressive energy policies initiated at the state level nevertheless may end up being counterproductive if they generate strong local opposition based on their failure to account for local concerns.[392] These factors also bolster our worry that existing state-granted local autonomy in the renewable energy area may be withdrawn, making the implementation regime unstable.[393]

The possibility of preemptive state action makes local authority contingent and, ultimately, subordinate to state-level political dynamics. Such instability

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387 *See* Paul S. Weiland, *Preemption of Local Efforts to Protect the Environment: Implications for Local Government Officials*, 18 VA. ENVTL. L.J. 467, 497–98 (1999) ("[T]he arguments made in favor of state action to protect the environment may extend to local governments. Thousands of local government entities may adopt alternative and innovative policies to address environmental challenges and problems. To the extent that local government efforts are preempted, innovation is stifled." (footnote omitted)).

388 *See id.* at 488–96 (discussing examples).

389 *See* Town of Wendell v. Attorney Gen., 476 N.E.2d 585, 592 (Mass. 1985).

390 *See* Water Quality Ass'n v. City of Escondido, 61 Cal. Rptr. 2d 878, 886–87 (Ct. App. 1997); Water Quality Ass'n v. Cnty. of Santa Barbara, 52 Cal. Rptr. 2d 184, 194 (Ct. App. 1996).

391 *See* Envirosafe Servs. of Idaho, Inc. v. Cnty. of Owyhee, 735 P.2d 998 (Idaho 1987); Twp. of Cascade v. Cascade Res. Recovery, Inc., 325 N.W.2d 500 (Mich. Ct. App. 1982); Stablex Corp. v. Town of Hooksett, 456 A.2d 94 (N.H. 1982); Rollins Envtl. Servs., Inc. v. Twp. of Logan, 508 A.2d 271 (N.J. Super. Ct. App. Div. 1986).

392 Local resistance to transmission required for the Texas wind power initiative is one case in point. *See, e.g.*, Initial Brief of Tom and Melissa Duren at 2, No. 37464 (Mass. State Office of Admin. Hearings Jan. 26, 2010), *available at* http://interchange.puc.state.tx.us/WebApp/Interchange/Documents/37464_730_640083.PDF (challenging the "preferred route" designated for the transmission line because it would run 288 feet from the residents' "dream home"). Local resistance to state implementation of a uniform, streamlined zoning process for wind energy facilities in Massachusetts is another. *See, e.g.*, Peter Murkett, Op-Ed., *A Sacrifice Worth Making*, BOS. GLOBE, July 13, 2009, at A11 (writing in support of wind turbines in the Berkshires); Eleanor Tillinghast, Op-Ed., *Turbines Are a Costly Blight*, BOS. GLOBE, July 13, 2009, at A11.

393 *See supra* notes 315–84 and accompanying text.

is detrimental to the goal of fostering truly local regulatory experimentation, and potential state preemption of local distributed renewables regulation and renewables-related land-energy rule making is thus undesirable. Therefore, a federal effort to empower local government regulation of distributed renewables is important, and federal displacement of state government authority to diminish local government autonomy in this area is also needed. We briefly address legal objections to this approach in the next subsection.

4. The Permissibility of a Federal–Local Approach

Regardless of the interjurisdictional strategy for distributed renewables suggested by careful comparative institutional analysis, there remains the question of legal permissibility. A program of local control over land-energy regulations, bolstered by a minimum federal standard, would fall squarely within Congress's affirmative legislative powers under the modern, expansive interpretation of the Commerce Clause. The question is whether any independent constitutional impediments remain. Perhaps the most obvious objection to proposals for direct federal–local cooperation of the kind we suggest for distributed renewables—including federal action to displace counterproductive state government assertions of control over local governments—is an objection based on constitutional federalism requirements.

The last twenty years have seen the Supreme Court's "federalist revival" reestablish aggressive judicial protections for state government prerogatives in a variety of contexts.[394] These decisions have reinvigorated the idea that the Constitution secures to state governments a characteristic of "sovereignty" or "autonomy" that serves as an external limitation on the powers of the federal government.[395] That is, they suggest a broad norm that courts should invalidate federal legislation, even if it is clearly permissible under one of Congress's enumerated powers, if it overly diminishes state government

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[394] *See, e.g.*, Bd. of Trs. of the Univ. of Ala. v. Garrett, 531 U.S. 356, 360 (2001); United States v. Morrison, 529 U.S. 598 (2000); Kimel v. Fla. Bd. of Regents, 528 U.S. 62, 67 (2000); Alden v. Maine, 527 U.S. 706 (1999); Printz v. United States, 521 U.S. 898 (1997); Seminole Tribe of Fla. v. Florida, 517 U.S. 44, 47 (1996); United States v. Lopez, 514 U.S. 549, 549 (1995); New York v. United States, 505 U.S. 144, 149 (1992); Gregory v. Ashcroft, 501 U.S. 452, 456 (1991). The term "federalist revival" was coined by Vicki Jackson. *See* Vicki C. Jackson, *Federalism and the Uses and Limits of Law:* Printz *and Principle?*, 111 HARV. L. REV. 2180, 2213 (1998). For detailed discussions of these decisions, see generally Young, *supra* note 280, and Young, *supra* note 325.

[395] *See* Young, *supra* note 325, at 23 (emphasizing that the federalist revival decisions "have opted for federalism doctrines that aggressively protect state sovereignty").

prerogatives.[396] And there are cases suggesting that states' control over their internal governmental structures, including control over the existence and authority of local governments, is one aspect of state sovereignty that the federalist revival seeks to protect.[397] Thus, the federalism objection appears front and center: Constitutional federalism norms demand that state governments retain authority to either permit local governments to exercise discretion or to impose uniform statewide standards that preempt local rules. Federal action displacing any aspect of this "traditional" state power, on this view, would be an unconstitutional invasion of state "autonomy" or "sovereignty."[398]

For our purposes, a few brief observations suffice to dispel most of the force of this objection. First, as others have ably argued, state sovereignty is not as clear a concept as it might seem.[399] The Court's own doctrine is far

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[396] Professor Gerken argues that federalism scholars, who tend to discuss state "autonomy" and criticize the Court's continuing focus on state "sovereignty," nevertheless continue to make arguments that depend on a protected zone of state policy-making freedom that amounts to something very similar to "sovereignty." Gerken, *supra* note 300, at 12–13.

[397] *See* Davidson, *supra* note 306, at 984–90 (giving examples). Davidson suggests that judicial affirmations of state power over local governments typically come in the form of "intimat[ions] that internal political ordering is a fundamental attribute of state sovereignty." *Id.* at 986; *see also, e.g.*, Nixon v. Mo. Mun. League, 541 U.S. 125, 140 (2004) (invoking the "working assumption that federal legislation threatening to trench on the States' arrangements for conducting their own governments should be treated with great skepticism, and read in a way that preserves a State's chosen disposition of its own power, in the absence of the plain statement *Gregory* requires"); *Alden*, 527 U.S. at 749 (denying federal power to "turn the State against itself and ultimately to commandeer the entire political machinery of the State against its will"); *Gregory*, 501 U.S. at 460 ("Through the structure of its government, and the character of those who exercise government authority, a State defines itself as a sovereign."). State control over local governments traditionally has been regarded as plenary. *See, e.g.*, Hunter v. City of Pittsburgh, 207 U.S. 161, 178 (1907) ("The number, nature and duration of the powers conferred upon [municipal governments] and the territory over which they shall be exercised rests in the absolute discretion of the State."); Davidson, *supra* note 306, at 976–84 (discussing the traditional conception of localities as "powerless," lacking meaningful constitutional status, and subject to "plenary" state authority). For an introduction to the literature on local government "powerlessness," see generally Richard Briffault, *Our Localism* (pts. 1 & 2), 90 COLUM. L. REV. 1, 346 (1990), and Gerald E. Frug, *The City as a Legal Concept*, 93 HARV. L. REV. 1057 (1980).

[398] Davidson, *supra* note 306, at 1018 ("It is true that states are generally the primary institution in our federal system charged with overseeing local governments."). On federalism-based objections to federal preemption, see generally Garrick B. Pursley, *Preemption in Congress*, 71 OHIO ST. L.J. 511 (2010); Young, *supra* note 325, at 52, 63; Ernest A. Young, *Two Cheers for Process Federalism*, 46 VILL. L. REV. 1349, 1369–70 (2001).

