CLIMATE CHANGE AND THE ROLES OF LAND USE AND ENERGY LAW: AN INTRODUCTION

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The articles in this volume represent the work of a range of scholars with a diverse set of perspectives about the challenges posed by climate change and the roles that land use and energy law can play in addressing these challenges.[1] These challenges are daunting and have spawned an enormous literature, indeed many literatures.[2] The legal regimes that govern our use of land and energy have already been, and will continue to be, integral to the effort to devise effective responses.[3]

My aim in this introductory essay is to provide a frame for the contributions that follow. I identify and review six aspects of climate change in an effort to capture some of the ferment that now exists as policy makers, scholars, and others wrestle with the challenges that climate change poses for extant legal regimes.[4] I then briefly summarize the articles in this symposium volume.

An essential feature of climate change policy is that challenges fall into two basic categories, mitigation and adaptation.[5] Mitigation often involves actions to reduce the emission of greenhouse

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1. The articles were generated from a symposium hosted by the Florida State University College of Law during the spring of 2011.

2. *See, e.g.*, SUSAN E. CAMERON DEVITT ET AL., FLORIDA BIODIVERSITY UNDER A CHANGING CLIMATE: A WHITE PAPER ON CLIMATE CHANGE IMPACTS AND NEEDS FOR FLORIDA 10 (Jan. 2012), *available at* http://floridaclimate.org/docs/biodiversity.pdf (noting that "[w]ell over 15,000 scientific papers have been published on the topic of climate change and biodiversity.").

3. *See generally* HANNAH CHOI GRANADE ET AL., MCKINSEY & CO., UNLOCKING ENERGY EFFICIENCY IN THE U.S. ECONOMY (2009), *available at* http://www.mckinsey.com/Client_Service/Electric_Power_and_Natural_Gas/Latest_thinking/Unlocking_energy_efficiency_in_the_US_economy (select "Read Full Report" hyperlink) [hereinafter MCKINSEY REPORT]; U.S. ENVTL. PROT. AGENCY, SMART GROWTH: A GUIDE TO DEVELOPING AND IMPLEMENTING GREENHOUSE GAS REDUCTION PROGRAMS (2010), [hereinafter U.S. E.P.A. REPORT].

4. This typology is not intended to be comprehensive. For example, I do not address the ferment about the underlying basic scientific underpinnings for the view that climate change is occurring and humans are contributing significantly. Similarly, a detailed review of the issues is far beyond the scope of this introduction. *See, e.g.*, DEVITT ET AL., *supra* note 2, at 10 (noting that "[t]he response of biodiversity to the various physical drivers of climate change is the subject of a prodigious amount of scientific research.").

5. *See generally* CENTER FOR CLIMATE AND ENERGY SOLUTIONS, CLIMATE CHANGE ADAPTATION: WHAT FEDERAL AGENCIES ARE DOING (Feb. 2012 Update), *available at* http://www.c2es.org/docUploads/federal-agencies-adaptation.pdf (providing a detailed summary of climate change adaptation efforts, policies, plans, and resources provided by various federal agencies); David Markell & J.B. Ruhl, *An Empirical Survey of Climate Change Litigation in the United States*, 40 Envtl. L. Rep. (Envtl. Law Inst.) 10,644 (July 2010).

gases ("GHG") that contribute to changes in climate.[6] Some have used the word "limiting" rather than "mitigation" in order to be clear that the focus of such initiatives is to limit the "main drivers of climate change" (notably GHG emissions).[7] The expectation is that limiting these drivers will limit climate change itself.[8] Adaptation is a "relatively new topic for U.S. citizens" and many others.[9] It typically involves actions to respond to the effects of climate change–to equip humans and other species to flourish if and as changes in climate occur.[10] Some strategies that will promote adaptation may undermine mitigation, and vice versa.[11] Thus, the need to confront mitigation *and* adaptation contributes to the complexity we currently face in the search for policies to address climate change and in the distribution of responsibility to develop and implement effective strategies.

Mitigation presents a multitude of policy challenges and opportunities in its own right. There are opportunities on the "supply side" to reduce emissions, either by reconfiguring existing sources so that they emit less in the future than they have in the past, or by shifting from more to less polluting sources. This is playing out for stationary as well as mobile sources. For example, the energy sector (especially coal-fired power plants, perhaps the poster child for emitters of large volumes of GHGs),[12] has been the focus of efforts to reconfigure existing facilities to reduce emissions and to

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6. *See* NAT'L RESEARCH COUNCIL, LIMITING THE MAGNITUDE OF FUTURE CLIMATE CHANGE, at ix (2010).

7. *Id.*

8. *Id.*

9. NAT'L RESEARCH COUNCIL, ADAPTING TO THE IMPACTS OF CLIMATE CHANGE, at ix (2010).

10. *See id.* As for mitigation, additions to the literature on adaptation appear on a seemingly daily basis. *See, e.g.*, CTR. FOR CLIMATE STRATEGIES, CENTER FOR CLIMATE STRATEGIES ADAPTATION GUIDEBOOK: COMPREHENSIVE CLIMATE ACTION (2011), *available at* http://www.climatestrategies.us/library/library/view/908 [hereinafter ADAPTATION GUIDEBOOK]; MARGUERITE KOCH-ROSE ET AL., FLORIDA WATER MANAGEMENT AND ADAPTATION IN THE FACE OF CLIMATE CHANGE: A WHITE PAPER ON CLIMATE CHANGE AND FLORIDA'S WATER RESOURCES (Nov. 2011).

11. *See, e.g.*, EXEC. OFFICE OF ENERGY & ENVTL. AFFAIRS & ADAPTATION ADVISORY COMM., MASSACHUSETTS CLIMATE CHANGE ADAPTATION REPORT 2, 24-26 (Sept. 2011), *available at* http://www.mass.gov/eea/docs/eea/energy/cca/eea-climate-adaptation-report.pdf (concluding that "[t]here are . . . areas of potential conflict between climate change adaptation and mitigation strategies that must be reconciled," in addition to strategies that might further both objectives).

12. *See, e.g.*, COMM'N FOR ENVTL. COOPERATION OF N. AM., NORTH AMERICAN POWER PLANT AIR EMISSIONS 6, 9, 36 fig.2.12 (2011), *available at* http://www.cec.org/temp/power_plants_english_web.pdf [hereinafter CEC POWER PLANT EMISSIONS] (indicating that in 2005 the energy sector accounted for over sixty percent of the world's GHG emissions and that "one third of the total GHG emissions in the United States were from electricity generation"); Andrew Childers & Avery Fellow, *Power Plants Accounted for 72 Percent of Greenhouse Gases Reported in 2010*, Bloomberg Online Daily Environment Report (BNA) (Jan. 12, 2012) (reporting that power plants emitted 72.3 percent of reported CO2e emissions nationwide in 2010).

shift from more polluting sources of energy to cleaner sources of energy including both non-renewable production (for example, natural gas powered plants) and renewable (for example, solar, wind, and biomass).[13] For mobile sources, recent federal policies have incentivized plug-in hybrid and natural gas vehicles, as well as other low-carbon transportation options.[14]

Opportunities also abound on the "demand side" to limit emissions of GHGs. In a 2009 report, McKinsey & Company observed that "energy efficiency stands out as perhaps the single most promising resource [in the nation's pursuit of climate change mitigation]."[15] Further, McKinsey & Company identified well over $100 billion in annual energy-saving opportunities that were going unrealized despite their potential for positive returns on investment.[16] The report identified a series of strategies to "unlock" this efficiency potential.[17] McKinsey & Company's conclusion provided at least some cause for cautious optimism:

> The central conclusion of our work: *Energy efficiency offers a vast, low-cost energy resource for the U.S. economy–but only if the nation can craft a comprehensive and innovative approach to unlock it. . . . [A] holistic approach . . . is estimated to reduce end-use energy consumption in 2020 by 9.1 quadrillion BTUs, roughly 23 percent of projected demand, potentially abating up to 1.1 gigatons of greenhouse gases annually*.[18]

Several articles in this volume highlight the contributions that land use legal regimes can make to energy efficiency–to "unlocking" this energy-saving potential.[19] These articles contribute to discussion of these possibilities in policy circles. For example, in a recent report EPA notes that "[s]mart growth policies and prac-

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13. Reflecting the importance of such efforts to the "sustainability" of the United States and North American economy, the CEC has noted that "[t]he fossil fuel electricity generation sector is an important component of North America's economy and provides an indispensable commodity." *See* CEC POWER PLANT EMISSIONS, *supra* note 12, at 1.

14. *See, e.g.*, I.R.C. §§ 30, 30B, 30D (West 2012), as amended by the American Reinvestment and Recovery Act of 2009 (providing tax credits for hybrid, plug-in, and alternative fuel vehicles).

15. *See* MCKINSEY REPORT, *supra* note 3, at xiv.

16. *Id.* at i.

17. *See generally id.*

18. *Id.* at iii (emphasis in original).

19. *See* Uma Outka, *The Energy-Land Use Nexus*, 27 J. LAND USE & ENVTL. L. 245 (2012); Steven Ferrey, *Earth, Air, Water and Fire: The Classical Elements Confront Land and Energy*, 27 J. LAND USE & ENVTL. L. 259 (2012); John R. Nolon, *Land Use for Energy Conservation and Sustainable Development: A New Path Toward Climate Change Mitigation*, 27 J. LAND USE & ENVTL. L. 295 (2012); Patricia Salkin, *The Key to Unlocking the Power of Small Scale Renewable Energy: Local Land Use Regulation*, 27 J. LAND USE & ENVTL. L. 339 (2012).

tices . . . can influence energy consumption in multiple ways."[20] To name two, "green building" is an important part of the mix while, on a larger scale, where development occurs is also critical because of its impact on transportation patterns.[21]

Taken together, land use, energy efficiency, and mobile and stationary source emission reduction approaches demonstrate that on the mitigation side of climate change supply and demand-oriented approaches are by no means "either-or." Instead, new sources of no- and low-carbon generation and energy efficiency are critical parts of the "overall portfolio of energy solutions."[22]

Like mitigation, adaptation provides a wide range of challenges and opportunities. Efforts are ongoing to develop and implement strategies to diagnose and respond to stresses that different environmental media face.[23] Similarly, enormous amounts of effort are being devoted to challenges to individual species and to biodiversity more generally.[24] And, adaptation of the entire human enterprise is receiving considerable attention as well.[25] It is well understood at this point, in short, that initiatives to facilitate adaptation to climate change will be an essential part of the policy response.[26]

Another critical component of the effort to devise effective responses to climate change (beyond recognizing the need for attention to adaptation and mitigation, and the value of focusing on different strategies to address the myriad challenges each poses) involves the question of normative objectives: the question of what we should be striving to accomplish. One's diagnosis of the risks

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20. U.S. E.P.A. REPORT, *supra* note 3, at 1. *See generally* INT'L CITY/CNTY. MGMT. ASS'N, GETTING TO SMART GROWTH: 100 POLICIES FOR IMPLEMENTATION, *available at* http://www.smartgrowth.org/pdf/gettosg.pdf (discussing ten smart growth principles and the variety of ways that communities can achieve them).

21. *See, e.g.*, THE LAW OF GREEN BUILDINGS: REGULATORY AND LEGAL ISSUES IN DESIGN, CONSTRUCTION, OPERATIONS, AND FINANCING (J. Cullen Howe & Michael B. Gerrard eds., 2010); U.S. E.P.A. REPORT, *supra* note 3, at iv.

22. *See* MCKINSEY REPORT, *supra* note 3, at iii-xiv, 92.

23. *See* ADAPTATION GUIDEBOOK, *supra* note 10.

24. DEVITT ET AL., *supra* note 2, at 10.

25. I do not make an effort to capture the scale and scope of such activities here, but suffice it to say that such efforts include land use regulation (the impacts of climate change on local land use law), insurance (how climate change should affect the price and availability of insurance), environmental regulation (for example, the location and operation of basic infrastructure such as wastewater treatment plants and the siting of new power sources), and a host of other fields. *See, e.g.*, SWISS RE, THE ESSENTIAL GUIDE TO REINSURANCE (2010), *available at* http://media.swissre.com/documents/The_Essential_Guide_to_Reinsurance_EN.pdf (for an example of the efforts in insurance regulation).

26. *See, e.g.*, CENTER FOR CLIMATE AND ENERGY SOLUTIONS, *supra* note 5, at 2; INTERAGENCY CLIMATE CHANGE ADAPTATION TASK FORCE, FEDERAL ACTIONS FOR A CLIMATE RESILIENT NATION (2011), *available at* www.whitehouse.gov/sites/default/files/microsites/ceq/2011_adaptation_progress_report.pdf; David Markell & J.B. Ruhl, *An Empirical Assessment of Climate Change in the Courts: A New Jurisprudence or Business as Usual?*, 64 FLA. L. REV. 15 (2012).

that climate change poses,[27] and the feasibility (considered broadly) of options for responding, inevitably influences one's views about best approaches. Value-infused judgments are also clearly integral to normative decisions, such as one's views about the extent to which legal regimes should take a "precautionary" approach, however that is defined,[28] or how one should balance the elements of "sustainable development," which include economic development, peace and security, human rights, as well as environmental protection.[29] One think tank recently suggested a set of adaptation actions that seemingly would be attractive to people across a broad spectrum of views, notably "actions that improve our ability to adapt to a changing climate [and that] also improve economic, environmental, health and energy security if they are properly developed and implemented."[30] The real world, however, can be much more difficult as trade-offs need to be made between and among different interests. The trade-offs that are made, and the processes used to make them,[31] will have enormous implications for the content and effectiveness of future policy decisions.

The final feature of this partial typology of challenges we face in addressing climate change involves the question of roles–what roles different levels of government should play (raising questions of horizontal as well as vertical governance), and the roles that should be available to and/or expected of NGOs, both those in the regulated (and potentially regulated) party community, and community and other groups who purport to be operating in the broader "public interest."[32] In addition to the fact that "[i]nteragency co-

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27. The disputes about the soundness of the science and current state of the science have received enormous attention. *See, e.g.*, Shi-Ling Hsu, Managing Regulatory Risks from Changing Climate Policy, (Nov. 18, 2011) (unnumbered Working Paper), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1956269.

28. *See, e.g.*, Jonathan B. Wiener, *Whose Precaution After All? A Comment on the Comparison and Evolution of Risk Regulatory Systems*, 13 DUKE J. COMP. & INT'L L. 207 (2003); Jonathan B. Wiener, *Precaution in a MultiRisk World*, *in* HUMAN AND ECOLOGICAL RISK ASSESSMENT: THEORY AND PRACTICE 1509-31 (Dennis J. Paustenbach ed., 2002).

29. *See* Daniel C. Esty, *A Term's Limits,* FOREIGN POL'Y, Sept.-Oct. 2011, at 74, 74-75 (claiming that, for all its laudable goals and initial fanfare, sustainable development has become a buzzword largely devoid of content); David L. Markell, *Greening the Economy Sustainably*, 1 WASH. & LEE J. ENERGY, CLIMATE, & ENV'T 49 (2010); ENVTL. LAW INST., AGENDA FOR A SUSTAINABLE AMERICA (John C. Dernbach ed., 2009).

30. ADAPTATION GUIDEBOOK, *supra* note 10, at 8.

31. *See, e.g.*, Tom Tyler & David Markell, *The Public Regulation of Land Use Decisions: Criteria for Evaluating Alternative Procedures*, 7 J. EMPIRICAL LEGAL STUD. 538 (2010).

32. One of the particular challenges of climate change is its anti-silo character. That is, climate change raises issues that fall within the turf of various government entities horizontally. *See, e.g.*, CENTER FOR CLIMATE AND ENERGY SOLUTIONS, *supra* note 5 (discussing some of the federal actors involved in adaptation). Vertically, it implicates land use regulation, traditionally to a significant degree the province of local governments, as well as state and federal responsibilities. *See, e.g.*, Markell & Ruhl, *supra* note 26 (noting that climate change litigation to date has arisen under a variety of laws, including NEPA, the Endan-

ordination is one of the central challenges of modern governance,"[33] integration of the relevant publics poses a challenge of similar magnitude.[34]

With that contextual backdrop, I now turn to a brief overview of the contributions that follow. Each of the contributors brings years of experience to the challenges we face, and the pieces stand on their own; my hope is that these brief summaries will help the reader make the best use possible of this symposium volume.

In her article, *The Energy-Land Use Nexus*,[35] Professor Outka focuses on several significant challenges that climate change poses for energy and land use law. After summarizing some of the regulatory efforts to integrate land use and energy consumption that concerns about climate change have spawned (for example, California's SB 375, its Sustainable Communities Act, and 2008 Florida legislation that explicitly required integration of energy conservation issues into land use regulation), Professor Outka emphasizes the uniquely challenging context for the progress new regulatory regimes of this sort have made in addressing the institutional governance challenge of integrating energy concerns into land use regulation. She suggests that these efforts "[have] been paired with problems, criticism, and set-backs," including 2011 Florida legislation that weakened the 2008 enactments, the withdrawal of the Florida rulemaking that was intended to implement the Florida legislation, and the dissolution of the Florida State agency, the Department of Community Affairs (DCA), charged with developing and administering land use policy at the state level.[36] Her conclusion: the enactment of SB 375 and the 2008 Florida legislation underscore that "[r]ecognizing the influence of land use on energy consumption is a key first step in this direction, but an incredible amount of consensus building and policy work stands between the status quo and having effective law in place to moderate and rationalize that influence."[37]

A second important issue that Professor Outka addresses involves regulation of land used to generate energy, through siting regimes and other approaches. Many commentators have argued

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gered Species Act, and the Clean Air Act). Multilateral efforts and international institutions have obviously been a part of the climate change landscape as well.

33. Jody Freeman & Jim Rossi, *Agency Coordination in Shared Regulatory Space*, 125 HARV. L. REV. 1131, 1134 (2012).

34. *See, e.g.*, David L. Markell & Tom R. Tyler, *Using Empirical Research to Design Government Citizen Participation Processes: A Case Study of Citizens' Roles in Environmental Compliance and Enforcement*, 57 U. KAN. L. REV. 1 (2008); David Markell et al., *What Has Love Got to Do with It?: Sentimental Attachments and Legal Decision-Making*, 57 VILL. L. REV. (forthcoming 2012), *available at* ssrn.com/abstract=1923807.

35. Outka, *supra* note 19.

36. *Id.* at 249-50.

37. *Id.* at 250.

for preferential, streamlined treatment of renewable energy sources, asserting that they are essential in the transition to a less GHG emitting future.[38] Such an approach raises obvious questions about the appropriateness of government "picking winners and losers."[39] Beyond this issue, Professor Outka emphasizes the significant impacts that the creation of new renewable energy sources may have on land and wildlife conservation goals, citing a 2009 study by The Nature Conservancy that examines the significant adverse impacts of renewable energy sources.[40] Professor Outka also points out that local residents potentially may be skeptical of such facilities for a variety of reasons.[41] She suggests that we need to do better at assessing "cumulative land impacts of energy policy"[42] and urges attention to governments' progress in assessing use of public lands for renewable energy generation for insights that can and should be transferred to development of private lands.[43]

In her final section, entitled "Energy-Land Use Integration," Professor Outka highlights the importance of demand side issues, such as improving energy efficiency for our built environment and for motor vehicles.[44] She also favors a concept discussed in more detail in other articles in this volume, notably the idea of distributed energy and the need to revisit legal regimes to ensure they appropriately encourage development of such sources (rooftop solar panels, urban wind power, etc.).[45] A third issue addressed in this section is the idea of taking advantage of existing infrastructure by promoting redevelopment of brownfield sites for energy generation purposes rather than locating renewable technologies in greenfields.[46] Reflecting the multi-layered governance challenges in-

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38. *See, e.g.*, American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, § 1609(c), 123 Stat. 115, 304 (2009) (streamlining the NEPA review for renewable energy projects); *see also* Exec. Order No. 13, 212, Actions to Expedite Energy-Related Projects, 66 Fed. Reg. 28,357 (May 18, 2001) (mandating expedited review of renewable energy projects); DEP'T OF INTERIOR, ORDER NO. 3285, RENEWABLE ENERGY DEVELOPMENT (Mar. 11, 2009), *available at* http://solareis.anl.gov/documents/docs/soenergy.pdf (streamlining renewable energy siting on federal land within the Department of Interior's jurisdiction).

39. *See, e.g.*, NORMAN Y. MINETA, FORMER U.S. SEC'Y OF TRANSP., U.S. COAL. FOR ADVANCED DIESEL CARS, THE CASE FOR TECHNOLOGY NEUTRAL PUBLIC POLICY IN FUEL ECONOMY DEBATE: ALLOWING PERFORMANCE TO DETERMINE SOLUTIONS 1 (2011), *available at* http://www.cleandieseldelivers.com/upload/CleanDieselDelivers_White_Paper.pdf.

40. Outka, *supra* note 19, at 251-52.

41. *Id.* at 250-51.

42. *Id.* at 252.

43. *Id.* at 252-53.

44. *Id.* at 255-57.

45. *See, e.g.*, Nolon, *supra* note 19; Salkin, *supra* note 19.

46. Outka, *supra* note 19, at 256-57. For a primer on using brownfields for green energy, see NAT'L ASS'N OF LOCAL GOV'T ENVTL. PROF'LS CULTIVATING GREEN ENERGY ON BROWNFIELDS: A NUTS AND BOLTS PRIMER FOR LOCAL GOVERNMENTS 4-5 (2012). EPA has also invested considerable energy in siting renewable energy projects on contaminated parcels. *See, e.g.*, U.S. ENVTL. PROT. AGENCY, RE-POWERING AMERICA'S LAND FACT SHEET: SIT-

volved in energy and land use decision-making, Professor Outka notes the role the federal EPA has played in developing legal guidelines that influence where development occurs.[47]

In his article, *Earth, Air, Water and Fire: The Classical Elements Confront Land and Energy*, Professor Ferrey suggests that "electricity has become perhaps the signature technology of the 21st century" because the "modern information age, national defense, and a variety of other communication and intelligence-based applications are dependent on electricity with no available energy substitutes."[48] He identifies a series of strategies that could help to assure adequate supplies of electricity with greater efficiency and reduced environmental impact.[49]

Like Professor Outka, Professor Ferrey raises a number of issues concerning the land use implications of the ongoing shift to renewable sources of energy. Prominent concerns include the relatively large land area that solar and wind renewable energy generation tends to require, the significant water demands in some cases, and the need for transmission capability between the areas where such sources exist and where demand is located.[50] Professor Ferrey identifies a number of legal issues that will require attention in developing needed transmission capacity in particular.[51]

A third topic Professor Ferrey addresses is the extraordinary promise of demand-side strategies. He highlights opportunities to reduce energy demand through a variety of conservation measures and summarizes some of the substantial amount of ongoing activity, including more than 200 local government initiatives, statewide initiatives across the country, and the federal stimulus packages' multi-billion dollars worth of support for energy efficiency improvements.[52]

Finally, Professor Ferrey addresses the use of waste as an energy resource. He focuses especially on methane gas from landfills—its use as an energy source has the double benefit of providing a new source of energy and reducing GHG emissions. Professor Ferrey suggests that "[b]ecause methane is much more harmful as a [GHG] than CO_2, . . . and the landfills are such a dominant anthropogenic source of methane emission[s], it is a prime emission to control."[53] Professor Ferrey also discusses a variety of other

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ING RENEWABLE ENERGY PROJECTS WHILE ADDRESSING ENVIRONMENTAL ISSUES (Dec. 2011), *available at* http://www.epa.gov/oswercpa/docs/decision_tree_factsheet.pdf.

47. Outka, *supra* note 19, at 256-57.
48. Ferrey, *supra* note 19, at 261.
49. *Id.* at 262-67.
50. *Id.* at 262-63.
51. *Id.* at 264-67.
52. *Id.* at 269-76.
53. *Id.* at 284.

ways in which "distressed land" can be recycled and provide energy. For example, he suggests that landfills may provide a good location for wind turbines in some cases because the landfills are at an elevated height and are cleared, though he indicates that this marriage of wind generation and landfills has been a rare occurrence to date.[54] He suggests that "landfills have become a prime location for the siting of large arrays of solar [photovoltaic] electric generation," again, because the land is elevated and often cleared and the terrain is flat, as well as secure.[55] Professor Ferrey reviews the different types of financial incentives that are available to promote development of renewable energy sources, including on distressed properties.