[399] *See generally* Gerken, *supra* note 300, at 13; Jenna Bednar & William N. Eskridge, Jr., *Steadying the Court's "Unsteady Path": A Theory of Judicial Enforcement of Federalism*, 68 S. CAL. L. REV. 1447 (1995); Ronald J. Krotoszynski, Jr., *Listening to the "Sounds of Sovereignty" but Missing the Beat: Does the New Federalism Really Matter?*, 32 IND. L. REV. 11 (1998); Calvin Massey, *Federalism and the Rehnquist Court*, 53 HASTINGS L.J. 431 (2002); Todd E. Pettys, *Competing for the People's Affection: Federalism's Forgotten Marketplace*, 56 VAND. L. REV. 329 (2003).

from settled or uniform with respect to the permissibility of federal interference with states' internal political ordering—the Court has upheld, after all, Congress's application of federal wage and hour requirements[400] and the federal Family and Medical Leave Act to state government employees.[401] More specifically, as Nestor Davidson observes, it is unclear whether constitutionally enshrined state sovereignty precludes direct federal–local cooperation even over state government resistance.[402] Federal courts have in fact upheld federal legislation that empowers local governments to take actions that state governments might wish to prohibit.[403] Indeed, the Court in *Nixon v. Missouri Municipal League*, even while articulating a strong presumption against federal derogation of state control over local governments, allowed that such action might be permissible if Congress made its intentions plain in statutory text.[404]

Accordingly, federal empowerment of and cooperation with local governments does not seem straightforwardly unconstitutional on grounds of inconsistency with concepts of state "sovereignty,"[405] even where the cooperation interferes with state control over local governments. The Court's federalism jurisprudence, including the decisions comprising the "federalist revival,"[406] confirms that the Court has not applied a clearly defined concept of state sovereignty, but instead has been "engaged in a fundamentally *functionalist* enterprise" in which "pragmatic and normative concerns about the

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400 Garcia v. San Antonio Metro. Transit Auth., 469 U.S. 528, 530–31 (1985).

401 Nev. Dep't of Human Res. v. Hibbs, 538 U.S. 721, 724–25, 733–35 (2003).

402 *See* Davidson, *supra* note 306, at 995–98; Roderick M. Hills, Jr., *Dissecting the State: The Use of Federal Law to Free State and Local Officials from State Legislatures' Control*, 97 MICH. L. REV. 1201, 1207–16 (1999).

403 *See* Davidson, *supra* note 306, at 996–99; *see, e.g.*, Lawrence Cnty. v. Lead-Deadwood Sch. Dist. No. 40-1, 469 U.S. 256, 257–61 (1985) (holding that federal Payment in Lieu of Taxes statute authorizing local governments to use federal funding for "any" governmental purpose preempted state statute purporting to require local governments to distribute federal funds under the program similarly to distribution of general tax revenue); City of Tacoma v. Taxpayers of Tacoma, 357 U.S. 320, 324–26, 341 (1958) (affirming Tacoma's claim of power to exercise eminent domain over state-owned fish hatcheries adjacent to dam project, despite state objection that state law granted Tacoma no such power, in reliance on Ninth Circuit's upholding of the federal license's validity); Wash. Dep't of Game v. Fed. Power Comm'n, 207 F.2d 391, 396 (9th Cir. 1953) (upholding validity of Federal Power Act license issued to Tacoma to build a dam despite state government argument that state law prohibited the dam).

404 541 U.S. 125, 140 (2004).

405 *See* Davidson, *supra* note 306, at 1000 ("[F]ederal empowerment jurisprudence and other instances of federal intervention in state internal political ordering undermine any robust view of the constitutional necessity of state control over local governments.").

406 *See* Ernest A. Young, *Making Federalism Doctrine: Fidelity, Institutional Competence, and Compensating Adjustments*, 46 WM. & MARY L. REV. 1733, 1735–36, 1755–56 (2005).

appropriate allocation of power in a federal system have largely driven the jurisprudence."[407] Federalism doctrine must be justified *instrumentally* because there is no textual constitutional commitment to any particular arrangement or constellation of state government powers within the constitutional system.[408] All that we know is that the Constitution commits us to have federalism—there must be both federal and state governments—and we cannot tell very much from the text about how much power the states must, or should, retain against federal usurpation.[409]

In response to the lack of a firm textual basis, federalism doctrine traditionally has been designed to promote the familiar benefits that are thought to justify entrenching a federalist system in the first instance: the capacity of subnational governments to tailor policies to diverse citizen preferences; the value of regulatory diversity and experimentation; the capacity for decentralized governmental authority to prevent tyrannical accumulation of power at any one level of government; and the potential for multiple, differentiated governmental forums in which citizens may participate to enhance basic values of democratic engagement and popular sovereignty.[410] Doctrines limiting federal power in the name of federalism find their sturdiest constitutional justification in their tendency to promote one or more of these values.[411] The "values of federalism," however, are not inextricably connected with the preservation of state authority. It is not necessarily *state* policy

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[407] Davidson, *supra* note 306, at 1006 (emphasis added); *see also* Gerken, *supra* note 300, at 18–23 (noting that courts have shifted, in making federalism decisions, to "functional accounts that are keyed to the role states play in preserving a well-functioning democracy").

[408] *See* ROBERT A. SCHAPIRO, POLYPHONIC FEDERALISM: TOWARD THE PROTECTION OF FUNDAMENTAL RIGHTS 96, 109 (2009) (arguing that the lack of specific constitutional text on federalism requirements makes it necessary to derive our federalism norms by "structural inference," and that a variety of different inferences are consistent with the textual evidence that does exist); Ernest A. Young, *State Sovereign Immunity and the Future of Federalism*, 1999 SUP. CT. REV. 1, 36 (observing that there is no "federalism clause" in the Constitution); Garrick B. Pursley, *Federalism Compatibilists*, 89 TEX. L. REV. (forthcoming 2011) (manuscript at 17) [hereinafter Pursley, *Federalism Compatibilists*] (reviewing SCHAPIRO, *supra*, and noting the absence of textual support for specific federalism requirements); Garrick B. Pursley, *Dormancy*, 100 GEO. L.J. (forthcoming 2012) (arguing that the lack of textual specificity on federalism requirements permits the inference of only very basic, and broad, preclusions of government actions that undermine the constitutional structure).

[409] *See* SCHAPIRO, *supra* note 408, at 96; Gerken, *supra* note 300, at 23 ("[N]either the Constitution's text nor its structure offers definitive guidance on how to referee federal-state interactions."); Pursley, *Federalism Compatibilists*, *supra* note 408, at 13–17; Ernest A. Young, *State Sovereign Immunity and the Future of Federalism*, 1999 SUP. CT. REV. 1, 36 (observing that the Constitution contains "several clauses with important federalism implications, but no central 'Federalism Clause'").

[410] *See* Davidson, *supra* note 306, at 1006–08; Gerken, *supra* note 300, at 18–23; Young, *supra* note 325, at 52–65; *supra* notes 306, 317–21, 325–31, and accompanying text.

[411] Young, *supra* note 325, at 50–52.

experimentation that we value, just policy experimentation; it is not necessarily *state government* responsiveness to localized concerns that we value, just a tailored response from some governmental institution; and it is not *statewide* forums for civic participation that we must preserve, it is a broad spectrum of opportunities to participate in government *somewhere*.[412] There is no reason in principle why the instrumental considerations that justify protecting *state* governments against federal intrusion should not also frame a strong normative case for empowering and protecting *local* governments, even if doing that requires that the federal government take action that intrudes into state government authority.[413] Accordingly, if *local* empowerment would better serve the underlying ends of the system, then there seems to be a persuasive case for constitutional permissibility.

In the renewables context, we think that the reasons we have given here for preferring a system of federal–local collaboration in promoting distributed renewable energy technologies show that, in this context, federalism's underlying values are best promoted by enhancing *local* government power.[414] The values that provide the very justification for federalism, in other words, make a persuasive normative case for local energy.

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412 *See* Pursley, *Federalism Compatibilists*, *supra* note 408 (manuscript at 14–15) (arguing that the traditional "values of federalism" are instrumental values that may be promoted through a variety of different governmental structures).

413 *See* Richard Briffault, *"What About the 'Ism'?" Normative and Formal Concerns in Contemporary Federalism*, 47 VAND. L. REV. 1303, 1305–06 (1994); Davidson, *supra* note 306, at 1010; Gerken, *supra* note 300, at 23–24.

414 This may seem paradoxical because local governments possess only the power that state governments grant to them through legislation. Some commentators argue that there are—or should be—some constitutional protections for local government autonomy, particularly as it relates to protecting individual rights and liberties, that operate independently from state law. *See, e.g.*, David J. Barron, *The Promise of Cooley's City: Traces of Local Constitutionalism*, 147 U. PA. L. REV. 487, 560–95 (1999); Heather K. Gerken, *Dissenting by Deciding*, 57 STAN. L. REV. 1745, 1748 (2005); Richard C. Schragger, *The Role of the Local in the Doctrine and Discourse of Religious Liberty*, 117 HARV. L. REV. 1810 (2004) (discussing the role of local governments in the context of the Establishment and Free Exercise Clauses). Since we are here concerned with environmental regulatory authority, we will assume that local governments must derive their power from either state or federal positive law. Given that, the process of "freeing" local governments from state control does not merely involve federal invalidation of state law restrictions; the federal government must also confer regulatory authority on local governments in many cases. This creates complexities that we do not explore here. One problem is that even a federal grant of local power over renewable energy must operate against the backdrop of local governments' general powers delegated by the state. State control over the contours of city power generally means that state governments may find ways to change the "default conditions" under which federally delegated authority must be exercised, perhaps to the detriment of federal goals. *See* Davidson, *supra* note 306, at 978. Additional federal prohibitions may be needed to prevent such state tinkering, but this wrinkle requires separate analysis that is beyond the scope of this Article.