As the title reflects, Professor Nolon's contribution to this volume, *Land Use for Energy Conservation and Sustainable Development: A New Path Toward Climate Change Mitigation*, focuses primarily on land use tools to conserve energy and mitigate emissions of GHGs. Professor Nolon grounds his analysis in three basic facts: 1) "construction and operation of buildings as well as the [vehicle miles travelled] . . . will account for a large percentage of the energy needs by mid-century";[56] 2) currently, because of the large amount of energy they use, "residential and commercial buildings accounted for thirty-five percent of CO_2e emissions" in 2009, and, similarly, "[t]ransportation activities . . . accounted for [thirty-three] percent of CO_2 emissions from fossil fuel combustion in 2009";[57] and 3) there are a wide array of strategies available to reduce emissions from both sources, from greater efficiency in the generation and transmission of energy for these buildings to "urban settlement" that would reduce vehicle miles travelled (VMT).[58] Professor Nolon's proposals for reducing energy use and GHG emissions focus largely on these strategies for reducing energy use in buildings and by mobile sources.[59]

Professor Nolon urges particular attention to opportunities at the local level to make a difference because local governments often create and enforce the legal rules that govern energy efficiency in buildings and the amount of travel "within and between human settlements."[60] He begins with energy conservation codes. These

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54. *Id.* at 287.
55. *Id.* at 288.
56. Nolon, *supra* note 19, at 297.
57. *Id.* at 299.
58. *Id.* at 300.
59. Nolon "presupposes that climate change is happening." *Id.* at 298. He cites the IPCC reports for the underlying notion that climate change is occurring, anthropogenic GHG emissions are contributing to this phenomenon, and the consequences may be significant.
60. *Id.*

are codes that establish standards for the design, construction, and installation of various parts of buildings. The goal of such codes is to "reduce the energy consumed . . ." by buildings.[61] In some states, state building codes preempt local codes; in others, there is no statewide energy code and local governments may adopt their own. In still others, there is a statewide code but local governments are free within various parameters to build on the statewide version. Professor Nolon encourages local governments to take the initiative where possible to strengthen their building codes to conserve energy and make buildings more efficient.[62]

Professor Nolon also outlines a series of opportunities to conserve energy and reduce GHG emissions through regulation of buildings in ways beyond the coverage provided in energy codes. For example, regulations can direct or encourage plug-in facilities for hybrid cars, limit idling, require bike storage and other infrastructure to encourage bicycling, dictate building orientation and landscaping that reduces energy consumption, and encourage active solar and wind generation facilities, to name a few. Professor Nolon suggests that, while the structure of land use law varies by state, local governments in some states possess the delegated land use authority to "require or encourage these energy-conserving features of land development as part of their land use regulatory system" and he urges them to do so.[63]

In addition to his proposals for improving regulation of individual buildings and building sites in order to improve energy conservation and reduce GHG emissions, Professor Nolon offers a series of ideas for reconfiguring communities to further the same goals. He suggests that high density living, in tandem with mixed-use development and better transit systems, will help to create a less car-dependent society, which is a key feature of this more expansive vision of possible strategies.[64] Professor Nolon suggests that inter-governmental coordination, both horizontal (for example, local governments working with each other) and vertical (for example, local governments and regional organizations collaborating) will be needed, since federal law gives Metropolitan Planning Organizations (MPOs) responsibility for various aspects of transit services.[65] From a normative standpoint, Professor Nolon touts the promise of Leadership in Energy and Environmental Design (LEED) for neighborhood development as establishing standards and methodologies that will lead to more efficient use of energy

61. *Id.* at 303.
62. *Id.* at 303-04.
63. *Id.* at 307-08.
64. *Id.* at 313-15.
65. *Id.* at 321.

and other best practices for entire neighborhoods, not merely individual buildings.[66] He concludes that "[o]ne of the historic inefficiencies in our zoning system [has been] the lack of respected standard-setting agencies to guide the drafting of local regulations," and suggests that "the LEED-ND system responds to this need by providing intelligent practices that can be used to guide sustainable neighborhood planning and regulation."[67]

Another piece of the energy efficiency and reduced GHG emission scenario that Professor Nolon discusses involves the promise of distributed energy generation. He suggests that "[b]uildings can be made up to eighty percent more energy efficient through distributed-generation systems . . . ."[68] He encourages including such systems in the neighborhood planning process, noting that their scale can extend to multiple buildings in close proximity to one another. Professor Nolon offers several recommendations for structuring local land use regulatory systems to allow and incentivize such systems and provides examples of communities that have done this effectively.[69]

Finally, Professor Nolon urges creation of "energy conservation districts," perhaps modeled after initiatives in other policy arenas, such as the federal Enterprise Zone initiative, which sought to reduce poverty and enhance job growth through creation of enterprise zones. Professor Nolon notes that the Enterprise Zone initiative used census-based metrics to identify areas that would be eligible for various types of assistance (for example, in that program, poverty rate, unemployment rate, and rate of public assistance). Professor Nolon's concept is that similarly helpful census-based data is available to identify areas where opportunities for energy efficiency and GHG emission reduction are significant, and that a federal energy conservation zoning district program could provide support for interested states (similar to the Coastal Zone Management Act) and local governments that are prepared to pursue different options for energy efficiency and GHG emission reduction, such as enhanced energy codes and various neighborhood sustainability practices.[70]

Like Professor Nolon, Professor Salkin focuses on local land use regulation. In her article, *The Key to Unlocking the Power of Small*

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66. *See, e.g.*, *What LEED Is,* U.S. GREEN BLDG. COUNCIL, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1988 (last visited July 5, 2012). The initiative discussed in the text takes the LEED concept to the next level by extending it beyond individual structures. *See* Nolon, *supra* note 19, at 326 n.181.

67. *See* Nolon, *supra* note 19, at 330.

68. *Id.*

69. *Id.* at 330-34.

70. *Id.* at 334-37.

Scale Renewable Energy: Local Land Use Regulation,[71] Professor Salkin focuses particularly on one aspect of local land use regulation, facilitation or promotion of small-scale renewable energy sources. She notes the potential contribution that such sources can make to the effort to achieve a paradigm shift towards more affordable and less polluting energy sources; discusses some of the incentives that the federal government and some states have provided to encourage such sources; identifies some of the barriers that local government laws (as well as private restrictions such as deed restrictions in home association rules) put in the way; and outlines some of the strategies local governments have developed to encourage rather than impede new small-scale renewable energy sources.[72] Further, on the "stick end" of the regulatory spectrum, Professor Salkin suggests that local governments' inaction in supporting siting of renewable energy sources may expose them to preemptive federal and/or state legislative or regulatory initiatives.[73] Thus, her bottom line is that such sources have great promise, and that while local land use law sometimes acts as an impediment, there are a variety of practical steps local governments can take to transform themselves from naysayers to facilitators that would benefit their communities. Further, if the vision and reach of local governments fails to rise to the challenge other levels of government may step in and occupy the regulatory landscape.

Professor Salkin suggests that local governments interested in promoting small-scale renewable energy sources rely on the tools commonly used in land use regulation throughout the country to move in this direction. For example, Professor Salkin highlights features of comprehensive planning statutes from several states that advise local governments to consider renewable energy and sustainability as part of the comprehensive planning process. Similarly, she highlights a series of local comprehensive plans that include provisions that do so.[74]

In addition, Professor Salkin identifies various aspects of general zoning regulations that may impede or promote renewable energy sources. These include allowing permitting of renewable energy devices as of right, configuring setback and height limitations in a way that enhances opportunities for renewable energy systems such as solar and wind energy systems, treating visual impacts associated with such systems (for example, wind turbines) sensibly, and making renewable energy devices permissible acces-

71. Salkin, *supra* note 19, at 339.
72. *See id.*
73. *Id.* at 340, 367.
74. *Id.* at 351-54.

sory uses.[75] Designing site plan review, structuring special permit procedures, enacting subdivision requirements, and adapting planned unit developments (PUDs) in ways that promote small scale renewable energy sources are other strategies from the land use regulatory toolbox that Professor Salkin suggests hold considerable promise.[76]

In short, in her contribution to this volume, Professor Salkin urges local governments to conduct "renewable energy audits" of their local comprehensive plans and land use regulations "to ensure that the regulatory regime is designed to accommodate and welcome the use of small-scale renewable energy" and that they use conventional land use regulatory authorities to encourage small-scale renewable energy systems.[77] She further urges federal and state support of local governments in this arena, and suggests that local governments fail to adopt best practices at their peril, with the specter of federal or state preemption looming if local governments do not "step up to the plate."[78]

As I have tried to illustrate, the articles that follow offer a rich mix of assessments of the energy/land use landscape, including an essential toolbox of strategies to address the many challenges we face.

75. *Id.* at 356-60.
76. *Id.* at 361-63.
77. *Id.* at 367.
78. *Id.* at 367.

THE ENERGY-LAND USE NEXUS

UMA OUTKA*

I. INTRODUCTION

In California's Ivanpah Valley, a 392-megawatt (MW) solar facility[1] will soon span over 3000 acres that are home to rare species of desert plants and animals.[2] A 132-MW wind farm spins along the forested ridge of Kibby Mountain, Maine, generating electricity sufficient to power every household in three counties.[3] Outside of Gainesville, Florida, a 100-MW facility will burn wood waste for electricity, adjacent to an existing coal-fired power plant.[4]

Across the country, renewable energy projects like these are under review, in construction, and, increasingly, fully operational, producing electric power with alternatives to fossil fuels. The path from proposal to operation is often fraught with challenges, not the least of which can be siting controversies–local communities resisting projects in view, and environmental groups working to avoid harm to wildlife.

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1. *Ivanpah Solar Electric Generating System*, *What is Ivanpah?*, BRIGHTSOURCE ENERGY, INC., http://ivanpahsolar.com/about (last visited July 5, 2012); *Ivanpah Solar Electric Generation System Project*, BUREAU OF LAND MGMT., http://www.blm.gov/ca/st/en/fo/needles/nefo_nepa.html (last updated July 18, 2011).

2. BUREAU OF LAND MGMT., FINAL ENVIRONMENTAL IMPACT STATEMENT FOR IVANPAH SOLAR ELECTRIC GENERATING SYSTEM 4.3-1 to 4.3-25 (2010), *available at* http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/needles/lands_solar.Par.20589.File.dat/2-4_0_Affected_Environment_and_Environmental_Consequences.pdf.

3. *Kibby Mountain Wind Project*, NATURAL RES. COUNCIL OF ME., http://www.nrcm.org/kibby_mountain.asp (last visited July 5, 2012); *Kibby Wind Power Project,* TRANSCANADA, http://www.transcanada.com/kibby.html (last updated Feb. 2, 2012).

4. *See Gainesville Renewable Energy Center (GREC)*, AMERICAN RENEWABLES, http://www.amrenewables.com/our-projects/gainesville-renewable-energy-center.php (last visited July 5, 2012).

Siting controversies have drawn attention to the role of land and land use law in this shifting energy landscape. Yet siting power plants and transmission lines is only one facet of the energy-land use nexus–a rich set of interrelationships between land use and energy production and consumption that has developed over time and continues to emerge. At a time when the stakes in energy policy are exceedingly high, this underexplored nexus encapsulates barriers and opportunities for land and energy interests alike.

In articulating this interdependency, the energy-land use nexus provides a useful frame for approaching policy that minimizes points of conflict between energy goals on the one hand, and land conservation and land use efficiency on the other. Current trends in energy use are widely recognized as unsustainable–fossil fuels remain the dominant resources for electricity and transportation, pollute the environment, harm public health, and change the climate.[5] At the same time, land is, of course, finite–as the world's population grows, competition among land uses, including energy production to meet rising demand, is only increasing.

This essay traces the contours of the energy-land use nexus, arguing that energy and land use interlock in at least three distinct ways. I term the first *energy for land use*–the relationship between energy consumption and patterns of land development. The second, conversely, is *land use for energy*–how we use land for energy generation. The third is reflected in new efforts at *energy-land use integration*–reconceiving existing land uses to generate energy and reduce energy demand. These interrelationships, however, are typically not well-reflected in either land use law or energy law. This observation compels a reassessment of each–the project at the heart of this Symposium–with a focus on how to integrate land use concerns with energy policy and to make energy generation and consumption a more central concern for land use law.

II. ENERGY FOR LAND USE

Land development patterns directly affect energy consumption–how we use energy, particularly for transportation, is dictated by the developed landscape we navigate. Land use law, operating mostly at the local level, orchestrates how and where land development can occur. This is true at both extremes–whether land use regulations give effect to careful land use planning or the failure to plan. Where land use law fosters suburban sprawl, driving is

5. *See* U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2011 WITH PROJECTIONS TO 2035, at 2-4 (Apr. 2011), *available at* http://www.eia.gov/forecasts/aeo/pdf/0383(2011).pdf.

unavoidable[6] and every vehicle mile travelled (VMT) consumes fuel and emits carbon dioxide at the tailpipe.[7] At the same time, sprawling land use patterns commonly foreclose viable transportation alternatives that would use less energy, from walking and biking to mass transit. Compact and mixed-use development, in contrast, affords lower energy consumption–unsurprisingly, there are fewer VMT when we can easily walk or bike to our destinations, or when efficient public transportation is available.

The smart growth movement has for many years been highlighting the broad range of benefits to be gained through planning approaches that avoid suburban sprawl–from land conservation and wildlife protection to enhanced quality of life, improved public health, better air quality, and energy conservation.[8] Looking more closely at this aspect of the energy-land use nexus, however, it is important to reframe this relationship between land use and energy, with energy conservation not simply as one among many benefits of sprawl avoidance. Rather, in this narrow but functionally critical sense, land use law *is* energy law. To be sure, energy law is centered at the federal and state level, while land use law is primarily local.[9] But in exerting such direct and stubborn influence on energy consumption, the wisdom or folly of land use law implementation effectively defines much of what energy policy must respond to and the range of choices available for future reforms. And this influence is stubborn–it is hard, and if not impossible, often completely unfeasible, to change land use decisions once they are made.

This is especially true where land use patterns are inextricably oriented around transportation infrastructure.[10] Increasingly, but very slowly, we see this transportation-land use link being directly

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6. As even the U.S. Supreme Court has recognized, "driving an automobile [is] a virtual necessity for most Americans . . . ." Wooley v. Maynard, 430 U.S. 705, 715 (1977).

7. *See, e.g.*, REID EWING ET AL., URBAN LAND INST., GROWING COOLER: THE EVIDENCE ON URBAN DEVELOPMENT AND CLIMATE CHANGE 2 (2008).

8. *See generally* Smart Growth America, http://www.smartgrowthamerica.org (last visited July 5, 2012); Smart Growth Network, http://www.smartgrowth.org (last visited July 5, 2012) (linking the principles of smart growth to a broad range of economic, environmental, and quality of life benefits).

9. *See, e.g.*, FRED BOSSELMAN ET AL., ENERGY, ECONOMICS AND THE ENVIRONMENT 12-13 (3d ed. 2010) (providing brief delineation of federal, state, and local roles in the regulation of energy); Craig Anthony (Tony) Arnold, *The Structure of the Land Use Regulatory System in the United States*, 22 J. LAND USE & ENVTL. L. 441, 446-47 (2007); John R. Nolon, *Historical Overview of the American Land Use System: A Diagnostic Approach to Evaluating Governmental Land Use Control,* 23 PACE ENVTL. L. REV. 821, 821-22 (2006).

10. *See, e.g.*, NEHA BHATT ET AL., GETTING BACK ON TRACK: ALIGNING STATE TRANSPORTATION POLICY WITH CLIMATE CHANGE GOALS (2010), *available at* http://smartgrowthamerica.org/documents/getting-back-on-track.pdf (outlining and proceeding from the premise that state policy drives transportation emissions and offering recommendations at the state and federal level for reducing emissions while still meeting transportation needs).

connected to energy consumption in law. The most highly publicized and ambitious example is California's Sustainable Communities Act, or as it is still commonly known, SB 375.[11] This law charged the state's eighteen Metropolitan Planning Organizations (MPOs) with creating integrated regional land use and transportation plans, or "Sustainable Community Strategies," to curb emissions from passenger vehicles.[12] The California Legislature made clear that SB 375 was a necessary measure to achieve the mandate in the Global Warming Solutions Act of 2006 (also known as Assembly Bill (AB) 32) of reducing statewide greenhouse gas emissions to 1990 levels by 2020.[13] Noting that "automobiles and light trucks account for [fifty] percent of air pollution in California and [seventy] percent of its consumption of petroleum," SB 375 opens with the conclusion that "[w]ithout improved land use and transportation policy, California will not be able to achieve the goals of AB 32."[14]

Another example can be found in Florida's House Bill 697, a major bill signed into law in 2008 that required changes to the Florida Energy Code for Building Construction that increased energy efficiency standards for new construction, and incorporated new energy-focused requirements into local land use plans.[15] With regard to land use, for example, the bill required that the future land use element of all local comprehensive plans include measures for "discouragement of urban sprawl; energy-efficient land use patterns accounting for existing and future electric power generation and transmission systems; [and] greenhouse gas reduction strategies."[16] As amended, the traffic circulation element would have to "incorporate transportation strategies to address reduction in greenhouse gas emissions from the transportation sector."[17] The conservation element was also amended to include "fac-

11. S.B. 375, 2007-2008 Leg. Sess. (Cal. 2008) [hereinafter S.B. 375].

12. *Id.* § 4. For information on the implementation and impact of SB 375, which became effective January 1, 2009 see for example, *SB 375 Resources*, AM. PLANNING ASS'N CAL. CHAPTER, http://www.calapa.org/en/cms/?2841 (last visited July 5, 2012); *About SB 375,* CLIMATEPLAN, http://www.climateplan.org/californias-new-vision/sub-page-2 (last visited July 5, 2012); *Sustainable Communities,* CAL. ENVTL. PROT. AGENCY, AIR RES. BD., http://www.arb.ca.gov/cc/sb375/sb375.htm (last visited July 5, 2012); *Climate Change & SB 375 Updates,* LEAGUE OF CAL. CITIES, http://www.cacities.org/index.jsp?displaytype=11 &story=27615 (last updated Sept. 24, 2010); *Senate Bill 375,* CAL. DEP'T OF TRANSP., http://www.dot.ca.gov/hq/tpp/offices/orip/sb375.html (last visited July 5, 2012). *See also* TOM ADAMS ET AL., COMMUNITIES TACKLE GLOBAL WARMING: A GUIDE TO CALIFORNIA'S SB 375 (2009) (providing an in-depth analysis of SB 375 and its effects).

13. *See* S.B. 375, § 1(c); A.B. 32, 2005-2006 Leg. Sess. (Cal. 2006) (codified at CAL. HEALTH & SAFETY CODE §§ 38500-99 (West 2012)).

14. *See* S.B. 375, § 1(c)-(d).

15. *See* Act effective July 1, 2008, ch. 2008-191, § 2, 2008 Fla. Laws 3, 3-7 (amending scattered sections of FLA. STAT. § 163.3177(6) (2007)).

16. *Id.* 2008 Fla. Laws at 4 (amending FLA. STAT. § 163.3177(6)(a) (2007)).

17. *Id.* 2008 Fla. Laws at 5 (amending FLA. STAT. § 163.3177(6)(b) (2007)).

tors that affect energy conservation," and the transportation element, required in urbanized areas, had to incorporate "transportation strategies to address reduction in greenhouse gas emissions from the transportation sector."[18] A second major energy bill that year, House Bill 7135, approached the same goals through Florida's MPOs, adding reduction of greenhouse gas emissions to the MPOs' statutory purpose and adding non-mandatory language encouraging MPOs "to consider strategies that integrate transportation and land use planning to provide for sustainable development and reduce greenhouse gas emissions."[19]

These "energy" bills represent important efforts to craft law that addresses energy and land use in an integrated way, cognizant of their interrelationship. Yet their potential has been paired with problems, criticism, and set-backs. SB 375 has been criticized for lacking meaningful enforcement mechanisms,[20] and few "Sustainable Communities Strategies" have been fully developed.[21] The implementation of AB 32, the emissions reduction law that SB 375 is designed to achieve, has been stalled by litigation.[22] Additionally, the Florida provisions were vague and prompted a lengthy rulemaking process by the state land planning agency.[23] Shortly after issuing the final rule in 2010, Rick Scott was elected Governor. The agency withdrew the administrative rule and the agency itself has since been eliminated by the Republican-dominated legislature.[24] The statutory provisions themselves have also been

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18. *Id.* 2008 Fla. Laws at 5, 7 (amending FLA. STAT. § 163.3177(6)(d), (j)(10) (2007)).

19. Act effective July 1, 2008, ch. 2008-227, § 30, 2008 Fla. Laws 37, 37-38 (amending FLA. STAT. § 339.175(1), (7)).

20. *See, e.g.*, William Fulton, *SB 375 Is Now Law - But What Will It Do?*, CAL. PLANNING & DEV. REPORT BLOG (Oct. 1, 2008, 8:32 AM), http://www.cp-dr.com/node/2140. *See also* Joanna D. Malaczynski & Timothy P. Duane, *Reducing Greenhouse Gas Emissions from Vehicle Miles Traveled: Integrating the California Environmental Quality Act with the California Global Warming Solutions Act*, 36 ECOLOGY L.Q. 71 (2009) (questioning the effectiveness of SB 375 compared with other policy approaches to reducing emissions).

21. *See, e.g.*, Ethan Elkind, *So Much for California's Anti-Sprawl Law*, LEGAL PLANET BLOG (July 5, 2011), http://legalplanet.wordpress.com/2011/07/05/so-much-for-californias-anti-sprawl-law/ (critiquing first draft plan submitted under SB 375); Debra Kahn, *Enviros Sue Over San Diego's Plan To Limit GHG Emissions, Sprawl*, GREENWIRE (Nov. 28, 2011), http://www.eenews.net/Greenwire/rss/2011/11/28/9 (describing a lawsuit against San Diego over its "first-in-the-nation plan to reduce greenhouse gas emissions from transportation and land use, . . . [the suit alleged the plan's] policies will actually spur increased emissions").

22. *See* Ass'n of Irritated Residents v. Cal. Air Res. Bd., No. CPF-09-509562 (Cal. Super. Ct. Mar. 18, 2011).

23. *See, e.g.*, *HB 697 – First No Rules – Now No Statute*, REDEVELOPMENT EDGE BLOG (Feb. 22, 2011), http://www.floridaredevelopment.com/2011/02/22/hb-697-no-rules/ (critiquing the lack of guidance in H.B. 697 and the abandonment of the rulemaking process).

24. *Id.*; *See also* KEN BOUTWELL ET AL., MGT OF AMERICA, INC., ORGANIZATION STRUCTURE FOR THE DEPARTMENT OF ECONOMIC OPPORTUNITY STATE OF FLORIDA FINAL REPORT 1-2 (2011), *available at* http://floridajobs.org/about awi/open_government/DEO_final_report.pdf (discussing how the Department of Community Affairs and several other agencies were reorganized and integrated into the Department of Economic Opportunity).

weakened substantially during subsequent legislative sessions.[25] All language references to greenhouse gases were stripped in 2011 revisions to Florida's growth management laws.[26] Accordingly, the bills also underscore the uniquely challenging context for policy making to integrate energy with land use law. Recognizing the influence of land use on energy consumption is a key first step in this direction, but an incredible amount of consensus building and policy work stands between the status quo and having effective law in place to moderate and rationalize that influence.

III. LAND USE FOR ENERGY

How we consume energy is tied to land use patterns, but how we generate energy is also inextricably bound to the land–what I have elsewhere called "energy land use," or land used for energy.[27] At the siting level, the energy-land use nexus can be highly personal and the effects of a facility are often felt quite directly. Prospective host communities feel this acutely when confronted by a proposal to site an energy facility or transmission line near their homes. It may affect their property values, their daily aesthetic enjoyment of their home and sense of place, and in worst cases, may pose health risks if the facility will degrade and pollute the local environment. Local opposition is often categorically dismissed as "NIMBYism,"[28] but this reflex can assume too quickly that a site selected, typically by the project developer, is in fact appropriate for an energy facility. Opposition movements make siting difficult, but they also raise concerns that matter fundamentally for effective energy land use: what are the environmental and community contexts for the site? These may easily go unaccounted for until local opponents draw attention to specific impacts. Although environmental concerns can be used as proxies for private interests, there are often significant and legitimate environmental issues at

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For more information on the new agency as it now exists see *Community Planning and Development*, FLA. DEP'T OF ECON. OPPORTUNITY, http://floridajobs.org/community-planning-and-development (last visited July 5, 2012).

25. *See, e.g.*, Act effective June 2, 2011, ch. 2011-139, § 12, 2011 Fla. Laws 27 (amending FLA. STAT. § 163.3177(6)(a) (2010)) (eliminating key language that HB 697 created. For example, this bill removed the requirement that "greenhouse gas reduction strategies" must be considered in future land use plans). *Id.*

26. *See id.* 2011 Fla. Laws at 21, 27, 34, 43 (amending FLA. STAT. §§ 163.3177(6)(a)(2)(h), (6)(b)(4), (6)(j)(10)).

27. *See generally* Uma Outka, *The Renewable Energy Footprint*, 30 STAN. ENVTL. L.J. 241 (2011) [hereinafter Outka, *Renewable Energy Footprint*] (analyzing the nexus between energy policy and land use in the context of addressing cumulative land impacts of renewable energy expansion).

28. Peter Pollock, *A Comment on Making Sustainable Land-Use Planning Work*, 80 U. COLO. L. REV. 999, 1002, 1005 (2009) (discussing the "not in my backyard" attitude of citizens who seek to see the development move elsewhere).

stake that may indicate the project is in the wrong place. What roles are appropriate for state government, local government, potential host communities, utilities and energy developers? Some states leave siting decisions to local governments; others require state-level site approvals and structure the form and degree of public involvement.[29] How might host communities or individual burdens be compensated for the local impacts of facility siting, and when is this appropriate, accounting for environmental justice and other socioeconomic considerations? Agreement through alternatives to litigation is often possible when decision-makers and project proponents are willing to acknowledge the burdens to a community.[30] At the same time, there is a risk of solidifying siting patterns in low-income communities by exploiting economic vulnerability.[31] Although contextual concerns for people, wildlife, and local environmental resources undoubtedly serve to constrain energy land use, they can also force *better* energy land use. Opportunities exist, especially for local governments, to use their land use authority to guide siting in ways that can avoid conflicts.[32] To date, however, there seems to be little affirmative progress in this regard, and decision-makers continue to operate reactively in response to privately-crafted proposals.[33]

Apart from the local and site-specific impacts, rising energy demand and shifting resources make it increasingly important for energy law to account for large-scale energy land use into the future. The Nature Conservancy highlighted this aspect of the energy-land use nexus in 2009 when it released a study examining the potential impact of renewable energy policies on land and wild-

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29. Outka, *Renewable Energy Footprint, supra* note 27, at 254-66.

30. *See, e.g.*, Sean F. Nolon, *Negotiating the Wind: A Framework to Engage Citizens in Siting Wind Turbines*, 12 CARDOZO J. CONFLICT RESOL. 327 (2011) (focusing on substantive as well as procedural problems and solutions in the community siting context); Sean F. Nolon, *The Lawyer as Process Advocate: Encouraging Collaborative Approaches to Controversial Development Decisions*, 27 PACE ENVTL. L. REV. 103 (2009) (on lawyers' potential to assist in resolving conflicts over land development); Lynne Gillette et al., *Using Collaboration to Address Renewable Energy Siting Challenges*, FED. LAW., June 2009, at 50 (applying environmental conflict resolution (ECR) to renewable energy siting); *The Renewable Energy Siting Partnership: Helping Communities Make Renewable Energy Decisions,* R.I. SEA GRANT, http://www.seagrant.gso.uri.edu/coast/resp.html (last visited July 5, 2012) (the University of Rhode Island has partnered with the state to provide information on the effects various energy projects may have on the "people, wildlife and natural resources of Rhode Island.").