CONCLUSION

The deployment of distributed renewable generation systems is an essential component of America's sustainable future. Wind turbines in backyards and solar panels on roofs are quick to install and are likely to attract lower levels of political attention from adversaries. The individual impacts of these twenty-first-century renewable gardens are small, but in the aggregate they may make an enormous difference in reducing demand for electricity during peak hours, empowering individuals and communities, and producing locally grown electricity, jobs, and profits. America's ability to shed its antiquated energy infrastructure and move toward the essential distributed renewable component of a twenty-first-century energy system, however, depends on upending traditional governance structures in this area. Widespread distributed renewable energy generation, and the larger transformation that it potentiates, is best facilitated by an unusual cooperative federal–local regulatory structure. Local governments must have the power to shape land-energy rules to enable broader adoption of distributed devices in a manner tailored to unique, localized physical, social, and political conditions. The great moves from candles to provision of gas for centralized home lighting began with local innovation. Individual entrepreneurs—early energy pioneers—persuaded citizens of their home towns that the change was worthwhile and safe, that their homes would no longer be smoky and dark, and that new forms of energy were convenient and accessible; then they persuaded local governments to adopt policies that enabled the change. Additional pioneering efforts, again initially with local governmental support, helped to make electricity a nationwide good delivered through a massive centralized infrastructure.

The next necessary transition—away from this centralized system—will require the same kinds of bottom-up actions of pioneers and innovation that arise from energy entrepreneurs' responses to varied local challenges. Solar panels and wind turbines must physically appear in yards; neighbors must discuss their experiences with these new technologies; and the word must spread beyond the neighborhood level. For that to happen, land-energy laws must be retooled to maximize opportunities for promotion and adoption of these technologies. Empowering local governments in this area will generate clusters of differing regulatory packages crafted to reflect unique geographical, social, and political circumstances, to which renewables pioneers will have to creatively respond. The innovation inspired by these differences will create thousands of approaches to renewables deployment from which other localities can pick and choose.

In addition to local governments that are empowered to write and enact local land-energy rules, a federal minimum standard is needed to prevent negative, anti-renewables regulatory variation. And to ensure that local governments are able to implement a variety of land-energy rules, we have argued that states must not intervene; the federal government must therefore preempt state laws that unacceptably constrain municipal land-energy laws. The underlying values of federalism are best promoted by local governments in the distributed renewables land-energy context, and there seems to be no constitutional barrier to this type of federal–local cooperative system.

This Article is only an initial step toward a broader vision of a new energy future. Local governments, even though not yet fully empowered to enact local land-energy laws, have already begun to move aggressively toward this future—with some even declaring that one-hundred percent of their electricity will come from renewable sources.[415] The production of vast quantities of electricity from clean, distributed renewable generation is currently a fragile vision that is part of an energy future shrouded in uncertainty. This Article has suggested the ideal governmental levels at which sustainable energy, grown from the bottom up, will become more than a vision. From this partial foundation, we hope that much will emerge. Indeed, for a prosperous future, it must.

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[415] *See supra* text accompanying note 102 (describing San Jose's initiative).

ADDENDUM

Authors' note: This table is not comprehensive. It does not include, for example, many local and state financial incentives for renewables, such as tax credits. It also tends to focus on efforts toward distributed generation, not renewables farms. Its purpose is to begin to suggest the impressive level of renewables-based activity that is occurring at the state and particularly the local level in some of the major population centers.

TABLE 1. SELECT LOCAL AND STATE ORGANIZATIONS AND EFFORTS RELATING TO THE IMPLEMENTATION OF RENEWABLE GENERATION, 2009.

City and population[i]	Local commissions	Local efforts	State efforts and organizations
New York 8,363,710	• **New York City Economic Development Corporation:** Is "involved in planning for both short and long-term energy resource[s]" and "fostering the market for renewable energy."[ii] ○ Mayor formed the New York City Energy Policy Task Force, to be led by NYEDC, in 2003.[iii] Task Force generated a report in 2004, which has since guided City energy policy.[iv] • **New York City Energy Policy Board**: Submitted recommendations to the Energy Planning Board in December 2008.[v] Board will "review and approve energy plans that include supply and demand strategies to meet the city's needs."[vi] ○ Action by mayor.[vii] • **Mayor's Office of Long-Term Planning and Sustainability:** Works "with City agencies and the Mayor's Advisory Board for Sustainability" to help implement PlaNYC and the mayor's vision of making New York "sustainable" by 2030.[viii]	• **Request for Expressions of Interest for renewable energy projects:** Asked "firms with strong track records in producing renewable energy" for project ideas ("small- and large-scale").[ix] ○ Action by mayor; implemented by New York City Economic Development Corporation. • **PlaNYC:** Aims to "increase the amount of Clean DG [distributed generation] by 800 MW."[x] Also aims to establish a New York City Energy Planning Board.[xi] ○ Action by mayor.[xii] • **Renewable Energy Rebate:** Administrative Code provides: "Owners who demonstrate the production on a zoning lot of five percent or more of the annual energy consumption on the zoning lot through renewable energy sources may receive a fee rebate as established by rule."[xiii] • Mayor signed[xiv] **The U.S. Mayors Climate Protection Agreement**, which, among other things, commits the city to "strive to meet or exceed Kyoto Protocol targets for reducing global warming pollution by taking actions . . . such as . . . [i]ncreas[ing] the use of clean, alternative energy by . . . advocating for the development of renewable energy resources."[xv]	• **Renewable Portfolio Standard (RPS):** Twenty-five percent of electricity used by consumers must be produced by renewable sources by 2013.[xvi] ○ Action by governor (in response to the New York State Energy Planning Board's 2002 State Energy Plan) and the New York State Public Service Commission.[xvii] • **Solar Electric Incentive Program:** Provides $20.6 million in cash incentives to electricity customers who install new solar electric or photovoltaic systems.[xviii] ○ Action by Public Service Commission; uses funding allocated by RPS.[xix] • **New York Energy Policy Institute:** Formed to "help New York continue to be a leader in the new economy by building a clean energy economy."[xx] ○ Action by governor.[xxi] • **New York State Energy Research and Development Authority (NYSERDA):** Current goals include "reducing energy consumption, promoting the use of renewable energy sources, and protecting the environment."[xxii]
Los Angeles 3,833,995	• **Los Angeles Department of Water and Power (LADWP):** LADWP's Solar Incentive Program "has enable[ed] nearly 29 megawatts (MW) of clean, renewable solar power."[xxiii] Provides payments to residential and commercial customers that "purchase or lease solar photovoltaic (PV) systems to offset traditional energy	• **2005 renewable energy target**: Aimed for generating 20% of electricity with renewables by 2010; generation is now close to 12%.[xxvii] LA will purchase some renewable power from a Baja geothermal facility and Pine Tree, its municipally owned wind farm currently being constructed.[xxviii] ○ Action by mayor.[xxix] • **GREEN LA:** Aims to increase "the city's use of renewable energy to 40 percent by	• **Executive Order S-14-08:** Thirty-three percent of all retail electricity shall be served by renewable sources by 2020.[xxxix] ○ Action by governor following 2002 and 2006 legislatively-enacted Renewables Portfolio Standards.[xl] ○ Aims to encourage "technically and economically feasible distributed renewable energy opportunities."[xli] • **California Solar Initiative**: Beginning in 2007, provides $3.3 billion over ten years for solar equipment installed on existing and new structures.[xlii]

	consumption at the installation site."[xxiv] LADWP also implements the 2005 renewable energy target as part of its own Renewable Portfolio Standard.[xxv] Has completed and is developing multiple "renewable energy generation projects," including rooftop solar photovoltaics owned by LADWP,[xxvi] to meet its standard.	2020."[xxx] o Action by mayor[xxxi] (Note that neither the renewable energy target nor Green LA mentions distributed sources). • **The Los Angeles Solar Energy Plan:** Aims to incentivize homeowners to install 380 MW of solar power on the roofs of electricity customers' homes by 2020,[xxxii] to install 400 MW of City-owned solar equipment by 2014,[xxxiii] and to "procure 500 MW of utility-scale solar power projects" by 2020.[xxxiv] o Action by mayor.[xxxv] Failed as a ballot initiative, but mayor has continued to push for its implementation.[xxxvi] • Mayor signed[xxxvii] **The U.S. Mayors Climate Protection Agreement**, which includes renewable energy goals.[xxxviii]	o Action by governor, the California Public Utilities Commission, and the California Energy Commission.[xliii] • **Wind & Fuel Cell Rebates:** Beginning in 2007, provides cash rebates for small wind turbines and fuel cells powered by renewable sources of hydrogen.[xliv] • **Self-Generation Incentive Program:** "[P]rovides incentives to support existing, new, and emerging distributed energy resources" including wind turbines and fuel cells; administered by utilities.[xlv] • **Renewable Energy Transmission Initiative:** Will "help identify the transmission projects needed to accommodate" California's renewable energy goals.[xlvi] o Action by coalition of public agencies and private utilities.[xlvii] • **Cal. Health and Safety Code:** Emissions of greenhouse gases in California must be reduced to 1990 levels by 2020.[xlviii] o California Public Utility Commission, which must implement regulations to meet this target, describes "mandates that increase California's reliance on renewable energy sources" as future "cornerstones" of this effort.[xlix]
Chicago 2,853,114	• **Green Ribbon Committee** of "business and community leaders"[l] provides ongoing guidance for Climate Action Plan. • **Chicago Center for Green Technology:** Offers seminars and other educational resources related to green buildings, including buildings that incorporate solar and wind technologies.[li] • **Chicago Department of Environment:** Has helped prepare energy plans for the city[lii] and helps to provide energy grants, when available, through its Director of Energy Management.[liii]	• **Chicago Climate Action Plan**: City in 2009 partnered with two corporations "for the development of the nation's largest urban solar power plant," which "will produce an average of 14,000 megawatts [MWh] of power."[liv] The City also aims to "[i]ncrease efficient power generated onsite using distributed generation and combined heat and power," to "[d]ouble current household-scale renewable electricity generation," and to "[p]rocure enough renewable energy generation for Chicagoans to reduce electricity emissions by 20 percent."[lv] o Action by mayor[lvi] • **Solar Thermal Systems and Grant Program:** Grants were awarded prior to 2009, but the City continues to install solar thermal systems on its facilities.[lvii] o Action by mayor[lviii] • **Solar energy installations: "**The	• **Renewable Portfolio Standard:** Requires "at least" 25% of a utility's supply of electricity to eligible retail customers to come from renewable energy resources by June 1, 2025, and "each year thereafter."[lxv] "To the extent available, at least 75%" of this 25% must come from wind, and 6% of the 25% must come from photovoltaics.[lxvi] o Action by legislature.[lxvii] • **Renewable Energy Resources Program**: Administered by the Illinois Department of Commerce and Economic Opportunity's Division of Energy.[lxviii] Includes a Solar and Wind Energy Rebate Program "to encourage utilization of smaller-scale solar and wind energy systems in Illinois."[lxix] o Action by legislature.[lxx]

		Department of Water Management is planning to install a 1 megawatt solar array at the South Water Filtration Plant. In addition, the Chicago Park District is training their union employees on how to install solar arrays."[lix] • **Chicago Energy Plan:** Although written in 2001, this comprehensive strategy continues to influence energy policy.[lx] It aimed for 25% of new electricity demand in Chicago to be met with renewable sources by 2010.[lxi] o Action by mayor.[lxii] • Mayor signed[lxiii] **The U.S. Mayors Climate Protection Agreement**, which includes renewable energy goals.[lxiv]	
Houston 2,242,193	• **Environmental Coordinating Council:** "coordinat[es] environmental investigation and enforcement work across departments," and "identif[ies] and support[s] all departments to access opportunities for external funding for environmental projects,"[lxxi] including renewable energy programs.[lxxii] • **Houston Code Enforcement's Green Building Resource Center:** Has a solar-power pump for its rainwater collection system; offers reviews of residents' building plans and suggests "green strategies."[lxxiii]	• **Wind energy commitment:** In July 2009, the city committed to purchasing 32 percent of its total electricity load from wind energy.[lxxiv] o Action by mayor.[lxxv] • **Solarized City equipment:** The City has installed solar-powered parking meters and solar panels on top of several city facilities ("produc[ing] approximately 24000 kWh annually").[lxxvi] • **Consumer Choice Program:** Utilities participate in a program that offers "variable and fixed pricing and 'green' and conventional electricity" for consumers to purchase, and the City operates a website that allows customers to compare energy prices.[lxxvii] • **Comprehensive Renewable Energy Plan:** establishes a target for the city of purchasing "438 million kilowatt-hours of renewable energy."[lxxviii]	• **Renewable Portfolio Standard**: Aims for 10,000 MW of electricity in the state to be produced from renewable sources by 2025 and requires that renewable sources produce 5,880 MW of electricity by 2015.[lxxix] o Action by legislature.[lxxx] • **Texas Solar for Schools Program:** The State Energy Conservation Office "has funded 31 small-scale solar energy systems [in] school districts across the state."[lxxxi] • **Training solar photovoltaic installers:** The State Energy Conservation Office, along with the Texas Workforce Commission, have provided grants to form a community college program that trains students in advanced installation of PV systems for commercial and residential buildings.[lxxxii] • **Renewable Energy at Work:** The State Energy Conservation Office sponsors the installation of solar and wind generation projects around the state.[lxxxiii] • **Customer Choice:** Texas provides, as part of its customer safeguards in the deregulation ("customer choice") process, that a consumer is entitled "to have access to . . . on-site distributed generation, and to providers of energy generated by renewable energy resources."[lxxxiv] o Action by legislature.[lxxxv]
Phoenix 1,567,924	• **Environmental Quality Commission:** This group is a "citizens' commission" that has been "instrumental in recommending green building practices for inclusion in the General Plan" for the city.	• **City renewable energy goal:** The City has a goal to ensure that by 2025, "15% of the energy used by the city should come from renewable energy sources" and aims to achieve this goal "through city-owned and city-sponsored projects, primarily through public and private partnerships."[lxxxviii]	• **Renewable Energy Standard and Tariff Rules:** Require utilities to "derive at least . . . [1.1%] of the total retail energy solar from new solar resources or environmentally-friendly renewable electricity technologies" from 2007 to 2012, either by generating the electricity or purchasing it,[xcviii] and requires utilities to purchase "Renewable Energy Credits from Eligible Renewable Energy Resources" and in

	including recommendations regarding renewables.[lxxxvi] o Action by mayor and city council.[lxxxvii]	o Action by city council.[lxxxix] • **Solar installations:** Since 1990, the City has installed a number of solar photovoltaic systems and solar lights in local parks and at transit stations and other facilities.[xc] The City is currently planning to install a solar generating plant at one of its landfills.[xci] • **Green Phoenix:** Aims, among other goals, to "leverage current city efforts and resources" and "sustain quality of life for Phoenix residents" through projects such as solar panel installation and "green-retrofitting of public housing."[xcii] The City has already implemented "[o]ver 80 current sustainability programs in water, energy and natural resource conservation" and has created 250 megawatts of solar energy production capacity.[xciii] As part of the "Solar City" initiative under Green Phoenix, the City aims to "[i]nstall solar PV and solar water heaters in existing public facilities, require [it] in public new facilities, [and] incentivize [it] in residential and commercial sectors."[xciv] o Action by mayor.[xcv] • Mayor signed[xcvi] **The U.S. Mayors Climate Protection Agreement**, which includes renewable energy goals.[xcvii]	so doing, by 2025, to ensure that 15% of the retail kilowatt-hours of electricity sold is renewably produced.[xcix] o Action by Arizona Corporation Commission.[c] • **Prohibition on solar panel bans in private communities:** Arizona prohibits homeowners' associations from banning "the installation or use of a solar energy device" and retroactively invalidates deeds to the contrary.[ci] o Action by legislature.[cii] • **Arizona Climate Change Action Group:** Generated the **Arizona Climate Change Action Plan**, which includes recommendations to "Encourage Distributed Generation of Renewable Energy,"[ciii] "Reduce Barriers to Renewables and Distributed Generation of Clean Energy," and "Implement Pricing Strategies to Promote . . . Use of Renewable Energy."[civ] o Action by governor.[cv]
Philadelphia 1,447,395	• **Municipal Energy Office**: Helped implement "City's first solar-electric energy system" on the Police Forensic Science Center roof.[cvi] Member of Philadelphia Million Solar Roofs Partnership, a "collaborative of local organizations, businesses, and government agencies committed to helping the five county region of Southeastern Pennsylvania contribute over 500 new solar installations by 2010."[cvii]	• **Local Action Plan for Climate Change**: "purchase or generate at least 15 percent of electricity demand for City buildings from renewable sources by 2015";[cviii] purchase wind energy to cover five percent of City electricity use by 2010;[cix] "[e]valuate the financial feasibility of installing solar and other [non-greenhouse gas] producing systems at City-owned facilities."[cx] o Action by mayor.[cxi] • **Environmental Stewardship Program:** City purchases "12,960 MWh of wind energy annually" to power Philadelphia International Airport.[cxii] o Action by city planners.[cxiii] • Mayor signed[cxiv] **The U.S. Mayors Climate**	• **Renewable Portfolio Standard:** Electricity from solar photovoltaic technologies must comprise 0.0203% "of the electric energy sold" to retail electric customers from June 1, 2010, through May 31, 2011, and by June 20, 2020 and thereafter, the required percentage is 0.05000.[cxvi] By compliance year 2020–2021,[cxvii] "at least 8% of the electric energy sold" by a utility to retail electric customers must be from "Tier I alternative energy resources," which include "solar photovoltaic and solar thermal energy" and "wind power,"[cxviii] among others.[cxix] In total, 18% of the electric energy sold by compliance year 2020–2021 must be generated from renewable sources (Tier I and Tier II).[cxx] • **Pennsylvania Clean Energy Communities Campaign:** If one of twenty communities (including Philadelphia) passes an "official community resolution" and announces its "commitment to 20% [clean energy] by 2010[]," it receives