31. *See, e.g.*, Vicki Been, *Locally Undesirable Land Uses in Minority Neighborhoods: Disproportionate Siting or Market Dynamics?*, 103 YALE L.J. 1383 (1994).

32. *See* Uma Outka, *Siting Renewable Energy: Land Use and Regulatory Context,* 37 ECOLOGY L.Q. 1041, 1096-1101 (2010).

33. *See* Uma Outka & Richard Feiock, *Local Promise for Climate Mitigation: An Empirical Assessment,* 36 WM. & MARY ENVTL. L. & POL'Y REV. (forthcoming 2012) (finding that local governments are not using their land use authority to identify land suitable for energy development).

life conservation goals.[34] The study quantified the "land-use intensity" of various energy resources, concluding that favoring renewables could result in "energy sprawl," potentially doubling the land area needed in the United States for energy production over the next twenty years.[35] Citing concern for habitat loss, the Nature Conservancy called for delimiting new power production by favoring energy efficiency measures–minimizing land used for energy[36]–but the work was also clarifying in two other important respects. First, it made clear that the cumulative land impacts of energy policy can be significant and should be a central consideration for policymakers, not a facility siting afterthought.[37] And second, it highlighted the ways in which energy law can operate *as land use law* when energy policy choices, such as degree of emphasis on efficiency and treatment of energy resources, have direct and variable land use implications.[38]

Recognizing that the potential for conflict between large-scale energy facilities and sensitive areas is great, environmental organizations have broadly insisted that support for renewable energy does not have to depend on an abandonment of important conservation goals.[39] To do that successfully, they argue, will require geographically broad-based, long-range planning.[40] Federal land management agencies have been focused on this aspect of the energy-land use nexus in connection with the goal of facilitating renewable energy development on federally-owned public lands in the West. The Bureau of Land Management (BLM) and Department of Energy (DOE) have mapped Solar Energy Zones on federal land across six states–Arizona, California, Colorado, Nevada, New Mexico, and Utah–and used NEPA to analyze cumulative environmental impacts, among other things, through a draft Pro-

34. *See* Robert I. McDonald et al., The Nature Conservancy, *Energy Sprawl or Energy Efficiency: Climate Policy Impacts on Natural Habitat for the United States of America*, 4 PLOS ONE, (2009), *available at* http://www.plosone.org/article/info:doi/10.1371/journal.pone.0006802 [hereinafter *Energy Sprawl or Energy Efficiency*]. *See also* ROBERT MCDONALD ET AL., UPDATED ENERGY SPRAWL NUMBERS FOR THE AMERICAN CLEAN ENERGY AND SECURITY ACT (n.d.), *available at* http://robertmcdonald.info/UpdatedEnergySprawlNumbersACESA.pdf [hereinafter UPDATED ENERGY SPRAWL]. For more on "energy sprawl," see for example, Sara C. Bronin, *Curbing Energy Sprawl with Microgrids,* 43 CONN. L. REV. 547 (2010) [hereinafter Bronin, *Curbing Energy Sprawl*]; Outka, *Renewable Energy Footprint*, *supra* note 27.

35. *See Energy Sprawl or Energy Efficiency*, *supra* note 34, at 6; UPDATED ENERGY SPRAWL, *supra* note 34.

36. *See Energy Sprawl or Energy Efficiency*, *supra* note 34, at 5-6.

37. *See* Outka, *Renewable Energy Footprint*, *supra* note 27, at 284.

38. *See Energy Sprawl or Energy Efficiency*, *supra* note 34, at 6.

39. *See* DEFENDERS OF WILDLIFE ET AL., KEY PRINCIPLES: BALANCING RENEWABLE ENERGY DEVELOPMENT AND LAND CONSERVATION IN A WARMING WORLD (2009), *available at* http://www.defenders.org/publications/balancing_renewable_energy_development_and_land_conservation_in_a_warming_world.pdf.

40. *Id.*

grammatic Environmental Impact Statement (PEIS).[41] Through the PEIS, the agencies are evaluating solar energy potential, expected impacts to natural resources, possible mitigation measures, and alternative approaches to solar energy development, with the benefit of state-specific as well as regional environmental information.[42] The aim of the draft Solar PEIS is "to inform BLM's decision to identify [Solar Energy Zones] within the six-state study area as those locations that are best-suited for utility-scale solar energy development (i.e., high resource value and low [or limited] resource and/or environmental conflicts)."[43] For private land, in contrast, there are no such comparable, comprehensive analyses. Instead, state or local authorities—depending on the framework in a given state—typically respond to permit applications as they come through the door. Under such regulatory structures, assessment of the cumulative impacts of energy development is extremely limited.[44]

Despite the recent focus on renewable energy issues, harmful impacts to land and other critical resources result from all forms of energy development–this interrelationship is not a new concern or unique to renewable resources.[45] For many decades, it has been clear that land impacts from coal mining are especially severe.[46] Whole mountaintops are eliminated, wide swaths of land are overturned for strip mining, and polluted runoff and sediment despoil surrounding land and water resources.[47] Coal ash disposal is yet another link between coal energy and land that raises significant public health concerns.[48] And of course these land impacts are only

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41. *See* U.S. DEP'T OF ENERGY ET AL., DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT FOR SOLAR ENERGY DEVELOPMENT IN SIX SOUTHWESTERN STATES, PUB. NOS. DES 10-59, DOE/EIS-0403 (Dec. 2010), *available at* http://www.solareis.anl.gov/documents/dpeis/index.cfm [hereinafter DRAFT SOLAR PEIS]. For a detailed account of existing and emerging law applicable to renewable energy development on federal land, see Robert L. Glicksman, *Solar Energy Development on the Federal Public Lands: Environmental Trade-Offs on the Road to a Lower-Carbon Future*, 3 SAN DIEGO J. OF CLIMATE & ENERGY LAW (forthcoming 2011).

42. *See, e.g.*, DRAFT SOLAR PEIS, *supra* note 41, at apps. I, J.

43. *See id.* at Executive Summary, ES-5.

44. Outka, *Renewable Energy Footprint*, *supra* note 27, at 283-85 (discussing "energy land use myopia" of such structures).

45. *See, e.g.*, U.S. Envtl. Prot. Agency (EPA), *Clean Energy: Land Resource Use*, http://www.epa.gov/cleanenergy/energy-and-you/affect/land-resource.html (last updated June 6, 2011) (providing a very brief summary of the environmental impacts of land use based on different energy resources).

46. *See, e.g.*, *The Price of Strip Mining*, TIME, Mar. 22, 1971, at 67.

47. *See, e.g.*, CLEAN AIR TASK FORCE, CRADLE TO GRAVE: THE ENVIRONMENTAL IMPACTS FROM COAL 1-8 (2001), *available at* http://www.catf.us/resources/publications/files/Cradle_to_Grave.pdf.

48. *See, e.g.*, *id.* at 3-7; *EPA Offers Two Possible Coal Ash Disposal Rules for Public Comment*, ENV'T NEWS SERV., May 4, 2010, http://www.ens-newswire.com/ens/may2010/2010-05-04-091.html (noting the health risks associated with the disposal of coal ash and that there are over 900 coal ash landfills in the United States). For EPA's proposed rule on

one set of harms associated with coal production, saying nothing of greenhouse gas emissions from coal-burning power plants, health effects from air and water pollution, or socioeconomic and environmental justice impacts–all critical considerations for energy policymakers. Oil extraction from tar sands, such as the Canadian tar sands that may soon supply oil to other nations via the Keystone XL pipeline,[49] involves strip or open pit mining.[50] Mining oil shale likewise involves major land disturbance and disposal of spent oil shales, resulting in additional land impacts.[51] Nuclear energy, despite a "clean" emissions profile and small facility footprint, carries significant land impacts in the form of uranium mining (mostly now outside the United States) as well as storage and disposal of radioactive waste.[52] Renewable biomass, especially produced for transportation fuel, is highly land-intensive, with potential to displace croplands.[53] Even the cleanest sources of energy, solar and wind, depend on land-intensive mining of rare earth minerals to build component parts of renewable technology.[54] This sampling of examples demonstrates that the energy-land use nexus touches on much more than the land used to construct a power plant, renewable or otherwise. Although siting is a key threshold of implementation for energy policy, this nexus pushes against an over-determined focus on siting to include a much broader range of land impacts.

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the disposal of coal combustion residuals and related documents, see Hazardous and Solid Waste Management System; Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals from Electric Utilities, 75 Fed. Reg. 35,127 (proposed June 21, 2010).

49. *See, e.g.*, Keystone Pipeline Project, U.S. DEP'T OF STATE, http://www.keystonepipeline.state.gov/clientsite/keystone.nsf?Open (last visited July 5, 2012); *Key Facts on Keystone XL*, TAR SANDS ACTION, http://www.tarsandsaction.org/spread-the-word/key-facts-keystone-xl/ (last visited July 5, 2012).

50. U.S. DEP'T OF INTERIOR, BUREAU OF LAND MGMT., *About Tar Sands*, http://ostseis.anl.gov/guide/tarsands/index.cfm (last visited July 5, 2012).

51. U.S. DEP'T OF INTERIOR, BUREAU OF LAND MGMT., *About Oil Shale*, http://ostseis.anl.gov/guide/oilshale/index.cfm (last visited July 5, 2012).

52. *See, e.g.*, Charles de Saillan, *Disposal of Spent Nuclear Fuel in the United States and Europe: A Persistent Environmental Problem*, 34 HARV. ENVTL. L. REV. 461 (2010); Richard B. Stewart, *U.S. Nuclear Waste Law and Policy: Fixing a Bankrupt System*, 17 N.Y.U. ENVTL. L.J. 783 (2008); Erin Klauk, *Environmental Impacts on the Navajo Nation from Uranium Mining*, INTEGRATING RESEARCH IN EDUCATION, http://serc.carleton.edu/research_education/nativelands/navajo/environmental.html (last visited July 5, 2012).

53. *See, e.g.*, Daniel A. Farber*, Indirect Land Use Change, Uncertainty, and Biofuels Policy*, ILL. L. REV. 381, 389 (2011); JOSHUA A. BLONZ ET AL., RES. FOR THE FUTURE, GROWING COMPLEXITIES: A CROSS-SECTOR REVIEW OF U.S. BIOFUELS POLICIES AND THEIR INTERACTIONS 26-27 (2008), *available at* http://www.rff.org/RFF/Documents/RFF-DP-08-47_final.pdf; GREENPEACE ET AL., THE REAL IMPACT OF GROWING BIOFUELS: CALCULATING INDIRECT LAND-USE CHANGE (2008), *available at* http://www.transportenvironment.org/sites/default/files/media/2008_10_23_briefing_indirect_land_use_change_biofuels.pdf.

54. Lisa Margonelli, *Clean Energy's Dirty Little Secret*, THE ATLANTIC, May 2009.

IV. ENERGY-LAND USE INTEGRATION

Finally, increased attention is turning to how we might recast the energy-land use nexus in a third direction, reconceiving existing land uses to generate energy and reduce energy demand. Unlike the first two interrelationships, both long-standing and problematic in a range of ways, this third interrelationship is still developing.

This aspect of the nexus is taking shape in a variety of forms. Most important, perhaps, are increased efforts to reduce energy consumption in constructed land uses through energy efficiency. According to the U.S. Department of Energy, in 2011 "the buildings in which we work and live used roughly [forty percent] of the energy in the U.S. economy at a cost of over $400 billion."[55] Existing development patterns may not be readily subject to change, at least not in the near-term, but as the Nature Conservancy has emphasized, energy efficiency measures applied to existing built environments can reduce the need for new power plant construction. The goal of energy efficiency is not new in law, and touches on many other issues (vehicle fuel efficiency, appliance efficiency, electric utilities' efficiency, to name a few of the most important), all of which bear a relationship with new demand.[56] But energy efficiency programs focused on buildings represent a basic recognition that how we use energy and land are coextensive activities. The law of energy efficiency for the built environment, primarily developed and operated through building codes at the state level, is still expanding to address the full scope of this recognition.[57]

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55. *Better Buildings*, U.S. DEP'T OF ENERGY, http://www1.eere.energy.gov/buildings/betterbuildings/ (last updated Apr. 13, 2012).

56. For a comprehensive but brief overview of energy efficiency in U.S. law, see John C. Dernbach & Marianne Tyrrell, *Federal Energy Efficiency and Conservation Laws*, *in* THE LAW OF CLEAN ENERGY: EFFICIENCY AND RENEWABLES 25 (Michael B. Gerrard ed., 2011). *See also* RICHARD J. CAMPBELL ET AL., CONG. RESEARCH SERV., 7-5700, RENEWABLE ENERGY AND ENERGY EFFICIENCY INCENTIVES: A SUMMARY OF FEDERAL PROGRAMS (2009); *Rules, Regulations, & Policies for Energy Efficiency*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY (DSIRE), http://www.dsireusa.org/summarytables/rrpee.cfm (last visited July 5, 2012).

57. *See* Dernbach & Tyrrell, *supra* note 56, at 34-37 (discussing energy efficiency law for buildings, and the interplay of primary state law with federal law). A recent study on sustainable community policies showed, for example, greater implementation of energy efficiency measures in government buildings and operations than in residential and commercial buildings community-wide. *See* Outka & Feiock, *supra* note 33, at 21 (reporting results from Florida cities regarding energy efficiency implementation). *But see* MIDDLE CLASS TASK FORCE, COUNCIL ON ENVTL. QUALITY, RECOVERY *THROUGH* RETROFIT (2009), *available at* http://www.whitehouse.gov/assets/documents/Recovery_Through_Retrofit_Final_Report.pdf (detailing how the government can improve energy efficiency in homes through the retrofit industry); *Energy Upgrade California*, CAL. ENERGY COMM'N, https://www.energyupgradeca.org/overview (last visited July 5, 2012) (state-based alliance between local governments, utilities, and non-profit organizations supporting efficiency retrofits).

A second critical element is increased development of onsite energy generation–building capacity for power production into new and existing structures. Rooftop solar panels are the best-known example, though as scholars have noted, the law often serves to hinder rooftop solar development, whether directly, as with prohibitions, or by failure to provide legal protection for solar access.[58] Urban wind power is an emerging example, integrating small and aesthetically innovative turbines into the built environment.[59] So called micro-cogeneration, or onsite combined heat and power systems, captures heat that would otherwise be wasted in the process of electricity generation to satisfy onsite needs.[60] Microgrids and district energy systems hold potential for locally integrated energy generation, cutting into the need for new centralized power plant siting.[61] Here again, the law needed to facilitate such developments lags behind the broad aspirations.

A third element is reusing land *for* or *from* energy production. This represents an ideal subset of land use for energy by formally favoring disturbed or degraded land over "greenfield" sites for energy projects. EPA has shown that many environmentally contam-

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58. *See, e.g.*, Sara C. Bronin, *Modern Lights*, 80 U. COLO. L. REV. 881 (2009) (discussing barriers to rooftop solar energy); Troy A. Rule, *Renewable Energy and the Neighbors,* 4 UTAH L. REV. 1223 (2010) (addressing land use laws that restrict use of onsite renewable energy).

59. *See, e.g.*, Nick McManus, *Urban Wind: Power Flower Wind Turbine Trees*, THE ALT. CONSUMER BLOG (July 6, 2011, 10:59 AM), http://www.alternativeconsumer.com/2011/07/06/urban-wind-power-flower-wind-turbine-trees/; Russell Nichols, *Reno, Nev., Puts Wind Turbines on City Hall Roof*, GOV'T TECH. (Aug. 1, 2010), http://www.govtech.com/technology/Reno-Nev-Puts-Wind-Turbines-on.html; *Wineur Project*: *Wind Energy Integration in the Urban Environment*, WINEUR PROJECT, http://www.urbanwind.net/wineur.html (last visited July 5, 2012) (a wind energy initiative based in England, France, and the Netherlands).

60. *See generally* INT'L ENERGY AGENCY, COGENERATION AND DISTRICT ENERGY: SUSTAINABLE ENERGY TECHNOLOGIES FOR TODAY . . . AND TOMORROW (2009), *available at* http://www.iea.org/files/CHPbrochure09.pdf (discussing policies for implementing cogeneration, also known as combined heat and power (CHP)). This report defines CHP as "the simultaneous generation of useful heat and power from a single fuel or energy source, at or close to the point of use." *Id.* at 12.

61. *See, e.g.*, N.Y. STATE ENERGY RESEARCH AND DEV. AUTH. (NYSERDA), MICROGRIDS: AN ASSESSMENT OF THE VALUE, OPPORTUNITIES AND BARRIERS TO DEPLOYMENT IN NEW YORK STATE (2010), *available at* http://www.nyserda.ny.gov/~/media/Files/Publications/Research/Electic Power Delivery/10-35-microgrids.ashx?sc_database=web (evaluating prospects for microgrids in New York). Distinguishing between microgrids and district energy systems, the NYSERDA explains that

> while they may overlap in some respects, microgrids deploying CHP are not the same as district energy. District energy systems, which may involve cogeneration of electricity, typically use large boilers to produce and distribute steam or hot water for heating or cooling large districts. Con Edison's steam system in mid-town and downtown Manhattan is an example of a district energy system . . . . While it is possible that some large microgrids could be construed as providing district energy, most microgrids will be much smaller (e.g., less than 40 MW of electric capacity) and serve a much smaller number of customers with both electricity and thermal energy.

Id. at 15. *See also* INT'L ENERGY AGENCY, *supra* note 60 (discussing district energy and CHP); Bronin, *Curbing Energy Sprawl*, *supra* note 34.

inated sites across the United States are suitable for new energy facilities.[62] The conversion of a power plant from one fuel source to another, cleaner source, is another reuse of land for energy.[63] Yet the potential to use law to steer project proposals to such sites has not been fully realized. Conversely, as the shift away from fossil fuels continues its slow course, there will be land previously used for traditional energy generation that can be redirected for other uses. The American Clean Skies Foundation, for example, has proposed a range of ways to put retired power plant sites to "new civic and private uses such as riverfront housing, shops and offices – as well as museums, parks and other community amenities."[64]

V. CONCLUSION

In the context of significant change and uncertainty for energy policy, and when energy and other development pressures are increasingly at odds with land conservation, the energy-land use nexus at the heart of this Symposium is analytically useful in at least two respects. First, it allows us to frame critiques of existing regimes to identify how "energy law" is shaped by and is shaping land use patterns, and conversely, the role of "land use law" in defining problems energy policy must respond to and limiting the range of viable options for energy infrastructure. Through this lens, we see permeability between areas of law that are typically conceived as distinct and largely unrelated. Second, in clarifying the legal and practical interrelationships between energy and land use, the energy-land use nexus becomes useful for policymaking, both in targeting shortcomings of current legal frameworks for reform and for innovating policy that is designed to integrate energy and land use goals.

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62. *See Siting Renewable Energy on Potentially Contaminated Land and Mine Sites,* U.S. ENTL. PROT. AGENCY, http://www.epa.gov/renewableenergyland/ (last updated Apr. 13, 2012). *See also Restoration Design Energy Project,* BUREAU OF LAND MGMT. – ARIZ., U.S. DEP'T OF INTERIOR, http://www.blm.gov/az/st/en/prog/energy/arra_solar.html (last updated Mar. 08, 2012) (aiming to identify public lands in Arizona suitable for targeted reuse as sites for renewable energy facilities).

63. Colorado, for example, enacted a law designed to encourage the conversion of coal plants to use alternative fuels. *See* Clean Air – Clean Jobs Act, COLO. REV. STAT. § 40-3.2-201-210 (2011).

64. AM. CLEAN SKIES FOUND., REPURPOSING LEGACY POWER PLANTS: LESSONS FOR THE FUTURE 5 (2011), *available at* http://www.potomacrivergreen.org/sites/default/files/ACSF_layout_coverANDtext.pdf (providing case study examples of effective power plant repurposing projects).

EARTH, AIR, WATER AND FIRE: THE CLASSICAL ELEMENTS CONFRONT LAND AND ENERGY

STEVEN FERREY*

I. CHICKENS, EGGS, AND DEPENDENT VARIABLES

For thousands of years, the classical theory, which was considered the best science of the time and was observed by most cultures and religions of the world, was that there were four basic elements from which everything in life was constructed: Earth, Wa-

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ter, Air and Fire.[1] This classical theory anchored Hinduism, Buddhism, Chinese and Japanese religions, as well as Greek philosophy.[2] From these classical elements, all matter was derived.[3]

From the time of Aristotle to relatively recent times, this theory persisted. These classical elements were thought to be at the core of alchemy in Medieval times[4] and today's modern astrology still features these four classic elements—with three signs of the zodiac placed in each of the elements of Earth, Air, Water and Fire. There also was thought to be a fifth element, quintessence or aether.[5] These elements factor into the energy relationship between Earth and Air. Traditionally, society derived energy from the Earth (wood, fossil fuels, etc.); however with renewable technologies, we take energy from the air–in the form of solar radiation and kinetic wind energy. And this shift alters the classical elements.

Earth and Energy. Energy and Earth. Which is the dependent variable and which is the independent variable–land or energy? It is a complex "chicken and egg" conundrum. Much energy, but not all, derives from various relationships with the land of the Earth. In its application and use, modern energy has facilitated the complex use of land: in buildings, in transportation, and in mechanized work and production. There is an historic pattern and linkage between land and energy. Since the law and regulation surround both–land transactions and usage are governed by legal ownership, and electricity is the last of the regulated industries, thus it is an appropriate interrelationship for examination.

Land was the original source of legal rights and legal property. During the first 99.99% of the approximately 2.5 million years that the genus 'homo' has existed on the Earth, or 99.8% of the time of homo sapiens as the more recent embodiment of intelligent humans, the human relationship to land has been constant. It is only

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1. John H. Lienhard, *The Engines of Our Ingenuity: Earth, Air, Fire, & Water*, http://www.uh.edu/engines/epi1891.htm (last visited July 5, 2012).

2. ROBERT BEER, THE HANDBOOK OF TIBETAN BUDDHIST SYMBOLS 82 (2003); Anne Marie Helmenstine, *Chemistry: 5 Elements*, http://chemistry.about.com/od/historyofchemistry/a/5-Elements.htm (last visited July 5, 2012); Pankaj Jain, *Hinduism: Ten Key Hindu Environmental Teachings*, http://www.livingwithinnature.org/links_Hindu.html (last visited July 5, 2012); Michael Schiesser, *The Five Elements*, http://www.michaelschiesser.com/the-five-elements.html (last visited July 5, 2012).

3. Tracy Marks, *Elemental: The Four Elements Earth, Fire, Air, Water in Greek Philosophy and Jungian Psychology*, http://webwinds.com/myth/elemental.htm (last visited July 5, 2012); Bonnie Moss, *The Four Elements*, http://goldencupcafe.tripod.com/html/the_four_elements.html (last visited July 5, 2012).

4. Melissa Snell, *Alchemy in the Middle Ages*, http://www.historymedren.about.com/od/alchemy/p/alchemy.htm (last visited July 5, 2012).

5. *See Aether: The Final Element*, http://www.gwarv.com/manticora/esoteric/aether.htm (last visited July 5, 2012).

in the past 300 years, or 0.02% of this passage of time, that modern forms of energy have been harnessed, for example, electricity has only been harnessed for approximately 130 of the past years.[6] In this author's opinion, electricity has become perhaps the signature technology of the 21st century.[7] The modern information age, national defense, and a variety of other communication and intelligence-based applications are dependent on electricity with no available energy substitutes.[8]

During these past 300 years, fossil fuel energy resources have been derived from the land; the share of fossil fuels converted to create electricity increased over the last century from 1% in 1900 to 25% in 1990.[9] Fossil fuels produce electricity in a very concentrated application, which in turn allows a relatively small area of land to serve for very large amounts of electricity production.[10] By contrast, renewable resources are less concentrated in their electric energy creation capabilities, and thus utilize a larger area of land for a similar amount of electricity production. I touch on a few of these evolving relationships between electricity and land, chickens and eggs, in what follows.

Climate control and greenhouse gas ("GHG") emissions are of intense recent focus. To control GHG emissions, land use improvements related to energy are required:

> To meet this [climate control] goal, we must transform the way we make and use energy—we must maximize efficiency and make a major shift toward zero-GHG emissions in electricity generation, smart electric transmission and distribution systems, low-carbon buildings, and zero-emission vehicles, and increase options for alternative modes of travel and land use.[11]

As the United States moves to greater reliance on renewable resources, land use is impacted. The Obama Administration is forging a "smarter" energy policy to shift greater promotion to re-

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6. *See* Steven Ferrey, *Power Future*, 15 DUKE ENVTL. L. & POL'Y F. 261, 262-63 (2005) [hereinafter Ferrey, *Power Future*].

7. *See* STEVEN FERREY, ENVIRONMENTAL LAW: EXAMPLES & EXPLANATIONS 541 (5th ed. 2010) [hereinafter FERREY, E&E].

8. *See generally id.* at 539-40; *see* Ferrey, *Power Future*, *supra* note 6, at 266.

9. Ferrey, *Power Future*, *supra* note 6, at 267.

10. *See id.* at 264.

11. Lisa Wood, *New York Will Need to Swap out Fossil Fuel Units if it is to Reach GHG Goal, Report Says*, ELECTRIC UTIL. WK., Nov. 15, 2010 (quoting NEW YORK STATE CLIMATE ACTION COUNCIL, 2010 CLIMATE ACTION PLAN INTERIM REPORT, at ES-1-ES-2 (2010)).

newable energy.[12] In many special dimensions, certain renewable energy projects do not minimize land impacts: while they may consume more land, they do so in a less invasive manner in certain regards. But this does not mean that it does not have a significant impact.

Energy use significantly affects our land-use patterns. The use of coal-based energy for locomotive transportation and petroleum-based liquid energy for automobiles spawned a new, sprawled suburban land-use pattern that developed over the past century in industrializing countries around the world.[13] This is not without environmental impacts: burning a gallon of gasoline, which weighs 6.3 pounds, releases into the atmosphere 5.5 pounds of carbon, which in the atmosphere combines into more than 20 pounds of CO_2.[14] In the 21st century, electric energy is an energy source that is as significant and fundamental as petroleum.[15] Our use of land is a function of how we use energy to move over distance and organize our environment.[16]

One way to minimize land impacts of energy use is to utilize already occupied and used land for energy generation. There are several aspects of this:

- Develop cogeneration of power at existing industrial, commercial and residential sites. This generates more power at existing occupied facilities that otherwise utilize other centralized power.

- Increase energy efficiency at existing buildings, which already occupy land and consume more than one-third of all power.

- Develop efficient means to connect the new renewable energy resources with areas of energy demand.

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12. *See generally* American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009) (codified at 26 U.S.C. § 48); *see* Cathy Cash et al., *Senate Tries a Push for Big-Picture Grid Plans, Though 'Shovel-Ready' Projects Still a Question*, ELECTRIC UTIL. WK., Feb. 2, 2009, at 1, 35-36.

13. *See* Ferrey, *Power Future*, *supra* note 6, at 264-65.

14. *See, e.g.*, *Explain Pounds of CO_2 per Gallon of Gasoline*, LOCAL WARMING BLOG (Jan. 28, 2008), http://local-warming.blogspot.com/2008/01/explain-pounds-of-co2-per-gallon-of.html.

15. *See* FERREY, E&E, *supra* note 7, at 540.

16. *See* Ferrey, *Power Future*, *supra* note 6, at 265-66.

So new power resources, in new locations, given that electricity must be connected to consumers in order to be delivered,[17] have impacts on the land from power source to power consumption, and can have impacts on the air and water resources.[18] The next two sections look at aspects of using electricity more efficiently at existing land uses, and then the land-use impacts of renewable energy serving a more significant share of the electric supply mix.

II. MORE EFFICIENT USE AT EXISTING LAND USES: NEW CONSERVATION STANDARDS AND SELF GENERATION

The classical elements were linked to magical things. The four classical elements of Earth, Air, Water, and Fire, were believed not only to be from what all matter derived, but were thought to be at the core of alchemy in Medieval times.[19] That energy alchemy, in the 21st century, may be evident in the possibilities of conservation and efficiency–doing more in the modern economy, with less.

Cogeneration is the generation of both electricity and useful thermal energy.[20] Traditionally, when using fossil fuels to generate electricity, more than half of the energy used in the generation of electricity is waste heat.[21] Cogeneration facilities capture that waste heat and use it for useful purposes.[22] Typically, this electricity is distributed, or dispersed to generation in many smaller generation units, where the energy can be usefully applied. A study by the U.S. Department of Energy ("DOE") found the potential for 135,000 megawatts ("MW") of additional cogeneration at industrial facilities, while the National Renewable Energy Laboratory found an additional 64,000 MW that could be recovered from industrial waste energy recovery.[23] Much more efficiency could be captured in

17. A company in Watertown, Mass., WiTricity, has developed the ability to transmit electricity as a wave without a wire connection. To date, this can only be transmitted short distances. While this opens the possibility of wireless transmission, it is unlikely in the near term that this would or could be applied to high-voltage transmission over significant distances. By containing electricity in wires, it prevents easy theft, loss, or disruption of this valuable force. *See* WITRICITY, http://www.witricity.com (last visited July 5, 2012).

18. *See generally* STEVEN FERREY, LAW OF INDEPENDENT POWER §§ 6:17 to :21 (2011) (regarding environmental and land-use impacts of electric power) [hereinafter FERREY, INDEPENDENT POWER].

19. *See* Snell, *supra* note 4.

20. 18 C.F.R. § 292.202(c) (2011); FERREY, INDEPENDENT POWER, *supra* note 18, § 4:10.

21. John Tozzi & David Yanofsky, *U.S. Energy: Where It's From, Where It Goes, and What's Wasted*, BLOOMBERG.COM (July 7, 2011), http://www.bloomberg.com/data-visualization/americas-energy-where-it-comes-from-where-it-goes/.

22. *See Cogeneration/Combined Heat and Power*, CTR. FOR CLIMATE & ENERGY SOLUTIONS, http://www.pewclimate.org/technology/factsheet/CogenerationCHP (last visited July 5, 2012).

23. Richard Munson, *The Missing Efficiency*, ELEC. J., June 2010, at 79.

the industrial sector than in the residential sector, which attracts more attention.[24] Trade competitors to the United States, including Japan, Germany, France, Russia and Denmark, recycle a much larger percentage of their energy than does the United States.[25]

The implications of generating energy at or near the point where it is used, and exporting any surplus to the grid, generally increases efficient use of energy because waste heat can be utilized, and less use of land resources results because existing land is used for power generation.[26] The California Public Utilities Commission ("PUC") Chair announced that smaller-scale renewable projects have the advantage of being able to be located on disturbed land and are less likely to require transmission upgrades.[27] New England concluded that the $10.1 million paid to demand response programs yielded savings of more than three times this amount in lower cost of energy due to the second-priced auction run by grid operators in New England and elsewhere.[28]

Large centralized renewable power supply projects, whether wind, biomass, waste-to-energy, geothermal, or other technologies, are likely to be located far from power demand and load centers. Massive transmission infrastructure will have to be created to carry that power from the renewable energy source to the load centers. Massive new high voltage copper or aluminum transmission infrastructure also impacts the land it crosses. There also can be concern about the creation of additional new corridors of electromagnetic fields on land.[29]

Greater building efficiency is a second means to minimize impacts on land by decreasing the amount of energy needed to achieve certain end-uses on land. Focusing just on building energy use in cities and individual energy conservation measures, the U.S. Congress Office of Technology Assessment, forecast that by using existing technologies and feasible investments, seven Quads of energy annually could be saved through greater efficiency.[30] This represented a potential efficiency savings equal to more than half the current energy consumption of these buildings.[31] Even

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24. *Id.*
25. *Id.* at 80.
26. *See* FERREY, E&E, *supra* note 7, at 565-66.
27. Lisa Weinzimer, *CPUC Approves 'Least-Cost' Renewables Auction Intended to Ramp Up Procurement*, ELECTRIC UTIL. WK., Dec. 20, 2010, at 16.
28. Craig Cano, *Load Response Programs Save Three Times More Than They Cost, ISO-NE Report Says*, ELECTRIC UTIL. WK., Jan. 10, 2011, at 23.
29. FERREY, INDEPENDENT POWER, *supra* note 18, §§ 8:24 to :27.
30. OFFICE OF TECHNOLOGY ASSESSMENT, ENERGY EFFICIENCY OF BUILDINGS IN CITIES 4 (1982), *available at* http://www.fas.org/ota/reports/8206.pdf.
31. *Id.* at 3.

greater savings in delivered energy could result from utility system load shaping, known as Demand Side Management ("DSM").[32] The Federal Energy Regulatory Commission ("FERC") is now undertaking rulemaking to ensure that demand-side resources are treated equally in wholesale market payments for capacity provided.[33] If there was real-time pricing of power, this federal rulemaking would be superfluous.

New building efficiency and new major appliance efficiency are regulated by federal law and by state and local codes. The Energy Policy Act of 1992 ("EP Act 1992")[34] designated the required energy building codes the DOE was expected to implement and enforce, but it has since been replaced by the International Energy Conservation Code ("IECC") and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers ("ASHRAE") Standards.[35] States and local jurisdictions are tasked with enforcing the standards and ensuring compliance.[36]

The DOE ensures that the ASHRAE Standards for commercial buildings and the IECC Standards for residential buildings are current, reasonable, and enforceable.[37] The ASHRAE Standards are baseline building energy codes developed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE).[38] The IECC is a model energy code published and developed by the International Code Council and has been incorporated into the Energy Policy and Conservation Act by the DOE.[39] The IECC and ASHRAE standards function as baseline building energy codes—many states and municipalities implement codes that may be significantly stricter than the mandated levels.[40]

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32. *See* FERREY, INDEPENDENT POWER, *supra* note 18, § 3:22 (discussing load shaping alternatives).

33. *See* Demand Response Compensation in Organized Wholesale Energy Markets, 75 Fed. Reg. 47,499, 47,499-500 (Aug. 6, 2010) (to be codified at 18 C.F.R. pt. 35).

34. Pub L. No 102-486, 106 Stat. 2776 (codified as amended in scattered sections of 42 U.S.C.).

35. *See Types of Codes*, U.S. DEP'T OF ENERGY, http://www.energycodes.gov/why_codes/types.stm (last updated Mar. 22, 2011).

36. *Id.*

37. *See About the Building Energy Codes Program*, U.S. DEP'T OF ENERGY, http://www.energycodes.gov/about/ (last updated July 19, 2011). IECC codes were recently updated from the 2009 IECC to the 2012 IECC. ASHRAE Standard 90.1-2010 replaced Standard 90.1-2007 as well. *See* Alison Lindburgh, *Energy Efficiency – Energy codes*, FRESH ENERGY (Nov. 20, 2011), http://www.fresh-energy.org/2011/11/energy-efficiency-energy-codes/.

38. *See Types of Codes*, *supra* note 35.

39. *Id.*; *See* J. Cullen Howe, *Federal District Court in Washington State Upholds State Energy Code*, GREEN BUILDING LAW BLOG (Mar. 14, 2011), http://blogs.law.columbia.edu/greenbuildinglaw/2011/03/14/federal-district-court-in-washington-state-upholds-state-energy-code/.

40. *See, e.g.*, J. Cullen Howe, *Federal District Court in Washington State Upholds State Energy Code*, GREEN BUILDING LAW BLOG (Mar. 14, 2011), http://blogs.law.columbia.

This can include the Leadership in Energy and Environmental Design ("LEED") standards, established by committees of the U.S. Green Building Council ("USGBC"),[41] the most utilized green building standards today for the new construction of buildings.[42] The LEED Green Building Rating System operates as a checklist of a range of criteria earning points to achieve various ratings "in six areas – sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environments quality and innovation and design process."[43] Some government authorities choose to adopt the LEED standards into their building codes: as of 2008, "there were 134 mandatory government green building programs [in addition to] 85 voluntary programs . . . in 118 counties, municipalities and districts in the United States."[44]

States, including Rhode Island, Connecticut, Maryland, Nevada and Hawaii, enacted state-wide green building codes requiring LEED Silver certification or higher on certain new projects.[45] The Electricity Policy Research Institute estimates that energy efficiency programs have the potential to reduce the annual electricity use growth rate by twenty-two percent from 2008 to 2030, yielding an approximately five percent reduction in total electricity consumption in the United States in 2030.[46] Efficiency is forecast to be able to reduce summer peak electric demand by fourteen percent.[47] However, while addressing permits for new building construction most standards do not impact pre-existing buildings, unless they undergo rehabilitation that requires a new permit. Therefore, existing building energy use is not regulated, although there are various tax and other stimulus incentives for improving existing building efficiency.[48]

In response to the economic crisis, the Obama American Recovery and Reinvestment Act ("ARRA") stimulus package included a

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edu/greenbuildinglaw/2011/03/14/federal-district-court-in-washington-state-upholds-state-energy-code/.

41. *What LEED Is*, U.S. GREEN BLDG. COUNCIL, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1988 (last visited July 5, 2012).

42. *See About USGBC*, U.S. GREEN BLDG. COUNCIL, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=124 (last visited July 5, 2012).

43. KATE BOWERS & LEAH COHEN, HARV. ENVTL. LAW & POLICY CLINIC, THE GREEN BUILDING REVOLUTION: ADDRESSING AND MANAGING LEGAL RISKS AND LIABILITIES 2 (2009).

44. *Id.* at 4.

45. U.S. GREEN BLDG. COUNCIL, LEED PUBLIC POLICIES 8-12, 16 (2010), *available at* https://www.usgbc.org/ShowFile.aspx?DocumentID=691.

46. ELECTRIC POWER RESEARCH INST., ASSESSMENT OF ACHIEVABLE POTENTIAL FROM ENERGY EFFICIENCY AND DEMAND RESPONSE PROGRAMS IN THE U.S. (2010-2030): EXECUTIVE SUMMARY 7 (2009), *available at* http://www.edisonfoundation.net/iee/reports/EPRI_SummaryAssessmentAchievableEEPotential0109.pdf.

47. *Id.*

48. *See infra* Tables 1-2.

significant incentive package for the electric sector, pouring $80 billion in spending and $20 billion in tax incentives into renewable energy and energy efficiency, as part of the $787 billion stimulus plan.[49] This includes $12.35 billion for energy efficiency improvements through low-income weatherization, state block grants, public and Section 8 housing efficiency, and Department of Defense efficiency.[50] The DOE in 2009 awarded more than $155 million in stimulus funds to forty-one industrial efficiency projects, including district energy systems and combined heat and power facilities.[51] ARRA also provided states and municipalities about $10.8 billion of conservation funding.[52] This can be the energy alchemy in the 21st century.

III. THE LAND IMPACTS OF THE NEW RENEWABLE ENERGY SHIFT

A. The 'What' and 'Where'

Classical theory included not only the four basic elements of Earth, Water, Air and Fire, but also a fifth element, quintessence or aether.[53] Aristotle thought that aether was what composed the stars, as the stars were deemed unearthly.[54] In fact, energy from the stars is the source of all renewable energy, so renewable power, in fact, may be the quintessence.

Solar energy is the source of all energy on earth: creating wind and water movement and ultimately creating plants,[55] biomass,

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49. *See generally* American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009) (codified at 26 U.S.C. § 48).

50. *Id.*; *see also* David M. Herszenhorn, *A Smaller, Faster Stimulus Plan, But Still With a Lot of Money*, N.Y. TIMES, Feb. 14, 2009, at A14, *available at* http://www.nytimes.com/2009/02/14/us/politics/14stimintro.ready.html?_r=1.

51. *DOE Awards $155 Million to 41 Industrial Energy Efficiency Projects*, U.S. DEP'T OF ENERGY (Nov. 4, 2009), http://www1.eere.energy.gov/solar/news_detail.html?news_id=15600.

52. Derek Sands, *Report Documents Growing Number of State Efficiency Programs; Now 27 Have Standards*, ELECTRIC UTIL. WK., Oct. 18, 2010, at 12-13.

53. *See* Thomas Fowler, *Aristotle's Astronomy*, PERSEUS PROJECT, http://perseus.mpiwg-berlin.mpg.de/GreekScience/Students/Tom/AristotleAstro.html (last visited July 5, 2012).

54. *Id.*

55. Plants are a significant source of energy. Photosynthesis is an "endothermic reaction requiring 2.8 MJ of solar radiation to synthesize one molecule of glucose from six molecules of CO_2 and H_2O . . . . Most of the terrestrial phytomass productivity and storage is concentrated in large trees in forests." VACLAV SMIL, ENERGIES: AN ILLUSTRATED GUIDE TO THE BIOSPHERE AND CIVILIZATION 42, 46 (1999). Phytoplankton species in the oceans store this mass in the hydrologic cycle. Phytoplankton productions are 65-80% of the terrestrial phytomass total, but phytoplankton has a life span of only 1-5 days. *Id.* at 48. The most voluminous trees are the most massive life forms on earth, with the most phytomass, and

and animals that become fossil fuels when their organic matter decays. While the energy output of the sun in the direction of the Earth is about 1300 W/m^2 at its source, one-third is reflected back into space by the Earth's atmosphere, yielding as much as 1000 W/m^2 at the surface of the Earth at noon on a cloudless day, or an average over the hours of a year of about 170 W/m^2 of solar radiation reaches the Earth's oceans, and about 180 W/m^2 reaches the land surfaces.[56]

"Human capture of this energy is neither efficient nor prodigious. Energy used by humankind on the earth equals only approximately 0.01% of the total solar energy reaching the earth."[57] "[Wind power's] global [energy] potential is [thirty-five] times world electricity use."[58] Solar energy provides as much potential energy as humankind uses each year approximately every seventy minutes.[59]

> In fact, no nation on earth uses more energy than the energy content contained in the sunlight that strikes its existing buildings every day. The solar energy that falls on roads in the United States each year contains roughly as much energy content as all the fossil fuel consumed in the world during that same year.[60]

Some leaders of the oil industry suggest that fifty percent of total energy demand in the world could be met by solar, wind and other renewable resources by 2050.[61] In addition to environmental and climate benefits, a renewable energy economy would have national security benefits by reducing importation of fuels, as well as by reducing the vulnerability of the electricity grid to a terrorist attack.[62] We are shifting to more renewable resources. Do these

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are even larger than blue whales in mass. *Id.* at 51. Tropical forests use available nutrients rather inefficiently. *Id.*

56. *See id.* at 5. This results in total solar radiation annually of 2.7 x 10^{24} joules. This amount of energy reaching the earth in the form of solar radiation is about 8,000 times more than worldwide consumption of fossil fuels and electricity in the early 1990's. *Id.* at 6.

57. STEVEN FERREY WITH ANIL CABRAAL, RENEWABLE POWER IN DEVELOPING COUNTRIES: WINNING THE WAR ON GLOBAL WARMING 36 (2006).

58. Amory B. Lovins et al., *Forget Nuclear*, SOLUTIONS (ROCKY MTN. INST.), Spring 2008, at 1, 25, *available at* http://www.rmi.org/Knowledge-Center/Library/E08-04_ForgetNuclear.

59. *Id.*

60. FERREY WITH CABRAAL, *supra* note 57, at 36.

61. *See* JEREMY RIFKIN, THE HYDROGEN ECONOMY: THE CREATION OF THE WORLD-WIDE ENERGY WEB AND THE REDISTRIBUTION OF POWER ON EARTH 189 (2002).

62. *See* ROSS GELBSPAN, BOILING POINT: HOW POLITICIANS, BIG OIL AND COAL, JOURNALISTS, AND ACTIVISTS ARE FUELING THE CLIMATE CRISIS–AND WHAT WE CAN DO TO AVERT DISASTER 176 (2004).

"green" resources necessarily have less impact on land? It is clear that some of them do not derive from the land–instead converting wind and light waves to thermal and electric power. Yet some of the renewable resources also derive from the land, such as landfill gas ("LFG"), biomass resources, hydro, and ocean kinetic energy.

Because it is diffuse and not a concentrated type of energy, use of renewable power has land-use implications and impacts. Solar photovoltaic ("PV") technologies do require a relatively large amount of land compared to conventional means of power production.[63] Concentrating solar collectors require ten times as much land area, and wind turbines require up to seventy times as much land area, as does a typical fossil-fuel-fired power plant.[64] This is because solar technology is less efficient in generating electricity[65] through a centralized turbine technology than concentrated fossil-fuel technologies.[66] Concentrated solar power technology plants consume significant amounts of water because their electric production is less efficient than use of fossil fuels, and four states have denied permits for such solar facilities because of their water demands.[67] National environmental organizations generally supporting renewable energy have seen their local chapters split with them regarding specific siting decisions involving renewable projects.[68]

B. Federal Incentives Underwriting New Technologies and Shaping Future Land Impacts

By the end of 2010, the Treasury dispensed $5.53 billion in section 1603 cash grants to 1465 renewable project developers, principally denominated by wind project developers ($4.7 billion of the total for wind, with another $416 million for solar, and $414 million each for geothermal, LFG, hydroelectric, biomass and fuel cell), with another $9 billion of project eligibility in the pipeline.[69]

There is $6 billion for a loan guarantee program for renewable energy projects that began construction by September 2011, which should support about $60 billion of renewable loans for renewable

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63. *See* Robert Glennon & Andrew M. Reeves, *Solar Energy's Cloudy Future*, 1 ARIZ. J. ENVTL. L. & POL'Y 91, 103-104 (2010).

64. *See id.*

65. *See id.* at 101, 127 (showing less than 20% efficiency of installed solar capacity).

66. *Id.* at 101.

67. *Id.* at 95, 101.

68. *See id.* at 116, 121.

69. Jeffrey Ryser, *Cash Grant Program for Renewable Projects Could Leave Government Owing $9 Billion*, ELECTRIC UTIL. WK., Dec. 13, 2010, at 3 [hereinafter Ryser, *Cash Grant Program*].

power and transmission projects.[70] "In the first half of [2010], 339 MW of grid-connected PV power was installed."[71]

In the United States, the Production Tax Credit ("PTC") set forth in section 45 of the Internal Revenue Code remains the cornerstone of federal policies supporting renewable energy.[72] The PTC was originally enacted as part of the EP Act 1992 and has been periodically extended, with each extension lasting only for a limited period.[73] Qualified facilities are wind, closed-loop biomass, open-loop biomass, geothermal, small irrigation power, municipal solid waste ("MSW"), and qualified hydropower facilities.[74] These are set forth in Tables 1 and 2. Each of these renewable projects, if not sited atop an existing land use, has impacts on land. The PTC applies for ten years for wind and closed loop biomass and open-loop biomass built after August 8, 2005 and five years for other qualified facilities following the date the qualified facility was originally placed in service.[75]

As part of the Obama administration stimulus package,[76] the tax credit was maintained at $0.021/kwh for wind, geothermal, steam or fluid and "closed-loop" biomass, and at $.01/kwh for all other renewable projects.[77] Certain developers who otherwise could obtain this credit were allowed to elect an investment tax credit on tangible property instead, subject to some qualifications.[78] This essentially provides a cash grant instead of tax credits and is subject to five-year recapture rules.[79] A taxpayer may make an irrevocable election to have certain qualified facilities, placed in service in 2009 through 2013 (2012 for wind facilities), be treated as energy

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70. PAUL SCHWABE ET AL., NATIONAL RENEWABLE ENERGY LAB., RENEWABLE ENERGY PROJECT FINANCING: IMPACTS OF THE FINANCIAL CRISIS AND FEDERAL LEGISLATION 8 (July 2009), *available at* http://www.nrel.gov/docs/fy09osti/44930.pdf.

71. Jeffrey Ryser, *U.S. Solar Installations Head For Record Year Thanks to Lower Costs and '1603' Grants*, ELECTRIC UTIL. WK., Oct. 18, 2010, at 23-24.

72. *See generally* 26 U.S.C. § 45 (2006).

73. The Tax Relief and Health Care Act of 2006 extended the PTC to qualified facilities placed in service before January 1, 2009. *See* Pub. L. No. 109-432, § 201, 120 Stat. 2922 (codified as amended at 26 U.S.C. § 45).

74. The PTC also applies to Refined Coal. *See* 26 U.S.C. §§ 45(d)(8), (e)(8).

75. *Id.* §45(b)(4)(B)(i).

76. American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009) (codified at 26 U.S.C. § 48).

77. *Renewable Electricity Production Tax Credit (PTC)*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US13F&re=1&ee=0 (last updated June 03, 2011).

78. *Business Energy Investment Tax Credit (ITC)*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US02F&re=1&ee=1 (last updated Nov. 18, 2011).

79. *See id.*; HUGH M. DOUGAN & BRIAN WAINWRIGHT, GUIDANCE ON ENERGY TAX CREDIT ELECTION 2 (2009), *available at* http://www.pillsburylaw.com/siteFiles/Publications/67B3B52EE8FCCBAA3C1B31E916ADC54E.pdf.

property eligible for a section 1603 thirty percent investment credit under section 48.[80] These credits for renewable technologies are summarized in Table 3.

Congress in December 2010 passed the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010, which extends several expiring renewable energy and fuel tax incentives and includes some new incentives.[81] The Act extends the section 1603 grant in lieu of tax credits.[82] The section 1603 program will provide cash grants worth up to thirty percent of eligible costs of renewable energy projects.[83] Qualifying renewable energy projects receive cash payments from the U.S. Department of Treasury in lieu of the traditional energy-related production and investment tax credits under sections 45 and 48 of the Internal Revenue Code.[84] Qualifying projects include wind turbines, certain biomass facilities, geothermal facilities, LFG facilities, certain trash facilities, certain hydropower facilities, solar facilities, fuel cells, cogeneration facilities under 50 MW, gas micro-turbines and geothermal heat pumps,[85] as set forth in Table 1 below.[86]

80. DOUGAN & WAINWRIGHT, *supra* note 79.

81. *See generally* Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010, Pub. L. No. 111-312, 124 Stat. 3296 (2010).

82. DOUGAN & WAINWRIGHT, *supra* note 79, at 3.

83. *Id.* at 2-3.

84. U.S. TREASURY DEP'T, PAYMENTS FOR SPECIFIED ENERGY PROPERTY IN LIEU OF TAX CREDITS UNDER THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009, at 2 (rev. Apr. 2011), *available at* http://www.treasury.gov/initiatives/recovery/Documents/B Guidance 3-29-11 revised (2) clean.pdf.

85. *Id.* at 12-16.

86. *Id.* at 5.