		Protection Agreement, which includes renewable energy goals.[cxv]	a free 1kWh solar energy system.[cxxi] o Led by the Sustainable Development Fund of the Pennsylvania Public Utility Commission and SmartPower.[cxxii]
San Antonio 1,351,305	• **Citizens Advisory Committee:** The City's municipally owned utility, CPS, has a Citizens Advisory Committee with fifteen members who provide "community input directly to the CPS Energy Board of Trustees and staff."[cxxiii] • **Office of Environmental Policy:** Involved in implementing the Mission Verde Sustainability Plan.[cxxiv] o **Sustainability Task Force Executive Committee:** "[C]reated to . . . integrate sustainability principles with municipal operations."[cxxv] Also a resource for the Mission Verde plan.[cxvi]	• **Mission Verde Sustainability Plan:** Initiative "#1" is to "[b]uild a 21st Century urban energy infrastructure in San Antonio with distributive energy" by generating "energy from renewable energy sources such as solar, wind, biomass and geothermal, originated from buildings and homes, stored until needed and connected with a multi-directional grid."[cxxvii] o Action by mayor.[cxxviii] • **Solar Energy Solar Initiative Rebate Program:** Offers customers up to $3.00 per watt produced by a solar photovoltaic system installed on the customer's property.[cxxix] The municipal utility also provides customers with a rebate for installing solar water heaters.[cxxx] • CPS Energy's **Vision 2020:** Lists as goal for 2020 that installation of 1500 megawatts of renewable generation.[cxxxi] • As part of its **Strategic Energy Plan,** CPS energy plans to add 100 megawatts of "solar-generated electricity" to complement its existing 709 megawatts of purchased wind power.[cxxxii] • Mayor signed[cxxxiii] **The U.S. Mayors Climate Protection Agreement**, which includes renewable energy goals.[cxxxiv]	• See **Houston,** *supra.*
Dallas 1,279,910	• **Office of Environmental Quality:** The Dallas Comprehensive Plan aims to "[e]xpand the role of the City of Dallas Office of Environmental Quality to include an interagency taskforce . . . to educate and advocate for environmentally sound development practices," including green building practices.[cxxxv]	• **City of Dallas Comprehensive Plan:** Goal 6.3.4 aims to "reduce non-renewable energy resource consumption and promote the use of alternative energy,"[cxxxvi] and includes as an implementation measure: "Promote . . . use of solar power in residential, commercial and industrial development."[cxxxvii] o Action by city council.[cxxxviii] • **Green Building Program**: Through this program, the City has constructed twenty-two projects for which it is seeking	• See **Houston**, *supra.*

		Leadership in Energy and Environmental Design (LEED) Certification;[cxxxix] one of these projects includes a solar panel array.[cxl] o Action by city council.[cxli] • **Renewable power purchasing:** The City purchased "nearly 334 million kilowatt-hours" of renewable power in 2008.[cxlii] • Mayor signed[cxliii] **The U.S. Mayors Climate Protection Agreement**, which includes renewable energy goals.[cxliv]	
San Diego 1,279,329	• **Environmental Services Department, Energy Conservation and Management Division:** Formed "to pursue the City of San Diego's long-term goal of energy independence."[cxlv]	• **Solar installations:** City has installed solar panel systems on many city facilities.[cxlvi] • Encourages renewables as part of its **green building requirement:** Requires that "all new buildings and major renovations over 5,000 square feet" achieve the Leadership in Energy and Environmental Design (LEED) "Silver" Level Certification[cxlvii] and additionally "encourages" "all newly constructed facilities and major renovation projects regardless of square footage" to "[i]ncorporate self-generation using renewable technologies."[cxlviii] Requires "[c]ity owned new construction and major renovation projects [to] provide a minimum of 15 percent of total building energy from onsite self-generation."[cxlix] o Action by city council.[cl]	• See **Los Angeles**, *supra.*
San Jose 948,279	• **Transportation and Environment Committee:** Receives status reports on solar energy initiatives[cli] and other proposed activities related to renewables.[clii] • **Interdepartmental Energy and Solar Team:** Helps to coordinate installation of renewables,[cliii] among other projects. • **Environmental Services Department:** Prepared a request for qualifications package to determine the optimal "size and type of renewable energy	• **San Jose Green Vision:** This is a fifteen-year plan to "transform San José into the world center of Clean Technology innovation" and "promote cutting-edge sustainable practices," among other goals.[cliv] As part of this 10-point plan, the City through a "60-Day Solar Challenge"[clvi] "pushed numerous local solar companies to offer no/low down-payment financing and lease programs to residents interested in installing solar on their homes."[clvii] It has also "installed solar power systems on city facilities"[clviii] (approximately ten to date[clix]). In one project, the Housing Department granted an apartment complex $300,000 to "retrofit the complex with photovoltaics."[clx]	• See **Los Angeles**, *supra.*

	system" and "[e]stimated output" of systems that would be installed on City facilities.[cliv]	○ Actions by mayor[dxi] and city council.[clxii] • **City of San Jose Strategic Energy Plan:** "[S]eeks to identify the ways and means to implement the energy and renewable goals of the City's adopted Green Vision."[clxiii] • **2009–2010 San Jose Clean Tech Legislative Agenda:** "Within 15 years," the City aims to "[r]eceive 100 percent of [its] electrical power from clean renewable sources."[clxiv] Other goals include to "[e]ncourage demonstration projects and early public procurement of Clean Tech products"[clxv] and to make "Clean Tech products cost competitive with non-renewable technologies."[clxvi] The report also concludes that "key [local] projects in 2009 should focus on urban utility-scale renewable energy projects" and that "[p]olicies should . . . be adopted to promote . . . onsite renewable energy generation."[clxvii] ○ Action by mayor "following discussions at the Clean Tech Summit."[clxviii] • **Sustainable Energy Policy:** This 2003 policy and "subsequent annual action plans" aim to "[e]ncourage the development and use of renewable energy sources."[clxix] ○ Action by city council.[dxx] • With funding from the federal **Smart Solar Initiative**, the City is working to install solar on City-owned buildings and "[c]oordinate public and private sector resources . . . toward the increased use of solar."[clxxi]	

[i] Population numbers represent the city population in number of individuals as estimated by the U.S. Census Bureau for July 1, 2008. U.S. Census Bureau, Annual Estimates of the Resident Population for Incorporated Places over 100,000, Ranked by July 1, 2008 Population: April 1, 2000 to July 1, 2008 (July 1, 2009), *available at* http://www.census.gov/popest/cities/tables/SUB-EST2008-01.xls.

[ii] *Department Overviews*, N.Y.C. ECON. DEV. CORP., http://www.nycedc.com/AboutUs/WhoWeAre/DepartmentOverviews/Pages/DepartmentOverviews.aspx (last visited Feb. 17, 2011).

[iii] N.Y.C. ENERGY POLICY TASK FORCE, NEW YORK CITY ENERGY POLICY: AN ELECTRICITY RESOURCE ROADMAP 6 (2004), *available at* http://www.nyc.gov/html/om/pdf/energy_task_force.pdf.

[iv] *See generally id.* (detailing the New York City Energy Policy Task Force's recommendations for future action by the mayor).

[v] CITY OF N.Y., PLANYC: PROGRESS REPORT 2010, at 58 (2010), *available at* http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/planyc_progress_report_2010.pdf.

[vi] CITY OF N.Y., PLANYC: A GREENER, GREATER NEW YORK 105 (2007).

[vii] Mayor's Office of Operations, *About*, NYC.GOV, http://www.nyc.gov/html/ops/planyc/html/about/about.shtml (last visited May 1, 2011) ("On Earth Day 2007, Mayor Michael R. Bloomberg, released PlaNYC . . . .").