Table 1: Extension of Renewable Energy Tax Credits and Grants

Energy Property	Termination Date	Credit Amount
Large Wind	Jan. 1, 2013	30%
Closed-Loop Biomass Facility	Jan. 1, 2014	30%
Open-loop Biomass Facility	Jan. 1, 2014	30%
Geothermal (under IRC sec. 45)	Jan. 1, 2014	30%
Landfill Gas Facility	Jan. 1, 2014	30%
Trash Facility	Jan. 1, 2014	30%
Qualified Hydropower Facility	Jan. 1, 2014	30%
Marine & Hydrokinetic	Jan. 1, 2014	30%
Solar	Jan. 1, 2017	30%
Geothermal (under IRC sec.48)	Jan. 1, 2017	10%
Fuel Cells	Jan. 1, 2017	30%
Microturbines	Jan. 1, 2017	10%
Combined Heat & Power	Jan. 1, 2017	10%
Small Wind	Jan. 1, 2017	30%
Geothermal Heat Pumps	Jan. 1, 2017	10%

Under the original law, a facility was required to be placed in service, or construction must have begun, before January 1, 2011.[87] Now, property qualifies if it was placed in service in 2011 or if construction began before 2012 and the project is placed in service before the applicable credit termination date (January 1, 2013 for large wind projects, January 1, 2014 for biomass, trash, marine and certain other facilities, or January 1, 2017 for solar,

87. MOLLY F. SHERLOCK, CONG. RESEARCH SERV., R41227, ENERGY TAX POLICY: HISTORICAL PERSPECTIVES ON AND CURRENT STATUS OF ENERGY TAX EXPENDITURES 9 (2011).

geothermal, fuel cells, micro-turbines, combined heat and power, small wind, and geothermal heat pump facilities).[88]

The Act also extends through 2011, related to renewable energy but unrelated to electric production, the $1.00 per gallon tax credits for the sale or use of biodiesel, renewable diesel, and biodiesel mixtures, as well as the alternative fuel credit and the alternative fuel mixture credit and the $0.10 per gallon small agri-biodiesel producer credit.[89] In 2009, about 65% of the projects elected the section 1603 refundable cash grant in lieu of the PTC, while in 2010 the percentage electing rose to 85%.[90]

88. *See* 26 U.S.C.A. § 45(d) (West 2012); *U.S. Dep't of Treasury – Renewable Energy Grants*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US53F (last updated Nov. 29, 2011).

89. Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010, Pub. L. No. 111-312, § 701, 124 Stat. 3296 (2010); *RIA Special Study: Energy-Related Tax Breaks and Disaster Relief Provisions Extended by the 2010 Tax Relief Act*, THURMAN, SHINN & CO., http://www.thurmanshinnco.com/custom13.php.

90. Ryser, *Cash Grant Program*, *supra* note 69, at 3.

Table 2: Summary of Credit for Electricity Produced from Certain Renewable Resources

Eligible electricity production activity (sec. 45)[1]	**Credit amount for 2010[2] (cents per kilowatt-hour)**	**Expiration[3]**
Wind	2.2	Dec. 31, 2012
Closed-loop biomass	2.2	Dec. 31, 2013
Open-loop biomass (including agricultural livestock waste nutrient facilities)	1.1	Dec. 31, 2013
Geothermal	2.2	Dec. 31, 2013
Solar (pre-2006 facilities only)	2.2	Dec. 31, 2005
Small irrigation power	1.1	Dec. 31, 2013
MSW (including LFG facilities and trash combustion facilities)	1.1	Dec. 31, 2013
Qualified hydropower	1.1	Dec. 31, 2013
Marine & hydrokinetic	1.1	Dec. 31, 2013

1. Except where otherwise provided, all section references are to the Internal Revenue Code of 1986, as amended.

2. In general, the credit is available for electricity produced during the first 10 years after a facility has been placed in service.

3. Expires for property placed in service after this date.

Table 3: Summary of Investment Tax Credit
Energy Production Incentives

		Credit Rate	Maximum Credit	Expiration
Energy credit (sec. 48)	Equipment to produce a geothermal deposit	10%	None	None
	Equipment to use ground or ground water for heating or cooling	10%	None	Dec. 31, 2016
	Microturbine property (< 2 MW electrical generation power plants of >26% efficiency)	10%	$200 per KW of capacity	Dec. 31, 2016
	Combined heat and power property (simultaneous production of electrical/ mechanical power and useful heat > 60% efficiency)	10%	None	Dec.31, 2016
	Solar electric or solar hot water property	30% (10% after Dec. 31, 2016)	None	None

		Credit Rate	**Maximum Credit**	**Expiration**
Energy credit (sec. 48)	Fuel cell property (generates electricity through electro-chemical process)	30%	$1,500 for each 1/2 KW of capacity	Dec. 31, 2016
	Small (<100 kW capacity) wind electri-cal genera-tion property	30%	None	Dec. 31, 2016

C. Land Impacts

1. Resource Consumption

Although "green" technologies are assumed to be beyond negative impact, renewable projects are not without significant land, water and other resource impacts. With fresh water supply becoming scarce in parts of the United States as global warming advances, concentrated solar collectors have drawn criticism because they consume up to 300% more water than coal and other fossil-fuel-fired power plants and require very large land areas.[91] Less than 1% of all the Earth's water is fresh water that is available for human use.[92] Four states already have denied permits for solar generation facilities recently because of lack of sufficient fresh water.[93]

Concentrating solar collectors require ten times as much land area, and wind turbines require up to seventy times as much land area, as does a typical fossil-fuel-fired power plant[94] because solar technology is less efficient in generating electricity[95] through a centralized turbine technology than concentrated fossil-fuel technologies.[96] National environmental organizations generally supporting renewable energy have seen their local chapters split with them regarding local opposition to specific siting decisions involving renewable projects.[97]

2. Grid Reach and Reliability

In 2008, forty-two percent of all new electric power capacity additions in the United States were wind power.[98] Moreover, the intermittent nature of the renewable power options of choice–wind turbines and solar power technologies–challenge the traditional reliability of the power grid: " '[e]lectricity is a unique energy form: [i]t cannot be stored or conserved with any efficiency. Therefore, electricity has substantially different value at different hours of

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91. *See* Glennon & Reeves, *supra* note 63, at 94, 100 tbl.1, 101, 103, 104 tbl.2.

92. *See Where is Earth's Water Located?*, U.S. GEOLOGICAL SURVEY, http://ga.water.usgs.gov/edu/earthwherewater.html (last modified May 09, 2012).

93. Glennon & Reeves, *supra* note 63, at 95.

94. *See id.* at 103-04.

95. *See id.* at 101, 127.

96. *Id.* at 101.

97. *See id.* at 116, 121.

98. AM. WIND ENERGY ASS'N, ANNUAL WIND INDUSTRY REPORT: YEAR ENDING 2008, at 2 (2009), *available at* http://www.awea.org/_cs_upload/learnabout/publications/5094_1.pdf.

the day, different seasons of the year, and at different places in the utility system.' "[99]

For construction, many renewable projects are dependent on various federal and state subsidies; recent decisions in Spain to renege on formerly pledged subsidies for renewable technologies underscore the fragility of alternative energy projects amid regulatory change.[100] Major subsidization of renewable power is coming under increasing criticism.[101] Push-backs to renewable power initiatives have occurred in California, Massachusetts, and Rhode Island.[102] These resource issues are evolving and ongoing.

Reaching renewable power and delivering it to load centers is a separate challenge to land. While renewable resources are distributed across the United States and the world, they are not distributed evenly. Nine states east of the Mississippi River do not have any sub-regions with very high wind resources.[103] Six states from Virginia to Massachusetts do not have any sub-regions with at least one-quarter million metric tons of currently available biomass annually.[104] These northeastern regions of the United States have relatively dense populations and significant electricity demand. However, with many buildings, there is always the potential of tapping energy efficiency as a substitute for additional generation capacity (see discussion below).[105]

An increase in use of renewable energy will require new transmission corridors and capacity to transport that power from the wind or solar generation site to load centers. The "grid" is composed not only of the approximately 4800 interconnected power generation resources in the United States, but also of future more dispersed power generation resources, efficiency capabilities and self-generation resources, as well as the cable to connect them with

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99. Steven Ferrey et al., *Fire and Ice: World Renewable Energy and Carbon Control Mechanisms Confront Constitutional Barriers*, 20 DUKE ENVTL. L. & POL'Y F. 125, 191 (2010).

100. *See* Glennon & Reeves, *supra* note 63, at 111.

101. *Id.* at 134-35.

102. Steven Ferrey, *Efficiency in the Regulatory Crucible: Navigating 21st Century 'Smart' Technology and Power*, 3 J. ENERGY & ENVTL. L. 1, 2 (2012).

103. *See* Charles F. Kutscher, *Overview and Summary of the Studies*, *in* TACKLING CLIMATE CHANGE IN THE U.S. 7, 22 fig.14 (Charles F. Kutscher ed., 2007).

104. *Id.* at 25 fig.19. These resources count agricultural residues, crops, animal manure, wood residues, municipal discarded materials and methane from landfill, as well as dedicated crop biomass. With the exception of Florida, the eastern half of the United States is devoid of sub-regions capable of producing 6.0 kwh/m^2/day with solar photovoltaic resources on south-facing structures and surfaces. *Id.* at 25, 20 fig.10.

105. *See* MARILYN A. BROWN ET AL., TOWARDS A CLIMATE-FRIENDLY BUILT ENVIRONMENT, PEW CTR. ON GLOBAL CLIMATE CHANGE, at iii (2005).

consumers, and the human intervention and hardware to manage them in an energized instantaneous network.[106]

The Joint Coordinated System Plan, a study commissioned by several power pools and independent system operators of transmission capacity, predicted that a 5% wind generation component by 2024 would require roughly 10,000 miles of additional high-voltage transmission lines constructed at an estimated cost of $50 billion.[107] A more aggressive 20% wind penetration target would require 15,000 miles of additional high-voltage transmission lines constructed at a cost of approximately $80 billion.[108] "[T]he Brattle Group estimates that it may take as much as $1.5 trillion to update the grid by 2030."[109]

When renewable power from remote sources will likely move in interstate commerce across state boundaries, it argues for cooperation of regional state regulators. However, there are constitutional issues if states form legal compacts to jointly promote energy planning.[110] The Interstate Compact Clause of the Constitution provides that:

> No State shall, without the Consent of Congress, lay any Duty of Tonnage, keep Troops, or Ships of War in time of Peace, enter into any Agreement or Compact with another State, or with a foreign Power, or engage in War, unless actually invaded, or in such imminent Danger as will not admit of delay.[111]

Therefore, multi-state compacts regarding power regulation require prior federal congressional approval to be constitutional.

However, even federal authority under current law also hits legal limits. "Section 216 [of the Energy Policy Act of 2005 ("EP Act 2005")] directs the DOE to study transmission congestion in consultation with the states, and designate certain transmission-constrained areas as national interest electric transmission cor-

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106. *See Glossary – E*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/tools/glossary/index.cfm?id=E (last visited July 5, 2012).

107. JOINT COORDINATED SYSTEM PLAN, EXECUTIVE SUMMARY 4 (2008), *available at* http://graphics8.nytimes.com/images/blogs/greeninc/jointplan.pdf [hereinafter EXECUTIVE SUMMARY]; *see also* JOINT COORDINATED SYSTEM PLAN, OVERVIEW/UPDATE (2008), *available at* http://www.interiso.com/public/meeting/20080627/ipsac_jcsp_overview.pdf.

108. EXECUTIVE SUMMARY, *supra* note 107, at 4.

109. U.S. DEP'T OF ENERGY, SMART GRID SYSTEM REPORT, at viii (2009).

110. *See* Steven Ferrey, *Goblets of Fire: Potential Constitutional Impediments to the Regulation of Global Warming*, 35 ECOLOGY L.Q. 835, 900-03 (2008).

111. U.S. CONST. art. I, § 10, cl. 3.

ridors ("NIETCs")."[112] Section 216 grants FERC "authority to issue permits to construct transmission facilities in these NIETCs under certain circumstances."[113] This has proven extremely difficult to do.

In 2006, FERC issued Order No. 689 that created a cumbersome, multi-year process for obtaining a federal permit to construct transmission within a NIETC.[114] A federal appeals court blocked FERC from acting to "backstop" and grant a federal permit under section 216 for a new transmission line, where the state had failed for twelve months to act on the permit.[115] As long as the state took some action, including a denial of the permit, this did not trigger FERC's section 216 authority to intercede.[116]

Finally, in 2011, the Ninth Circuit ruled that the DOE (1) failed to properly consult with affected states in preparing the Congestion Study, as required by section 216, and (2) failed to consider the environmental effects of designating NIETCs under the National Environmental Protection Act ("NEPA") for corridors in mid-Atlantic and southwestern states.[117] The federal push for NIETCs was criticized as running a giant extension cord to existing coal sources. Multiple suits for failure to adequately assess GHG impacts involving NEPA were filed by environmental groups, including the Natural Resources Defense Council ("NRDC"), in this and past actions,[118] and Endangered Species Act challenges regarding failure to assess GHG impacts may follow.[119]

Whether or not renewable power is the classical quintessence, solar power is the ultimate source of all renewable energy. As such, it is altering the shape of modern power, and power's effect on Earth and land.

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112. *Energy Law Alert: Ninth Circuit Decision Further Dismantles an Already Weakened Federal Transmission Siting Authority*, STOEL RIVES LLP (Feb. 2, 2011), http://www.stoel.com/showalert.aspx?Show=7427.

113. *Id.*

114. *See* Regulations for Filing Applications for Permits to Site Interstate Electric Transmission Facilities, 71 Fed. Reg. 69,440 (Dec. 1, 2006) (to be codified at 18 C.F.R. pts. 50, 380).

115. *See* Piedmont Envtl. Council v. F.E.R.C., 558 F.3d 304, 319-20 (4th Cir. 2009).

116. *Id.* at 315.

117. *See* Cal. Wilderness Coal. v. U.S. Dep't of Energy, 631 F.3d 1072, 1107 (9th Cir. 2011).

118. *See, e.g.*, Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 538 F.3d 1172 (9th Cir. 2008); Mid States Coal. for Progress v. Surface Transp. Bd., 345 F.3d 520 (8th Cir. 2003); Border Power Plant Working Grp. v. U.S. Dep't of Energy, 260 F. Supp. 2d 997 (S.D. Cal. 2003).

119. *See, e.g.*, Pac. Coast Fed'n. of Fishermen's Ass'ns v. Gutierrez, 606 F. Supp. 2d 1122 (E.D. Cal. 2008); N.R.D.C. v. Kempthorne, 506 F. Supp. 2d 322 (E.D. Cal. 2007).

IV. SMARTER USE OF LAND AND ENERGY

A. Waste as an Energy Source

Modern society will have to be smarter on how it uses the classical elements to create and utilize energy. At the beginning of the decade, the financial incentives and subsidies for solar were not as compelling as the current subsidies. Wind power was one of the more cost-effective renewable energy technologies based on installed and operating cost. Consequently, more than 90% of renewable power options developed and Renewable Portfolio Standard ("RPS") credits during the 2000-2010 period were claimed by wind power.[120] "[O]ver 50% of the non-hydro renewable capacity additions in the U.S. from 1998 through 2007 occurred in states with RPS programs . . . 93% of these additions came from wind power, 4% from biomass, 2% from solar, and 1% from geothermal."[121] Wind also is projected to be the dominant renewable energy technology going forward.

We often group "waste" fuels as "renewable" resources. The 1978 PURPA amendments to the Federal Power Act have done this for the last three decades,[122] as does the RPS in some of the states.[123] Waste resources and renewable resources have in common that these are resources we want to consume, precisely because they are constantly replenished, and there is an "opportunity cost" to not taking advantage of resource opportunities. This is particularly true of waste–most of which is placed in landfills and creates an environmental "negative" impact on land. About twenty percent of the National Priority List ("NPL") Superfund sites are or were MSW disposal facilities.[124]

There were 236.2 million tons of MSW created in 2003, of which 163.9 million tons were discarded.[125] The by-product of this landfill waste is the natural creation of LFG, which without any

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120. *See* Nat'l Renewable Energy Lab., *Wind Energy Update*, WIND POWERING AMERICA (Jan. 2012), http://www.windpoweringamerica.gov/pdfs/wpa/wpa_update.pdf.

121. RYAN WISER & GALEN BARBOSE, LAWRENCE BERKELEY NAT'L LAB., RENEWABLES PORTFOLIO STANDARDS IN THE UNITED STATES: A STATUS REPORT WITH DATA THROUGH 2007, at 1 (2008).

122. *See* 16 U.S.C.A. § 824a-3(e)(2) (West 2012).

123. *See Rules, Regulations, & Policies*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/incentives/index.cfm?EE=1&RE=1&SPV=0&ST=0&searchtype=RPS&sh=1.

124. OFFICE OF TECH. ASSESSMENT, PB86-120425, SUPERFUND STRATEGY 11 tbl.1-1 (1985) (listing 550 Superfund sites as of 1985). The NPL currently contains listed sites.

125. U.S. ENVTL. PROT. AGENCY, MUNICIPAL SOLID WASTE GENERATION, RECYCLING, AND DISPOSAL IN THE UNITED STATES: FACTS AND FIGURES FOR 2003, at 2 tbl.1 (2005), *available at* http://www.EPA.gov/wastes/nonhaz/municipal/pubs/msw03rpt.pdf [hereinafter MUNICIPAL] (listing figures for 2003).

other human intervention is about half methane, and is the only increasing renewable resource.[126] About two-thirds of the total waste is organic matter that will degrade to release methane under anaerobic conditions.[127] Because waste is composed of a high percentage of organic materials—including paper, food scraps, and yard waste—over time, bacterial decomposition of organic material, the volatilization of certain wastes, and chemical reactions within the landfill creates a gas degradation by-product.[128] This LFG is comprised primarily of carbon dioxide and 45-60% methane, while containing smaller amounts of non-methane organic compounds ("NMOCs") and some other trace organic elements.[129] LFG has an energy content of about 555 Btu/cu.ft., or roughly half the energy density of pipeline quality gas.[130] For comparison, pipeline natural gas contains about ninety-nine percent methane.[131]

For better or worse, waste generation is not a static variable:[132] between 1980 and 2003, total generation of MSW in the United States increased fifty percent to a level of 236.2 million tons annually.[133] In 2003, the per capita MSW generation rate was 4.45 lbs/person/day.[134] "In 2002, landfills accounted for 6.9 million metric tons of methane emitted annually."[135]

There are several options for use of this by-product gas: it can be captured and employed productively as a methane gas energy source, collected and flared for no productive purpose, or if left alone can migrate into the environment as a potent GHG.[136] Recently, methane destruction has been a prime target of the efforts to control emissions of global warming gases, because as a GHG,

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126. Craig Freudenrich, *How Landfills Work*, HOW STUFF WORKS, http://www.science.howstuffworks.com/environmental/green-science/landfill6.htm (last visited July 5, 2012).

127. *Id.* The composition of typical MSW is 35.2% paper, 12.1% yard waste, 11.7% food waste, 5.8% wood, 11.3% plastics, and 7.4% textiles, leather and rubber, and the remainder metals, glass and other materials. MUNICIPAL, *supra* note 125, at 5 fig.3.

128. *See* AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY, U.S. DEP'T OF HEALTH & HUMAN SERVS., LANDFILL GAS PRIMER: AN OVERVIEW FOR ENVIRONMENTAL HEALTH PROFESSIONALS 3 (2001), *available at* http://www.atsdr.cdc.gov/HAC/landfill/PDFs/Landfill_2001_ch2mod.pdf.

129. *Id.*

130. *BCR – Landfill Gas: An Alternative Fuel*, CERAMIC INDUSTRY (July 21, 2000), http://www.ceramicindustry.com/articles/bcr-landfill-gas-an-alternative-fuel.

131. *See Processing Natural Gas*, NATURALGAS.ORG, http://www.naturalgas.org/naturalgas/processing_ng.asp (last visited July 5, 2012).

132. For a discussion of ways to conserve resource usage, see *supra* Part II.

133. MUNICIPAL, *supra* note 125, at 1-2.

134. *Id.* at 4 tbl.3. This means that the average American generates his or her own weight in MSW approximately every month.

135. Steven Ferrey, *Converting Brownfield Environmental Negatives into Energy Positives*, 34 B.C. ENVTL. AFF. L. REV. 417, 419 (2007) [hereinafter Ferrey, *Converting Brownfield Negatives*].

136. *See* U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-1993, at 70 (1994).

methane has twenty-one times the warming impact, molecule-by-molecule, of CO_2.[137] The EPA estimates that each MW of electricity generated from LFG has about the same impact of planting 9000 acres of forest, removing 8100 cars per year, or eliminating the need for 4.8 million gallons of gasoline.[138] So it is better to burn or otherwise use LFG for energy, than allow it to migrate into the environment as a GHG.[139]

Existing statutes and regulations control the emission of this methane (if not yet controlling the emission of other GHGs), if, and only if, a very large landfill is involved as the source.[140] Both solid waste and air emissions statutes under federal law regulate operation of landfills in the United States. The Resource Conservation and Recovery Act ("RCRA") regulates control and monitoring of methane in the ground, while the Clean Air Act controls the environmental risk of escaping methane from landfills.[141]

RCRA mandates that all large landfills operating after 1991 install a protective "cap" to prevent gas from escaping.[142] Any landfill constructed or extended after October 1993 is required to install a protective lining around the sides and bottom of the landfill to prevent the lateral migration of LFG and groundwater contamination.[143] The Act requires that all MSW landfills have a methane gas concentration of less than "25 percent of the lower explosive limit for methane."[144]

The New Source Performance Standards ("NSPS") of the Clean Air Act apply to any new landfill which began modification, or construction, after May 30, 1991.[145] Under the NSPS, any owner or operator of a landfill that has a design capacity equal to or exceeding 2.5 million cubic meters must monitor NMOC emission rates.[146] If NMOC emission rates exceed 50 Mg/year, the landfill will be required to implement a LFG collection and control sys-

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137. *See* FERREY WITH CABRAAL, *supra* note 57, at 9 tbl.1-2.

138. *See LFG Energy Benefits Calculator*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/lmop/projects-candidates/lfge-calculator.html (last updated Mar. 28, 2012).

139. *See* STEVEN FERREY, UNLOCKING THE GLOBAL WARMING TOOLBOX 15-16 (2010).

140. *See* Ferrey, *Converting Brownfield Negatives*, *supra* note 135, at 435-46.

141. *Id.* at 436-40; Brendan Schlauch, *Methane from Landfills*, GOVERNING.COM (Aug. 31, 2009), http://www.governing.com/topics/energy-env/Methane-from-Landfills.html (noting that "[u]nder the federal *Clean Air Act*, only the nation's largest landfills are required to capture methane or burn it off." (emphasis added)).

142. *See* 40 C.F.R. § 258.40 (2011).

143. *See id.*

144. § 258.23(a)(1). The regulation defines the "lower explosive limit" as "the lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25 [degrees] Celsius and atmospheric pressure." § 258.23(d).

145. § 60.750(a).

146. § 60.752(b).

tem.[147] A landfill owner is required to "reduce NMOC by 98 weight-percent, or . . . to less than 20 parts per million by volume, dry basis as hexane at 3 percent oxygen."[148] Individual permits establish units for emissions of NO_x, CO, NMOC, PM, SO_2, VOC, and opacity (visible emissions).[149] Separate rules apply to landfills that do not come under the NSPS.[150]

Because methane is much more harmful as a global warming gas than CO_2, the most prevalent GHG, and the landfills are such a dominant anthropogenic source of methane emissions, it is a prime emission to control. The United States is responsible for approximately nine percent of worldwide methane emissions.[151] Of the anthropogenic methane emissions in the United States approximately twenty-nine percent—8.1 million metric tons—is from waste management.[152] "Landfills represent [ninety-eight] percent of the 8.1 million metric tons of methane emissions[,] . . . [by] far

147. §§ 60.752(b)(2), .754(a)(4)(i). Title 40, Part 60, subpart WWW of the Code of Federal Regulations provides the standards, record keeping, and reporting requirements for MSW landfills.

148. § 60.752(b)(2)(iii)(B).

149. A landfill is, in theory, a source of VOCs subject to Reasonably Available Control Technology ("RACT"). *See, e.g.*, 310 MASS. CODE REGS. 7.18(1)(a), (17)(a) (2011). But the RACT regulations do not specify any specific requirements for landfills. RACT applies only to facilities that have the potential to emit, prior to the "application of air pollution control equipment, greater than or equal to 50 tons (TPY) per year of NO_x." *Id.* 7.19(1)(a).

150. *See* 40 C.F.R. pt. 60, subpt. C. Under the NSPS and under 40 C.F.R. pts. 51, 52, and 60, landfills that meet certain size and age requirements are required to install and operate an active or passive LFG collection system that meets specified performance criteria and install devices that combust and destroy at least 98% of the NMOCs in the collected LFG or reduce the NMOCs concentration in the combustion gases to less than twenty ppm (dry basis as hexane at 3% oxygen). Specifically, landfills that commenced construction prior to May 30, 1991, accepted waste since November 8, 1987, have a design capacity to dispose of greater than 2.75 million tons of solid waste, and are projected to emit more than fifty tons per year of NMOCs without controls are subject to the requirements. *See* 40 C.F.R. § 60.752(b)(2)(iii)(B).