[viii] Mayor's Office of Operations, *Long-Term Planning and Sustainability*, NYC.GOV, http://www.nyc.gov/html/ops/html/long_term/long_term.shtml (last visited May 1, 2011).
[ix] Press Release, City of N.Y., Mayor Bloomberg Announces New York City's First Steps Toward Developing Off-Shore Windfarms and Other Sources of Renewable Energy at 2008 National Clean Energy Summit (Aug. 19, 2008), *available at* http://www.nyc.gov/cgi-bin/misc/pfprinter.cgi?action=print&sitename=OM&p=1304358927000.
[x] CITY OF N.Y., *supra* note vi, at 111.
[xi] *Id.* at 105.
[xii] *See supra* note vii and accompanying text.
[xiii] N.Y.C. ADMIN. CODE § 28-112.6.3.1 (2009).
[xiv] Climate Prot. Ctr., *List of Participating Mayors*, U.S. CONFERENCE OF MAYORS, http://www.usmayors.org/climateprotection/list.asp (last visited May 1, 2011).
[xv] CLIMATE PROT. CTR., U.S. CONFERENCE OF MAYORS, THE U.S. MAYORS CLIMATE PROTECTION AGREEMENT (2005), *available at* http://www.usmayors.org/climateprotection/documents/mcpAgreement.pdf.
[xvi] Pub. Serv. Comm'n, State of N.Y., Order Regarding Retail Renewable Portfolio Standard 26, 83 (Sept. 24, 2004), *available at* http://documents.dps.state.ny.us/public/Common/ViewDoc.aspx?DocRefId={B1830060-A43F-426D-8948-F60E6B754734}.
[xvii] *History of New York's Renewable Portfolio Standard*, N.Y. STATE ENERGY RESEARCH & DEV. AUTH., http://www.nyserda.org/rps/furtherreading.asp (last visited May 1, 2011).
[xviii] *See PV Incentives*, *supra* note 184.
[xix] *Id.*
[xx] Press Release, N.Y. State, Governor Paterson Names Stony Brook to Lead New York State Energy Policy Institute (Dec. 14, 2009), http://www.nyserda.org/Press_Releases/2009/PressReleas20091214.asp (quoting Governor David Patterson).
[xxi] *Id.*
[xxii] *About NYSERDA*, N.Y. STATE ENERGY RESEARCH & DEV. AUTH., http://www.nyserda.org/About/default.asp (last visited May 1, 2011).
[xxiii] *Solar Power*, L.A. DEP'T OF WATER & POWER, http://www.ladwp.com/ladwp/cms/ladwp000870.jsp (last visited May 1, 2011).
[xxiv] *Id.*
[xxv] *Renewable Energy Policy*, L.A. DEP'T OF WATER & POWER, http://www.ladwp.com/ladwp/cms/ladwp005864.jsp (last visited May 1, 2011) (explaining that the goal of providing twenty percent renewably produced electricity to customers by 2010 is "part of the LADWP's Renewable Portfolio Standard").
[xxvi] *RPS Generation Projects*, L.A. DEP'T OF WATER & POWER, http://www.ladwp.com/ladwp/cms/ladwp009507.jsp (last visited May 1, 2011).
[xxvii] *Climate*, MAYOR OF THE CITY OF L.A., http://mayor.lacity.org/Issues/Environment/Climate/index.htm (last visited May 1, 2011).
[xxviii] *Id.*; *see also* U.S. Dep't of Energy, *Los Angeles Breaks Ground on Nation's Largest City-Owned Wind Farm*, ENERGY EFFICIENCY & RENEWABLE ENERGY (Feb. 11, 2008), http://www1.eere.energy.gov/windandhydro/news_detail.html?news_id=11586.
[xxix] *Climate*, *supra* note 27.
[xxx] *Id.*
[xxxi] *Id.* (explaining that Mayor Villaraigosa "unveiled" the action plan in May 2007).
[xxxii] MAYOR ANTONIO R. VILLARAIGOSA & L.A. DEP'T OF WATER & POWER, THE LOS ANGELES SOLAR ENERGY PLAN 2 (2008), *available at* http://www.lacity.org/Mayor/stellent/groups/electedofficials/@myr_ch_contributor/documents/contributor_web_content/lacity_004982.pdf.
[xxxiii] *Id.* at 3.
[xxxiv] *Id.*
[xxxv] *See* MAYOR ANTONIO R. VILLARAIGOSA & L.A. DEP'T OF WATER & POWER, *supra* note xxxii.
[xxxvi] David Zahniser, *A Day After Measure B Fails*, *Environmentalists and Leaders Say They Will Continue to Push for Panel Installation*, L.A. TIMES, Mar. 21, 2009, at 3 ("Environmentalists, labor leaders and Mayor Antonio Villaraigosa said they would continue to press the municipal utility to achieve Measure B's core mission: the installation of 400 megawatts of DWP-owned solar panels throughout the city, and on city-owned property, by 2014.").
[xxxvii] Climate Prot. Ctr., *supra* note xiv.
[xxxviii] *See supra* note xv and accompanying text.
[xxxix] Cal. Exec. Order No. S-14-08 (Nov. 17, 2008), *available at* http://gov38.ca.gov/index.php?/executive-order/11072.
[xl] *Id.*; *California Renewables Portfolio Standard*, *supra* note 101.
[xli] Cal. Exec. Order No. S-14-08, *supra* note xxxix.
[xlii] *The California Solar Initiative—CSI*, *supra* note 184 (showing the budget for solar on existing homes is $2,167 million); *California's Renewable Energy Programs*, *supra* note 184 (explaining that the budget for solar on new residential building construction—the New Solar Homes Partnership—is $400 million and that the total budget for the California Solar Initiative is $3.3 billion over ten years); *About the New Solar Homes Partnership*, GO SOLAR CAL., http://www.gosolarcalifornia.org/about/nshp.php (last visited May 1, 2011) (describing the partnership as part of the "comprehensive statewide solar program, known as the California Solar Initiative").
[xliii] *About Go Solar California*, GO SOLAR CAL., http://www.gosolarcalifornia.ca.gov/about/index.php (last visited May 1, 2011) (explaining that the "Go Solar California!" campaign, which includes the California Solar Initiative, "is a joint effort of the California Energy Commission and the California Public Utilities Commission"); *see also A Short History of Solar Energy and Solar Energy in California*, GO SOLAR CAL., http://www.gosolarcalifornia.ca.gov/solar_basics/history.php (last visited May 1, 2011) ("At the direction of Governor Schwarzenegger, the California Solar Initiative was approved by the California Public Utilities Commission (CPUC) on January 12, 2006.").
[xliv] Cal. Energy Comm'n, *California's Emerging Renewables Program Rebates*, CONSUMER ENERGY CENTER, http://www.consumerenergycenter.org/erprebate (last visited May 1, 2011). Note that solar, wind, and fuel cell incentives were previously administered under the Emerging Renewables Program. *See More Info About the Emerging Renewables Program*, CAL. ENERGY COMM'N, http://www.energy.ca.gov/renewables/emerging_renewables/more_info.html (last visited May 1, 2011).
[xlv] *Self-Generation Incentive Program*, CAL. PUB. UTILS. COMM'N, http://www.cpuc.ca.gov/PUC/energy/DistGen/sgip (last visited May 1, 2011).
[xlvi] *Renewable Energy Transmission Initiative (RETI)*, CAL. ENERGY COMM'N, http://www.energy.ca.gov/reti (last visited May 1, 2011).

[xlviii] The public agencies include the California Public Utilities Commission, the California Energy Commission, and the California Independent System Operator. The private entities include three publicly- and investor-owned utilities. *See* Lynne Gillette et al., *Using Collaboration to Address Renewable Energy Siting Challenges*, FED. LAW., June 2009, at 50, 54 (explaining that RETI was action by the above-mentioned entities and that the utilities are a combination of publicly- and investor-owned utilities); *Self-Generation Incentive Program*, *supra* note xlv. The California Independent System Operator (ISO) is a quasi-public organization (a "non-profit public benefit corporation charged with operating the majority of California's high-voltage wholesale power grid"). CAL. ISO, http://www.caiso.com (last visited May 1, 2011).

[xlviii] CAL. HEALTH & SAFETY CODE § 38550 (West 2006 & Supp. 2010). The code was amended to set this target by Assembly Bill 32, which was approved by the Governor on September 27, 2006. Assemb. B. 32, 2006 Cal. Stat. 488 (2006), *available at* http://www.arb.ca.gov/cc/docs/ab32text.pdf.

[xlix] CAL. PUB. UTILS. COMM'N & CAL. ENERGY COMM'N, FINAL OPINION AND RECOMMENDATIONS ON GREENHOUSE GAS REGULATORY STRATEGIES 3 (2008), *available at* http://www.energy.ca.gov/2008publications/CEC-100-2008-007/CEC-100-2008-007-F.PDF.

[l] *Green Ribbon Committee*, *supra* note 357.

[li] *See Green Tech U*, CITY OF CHI., http://www.cityofchicago.org/city/en/depts/doe/provdrs/ccgt/svcs/green_tech_u.html (last visited May 1, 2011); *The Green Building Resource Center*, CITY OF CHI., http://www.cityofchicago.org/city/en/depts/doe/provdrs/ccgt/svcs/the_green_buildingresourcecenter.html (last visited May 1, 2011).

[lii] *See* MAYOR RICHARD M. DALEY & CITY OF CHI. DEP'T OF ENV'T, ENERGY PLAN 2001 (2001).

[liii] *Energy Grants*, CHI. DEP'T OF ENV'T, http://egov.cityofchicago.org/city/webportal/portalContentItemAction.do?BV_SessionID=@@@@0121393476.1262119818@@@@&BV_EngineID=ccccadejfdimmlicefecelldffhdfhk.0&contentOID=536911350&contenTypeName=COC_EDITORIAL&topChannelName=Dept&blockName=Environment%2FEnergy+Grants+%26+Loans%2FI+Want+To&context=dept&channelId=0&programId=0&entityName=Environment&deptMainCategoryOID=-536887205 (last visited Nov. 10, 2010) (on file with authors).

[liv] *Clean & Renewable Energy*, CITY OF CHI., http://www.cityofchicago.org/city/en/depts/doe/supp_info/clean_and_renewableenergy.html (last visited May 1, 2011).