151. *See* U.S. ENVTL. PROT. AGENCY, GLOBAL ANTHROPOGENIC NON-CO_2 GREENHOUSE GAS EMISSIONS: 1990-2020 Appendix A-2 (2006), *available at* http://www.epa.gov/climatechange/economics/downloads/GlobalAnthroEmissionsReport.pdf. The EPA estimates that in 2000, global levels of methane emissions reached approximately 6020.16 $MtCO_2eq$ (million metric tons of carbon dioxide equivalent), while the United States emitted roughly 546.42 $MtCO_2eq$. *Id.*

152. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, EMISSIONS OF GREENHOUSE GASES IN THE UNITED STATES 2001, at xii-iii (2002), *available at* ftp://eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggrpt/057301.pdf [hereinafter EMISSIONS 2001]. This value has been decreasing because of a robust effort to capture methane for productive purposes or destruction. *Id.* at 40. Landfills constitute the single largest source of methane emissions within the United States. *Id.*; *see also* U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2003, at 261 (2005), *available at* http://www.epa.gov/climatechange/emissions/downloads06/05CR.pdf. They are responsible for 17% of human-related methane emissions, while human-related activities such as natural gas and petroleum systems, livestock and wastewater treatment, along with landfills account for more than 50% of all emissions. *See Sources and Emissions*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/outreach/sources.html (last updated Apr. 18, 2011).

the single largest source."[153] Approximately 4.9 million metric tons of the 8.1 million metric tons of methane produced annually is captured as LFG, and 2.5 million metric tons of this is used for productive energy use, while 2.4 million metric tons of the recovered LFG is flared with no productive energy capture.[154] It is estimated that "each year . . . 421 to 613 billion cubic feet of methane from landfills alone is wasted."[155] That amount of methane could produce up to 4000 MW of electricity, which would be enough to power three million homes.[156]

The EPA estimates the levelized generating costs of LFG-to-electricity technology at $45.67/mwh (4.57¢/kwh), which makes LFG electricity less expensive than wind, geothermal, and solar PV resources, and competitive with some fossil fuel-generated electricity.[157] In addition to landfilling MSW and then capturing the methane produced as an energy fuel, the organic material can be directly combusted to release energy. Fourteen percent of MSW in the United States is incinerated, and some of that incineration is coupled with a turbine to produce electricity.[158] In 2002, there were 107 active waste-to-energy combustion facilities in operation in the United States.[159] Waste-to-energy combustion of MSW in the United States generated 289 trillion Btu of energy in 2001, representing approximately 0.3% of total electricity demand in the United States.[160] Thirty-one percent of the MSW stream in the United States is recycled or composted, an increase of almost double from a decade earlier.[161]

About half of the methane productively captured and used at landfills is utilized for electric production, as opposed to direct thermal use of the methane for heat.[162] This methane could

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153. EMISSIONS 2001, *supra* note 152, at 40. "The remain[ing 2%] of [these] emissions from waste management is associated with domestic wastewater treatment [programs]." *Id.*

154. *Id.*

155. Cory M. Gonyo, *Landfill Gas/Methane Gas: A Liability and an Asset*, 1 GREAT PLAINS NAT. RESOURCES J. 149, 152 (1996).

156. *Id.*

157. Jennifer Weeks, *Landfills Expand Energy Output*, BIOCYCLE, Aug. 2005, at 48.

158. *Combustion Efficiency*, NOVA ENERGY, LLC, http://www.wte.novoenergyllc.com/index.php?option=com_content&view=category&layout=blog&id=40&Itemid=60 (last visited July 5, 2012) ("[Waste to energy] projects reduce the amount of waste going to landfills by approximately 90-95 percent on a volume reduction basis.").

159. Kaufman et al., *supra* note 127, at 31-41.

160. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, RENEWABLE ENERGY ANNUAL 2002 WITH PRELIMINARY DATA FOR 2002, at 11 tbl.9 (2003), *available at* ftp://ftp.eia.doe.gov/renewables/060302.pdf.

161. *See* MUNICIPAL, *supra* note 125, at 3.

162. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, EMISSIONS OF GREENHOUSE GASES IN THE UNITED STATES 2002, at 36 (2003), *available at* ftp://eia.doe.gov/environment/057302.pdf. "Of the 5.9 million metric tons of methane believed to be captured from [U.S.

also be utilized in fuel cells or converted to methanol or ethanol.[163] There are approximately one dozen micro-turbines in operation at LFG facilities.[164]

However, regarding the production of energy, again the *legal* nature of the land at issue is a factor: the bulk of landfills in the country are municipally owned.[165] Municipalities often see landfills as environmental problems, without thinking "outside the box" to realize other opportunities with this land. Only a very small percentage of these have captured LFG for environmental purposes, or energy production or both. For example, "[o]f the approximately 715 active and closed landfills in Massachusetts, 16 landfills . . . hav[e] been developed with some type of LFG to energy project."[166] Approximately ninety-seven percent of the 715 Massachusetts landfills are owned by agencies of government, instead of in private ownership.[167]

"Larger sized landfills produce more LFG, since they have a larger waste mass. LFG production decreases annually after closure, therefore producing less LFG in older landfills."[168] Any landfill with at least 20-25 acres or more and approaching approximately 1 million tons of MSW waste, closed in the past decade, offers potential.[169] Even a very small municipal project can yield net revenues to the municipality of $250,000 or more annually.[170] However, with each year that the owner or controller of a landfill does not seize these opportunities, the value of the energy declines proportionately. Moreover, with each year, the escape of methane to the environment increases.

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landfills] in 2002, 3.0 million metric tons was recovered for energy use, and 2.9 million metric tons was recovered and flared." *Id.*

163. Weeks, *supra* note 157.

164. *Id.*

165. *See* U.S. ENVTL. PROT. AGENCY, ECONOMIC ANALYSIS OF FINAL EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS FOR THE LANDFILLS POINT SOURCE CATEGORY 3-7 (1999), *available at* http://water.epa.gov/scitech/wastetech/guide/landfills/upload/economics.pdf.

166. Letter from SCS Engineers, to Marybeth Campbell, Public Educ. Coordinator, Renewable Energy Trust, Preliminary Landfill Site Screening and Evaluation 3 (May 15, 2006), *available at* http://www.masstech.org/Project Deliverables/LandfillSiteScreeningStudy.pdf [hereinafter Landfill Study].

167. *See generally* MASS. DEP'T OF ENVTL. PROT., INACTIVE & CLOSED LANDFILLS & DUMPING GROUNDS (May 2012), *available at* http://www.mass.gov/dep/recycle/inactlf.pdf.

168. Landfill Study, *supra* note 166, at 3.

169. Author's calculations from development experience. Waste in place totals are not available for all landfills. Landfill acreage can be used to estimate volume.

170. Author's estimation, assuming a single small 800 kW capacity engine and sale of power at a price of $0.05/kwh plus a state renewable energy credit of $0.02/kwh, which would yield approximately $500,000 annually in gross revenue from constant operation, with about half of the gross revenue amount devoted to capital investment cost amortization of the engine. Most LFG projects employ multiple engines of approximately this size.

B. Recycling Distressed Land for Other Renewable Energy Generation Options

1. Wind Turbines

California offers an example of issues associated with the siting of wind projects on land. The California PUC rejected utility Pacific Gas & Electric's proposal for a large wind farm as too costly and risky to ratepayers.[171] A federal court judge temporarily enjoined the separate 709 MW Tessara Solar project in the Imperial Valley in a suit by a Native American tribe alleging lack of sufficient consultation from the Department of Interior Bureau of Land Management,[172] and ordered the parties to engage in settlement talks.[173] On a third matter, the Sierra Club sued to enjoin the 663-MW Calico solar project, alleging that California's rush was "in conflict" with " 'longstanding environmental laws.' "[174]

Landfills offer a different status of land: wind turbines could be sited on many landfills. These landfills may be at an elevated height, are cleared, and offer some typical distance from other inhabited land. The power to be generated by a wind turbine is determined by the cube of the swept area of the blades and the square of the wind speed.[175] A taller wind turbine can support larger blades creating a larger swept blade area, and wind speeds at greater height can be greater.[176]

In many states, large projects above a certain size must be approved at the state level.[177] For example, large wind projects may need to be approved prior to construction by a state facility siting authority.[178] Even smaller-scale wind projects can require approval if the project will require a new transmission line that is over one mile long or rated at over 69 kilovolts.[179] The Federal Aviation Administration ("FAA") also controls wind turbine height issues and requires that persons constructing structures 200 feet tall or

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171. Lyn Corum, *CPUC ALJ Rejects PG&E's Proposal for 246-MW Wind Farm as Too Costly*, ELECTRIC UTIL. WK., Jan. 3, 2011, at 8.

172. Jeffrey Ryser, *Tessara California Solar Project Hits Bump as US Judge Orders Halt to Construction*, ELECTRIC UTIL. WK., Dec. 20, 2010, at 17.

173. Jeffrey Ryser, *Judge Tells Tribe to Enter Settlement Talks with BLM on California Solar Project*, ELECTRIC UTIL. WK., Jan. 10, 2011, at 4.

174. *Id.* at 6.

175. *See* FERREY, INDEPENDENT POWER, *supra* note 18, § 2:11.

176. *See id.*

177. *See id.* § 6:140.

178. *See, e.g.*, MASS. GEN. LAWS ANN. ch. 164, § 69J (West 2012).

179. *See, e.g.*, *id.* §§ 69G, 69J.

higher submit a "Notice of Proposed Construction or Alteration."[180] This federal requirement resulted in blocking a proposed wind development in the town of Yarmouth, Massachusetts.[181]

There is only one landfill in the United States on which there is a wind turbine. That is the Hull Wind II in Hull, Massachusetts, which went on-line in May 2006,[182] stands 330 feet in height and can power approximately 750 homes.[183] It had a simple 7.5 year payback on the investment, assuming it offsets power retailing at 10¢/kwh.[184]

2. Solar Energy Facility Siting

Quintessence. Solar PV technology today is more likely to be utilized than in recent years. In addition to the tax credit and grant resources sited in the tables above, several states through their RPS systems offer significant additional incentives. PV will assume a more significant share of renewable energy development going forward. One advantage of solar PV is that it only produces electricity when the sun is shining. This also corresponds with the peak demand time for electric power.

The California PUC Chair announced that smaller-scale renewable projects have the advantage of being able to be located on disturbed land and are less likely to require transmission upgrades.[185] In fact, landfills have become a prime location for the siting of large arrays of solar PV electric generation. This is for several reasons. First, it can be easier and less expensive to field-mount a large array of solar collectors, rather than find enough rooftop space to mount them. It can require about five acres of area to contain enough PV collectors to generate 1 MW of power when

180. *See* 14 C.F.R. §§ 77.7, 77.9 (2011); FED. AVIATION ADMIN., NOTIFICATION OF PROPOSED CONSTRUCTION OF ALTERATION ON AIRPORT PART 77, *available at* http://www.faa.gov/airports/central/engineering/part77/ (last updated Sept. 08, 2011).

181. *See* Another Cape Conservative, *Barnstable Denies Yarmouth*, CAPECODTODAY: THE YARMOUTH TAXPAYER (Dec. 26, 2005, 5:02 PM), http://www.capecodtoday.com/blogs/index.php/Yarmouth/2005/12/26/barnstable_denies_yarmouth_again.

182. It is a single turbine 1.8 MW facility. JAMES F. MANWELL, UNIV. OF MASS., THE HULL WIND II PROJECT (2006), http://www.umass.edu/windenergy/downloads/pdfs/MWWG_Hull_II__Manwell_May06.pdf (presentation at the May 30, 2006 meeting of the Massachusetts Wind Working Group). There is also one wind turbine on a former landfill in Germany. *See Germany-Repower to Erect Wind Turbine for HAMBURG ENERGIE on Georgsweder Energieberg*, WINDFAIR.NET (Nov. 9, 2010), http://www.windfair.net/press/8366.html.

183. Ferrey, *Converting Brownfield Negatives*, *supra* note 135, at 434. It is located on top of a capped landfill, known as the George Washington Boulevard Landfill, on the opposite side of town from Windmill Point. *Id.*; MANWELL, *supra* note 182.

184. MANWELL, *supra* note 182.

185. Weinzimer, *supra* note 27, at 16.

the sun is shining.[186] The land area for such an array must be flat, cleared of trees and vegetation, and a secure location for the anchoring of what will be several million dollars of PV panels for each MW of generation capacity.[187] Landfills often offer this size of land that is already cleared and maintained. There can be a raised elevation to some landfills from the elevation of the waste within that makes unobstructed solar access even clearer.

Second, if in a developed part of a municipality, the landfill may either have electric service already supplied or close proximity to the electric transmission network. This makes it straightforward to export the PV power to consumers. As most landfills in the United States are municipally-owned, power could be sold to the municipality for its buildings and needs.

Third, there can be tax advantages for siting a project at a landfill that is municipally owned. PV installations require more capital value than almost all other sources of power generation. This increases the value of equipment at the site that can be subject to the property tax. While some states have provisions that appear to exempt solar improvements from property taxation, this may not be applied. For example, the Massachusetts tax code exempts from local property taxation solar units that generate power for a property that is otherwise subject to property tax (in other words, not owned by a municipality or tax-exempt non-profit institution).[188] However, for interpretive reasons that have not been articulated, one of the first large 2 MW PV projects in Massachusetts is being subjected to local property taxation on its capital value, despite this provision of state law.[189]

This issue disappears if a municipal landfill, or other tax-exempt property, is the location of a PV or other renewable power unit. Municipal and other property owned by a tax-exempt entity, is not subject to property tax.[190] In one regard, this makes the sale of power, renewable energy credits, or other regulatory attributes a non-income-taxable event. In addition to municipal landfills, this makes many universities, museums, and other government owned land prime opportunities for siting or owning renewable and other

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186. Author's estimation from the author's experience in providing counsel to solar developers.

187. *Id.*

188. MASS. GEN. LAWS ANN. ch. 59, § 5, cl. 45 (West 2012).

189. Stephen Singer, *Solar Energy Project Debuting in Pittsfield*, BOSTON GLOBE, Nov. 14, 2010, http://www.boston.com/news/local/massachusetts/articles/2010/11/14/solar_energy_project_debuting_in_pittsfield; *see also* David L. O'Connor et al., *MA Senate Bill Would Revise Incentives for Renewable Energy Development*, MINTZ LEVIN, http://www.mintzlevin.com/newsletter/2012/Advisories/1795-0412-NAT-ECT/index.html.

190. *See* MASS. GEN. LAWS ANN. ch. 59, § 5, cl. 45.

power generation units. To emphasize new dispersed and renewable power generation in small increments, this makes dispersed land areas sites for new energy sources.

This fundamentally changes the nature of where we site power generation and the need for transmission infrastructure. Power will increasingly be dispersed to be sited on existing land uses where there are buildings and consumers of power. This diminishes the need for additional power transmission corridors to carry power from remote sites to major cities and load centers. This changes the balance of power.

It also changes the profile of pollution emissions. In the United States, the recent trend has been to site large power generation facilities in more remote locations with access to cooling water. To the extent that this is fossil-fueled self-generation or cogeneration, this shifts sources of pollution both locationally and in dimension. Conventional generation closer to users brings greater pollution into city areas. Second, smaller fossil-fuel-fired generation tends to be less efficient and more costly, *ceteris paribus*, than large generation units. This will produce more pollution from the smaller units per unit of electricity that is produced. To alter this, the technology of generation must change: this is why renewable power resources are a critical part of this transition. There are no criteria pollutants generated in the operation of wind and PV power generation. Thus, this can reduce pollutants.

3. The Evaluation Process

Today, we evaluate the impacts on the classical elements of Earth, Air, Water, and Fire, before we commit to major actions with significant impact on the environment. For new projects, there needs to be a process of evaluation and mitigation of land and energy impacts, among others. The federal NEPA process evaluates the land impact of various new projects that involve significant federal funding or permits.[191] Some states have gone even further adding additional consideration of GHG impacts, which evaluates the carbon impact of various energy uses and land impacts. For example, for GHGs and other land uses, Massachusetts has adopted a sophisticated process.

Massachusetts has mandated by order that GHG environmental impacts be considered in the evaluation of new projects that

191. 42 U.S.C. §§ 4321, 4332 (2006).

could significantly impact the human environment.[192] Massachusetts Executive Office of Energy and Environmental Affairs determined that the phrase "damage to the environment," as used in the existing Massachusetts Environmental Policy Act ("MEPA"), which requires preparation of environmental impact reports ("EIR") before state permitting or funding of projects, includes the emission of GHGs caused by projects subject to MEPA review.[193] The policy requires that certain projects undergoing review by the MEPA office quantify the project's GHG emissions and identify measures to avoid, minimize, or mitigate such emissions, and quantify the impact of proposed mitigation in terms of emissions and energy savings.[194]

In the EIR, the proponent must "outline and commit to a series of mitigation measures that will help to reduce GHG emissions from the proposed project."[195] The analysis focuses primarily on CO_2; yet analysis of other GHGs may be required for certain projects, "such as methane emissions from landfills and wastewater treatment plants, emissions of hydrofluorocarbons and perfluorocarbons from the manufacturing, servicing and disposal of refrigeration and air conditioning equipment, and other GHGs emitted through various chemical and manufacturing processes."[196] The analysis must encompass both "direct" GHG emissions[197] and "indirect" emissions (for example, emissions from vehicles driven by employees and generating plants supplying electricity to the pro-

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192. MASS. EXEC. OFFICE OF ENERGY & ENVTL. AFFAIRS, REVISED MEPA GREENHOUSE GAS EMISSIONS POLICY AND PROTOCOL 1 (2010).

193. *See* 301 MASS. CODE REGS. 11.01 (2011); *see also* MASS. EXEC. OFFICE OF ENERGY & ENVTL. AFFAIRS, *supra* note 192.

194. MASS. EXEC. OFFICE OF ENERGY & ENVTL. AFFAIRS, *supra* note 192, at 3.

195. *Id.*

196. *Id.*

197. *See id.* at 4.

> "Direct Emissions" means the emissions from on-site stationary sources of the facility itself. Stationary sources typically emit GHGs by burning fossil fuels for heat, hot water, steam, on-site electricity generation, and other processes. Stationary sources include, but are not limited to, boilers, heaters, furnaces, incinerators, ovens, internal combustion engines (including emergency generators), combustion turbines, and any other equipment or machinery that combusts carbon bearing fuels or waste streams. See the 'Calculation Tool for Direct Emissions from Stationary Combustion Sources' available at the www.ghgprotocol.org website for more information on direct emissions from stationary sources.

Id. For most fuel types, the Energy Information Administration Documentation for Emissions of GHGs in the United States 2003 provides the appropriate factors. This document is available at http://www.eia.doe.gov/oiaf/1605/ggrpt/documentation/pdf/0638(2003).pdf. *Id.* at 8.

posed operation).[198] Mitigation for siting and design variables includes several elements that have direct or indirect impact on land:[199]

- Providing permanent protection for open space on the project site.
- Minimizing building footprint.
- Minimization of energy use through building orientation.
- Incorporate super insulation to minimize heat loss.
- Incorporate on-site renewable energy sources into project including solar, wind, geothermal, low-impact hydro, biomass and biogas strategies.
- Incorporate combined heat and power (CHP) technologies.

V. CONCLUSION

For thousands of years, every culture and Greek philosophy, as well as religions including Hinduism, Buddhism, Chinese and Japanese religions, adopted the classical theory holding that there were four basic elements from which everything in life was constructed: Earth, Water, Air and Fire.[200] They were thought to be part of alchemy in Medieval times,[201] and even today remain, as the signs of the zodiac are divided into twelve signs equally divided under the four classical elements. The fifth element, quintessence or aether, was thought by Aristotle to make up the stars in the solar system.[202] Today, these elements work the alchemy of the new solar dimension of renewable energy and quintessence. Land affects energy, and energy affects Earth.

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198. *Id.* at 4. The proponent should quantify the GHG emissions derived from the "purchase and consumption of electricity, heat (steam, hot water, etc.) or cooling provided from off-site sources such as the electrical utility or district heating or cooling systems." *Id.* at 4. "The proponent should use the current ISO-New England Marginal Emissions Report, which provides CO_2 emission factors expressed as pounds of CO_2 per megawatt hour for a variety of stationary combustion sources. The ISO-NE Marginal Emissions Report for 2007 is available at: http://www.isone.com/genrtion_resrcs/reports/emission/2007_mea_report.pdf." *Id.* at 8.

199. *Id.* at 14-15.

200. Marks, *supra* note 3.

201. Snell, *supra* note 4.

202. *See* Fowler, *supra* note 53.

The "chicken or egg" question is not the only inquiry. In an era of large federal and state budget deficits, and importation of substantial fossil fuel resources to meet energy needs, as well as concern about environmental degradation to land and other environmental media, the question is how to be more efficient and better utilize less intrusive ways to produce needed energy. Energy is the signature technology of modern times–covering the last 0.1% of human history on the Earth. Renewable resources are now playing an increasingly prominent role in the new energy infrastructure, and new energy infrastructure has impacts on land.

The recent stimulus funding has pumped unprecedented dollars into new energy supply and infrastructure, but paid no particular attention to land impacts. Land is a classical element and a critical piece of the total package. Traditionally interlinked: land yields and uses energy, and energy impacts the use of land. They are linked by the fifth element, aether, in a simultaneous and ongoing policy and legal equation.

LAND USE FOR ENERGY CONSERVATION AND SUSTAINABLE DEVELOPMENT: A NEW PATH TOWARD CLIMATE CHANGE MITIGATION

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I. INTRODUCTION

Land use tools and techniques have impressive potential to reduce energy consumption, improve the economy, and mitigate climate change. This article explores the little understood influence of local land use decision-making on energy conservation and sustainable development and how it can mitigate climate change if properly assisted by the federal and state governments. The construction and use of buildings combined with extensive vehicular travel throughout the nation's human settlements consume large amounts of energy, and much of that consumption is highly inefficient. By enforcing and enhancing energy codes, encouraging the use of combined heat and power and district energy systems, properly orienting and commissioning buildings, incorporating renewable energy resources, facilitating compact, mixed-use development, and promoting transit and other methods of reducing vehicle miles travelled ("VMT"), local land use law's potential to achieve energy conservation and sustainable development can be unlocked. These techniques can be organized at the neighborhood level and aggregated by adopting local Energy Conservation Zoning Districts in neighborhoods where significant energy conservation can be achieved. The article proposes federal and state policies, combining features of both the Coastal Zone Management Act and the Enterprise Zone initiative that can facilitate local land use initiatives that will shape human settlements and control the built environment as a new path toward energy efficiency and climate change mitigation.[1]

1. This article is one of four that examine how local land use law can be used as an effective strategy to mitigate climate change. *See* John R. Nolon, *The Land Use Stabilization Wedge Strategy: Shifting Ground to Mitigate Climate Change*, 34 WM. & MARY ENVTL. L. & POL'Y REV. 1 (2009) [hereinafter *Land Use Stabilization Wedge*]; John R. Nolon, *Managing Climate Change through Biological Sequestration: Open Space Law Redux*, 31 STAN. ENVTL. L.J. (forthcoming Spring 2012) (manuscript on file with author) [hereinafter *Open Space Law Redux*]; John R. Nolon, *Regulatory Takings and Property Rights Confront Sea Level Rise: How Do They Roll?*, 21 WIDENER L.J. (forthcoming 2012) (manuscript on file with author).

II. THE LAND USE-ENERGY CONSERVATION CONNECTION

A. Land Use, Energy Consumption, and Climate Change

According to the most conservative United States Bureau of Census estimates, our population will increase by over 100 million by mid-century.[2] In order to accommodate this growth, as much as sixty-six percent of the development on the ground in 2050 will be built between now and then.[3] The construction and operation of buildings as well as the VMT for daily work, errands, and pleasure will account for a large percentage of the energy needs by mid-century.

The Intergovernmental Panel on Climate Change (IPCC) released its "Fourth Assessment Report" on climate change in 2007.[4] According to this document, global temperatures and sea levels have risen dramatically.[5] In the IPCC's words, these changes are "very likely due to the observed increase in anthropogenic [greenhouse gas] (GHG) concentrations," as global GHG emissions have risen "70% between 1970 and 2004."[6] CO_2 specifically composed 77% of total anthropogenic GHG emissions in 2004, resulting in 38 gigatonnes (Gt) of CO_2 being released into the atmosphere.[7] As of 2009, CO_2 represents 83% of the total GHG emissions in the Unit-

2. The Census Bureau released national population projections, based on four different immigration scenarios. *National Population Projections*, U.S. CENSUS BUREAU, http://www.census.gov/population/www/projections/2009summarytables.html (last visited July 5, 2012). The "Low Net International Migration Series" predicted that the population would be 402,320,000 by 2043 and would be 422,554,000 by 2050. *Summary Tables: Low Net International Migration Series*, U.S. CENSUS BUREAU, http://www.census.gov/population/www/projections/2009lnmsSumTabs.html (follow the "Excel" link under the heading "1. Projections of the Population and Components of Change for the United States: 2010 to 2050") (last visited July 5, 2012). This is roughly a 1/3 increase in the population by the year 2043.

3. REID EWING ET AL., URBAN LAND INST., GROWING COOLER: THE EVIDENCE ON URBAN DEVELOPMENT AND CLIMATE CHANGE 8 (2007).

4. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), CLIMATE CHANGE 2007: SYNTHESIS REPORT (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf [hereinafter IPCC SYNTHESIS REPORT]. *See generally* JOHN R. NOLON & PATRICIA E. SALKIN, CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT LAW IN A NUTSHELL 22-23 (2011) (indicating the sufficiency of the reports the IPCC report was based on by stating that "[o]ver 40 writing teams and 450 lead authors–selected as lead authors because of their expertise–contributed to the Fourth Assessment Report. The report contains over 18,000 citations to scientific reports, the majority of which were published in peer-reviewed journals. The lead authors were assisted by over 800 scientists and analysts who participated as contributing authors on specific topics. These authors contributed their time and were assisted by four Technical Support Units with paid staff.").

5. *See* IPCC SYNTHESIS REPORT, *supra* note 4, at 30.

6. *Id.* at 36, 39.

7. *Id.* at 36.

ed States.[8] The IPCC's Special Report on Emissions Scenarios projects an increase of global GHG emissions by 25 to 90% (CO_2-eq) between 2000 and 2030.[9] Consistent with such an increase, "[c]ontinued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century."[10]

In the United States, observable signs of climate change include increased air and water temperatures; degradation of fresh water fish habitat; diminished terrestrial biodiversity; increased bleaching and die-off of coral reefs; increased frequency and intensity of heavy downpours; a rise in sea level; reduced snow cover, glaciers, permafrost, and sea ice; reduced water supply in some regions; a longer ice-free period on lakes and rivers; a longer growing season; and increased water vapor in the atmosphere.[11] These changes will affect human health,[12] water supply,[13] agriculture,[14] coastal areas,[15] and many other aspects of society and the natural environment.[16] This report effectively introduces the broad range of issues that climate change raises, but it presupposes that climate change is happening. This has been carefully documented and is now widely accepted by a growing number of respected institutions and agencies.[17]

No matter how we grow, the energy consumed in construction, building operation, and travel will worsen climate change.[18] This puts great pressure on policymakers, regulators, and the development industry to shape and control new development to minimize energy use and the resultant emissions caused by development. Under our legal system, the legal rules that dictate energy efficiency in new buildings and the frequency and intensity of travel within and between human settlements are often created and routinely enforced by local cities, villages, towns, and counties.[19]

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8. U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2009, at ES-6 (2011) [hereinafter EPA GREENHOUSE GAS INVENTORY].