[lv] *Clean & Renewable Energy Sources*, *supra* note 357.

[lvi] *Climate Change 101*, CHI. CLIMATE ACTION PLAN, http://www.chicagoclimateaction.org/pages/climate_change_101/25.php (last visited May 1, 2011).

[lvii] *Clean & Renewable Energy Sources*, *supra* note 357.

[lviii] Press Release, Dep't of Env't, City of Chi., Solar Thermal Grants Program (Mar. 10, 2006) (on file with authors).

[lix] *Future Initiatives*, *supra* note 208.

[lx] *Chicago's Energy Plan*, CHI. DEPARTMENT OF ENV'T, http://egov.cityofchicago.org/city/webportal/portalContentItemAction.do?BV_SessionID=@@@@0121393476.1262119818@@@@&BV_EngineID=ccccadejfdimmlicefecelldffhdfhk.0&contentOID=536910604&contenTypeName=COC_EDITORIAL&topChannelName=Dept&blockName=Environment%2FChicago%27s+Energy+Policies%2FI+Want+To&context=dept&channelId=0&programId=0&entityName=Environment&deptMainCategoryOID=-536887205 (last visited Nov. 10, 2010) (on file with authors) ("Many of the City of Chicago's energy policies and initiatives originated in Chicago's Energy Plan (2001).").

[lxi] *See* MAYOR RICHARD M. DALEY & CITY OF CHI. DEP'T OF ENV'T, *supra* note lii.

[lxii] *Id.* at 24.

[lxiii] Climate Prot. Ctr., *supra* note xiv.

[lxiv] *See supra* note xv and accompanying text.

[lxv] 20 ILL. COMP. STAT. ANN. 3855 / § 1-75(c) (West 2010).

[lxvi] *Id.* § 1-56(b) (establishing a yearly escalating schedule for photovoltaics, beginning with "0.5% by June 1, 2012" until finally "6% by June 1, 2015").

[lxvii] *See id.* (showing the renewable portfolio standard as part of the Illinois Power Agency Act).

[lxviii] *Solar and Wind Energy Rebate Program*, *supra* note 185; *Energy*, ILL. DEP'T COMMERCE & ECON. OPPORTUNITY, http://www.commerce.state.il.us/dceo/Bureaus/Energy_Recycling/Energy (last visited May 1, 2011).

[lxix] *Solar and Wind Energy Rebate Program*, *supra* note 185.

[lxx] *See* Renewable Energy, Energy Efficiency, and Coal Resources Development Law of 1997, 20 ILL. COMP. STAT. ANN. 687 (West 2010).

[lxxi] Tex. Exec. Order No. 1-17 (2009), *available at* http://www.greenhoustontx.gov/eo1-17.pdf; *see also Environmental Coordinating Council*, GREEN HOUS., http://www.greenhoustontx.gov/ecc.html (last visited May 1, 2011).

[lxxii] *See infra* notes lxxiii–lxxvi.

[lxxiii] *Green Building Resource Center*, GREEN HOUS., http://www.greenhoustontx.gov/greenbuilding.html (last visited May 1, 2011).

[lxxiv] Press Release, Green Hous., City of Houston Adds to Wind Energy Commitment (July 2, 2009), http://www.greenhoustontx.gov/pressrelease20090702.html.

[lxxv] *Id.*

[lxxvi] *Sustainability Projects—Energy Sources*, *supra* note 209.

[lxxvii] *Id.*

[lxxviii] Press Release, City of Hous., EPA Recognizes Houston Among the Nation's Leading Green Power Purchasers (Jan. 28, 2008), http://www.houstontx.gov/mayor/press/20080128.html.

[lxxix] TEX. UTIL. CODE ANN. § 39.904(a) (West 2007).

[lxxx] S. 20, 2005 Leg., 79th Sess. (Tex. 2005), *available at* http://www.capitol.state.tx.us/BillLookup/Text.aspx?LegSess=79I&Bill=SB20.

[lxxxi] *Solar Energy Projects*, STATE ENERGY CONSERVATION OFFICE, http://www.seco.cpa.state.tx.us/re_solar_projects.htm (last visited May 1, 2011).

[lxxxii] *Id.*

[lxxxiii] *Id.*

[lxxxiv] TEX. UTIL. CODE ANN. § 39.101.

[lxxxv] *Id.*

[lxxxvi] CITY OF PHX., *supra* note 214, at 2.

[lxxxvii] *Id.*

[lxxxviii] *Id.* at 28.

[lxxxix] *Id.*

[xc] *Solar and Other Renewable Energy Projects*, *supra* note 210.

[xci] *Id.*
[xcii] *Green Phoenix*, CITY OF PHX., http://phoenix.gov/greenphoenix/greenphx/index.html (last visited May 1, 2011).
[xciii] ARIZ. STATE UNIV. & CITY OF PHX., GREEN PHOENIX BROCHURE, *available at* http://phoenix.gov/webcms/groups/internet/@inter/@citygov/@recovery/documents/web_content/031522.pdf.
[xciv] *Id.*
[xcv] *Green Phoenix*, *supra* note xcii (describing the mayor's announcement of Green Phoenix).
[xcvi] Climate Prot. Ctr., *supra* note xiv.
[xcvii] *See supra* note xv and accompanying text.
[xcviii] AZ. ADMIN. CODE. § R14-2-1618 (2009), *available at* http://www.azsos.gov/public_services/Title_14/14-02.htm.
[xcix] *Id.* § R14-2-1804.
[c] Proposed Rulemaking for the Renewable Energy Standard and Tariff Rules, No. 69127 app. C (Ariz. Corp. Comm'n Nov. 14, 2006), *available at* http://www.cc.state.az.us/divisions/utilities/electric/res.pdf (explaining that the rules proposed by the Arizona Corporation Commission will consist of "permanent rules R14-2-1801 through -1815" in the Arizona Administrative Code and that these rules will "increase the standards established" in R14-2-1601 and -1618 of the Code).
[ci] AZ. REV. STAT. ANN. §§ 33-439 (2007).
[cii] S. 1254, 48th Leg., Reg. Sess. (Ariz. 2007), *available at* http://www.azleg.gov/legtext/48leg/1r/bills/sb1254c.pdf.
[ciii] ARIZ. CLIMATE CHANGE ADVISORY GRP., CLIMATE CHANGE ACTION PLAN, at E6 (2006), *available at* http://www.azclimatechange.gov/download/O40F9347.pdf.
[civ] *Id.* at E7.
[cv] The governor formed the group by Executive Order 2005-02 in 2005. ARIZ. CLIMATE CHANGE ADVISORY GRP., *supra* note ciii, at app. A, *available at* http://www.azclimatechange.gov/download/O40F9290.pdf; *see also* ARIZ. DEP'T OF ENVTL. QUALITY, ARIZ. CLIMATE CHANGE INITIATIVES, http://www.azclimatechange.gov (last visited May 1, 2011).
[cvi] *Green Buildings*, CITY OF PHILA., http://www.phila.gov/green/greenbldgs.html (last visited May 1, 2011).
[cvii] *Project Summary*, PHILA. SOLAR ENERGY ASS'N, http://www.nesea.org/PSEA (last visited May 1, 2011).
[cviii] CITY OF PHILA., LOCAL ACTION PLAN FOR CLIMATE CHANGE 9 (2007), *available at* http://dvgbc.org/files/resources/PhiladelphiaClimateChangeLocalActionPlan2007.pdf.
[cix] *Id.*
[cx] *Id.* at 11.
[cxi] Press Release, City of Phila., Mayor John F. Street Announces City's Local Action Plan for Climate Change, Highlighting Philadelphia's Commitment to a Sustainable Environment (Apr. 25, 2007).
[cxii] CITY OF PHILA., *supra* note cviii, at iii.
[cxiii] *Philadelphia International Airport Environmental Stewardship Plan*, VANASSE HANGEN BRUSTLIN, INC., http://www.vhb.com/template_project.asp?pagename=prj_21955_PHLEnvironmentalStewardship&serviceTitle=AirportSustainability (last visited May 1, 2011) (explaining that Philadelphia planners "retained" the company "to design" the stewardship plan).
[cxiv] Climate Prot. Ctr., *supra* note xiv.
[cxv] *See supra* note xv and accompanying text.
[cxvi] 73 PA. CONS. STAT. § 1648.3(b)(2) (2009).
[cxvii] *Id.* (requiring 8% by "the 15th year after the effective date of this subsection"); Final Rulemaking Order, No. L-00060810, at 2 (Pa. Pub. Util. Comm'n Sept. 25, 2008), *available at* http://www.puc.state.pa.us/PCDOCS/1023111.doc (describing the Alternative Energy Portfolio Standards Act as "effective February 28, 2005"); 52 PA. CODE § 75.61 (2008) ("For June 1, 2020, through May 31, 2021, and each successive 12 month period thereafter: The Tier I requirement is 8% of all retail sales.").
[cxviii] 73 PA. CONS. STAT. § 1648.2.
[cxix] *Id.* (also including low-impact hydropower, geothermal energy, biologically derived methane gas, fuel cells, biomass energy, and coal mine methane in the definition).
[cxx] *Id.* § 1648.3(b)(2), (c)(4).
[cxxi] *Pennsylvania Clean Energy Communities Program*, *supra* note 186.
[cxxii] *Id.*; *see also Sustainable Development Fund (SDF)*, THE REINVESTMENT FUND, http://www.trfund.com/sdf (last visited May 1, 2010) (describing TRF's Sustainable Development Fund as a fund "[c]reated by the Pennsylvania Public Utility Commission").
[cxxiii] *Who We Are*, CPS ENERGY, http://www.cpsenergy.com/About_CPS_Energy/Who_We_Are (last visited May 1, 2011); *CPS Energy's Citizens Advisory Committee*, CPS ENERGY, http://www.cpsenergy.com/About_CPS_Energy/Who_We_Are/Citizen_Advisory_Board/index.asp (last visited May 1, 2011).
[cxxiv] Mayor Phil Hardberger, Mission Verde: Building a 21st Century Economy 31 (Jan. 28, 2009) (on file with authors) (describing the Office of Environmental Policy as part of the "structure and resources" for the plan).
[cxxv] *Sustainability Task Force*, SAN ANTONIO OFFICE ENVTL. POL'Y, http://www.sanantonio.gov/oep/CitySustainability.asp (last visited May 1, 2011).
[cxxvi] Mayor Phil Hardberger, *supra* note cxxiv, at 31 (listed as parted of Mission Verde's "structure and resources").
[cxxvii] CITY OF SAN ANTONIO, MISSION VERDE: BUILDING A 21ST CENTURY ECONOMY 5 (2009), *available at* http://www.sanantonio.gov/oep/SustainabilityPlan/Mission Verde.pdf.
[cxxviii] *Id.* (showing that the report was prepared by the Office of Mayor Phil Hardberger).
[cxxix] *Solar Initiatives Photovoltaic (PV) Rebates*, CPS ENERGY, http://www.cpsenergy.com/Residential/Rebates/Solar_Rebates/Solar_Photovoltaic/index.asp (last visited May 1, 2011).
[cxxx] *Solar Water Heater Rebates*, CPS ENERGY, http://www.cpsenergy.com/Residential/Rebates/Solar_Rebates/Solar_WaterHeater/index.asp (last visited May 1, 2011).
[cxxxi] CPS Energy, Vision 2020, at 7 (May 10, 2010) (PowerPoint presentation), *available at* http://www.cpsenergy.com/files/Vision_2020.pdf.
[cxxxii] *San Antonio's Energy Future and You*, CPS ENERGY, http://www.cpsenergy.com/Residential/Information_Library/Strategic_Energy_Plan_faq.asp#question2 (last visited May 1, 2011).
[cxxxiii] Climate Prot. Ctr., *supra* note xiv.
[cxxxiv] *See supra* note xv and accompanying text.
[cxxxv] FORWARDDALLAS!, POLICY PLAN, at II-6-7, II-6-10 (2006), *available at* http://www.dallascityhall.com/forwardDallas/pdf/EnvironmentalElement.pdf.
[cxxxvi] *Id.* at II-6-11.
[cxxxvii] *Id.* at II-6-12.