9. IPCC SYNTHESIS REPORT, *supra* note 4, at 44.

10. *Id.* at 45.

11. U.S. GLOBAL CHANGE RESEARCH PROGRAM, GLOBAL CLIMATE CHANGE IMPACTS IN THE UNITED STATES 9 (2009) [hereinafter GLOBAL CLIMATE CHANGE IMPACTS IN THE U.S.]. The U.S. Global Change Research Program was charged with the responsibility of preparing this report by the Federal Advisory Committee Act. *Id.* at 7.

12. *Id.* at 89.

13. *Id.* at 41.

14. *Id.* at 71.

15. *Id.* at 12.

16. *Id.* at 99.

17. *See Open Space Law Redux*, *supra* note 1 (manuscript at 5-9).

18. *See infra* text accompanying notes 21-23.

19. *See Land Use Stabilization Wedge*, *supra* note 1, at 21-26; *Open Space Law Redux*, *supra* note 1 (manuscript at 11-19).

B. Human Settlement Patterns and Building Construction

Residential and commercial buildings use an extraordinary amount of electricity and energy. In 2008, U.S. residential and commercial buildings used 29.29 quadrillion BTUs, which was 73.2% of all electricity produced in the United States.[20] The Department of Energy projects that by 2035, residential and commercial buildings will use 76.5% of the total electricity in the United States.[21] Furthermore, "[r]oughly 41% of total U.S. energy consumption in 2010 was used in [residential and commercial] buildings . . . ."[22] Inherent to the nation's energy system are significant inefficiencies. Two-thirds of the energy used to produce electricity is vented as heat that escapes into the atmosphere during generation,[23] and up to 15-20% of the net energy produced at these plants is lost in transmission: so-called line losses.[24]

Due to the large amount of electricity that residential and commercial buildings require, these buildings are responsible for a significant amount of GHG emissions. In 2009, residential and commercial buildings accounted for thirty-five percent of CO_2e emissions, totaling 2.34 Gt CO_2e.[25] Improvements in the generation of electricity and its transmission to these buildings, and in building construction can significantly lower energy waste and use and greatly lower GHG emissions in the United States.

One of the main drivers of GHG emissions and thus climate change is transportation. Nationally, the EPA found that "[t]ransportation activities . . . accounted for [thirty-three] percent of CO_2 emissions from fossil fuel combustion in 2009 . . . . Nearly [sixty-five] percent of [these] emissions resulted from gasoline consumption for personal vehicle use."[26] For example, passenger cars alone emitted 0.6274 Gt CO_2e in 2009.[27] Although between 2008

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20. *U.S. Residential and Commercial Buildings Total Primary Energy Consumption*, U.S. DEP'T OF ENERGY, http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=1.1.1 (last updated Mar. 2012).

21. *Id.*

22. *How Much Energy is Used in Buildings in the United States?*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/tools/faqs/faq.cfm?id=86&t=1 (last reviewed Nov. 30, 2011).

23. E-mail from Thomas Bourgeois, Deputy Dir., Pace Energy & Climate Ctr., to author (June 30, 2011, 21:55 EST) (on file with author).

24. E-mail from Thomas Bourgeois, Deputy Dir., Pace Energy & Climate Ctr., to author (June 30, 2011, 17:22 EST) (on file with author).

25. EPA GREENHOUSE GAS INVENTORY, *supra* note 8, at 2-20. This enormous quantity of emissions is understandable, as eighty-three percent of energy consumed in the United States relied on carbon-intensive fossil fuels. *See Renewable Energy Consumption and Electricity Preliminary Statistics 2009*, U.S. ENERGY INFO. ADMIN., http://www.eia.doe.gov/cneaf/alternate/page/renew_energy_consump/rea_prereport.html (last visited July 5, 2012).

26. EPA GREENHOUSE GAS INVENTORY, *supra* note 8, at ES-8.

27. *Id.* at 2-22.

and 2009 there was a decrease in national CO_2 emissions, this decrease was temporary and is not indicative of a permanent shift away from carbon emission-trends related to vehicle travel.[28]

A useful measure of transportation levels is a count of the total VMT by Americans. Unfortunately, "[v]ehicle miles traveled (VMT) in the [United States] has grown three times faster than population [since 1980], and almost twice as fast as vehicle registrations . . . . Only 13% was explained by population growth," out of a total 36% increase in VMT.[29] This increase appears to be largely driven by personal auto use, as "vehicle miles traveled by light-duty motor vehicles (passenger cars and light-duty trucks) increased [thirty-nine] percent from 1990 to 2009."[30] "[VMT] may exceed seven trillion . . . miles by 2055," which is much higher than the three trillion traveled in 2006.[31]

One way to combat this projected rise in VMT is to promote urban settlement, as urban residents generally drive less than suburban or rural residents.[32] Residents of compact urban neighborhoods drive between twenty to forty percent less than suburban residents.[33] Directly related to this reduction in VMT, research has shown that per capita energy consumption and GHG emissions are two to two and a half times higher in areas of low density development, when compared to high density areas.[34]

C. Demographic Trends and Their Impact

It is estimated that, by 2050, eighty-nine million new and replacement residential units and "190 billion additional square feet

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28. *Id.* at 2-1 ("The following factors were primary contributors to this decrease [from 2008 to 2009]: (1) a decrease in economic output resulting in a decrease in energy consumption across all sectors; and (2) a decrease in the carbon intensity of fuels used to generate electricity due to fuel switching as the price of coal increased, and the price of natural gas decreased significantly.").

29. Keith Bartholomew & Reid Ewing, Address at the 87th Transportation Research Board Annual Meeting: Land Use-Transportation Scenario Planning in an Era of Global Climate Change 4 (Nov. 5, 2007).

30. EPA GREENHOUSE GAS INVENTORY, *supra* note 8, at 2-21.

31. AM. ASS'N OF STATE HIGHWAY & TRANSP. OFFICIALS, FUTURE NEEDS OF THE U.S. SURFACE TRANSPORTATION SYSTEM 18 (Feb. 2007).

32. *See* EWING ET AL., *supra* note 3, at 2. In fact, given location efficient transit planning, "a household can reduce its GHG emissions by as much as [seventy-eight] percent." PETER HAAS ET AL., CTR. FOR NEIGHBORHOOD TECH., TRANSIT ORIENTED DEVELOPMENT AND THE POTENTIAL FOR VMT-RELATED GREENHOUSE GAS EMISSIONS GROWTH REDUCTION 33 (2010), *available at* http://www.cnt.org/repository/TOD-Potential-GHG-Emissions-Growth.FINAL.pdf.

33. *See id.* at 9.

34. PATRICK M. CONDON ET AL., LINCOLN INST. OF LAND POLICY, URBAN PLANNING TOOLS FOR CLIMATE CHANGE MITIGATION 8 (2009).

of nonresidential space" will be created.[35] Where these buildings are located and how they are built will dictate how much this new construction will increase energy consumption and GHG emissions; this depends on the preferences of the new households that will be added to the population. The demographics of the American population will change in the future, shifting towards more childless and single-person households. By 2030, the percentage of households with children will decrease to twenty-seven percent, while households without children will rise to seventy-three percent.[36] Single individuals, living alone, will account for thirty-four percent of all households.[37]

Because these new households will seek housing and jobs suited to their needs, land use regulation must evolve to promote development in line with these changing market demands.[38] Research has "previously shown that there is enough large lot single-family development on the ground to meet the . . . demand [for such housing through] 2025."[39] As of 2010, there was more demand than supply for both attached residential units and small lot units.[40] In contrast, there was a higher supply of large lot units than demand.[41] The demand for smaller housing units will grow. "[B]etween 2010 and 2050, more single-person households will be added than households with children. Moreover, roughly two-thirds to three-quarters of the net gain in households between 2010 and 2050 will be among households without children."[42] A 2011 National Association of Realtors survey found that if people could choose where to live, forty-seven percent would choose to live in a city or suburban mixed-use community.[43]

D. Changing Land Use Law in a Changing Climate

There are numerous land use strategies available to state and local governments to achieve significant energy conservation as we

35. Memorandum from Reid Ewing, Arthur C. Nelson & Keith Bartholomew, Response to Special Report 298 Driving and the Built Environment: The Effects of Compact Development on Motorized Travel, Energy Use, and CO2 Emissions 3 (Sept. 16, 2009), *available at* http://www.smartgrowthamerica.org/documents/ResponsetoTRBSpecialReport.pdf [hereinafter Response to 298].

36. Arthur C. Nelson, Presidential Professor & Dir., Metro. Reserch Ctr., Univ. of Utah, Address at the 2011 Journalists Forum at Lincoln Inst. of Land Policy: Land on the Built Environment: The Next City (Apr. 15-16, 2011), *available at* https://www.lincolninst.edu/docs/771/1282_Nelson - Final.pptx.

37. *Id.*

38. *Id.*

39. Response to 298, *supra* note 35, at 4.

40. Nelson, *supra* note 36.

41. *Id.*

42. Response to 298, *supra* note 35, at 4.

43. Nelson, *supra* note 36.

build and substantially renovate individual buildings and plan neighborhood development to accommodate the nation's growing population. In the aggregate, these strategies can create urban settlements that not only consume less energy but create livable and exciting places for future generations to inhabit.

Part three of this article discusses enforcing and enhancing adopted energy conservation codes and explores a variety of ways that local governments can supplement energy conservation standards in individual buildings. Part four describes the connection between energy conservation and the land use regulatory process and discusses several techniques that can lower consumption and increase efficiency. In Part five, we turn to neighborhood-scale planning and demonstrate how transit oriented development, sustainable neighborhood planning, and district energy systems can be fostered by local land use plans and regulations. These strategies are capable of reducing fossil fuel consumption and tailpipe emissions by facilitating walking and biking, thus lowering the number of vehicle trips and VMT. Part six concludes by arguing that the aggregation of these strategies through the adoption of Energy Conservation Zones can shape human settlements to achieve sustainable development patterns that require less energy to build and occupy, thus contributing to America's quest for energy independence, affordability, and climate change mitigation.

III. ENERGY CODE ADOPTION AND ENHANCEMENT

A. Energy Codes: Coverage and Legal Authority

In the United States' legal system, the principal method of achieving energy efficiency in new building construction and the substantial renovation of buildings is through the energy conservation code.[44] The basic energy code, applicable in most states, contains minimum standards for the design, construction, and installation of the building shell or "envelope," mechanical systems, and lighting.[45] In the evolution of building codes in the United States,

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44. *See* THOMAS W. FLEMING, FRESHWATER DEV. CO., ENERGY CODES — ORIGINS AND CURRENT PRACTICES: A PRIMER (2009), *available at* http://www.freshwaterfl.com/EnergyCodesPrimer.pdf; Jessica A. Bacher & Jennie C. Nolon, *Energy Codes, Green Building Initiatives, and Beyond*, 38 REAL EST. L.J. 231 (2009). Energy conservation codes are either adopted by state governments—which typically require local enforcement and may allow localities to adopt stricter standards—or by local governments directly. *See* BLDG. CODES ASSISTANCE PROJECT, http://www.bcap-energy.org/who-we-are/history-and-mission/ (last visited July 5, 2012); *see also Building Energy Codes Program*, U.S. DEP'T OF ENERGY, http://www.energycodes.gov (last updated Apr. 30, 2012).

45. *Land Use Stabilization Wedge*, *supra* note 1, at 38 (citing INT'L CODE COUNCIL, INTERNATIONAL ENERGY CONSERVATION CODE, at iii (2009)).

the energy code is a relative newcomer, and a much-welcomed addition to the family of codes that has historically regulated building construction, plumbing, fire prevention, and electrical systems.[46] The explicit goal of the energy code is to reduce the energy consumed by new and substantially renovated buildings to which building construction codes apply.[47]

Every few years, energy codes are strengthened to add newly-evolved technologies and to accomplish ever-increasing degrees of energy conservation. Some states and local governments, aware that building technology exists that can make new buildings extraordinarily efficient, add new provisions to their codes more quickly than others; thus, they enhance their codes with new provisions that achieve deeper efficiencies.[48] Some local governments supplement energy codes with land use regulations that govern matters beyond the scope of building codes. Energy codes, for example, do not cover building orientation, layout, or landscaping on sites, which can be used to reduce energy consumption in new buildings.[49] These efficiencies can be accomplished through site plan regulations imposed and enforced by local land use boards. As a result, for local energy codes to achieve the maximum energy and climate efficiency, they must be enhanced through stricter provisions or supplemented by local land use regulations and project approval practices that can reach beyond the coverage of the basic energy code.

The power of local governments to amend energy codes varies from state to state. A few states have not adopted a statewide energy code, thereby leaving it to their local governments to decide whether to do so.[50] Some states have adopted a state energy code and have preempted local governments from adopting and enforcing stricter standards.[51] Other states have adopted a basic energy code, along with a separate set of stricter stand-

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46. *See, e.g.*, *Building and Construction Codes*, N.Y. STATE LIBRARY, http://www.nysl.nysed.gov/reference/building/#webster (last updated June 9, 2009).

47. *See generally* Craig DiLouie, *States Incorporate Energy Standard in Lighting Design Requirements*, ELECTRICAL CONSTRUCTION & MAINTENANCE MAG., Jan. 2005, *available at* http://ecmweb.com/mag/electric_states_incorporate_energy/ (explaining the motivation behind the new code and its widespread adoption across the United States).

48. *See Land Use Stabilization Wedge*, *supra* note 1, at 39 (citing CITY OF ARCATA, CAL., COMMUNITY GREENHOUSE GAS REDUCTION PLAN (2006), *available at* http://www.cityofarcata.org/sites/default/files/files/document_center/EnvironmentalServices/Energy/Greenhouse Gas Reduction Plan.pdf).

49. *Id.* (citing INT'L CODE COUNCIL, INTERNATIONAL ENERGY CONSERVATION CODE (2006)).

50. *Id.* (citing Steven Bodzin, *State Energy Codes: An Uphill Battle,* HOME ENERGY, Mar.-Apr. 1997, *available at* http://www.homeenergy.org/show/article/magazine/102/id/1288.

51. *Id.* (citing BCAP, *Home Rule and Energy Codes: An Introductory Outline*, ONLINE CODE ENV'T & ADVOCACY NETWORK (Mar. 2009), http://energycodesocean.org/sites/default/files/resources/Home_Rule_outline_FINAL.pdf).

ards, which localities are permitted to adopt in their discretion.[52] A final group of states has adopted a statewide mandatory code and allow local governments to enact stricter standards as a matter of local perogative.[53]

B. The International Energy Conservation Code

Most states and municipalities that adopt energy codes use the International Energy Conservation Code (IECC) promulgated by the International Codes Council (ICC).[54] Over eighty percent of the states in the United States have adopted the IECC as their standard.[55] The ICC was established in 1994 as a non-profit organization with the purpose of developing a single set of model construction codes, including building construction, plumbing, electrical, and energy conservation, among other topics.[56] The ICC was founded by Building Officials and Code Administrators International, Inc., the International Conference of Building Officials, and Southern Building Code Congress International, Inc.[57] These predecessor organizations developed three separate sets of model codes that were adopted or adapted by many of the states within their regions.[58]

By forming the ICC, these three professional organizations paved the way for the development of one national energy conservation code. The resulting IECC is divided into two primary parts. One regulates the construction of smaller residential buildings (one- and two-family homes and multifamily buildings three stories in height or less); the other regulates all other buildings, generally denominated "commercial" buildings, including larger residential buildings.[59]

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52. *Id.* at 39-40.

53. *Id.* at 39.

54. *See* Bacher & Nolon, *supra* note 44, at 234 (citing *see Code Status: Commercial*, ONLINE CODE ENV'T & ADVOCACY NETWORK, http://www.energycodesocean.org/code-status-commercial; *see also Code Status: Residential*, ONLINE CODE ENV'T & ADVOCACY NETWORK, http://www.energycodesocean.org/code-status-residential).

55. *International Codes – Adoption by State*, INT'L CODE COUNCIL, http://www.iccsafe.org/gr/Documents/stateadoptions.pdf (last updated Apr. 26, 2012) (forty-two out of the fifty states have adopted the IECC).

56. *About ICC*, INT'L CODE COUNCIL, http://www.iccsafe.org/AboutICC/Pages/default.aspx (last visited July 5, 2012).

57. *Id.*

58. *Id.*

59. Bacher & Nolon, *supra* note 44, at 234; *see also Land Use Stabilization Wedge*, *supra* note 1, at 38 (citing INT'L CODE COUNCIL, INT'L ENERGY CONSERVATION CODE § 202, ch. 6 (2006)); *What is the International Energy Conservation Code?*, RESPONSIBLE ENERGY CODES ALLIANCE, http://www.reca-codes.org/about-iecc.php (last visited July 5, 2012).

C. ASHRAE Standard 90.1

Most commercial buildings built today are designed to conform to "Standard 90.1, promulgated by the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)," which is incorporated by reference into the IECC.[60] ASHRAE, an international member organization founded in 1894,[61] issued its first set of energy standards for commercial buildings, Standard 90, in 1975.[62] Standard 90.1 is the most frequently used benchmark for commercial building energy construction, and it is constantly updated to keep pace with changing technology.[63] Today, this ASHRAE standard addresses the building envelope; heating, ventilation, and air-conditioning (HVAC) systems; water heating; power; lighting; other equipment; and boiler efficiency improvements.[64]

D. Code Enforcement and the Building Approval Process

Compliance with building, plumbing, electrical, fire, and energy codes is a prerequisite for obtaining a building permit and a certificate of occupancy (CO) from local governmental agencies empowered to regulate development.[65] The CO is the end point in the local land use regulatory process. It signifies compliance with all land use regulations, with all conditions imposed on a project's approval, and with all applicable building codes. Architects and engineers are engaged to draw plans for new buildings. Once a development proposal is determined to comply with zoning and site plan standards, these professionals draw plans for the construction of the buildings themselves, and these plans must incorporate and comply with every standard contained in applicable codes.[66] If they

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60. *Land Use Stabilization Wedge*, *supra* note 1, at 38 (citing Thomas E. Glavinich, *Energy Codes*, ELECTRICAL CONTRACTOR MAG. (Sept. 2005), http://www.ecmag.com/index.cfm?fa=article&articleID=6430); *see also 2009 Commercial Energy Efficiency*, RESPONSIBLE ENERGY CODES ALLIANCE, http://www.reca-codes.org/2009-commercial.php (last visited July 5, 2012).

61. *About ASHRAE*, ASHRAE.ORG, http://www.ashrae.org/about-ashrae/ (last visited July 5, 2012).

62. ASHRAE, ASHRAE STANDARD: ENERGY STANDARD FOR BUILDINGS EXCEPT LOW-RISE RESIDENTIAL BUILDINGS 4 (2010), *available at* http://openpub.realread.com/rrserver/browser?title=/ASHRAE_1/ashrae_90_1_2010_IP_1024.

63. *See* Bacher & Nolon, *supra* note 44, at 234-35.

64. ASHRAE, *supra* note 62, at 4.

65. *Land Use Stabilization Wedge*, *supra* note 1, at 37-38 (citing INT'L CODE COUNCIL, INTERNATIONAL ENERGY CONSERVATION CODE § 105.1 (2003) (commentary)).

66. *See* Brian W. Blaesser & Thomas P. Cody, *Entitlement Processes in Redevelopment*, *in* REDEVELOPMENT: PLANNING, LAW, AND PROJECT IMPLEMENTATION 213, 221 (Brian W. Blaesser & Thomas P. Cody eds., 2008).

do not, the local code enforcement department will reject the drawings and refuse to issue the developer a building permit.[67]

Once a building permit is issued, construction begins and local code enforcement personnel monitor and inspect the building to ensure that its construction complies with the permit.[68] If inspections indicate that code standards are being violated, a stop work order can be issued to the developer and, if work is not halted and the violations cured, the local government can go to court for an injunction and for imposition of civil, and sometimes criminal, penalties. Upon completion, the building is certified as code compliant and a CO is issued. It is only then that the building's owner is allowed to occupy the premises. If the building is a single-family home, the CO allows the homeowner to enter and begin residence. If it is a large commercial building, its owner can occupy or lease the premises following the issuance of the CO.

Energy code enforcement at the local level consists principally of having one or more code inspectors who are trained in the code, know its standards, ensure that they are met by the drawings and during construction, and then sign off on the CO, which certifies that the building has met all local standards, including zoning, site plan, building, plumbing, fire, electricity, and energy requirements.[69] Because local governments are often fiscally constrained, and because energy code enforcement is regarded in some local building departments as less critical to life and safety than compliance with building, fire, and other codes, many localities and states have less than adequate track records in enforcing energy code standards.[70]

States typically require training of local code inspectors and make training programs available to be sure that local inspectors are familiar with the energy code provisions.[71] States, too, are fiscally challenged and fail in some instances to provide adequate training accessible to current and newly employed code inspectors.[72] In the constellation of energy conservation and carbon emission reduction strategies, one of the most important actions is for state and local governments to properly enforce the energy code.[73] Federal initiatives that make funding or other incentives available for energy code enforcement help with this essential function of the

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67. *See id.* at 219-21.

68. U.S. DEP'T OF ENERGY, BUILDING ENERGY CODES 101: AN INTRODUCTION 17-18 (2010), *available at* http://bcap-ocean.org/sites/default/files/resources/20100301_std901_codes_101.pdf (describing the permitting and enforcement process).

69. *See id.*

70. *Id.* at 18.

71. *See* Bacher & Nolon, *supra* note 44, at 233.

72. *See* U.S. DEP'T OF ENERGY, *supra* note 68, at 3.

73. *Id.* at 17.

legal system.[74] Strengthening energy code compliance through training of local code enforcers and through better enforcement and monitoring procedures are relatively inexpensive strategies that will pay off significantly in energy conservation and the reduction of future carbon emissions.

E. Energy Code Enhancement

1. Legal Authority to Require or Incentivize Enhancements

States that either allow local governments to enhance statewide codes or that adopt their own statewide enhancement provisions understand that buildings can be made more energy efficient than by what is achieved through the provisions of the base energy code.[75] Adopting stricter standards, of course, increases the capital costs of new and substantially renovated buildings. There is natural tension between accomplishing more efficiency and increasing costs beyond the point of reason. When codes require capital improvements that do not offer short-term paybacks, they may simply discourage development or generate lawsuits.

This financial and political reality divides the attention of policymakers between regulation and the provision of incentives. The base energy code achieves important, but limited, conservation because the additional costs its provisions impose on builders are relatively modest. Certain stricter code provisions involve, in the opinion of their advocates, higher costs, but costs that are recouped within a reasonable period by the savings achieved. Achieving even greater efficiencies requires that governmental agencies or utility companies provide incentives to induce owners to expend the greater capital outlays involved. The recent history of energy code enhancement and energy efficiency incentives involves a range of reactions to the tensions between capital costs, energy savings, and the need for incentives versus regulations.

In Marin County, California, where state energy conservation code provisions are enforced, the County adopted a straightforward method of enhancing energy performance of new single-family homes.[76] Homes under 4000 square feet are required to exceed the energy conservation performance required by the state code by fif-

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74. One example being the International Code Council's collaboration with the Department of Energy to get federal funding to provide free copies of the IECC 2009. *Free 2009 IECC Download Instructions*, INT'L CODE COUNCIL, http://www.iccsafe.org/store/pages/doeregistration.aspx?r=FreeIECC (last visited July 5, 2012). While the offer has expired, this program illustrates that collaboration between the federal government and private organizations can be used to improve energy code enforcement.

75. *Land Use Stabilization Wedge*, *supra* note 1, at 37-39.

76. *See* CNTY. OF MARIN, CAL., ORDINANCE § 19.04.100 (2011).

teen percent.[77] If the home is over 4000 but fewer than 5500 square feet, it must exceed the state code in efficiency by twenty percent.[78] For homes between 5500 and 6500 square feet the requirement is thirty percent, and large homes, over 7000 square feet must be "net zero energy" users.[79] Similar standards with different thresholds and energy reduction requirements apply to multi-family and commercial buildings.[80] This approach to base energy code enhancement discourages the construction of larger, more energy consumptive buildings, or forces the purchasers of large, expensive homes to invest more in energy efficiency.

The process of energy code enhancement at the state level is illustrated in the Massachusetts Green Communities Act of 2008, which includes a supplemental set of standards that localities may adopt.[81] While the state's energy code is the same as those adopted in most states, a state-adopted "stretch code" gives local governments the option of adopting a package of more restrictive provisions if the local political and economic climate permit them to do so. The stretch code enhancements for smaller residential buildings are based on the Home Energy Rating System (HERS) standards and the Residential Energy Services Network (RESNET) rating approach.[82] For commercial buildings, enhancements are based on the latest version of the IECC, which is more restrictive than the version adopted by Massachusetts as its base code and the New Buildings Institute's Core Performance Guide for commercial buildings, discussed further below.[83] Third party standards such as Energy Star for Homes or the Core Performance Guide are created for the discrete purpose of enhancing the energy performance of buildings over and above that achieved by the base code. By adopting such third party standards as state or local law, an additional level of efficiency is achieved that is within the realm of economic reasonableness.