[cxxxviii] *forwardDallas! Comprehensive Plan*, FORWARDDALLAS!, http://www.dallascityhall.com/forwardDallas/index.html (last visited May 1, 2010) ("On June 14, 2006, City Council adopted the forwardDallas! Comprehensive Plan.").
[cxxxix] Dallas City Hall, *supra* note 211.
[cxl] *Id.* at 24.
[cxli] *Id.* at 19; City of Dallas, Agenda, City Council Meeting 4 (Jan. 22, 2003), *available at* http://www.ci.dallas.tx.us/cso/pdf/ag012203.pdf (approving council agenda item to "[a]uthorize implementation of the City of Dallas Green Building Program to . . . incorporate sustainable building design and construction practices into municipal building projects beginning with the facility projects included in the 2003 Bond Program").
[cxlii] *City of Dallas Green Initiatives and Accomplishments Fact Sheet*, GREEN DALLAS, http://www.greendallas.net/pdfs/FactSheet.pdf (last visited May 1, 2011). Most of this power, however, comes from large wind farms. *Id.*
[cxliii] Climate Prot. Ctr., *supra* note xiv.
[cxliv] *See supra* note xv and accompanying text.
[cxlv] *Energy Conservation & Management*, CITY OF SAN DIEGO, http://www.sandiego.gov/environmental-services/energy/index.shtml (last visited May 1, 2011).
[cxlvi] *See supra* note 212 and accompanying text.
[cxlvii] CITY OF SAN DIEGO, COUNCIL POLICY NO. 900-14, SUSTAINABLE BUILDING POLICY 1 (2010) [hereinafter CITY OF SAN DIEGO, 2010 COUNCIL POLICY], *available at* http://docs.sandiego.gov/councilpolicies/cpd_900-14.pdf; *see also* CITY OF SAN DIEGO, COUNCIL POLICY NO. 900-14, SUSTAINABLE BUILDING POLICY 1 (2003) [hereinafter CITY OF SAN DIEGO, 2003 COUNCIL POLICY], *available at* http://www.sandiego.gov/environmental-services/energy/pdf/900-14.pdf. Other cities similarly require new buildings to achieve LEED certification but do not specifically mention renewables; in such cases, the green building requirement is not included within the table. *See, e.g.*, Dallas, Tex., Ordinance 27131 (Apr. 9, 2008), *available at* http://www.greendallas.net/pdfs/green_building_ordinance.pdf (incorporating the green building program recommendations of the Green Building Task Force); Dallas City Hall, Citywide Green Building Program, Summary of Ordinance Requirements 8–11 (PowerPoint presentation), *available at* http://www.greendallas.net/pdfs/green_building_ordinance_highlights.pdf (summarizing the Task Force recommendations, such as energy efficiency, water reduction, and LEED certification, but not mentioning installation of renewables).
[cxlviii] CITY OF SAN DIEGO, 2003 COUNCIL POLICY, *supra* note cxlvii, at 2.
[cxlix] CITY OF SAN DIEGO, 2010 COUNCIL POLICY, *supra* note cxlvii, at 3.
[cl] *Id.* at 1 ("[T]he Sustainable Building Policy will be updated every three years to remain current with new State and Federal guidelines and local needs.").
[cli] Memorandum from John Stufflebean, *supra* note 213, at 1.
[clii] *See, e.g.*, Minutes, City of San Jose, Regular Meeting of the San Jose Transportation and Environment Committee 2 (Nov. 2, 2009), *available at* http://www.sanjoseca.gov/clerk/Agenda/20091117/20091117_0601.pdf (mentioning a verbal report from city staff to the committee regarding "Renewable Energy Activities").
[cliii] Memorandum from Ed Shikada, Deputy City Manager, and Paul Krutko, Chief Dev. Officer, to Mayor and City Council 6 (Nov. 12, 2008), *available at* http://www.sanjoseca.gov/mayor/goals/environment/GreenVision/11-17-08CMO.pdf.
[cliv] Memorandum from John Stufflebean, *supra* note 213, at 2.
[clv] *Green Vision Goals*, CITY OF SAN JOSE, http://greenvision.sanjoseca.gov/GreenVisionGoals.aspx (last visited May 1, 2011).
[clvi] Office of Mayor Chuck Reed, *Green Vision*, CITY OF SAN JOSE, http://www.sanjoseca.gov/mayor/goals/environment/environment.asp (last visited May 1, 2011).
[clvii] *Cleantech Open Gala*, CLEAN TECH OPEN, http://cleantechopengala.com/archives/1574 (last visited May 1, 2011).
[clviii] Office of Mayor Chuck Reed, *supra* note clvi.
[clix] CITY OF SAN JOSE, DRAFT OF STRATEGIC ENERGY PLAN 16 (Mar. 23, 2009), *available at* http://www.sanjoseca.gov/esd/natural-energy-resources/PDFs/2009StrategicEnergyPlan_DRAFT_3-23-09.pdf.
[clx] Memorandum from John Stufflebean, *supra* note 213, at 4.
[clxi] Office of Mayor Chuck Reed, *supra* note clvi.
[clxii] San Jose's city council adopted the plan in 2007. *Green Vision Goals*, *supra* note clv. The mayor has made efforts to implement strategies that achieve the plan's goals. Office of Mayor Chuck Reed, *supra* note clvi.
[clxiii] CITY OF SAN JOSE, *supra* note clix, at 2.
[clxiv] CITY OF SAN JOSE, *supra* note 102, at 2. This goal was introduced in the San Jose Green Vision. *Green Vision Goals*, *supra* note clv.
[clxv] CITY OF SAN JOSE, *supra* note 102, at 4.
[clxvi] *Id.*
[clxvii] *Id.* at 11.
[clxviii] *Id.* at 3.
[clxix] Memorandum from John Stufflebean, *supra* note 213, at 1 (internal quotation mark omitted).
[clxx] *Id.*
[clxxi] *Id.* at 3.