The State of New York allows local governments to adopt standards more restrictive than the New York State Energy Conservation Construction Code. The Town of Greenburgh amended its local code to require that all new homes (small residential buildings) constructed in the town achieve a certain HERS index value.[84]

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77. *Id.* § 19.04.100(E).
78. *Id.*
79. *Id.*
80. *Id.*
81. S. 2768, 2008 Leg., 2d Ann. Sess. (Mass. 2008).
82. Stretch Energy Code, 780 MASS. CODE REGS. CH. 120.AA (2011).
83. *Id.*
84. GREENBURGH, N.Y., TOWN CODE § 100-20 (2011), *available at* http://www.ecode360.com/?custId=GR0237.

2. Energy Star Standards

The Greenburgh, New York example above illustrates how the Energy Star program can be used to enhance the requirements of the base energy conservation code.[85] The Energy Star rating system is a joint venture of the Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE).[86] Initially developed in 1992 as a program for labeling energy efficient computers and monitors, Energy Star has expanded, now covering a full range of appliances, heating and cooling systems, and even newly constructed residential and commercial buildings.[87] A number of municipalities have incorporated Energy Star construction and appliance requirements into their codes, requiring thermal envelope efficiency, electrical savings, superior ventilation, and equipment efficiency requirements.[88]

Energy Star provides several methods of making buildings more energy efficient than most state energy code requirements. For homes, "[t]hese methods include more effective insulation, higher performance windows, more efficient heating and cooling equipment, tighter building envelopes to reduce air infiltration, and use of various energy efficiency products. The Home Energy Rating System (HERS) Index is used as the reference tool for ENERGY STAR-labeled residential buildings."[89] The HERS index uses a scale ranging from zero to 150, with zero being a building that uses no net energy.[90] The standard building constructed today in the United States typically ranks around 100 on the Index.[91] "To receive an Energy Star label, a home must achieve a minimum

85. *Id.*

86. Bacher & Nolon, *supra* note 44, at 236; *History of ENERGY STAR*, ENERGY STAR, http://www.energystar.gov/index.cfm?c=about.ab_history (last visited July 5, 2012).

87. Bacher & Nolon, *supra* note 44, at 236; *History of ENERGY STAR*, ENERGY STAR, http://www.energystar.gov/index.cfm?c=about.ab_history (last visited July 5, 2012).

88. *See, e.g.*, BLOOMING GROVE, N.Y., TOWN CODE § 235-14.1(A)(3) (2011); RED HOOK, N.Y., TOWN CODE § 74-20 (2011); Exec. Order No. 123 from John W. Hickenlooper, Mayor, City of Denver (Oct. 24, 2007), *available at* http://www.greenprintdenver.org/docs/CCDXO123.pdf; ARLINGTON DEP'T OF ENVTL. SERVS., POLICY FOR INTEGRATED FACILITY SUSTAINABILITY (2008), *available at* http://freshaireva.us/wp-content/uploads/2012/01/file699501.pdf; Bacher & Nolon, *supra* note 44, at 236-237. Seattle also offers assistance to those who are looking to implement Green technology in their buildings. *Seattle Climate Action Now*, SEATTLE DEP'T OF PLANNING & DEV., http://www.seattle.gov/dpd/seattleclimateactionnow/ (last visited July 5, 2012) "Rather than mandating compliance, Seattle promotes use of these standards by providing homeowners with information and links to each of these programs on its Climate Action Now website - a central clearinghouse for information and activities related to climate change mitigation." Bacher & Nolon, *supra* note 44, at 237.

89. Bacher & Nolon, *supra* note 44, at 236; *see alsoWhat is a Home Energy Rating?*, RESIDENTIAL ENERGY SERVS. NETWORK ("RESNET"), http://www.resnet.us/home-energy-ratings (last visited July 5, 2012).

90. Bacher & Nolon, *supra* note 44, at 236.

91. *Id.*

HERS rating that varies by climate zone, with 80 required in some zones and 85 required in others."[92]

Like many other third party standards and rating systems, "[Energy Star] guidelines for residential buildings may be adopted at the local level either as mandatory standards for new or renovated buildings" or as standards to be achieved through the provision of incentives.[93] The Town of Blooming Grove, New York, uses a density bonus technique to encourage developers of homes to adopt Energy Star, rather than requiring compliance like the Greenburgh approach.[94] The Town of Blooming Grove awards a ten percent increase in the number of homes that can be constructed under local zoning in exchange for making them all Energy Star compliant.[95] This is an illustration of using a municipality's delegated zoning authority to supplement energy code requirements.

A similar approach is followed by Seattle, Washington, which promotes green residential development through the use of Energy Star, among other third party standards.

> Rather than mandating compliance, Seattle promotes use of these [enhanced] standards by providing homeowners with information and links to each of these programs on its Climate Action Now website—a central clearinghouse for information and activities related to climate change mitigation. The [c]ity also promotes [Energy Star through] its City Green Building Program, [under] which the Department of Planning and Development . . . [assists] homeowners and builders [interested in using] green building technology for construction and remodeling projects.[96]

To set "an example for the private sector, Denver, [Colorado] requires Energy Star compliance for [buildings]" that are subsidized by the city. "Under Executive Order 123, city-funded new buildings and major renovations must be built in compliance with [Energy Star]."[97] In Arlington, Virginia, "county buildings must be built and designed to meet [Energy Star] performance [stand-

92. *Id.*

93. Bacher & Nolon, *supra* note 44, at 236-37.

94. *See* BLOOMING GROVE, N.Y., TOWN CODE § 235-14.1(A)(3) (2011).

95. *Id.*

96. Bacher & Nolon, *supra* note 44, at 237; *See also Making Green Building Standard Practice*, SEATTLE OFFICE OF SUSTAINABILITY & ENV'T, http://www.seattle.gov/dpd/greenbuilding/ (last visited July 5, 2012); *Seattle Climate Action Now*, *supra* note 88.

97. Bacher & Nolon, *supra* note 44, at 237; Exec. Order No. 123 from John W. Hickenlooper, Mayor, City of Denver (Oct. 24, 2007), *available at* http://www.greenprintdenver.org/docs/CCDXO123.pdf.

ards]."[98] The Arlington Initiative to Reduce Emissions recommends that small businesses adopt Energy Star standards to reduce energy use and emissions.[99] To move them along, the county offers several types of free energy audits.[100]

3. ASHRAE Standard 189.1

> ASHRAE, in conjunction with the United States Green Building Council (USGBC) and the Illuminating Engineering Society of North America (IESNA), developed Standard [189.1] . . . for the design and construction of high-performance green buildings.[101] The intent behind its creation is for both public and private entities to use Standard [189.1] as a performance baseline.[102] The Standard, which does not apply to low-rise residential buildings, is designed to achieve 30% greater energy efficiency than ASHRAE 90.1-2007. . . .[103]

Standard 189.1 goes beyond energy conservation. It includes aspects of site and building development such as site sustainability, water use efficiency, impact on the atmosphere, materials and resources, indoor environmental quality and construction and operation, as well as energy efficiency.[104] Among the energy conservation enhancement features of Standard 189.1 are standards for appliances and lighting, and a requirement that on-site renewable energy systems provide at least one percent of the electricity needed.[105] By implementing on-site generation, and requiring remote or automatic measuring devices for energy sources and key systems, Standard 189.1 can achieve its goal of thirty percent less energy use than buildings that comply with Standard 90.1.

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98. Bacher & Nolon, *supra* note 44, at 237.

99. *Id.*; *see also AIRE: Arlington Initiative to Reduce Emissions*, ARLINGTON CNTY. GOV'T, http://freshaireva.us (last visited July 5, 2012).

100. Bacher & Nolon, *supra* note 44, at 237.

101. *Id.* at 236; *See also* ASHRAE & U.S. GREEN BLDG. COUNCIL, STANDARD FOR THE DESIGN OF HIGH-PERFORMANCE GREEN BUILDINGS: EXCEPT LOW-RISE RESIDENTIAL BUILDINGS 2 (2011), *available at* http://openpub.realread.com/rrserver/browser?title=/ASHRAE_1/ashrae_189.1_113009M [hereinafter STANDARD FOR HIGH-PERFORMANCE GREEN BUILDINGS].

102. Bacher & Nolon, *supra* note 44, at 236; STANDARD FOR HIGH-PERFORMANCE GREEN BUILDINGS, *supra* note 101, at 2-3.

103. Bacher & Nolon, *supra* note 44, at 236.

104. STANDARD FOR HIGH-PERFORMANCE GREEN BUILDINGS, *supra* note 101, at 14-37.

105. *Id.* at 16, 27.

4. Core Performance

The New Buildings Institute (NBI) is a non-profit organization whose primary goal is to improve energy efficiency in buildings.[106] It has established a set of energy code enhancements that is available to state and local governments as a mechanism for enhancing their codes. Its Core Performance program is a prescriptive approach that can yield almost thirty percent energy savings above the IECC for commercial buildings smaller than 100,000 square feet.[107] Core Performance is incorporated by reference in the State of Massachusetts's supplemental code that is available for local governments to adopt.[108]

5. Combined Heat and Power

Local land use laws such as zoning, subdivision, and site plan regulations can achieve extraordinary energy efficiency by permitting and encouraging the use of combined heat and power (CHP) systems in individual buildings and interconnected energy systems in certain mixed use districts. By employing CHP, a mechanical system that can be used to produce electricity, heat or both, in higher density, mixed use neighborhoods, the potential for energy efficiency, and therefore energy conservation and climate change mitigation, is exponentially greater than if used on an individual parcel of land.

6. Requiring Energy Efficient Appliances

Appliances include refrigerators, freezers, computers, televisions, and clothes dryers in residences, and a host of larger appliances and equipment in commercial buildings, including printers, faxes, and other office equipment. In commercial and residential buildings, the use of appliances and equipment account for a significant percentage of electricity use.[109] In some places, equipment and appliances account for up to half of all energy used in both types of buildings. For this reason, some local governments have attempted to require developers to install energy efficient appliances and equipment in their buildings.

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106. *About Us*, NEW BLDGS. INST., http://www.newbuildings.org/about-us (last visited July 5, 2012).

107. *See Core Performance*, ADVANCED BLDGS., http://www.advancedbuildings.net/core-performance (last visited July 5, 2012).

108. *See* 780 MASS. CODE REGS. CH. 120.AA (2011).

109. *See About ENERGY STAR*, ENERGY STAR, http://www.energystar.gov/index.cfm?c=about.ab_index (last visited July 5, 2012).

In *Air Conditioning, Heating & Refrigeration Institute v. City of Albuquerque*, a federal district court issued a preliminary injunction barring enforcement of certain provisions of the City of Albuquerque's green building code pending the outcome of a lawsuit, brought by appliance and equipment trade organizations, contractors, and distributors, on the ground that those code provisions were preempted by federal law.[110] The city's green building code called for a thirty percent increase in energy efficiency for new commercial and residential buildings as well as for those undergoing substantial renovations.[111] To achieve this goal, the code contained prescriptive standards for individual building components including HVAC and water heaters that were in excess of federal standards for those products.[112] The court found:

> The [c]ity's goals in enacting [the disputed Code] are laudable. Unfortunately, the drafters of the Code were unaware of the long-standing federal statutes governing the energy efficiency of certain HVAC and water heating products and expressly preempting state regulation of these products when the Code was drafted and, as a result, the Code, as enacted, infringes on an area preempted by federal law.[113]

The court was unconcerned by other provisions of the Albuquerque code that required, for example, single-family homes to have more insulation and more efficient heating, cooling and ventilating, water heating, and lighting; and that some commercial and residential structures would have to undergo thermal bypass inspections.[114] These are helpful examples of the kinds of provisions that state and local governments can adopt to enhance base energy codes while avoiding federal preemption.

IV. LAND USE REGULATIONS AND ENERGY EFFICIENCY IN BUILDINGS

A. Land Use Objectives Include Energy Conservation

There are certain aspects of building and site development not governed by the energy code that can be regulated through the

110. Air Conditioning, Heating & Refrigeration Inst. v. City of Albuquerque, No. 08-633 MV/RLP, 2008 WL 5586316, at *1 (D.N.M. Oct. 3, 2008).
111. *Id.* at *2.
112. *Id.* at *3.
113. *Id.* at *12.
114. *Id.* at *11.

land use system that relate directly to how much energy a building will consume and how carbon intensive it will be. Building owners, for example, can be encouraged or required to accommodate hybrid cars by providing plug in facilities in the building's parking areas. Anti-idling policies can be adopted by building managers and signs can be posted discouraging idling in parking and waiting zones immediately outside buildings. For example, San Francisco is committed to becoming America's environmental car capital.[115] Among other initiatives, the city council adopted building code provisions that require new homes and office buildings to be wired for electric car chargers.[116] The city also provides loans to single-family homeowners to encourage them to install charging stations.[117] Less aggressive but similar initiatives are being undertaken in Houston,[118] San Diego,[119] and Portland.[120]

Where cities identify trails for pedestrians and bikers, site planning for new buildings can be required to connect to them, thereby reducing VMT, energy consumption, and emissions. New buildings can be required to have bike stalls on the outside or to provide indoor bike storage for workers or residents who are thereby encouraged to bike to and from work, on errands, and on outings. A new emphasis in city and regional planning has emerged concerning bicycle transportation, with some communities adopting bicycle master plans that call for street and sidewalk design standards, the location of bicycle parking facilities, incentives, and education—all to increase the use of this transportation alternative.[121] Using a variety of these techniques, New York City reported a thirty-five percent increase in commuter biking between

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115. *See* Todd Woody & Clifford Krauss, *Cities Prepare for Life With the Electric Car*, N.Y. TIMES, Feb. 15, 2010, at B1, *available at* http://www.nytimes.com/2010/02/15/business/15electric.html; *see also* Suzanne Goldenberg, *San Francisco Gears up for the Age of Electric Car,* THE GUARDIAN, Feb. 17, 2010, *available at* http://www.guardian.co.uk/environment/2010/feb/17/san-francisco-electric-cars.

116. *See* Woody & Krauss, *supra* note 115.

117. *See* Nick Allen, *San Francisco Prepares for Electric Car Revolution*, THE TELEGRAPH, Feb. 18, 2010, http://www.telegraph.co.uk/news/worldnews/northamerica/usa/7260958/San-Francisco-prepares-for-electric-car-revolution.html.

118. U.S. Dep't of Energy, *Houston's Plug-In Vehicle Activities and Processes*, ALTERNATIVE FUELS & ADVANCED VEHICLES DATA CTR., http://www.afdc.energy.gov/afdc/vehicles/electric_deployment_case_study_houston.html (last updated June 6, 2011).

119. Josie Garthwaite, *Car2go, Daimler-Backed Sharing Program, to Go Electric in San Diego*, N.Y. TIMES BLOGS (July 13, 2011, 2:49 PM), http://wheels.blogs.nytimes.com/2011/07/13/car2go-daimler-backed-sharing-program-to-go-electric-in-san-diego/.

120. *See generally* CITY OF PORTLAND, ELECTRIC VEHICLES: THE PORTLAND WAY (2010), *available at* http://www.portlandonline.com/shared/cfm/image.cfm?id=309915.

121. PETER LAGERWEY, THE NAT'L CTR. FOR BICYCLING & WALKING, CREATING A ROADMAP FOR PRODUCING & IMPLEMENTING A BICYCLE MASTER PLAN 3 (2009), *available at* http://www.bikewalk.org/pdfs/BMP_RoadMap.pdf.

2007 and 2008.[122] According to the 1990 Census, only 1.2% of Portland commuters reported biking to work.[123] After investing $3.50 per resident in bicycling infrastructure and programs, "[six] percent of commuters chose to bicycle to work; and as many as [twelve] percent did so in the downtown area" in 2007.[124] "In Minneapolis, [Minnesota], [twenty] percent of all trips are taken by bicycling or walking . . . ."[125]

Site plan regulations can dictate building orientation or require tree planting that can reduce energy consumption. In addition, active solar and wind generation facilities can be frustrated or facilitated by local land use law. Additional techniques within the ambit of land use regulation include space cooling systems that dissipate heat into natural heat "sinks" such as geothermal piping systems. Other conservation techniques can be facilitated as well including district energy systems and evaporative cooling and nighttime radiative cooling systems. Depending on the structure of land use law in any given state, it may be possible for local governments—under their delegated land use regulatory authority—to require or encourage these energy-conserving features of land development as part of their land use regulatory system.

State legislatures delegate land use authority to local governments as part of their police power, that is, their legal authority to legislate to protect the health, safety, and welfare of the people. Zoning enabling acts adopted by state legislatures routinely state that local land use regulations may be adopted to achieve the "appropriate use of the land."[126] Local land use regulations that govern land development to reduce energy use and mitigate climate change are consistent with these key precepts of the enabling acts. Quite often, enabling acts state that they are to be broadly construed and, increasingly, courts interpret them expansively if the

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122. Press Release, N.Y. Dep't of Transp., DOT Announces 35% Increase In Commuter Cycling From 2007 to 2008 and Calls on Cyclists to Use Lights to be Seen and Safe (Oct. 30, 2008), *available at* http://www.nyc.gov/html/dot//html/pr2008/pr08_047.shtml.

123. THOMAS GOTSCHI & KEVIN MILLS, RAILS-TO-TRAILS CONSERVANCY, ACTIVE TRANSPORTATION FOR AMERICA 17 (2008), *available at* http://www.railstotrails.org/resources/documents/whatwedo/atfa/ATFA_20081020.pdf (citing CITY OF PORTLAND OFFICE OF THE AUDITOR, SERVICE EFFORTS & ACCOMPLISHMENT REPORT 2006-7 (2007)).

124. *Id.*

125. *Id.* (citing FED. HIGHWAY ADMIN., INTERIM REPORT TO THE U.S. CONGRESS ON THE NONMOTORIZED TRANSPORTATION PILOT PROGRAM (2007)).

126. *See, e.g.*, John R. Nolon, *Historical Overview of the American Land Use System: A Diagnostic Approach to Evaluating Governmental Land Use Control*, 23 PACE ENVTL. L. REV. 821, 844 n.77 (2006) [hereinafter Nolon, *Overview of Land Use System*] ("In Rodgers v. Village of Tarrytown, 96 N.E.2d 731 (1951), municipalities in New York learned that they have the authority to create novel zoning devices such as the floating zone to achieve the most appropriate use of the land."); *See also* N.Y. TOWN LAW § 263 (McKinney 2011); N.Y. VILLAGE LAW § 7-704 (McKinney 2011).

challenged law is clearly designed to protect the public interest.[127] Challenges brought against local land use laws that are designed to conserve energy and mitigate climate change might be based on *ultra vires* claims (that the law exceeds the authority of the locality) or on the claim that the matter is preempted by federal or state law. Given our heighted awareness of the need to conserve energy and reduce carbon emissions, it is now clear that local regulations that do so achieve multiple public interests and advance the health, safety, and welfare of the people.

B. Passive Solar, Building Form, and Orientation

Developers of new or substantially renovated buildings must present an application to the local government in which their property is located and seek approval to build what they propose.[128] This requires an administrative review by the Zoning Enforcement Officer of the community who determines, in the first instance, whether the zoning ordinance allows the use and construction details proposed and whether subdivision, site plan, or special permit approval is required or whether a variance from the zoning provisions is necessary.[129] During the early stages of this review process, construction drawings have not been completed. Developers, architects, and engineers have not done detailed design work and, most certainly, lighting, electrical, and interior design professionals have not done much work, if they have even been engaged.

This early stage in the land use review process is an ideal time to require or encourage the developer to think through the most cost effective methods of reducing energy consumption and carbon emissions. It is at this stage that decisions can be made about building orientation, form, self-shading, window size and location, rooflines and extensions, height-to-floor ratios, and building features that relate to passive ventilation and cooling.[130] Land use laws can require buildings to be placed appropriately on the site, for multiple buildings to be clustered, and for designs to be

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127. *See* Nolon, *Overview of the Land Use System*, *supra* note 126, at 848.

128. JOHN R. NOLON, WELL GROUNDED: USING LOCAL LAND USE AUTHORITY TO ACHIEVE SMART GROWTH 21 (2001).

129. *See id*.

130. *See* INT'L CODE COUNCIL, INT'L ENERGY CONSERVATION CODE, tbl.506.5.1(1) (2009), *available at* http://publicecodes.citation.com/icod/iecc/2009/icod_iecc_2009_5_sec006_par007.htm. Even though this table is from an older version of the IECC, the table serves to illustrate the elements that can be manipulated at this early stage to achieve energy conservation.

changed to conserve energy.[131] Zoning can allow for a mix of uses, which can, in turn, enable developers to adopt more efficient district heating and cooling systems that greatly reduce energy consumption.[132] It is at this stage that on-site energy generation systems in larger projects can be considered. The significant loss of energy in transmission lines from remote plants is prevented by placing generation systems on site.

C. Building Commissioning

It is also at this early stage in the development review process that local land use officials can discuss the possible commissioning of the building with the developer and the design team. Local land use and building standards usually do not govern the actual quality of construction, and the tightness and functional integrity of a building have a great deal to do with energy conservation. In a pre-application workshop, the developer can be encouraged to draw up and follow a building commissioning process that creates ground rules for the design and construction of the building that go beyond the traditional reach of the land use approval process. Commissioning can include higher quality and frequency functional testing of energy consuming systems and components, and even an occupancy plan where the owner states how the post-occupancy management of the building will ensure energy conservation.[133]

D. Systems Approaches to Building Design

Integral to the success of this early building proposal review process is the ability of the developer and the design team to work with local officials to review the proposed building as an entire system and to change construction elements and design standards as this system-wide review occurs. This is referred to as an "integrated design process" involving all members of the design team in an iterative approach during the stage of the approval process where normally only the building's architect is at work.[134] By integrating

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131. *See generally Land Use Stabilization Wedge*, *supra* note 1; John R. Nolon, *Shifting Ground to Address Climate Change: The Land Use Law Solution*, 10 GOV'T L. & POL'Y J. 23, 23-24 (2008).

132. *See* Linda Baker, *Heating the 'Hood*, AM. PLANNING ASS'N (Dec. 2009), http://www.vancouver.ca/sustainability/documents/HeatingtheHood.pdf (discussing benefits of district heating and cooling systems).

133. *See* WASH. STATE UNIV., ENERGY EFFICIENCY FACTSHEET: BUILDING COMMISSIONING FOR NEW BUILDINGS (2005), *available at* http://www.energy.wsu.edu/Documents/BuildingCommissioning.pdf.

134. Whole Bldg. Design Guide Aesthetics Subcomm., *Engage the Integrated Design Process*, WORLD BLDG. DESIGN GUIDE, http://www.wbdg.org/design/engage_process.php (last updated Oct. 30, 2010).

the consideration of all design issues at the earliest stage, additional energy efficiencies of up to 35-40% can be achieved, greatly lowering the capital cost of construction and reducing post-occupancy costs of operations.

E. Land Use Approval Protocols

These approaches can be integrated into mandatory provisions of local land use laws or they can be employed as recommended protocols of the building review and approval process itself. By departmental practices, mayoral executive order, or a resolution of the city council or town board, a locality can make a commitment to energy conservation and the reduction of carbon emissions. A component of the comprehensive plan can be added by amendment outlining energy conservation goals, objectives, strategies, and implementation measures.

This clear articulation of local policy may be enough to empower the local administrative staff and planning commission to require developers of proposed projects to submit an energy conservation plan for their building that goes far beyond the standards of the energy code and moves into the building design, orientation, and commissioning initiatives discussed here.

V. INTEGRATED NEIGHBORHOOD PLANNING

A. Densities, Sustainability, and Energy Conservation at the Neighborhood Level

To achieve maximum energy efficiency and sustainability, planning and regulation must concentrate on scales larger than the individual building and site. In this part, we look at three strategies that focus at the neighborhood level: Transit Oriented Development, the LEED-ND rating system of the USGBC, and District Energy Systems. These constitute neighborhood planning strategies that achieve high levels of energy conservation and sustainability. It is at this level in appropriate neighborhoods that density must be increased, that compact and mixed uses must be provided, and that walkability must be promoted to achieve feasible transit systems, multiple sustainability objectives, and greatly reduced energy consumption.

B. Transit Oriented Development

There has been much written about transportation choices and land use, most of it under the rubric of "transit oriented development."[135] But the terminology is varied, revealing a certain amount of ambiguity about the subject matter. Some authors write about "transit supportive" development, others use the term "transit ready," and some discuss "transportation efficient" land use patterns.[136] Others appearing in the literature include "transit friendly,"[137] "station area planning,"[138] "transportation demand management" (TDM), "traditional neighborhood development" (TND),[139] "planned unit development,"[140] "development-oriented transit,"[141] "transit supportive urban design,"[142] "transit station communities,"[143] "transit focused development,"[144] and "transit villages."[145]

This is a highly interdisciplinary field involving many different geographical contexts, populations, densities, and transportation modalities. Much of what is written about the subject is imprecise about how land use planning and regulation can serve the cause of cost-effective transit oriented or transportation effi-

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135. ROBERT T. DUNPHY ET AL., URBAN LAND INST., DEVELOPING AROUND TRANSIT: STRATEGIES AND SOLUTIONS THAT WORK 4 (2004). This is the most widely used term, coined by urban designer Peter Calthorpe in the 1990s. *Id.*

136. *Id.*

137. *Transit Village Update*, TRANSIT-FRIENDLY DEV. NEWSL. (Alan M. Voorhees Transp. Ctr., New Brunswick, N.J.), May 2006, *available at* http://www.policy.rutgers.edu/vtc/tod/newsletter/vol2-num1/article_village_update.html#belmar (phrase used by New Jersey Transit).

138. *Transit-Oriented Development*, REAL ESTATE COUNCIL OF AUSTIN, INC., http://www.recaonline.com/docs/arc/arc2006/transit_oriented.html (last visited July 5, 2012) (phrase used in Austin, TX, referring specifically to overlay zoning around transit stations).

139. Refers to the kind of development popular before post-WWII sprawl, and is essentially TOD before it got that name.

140. DUNPHY ET AL., *supra* note 135, at 4 (describing a planned unit development).

141. This term actually is when transit planners are asked to accommodate existing developments, but the goal is the same.

142. CAROL J. SWENSON & FREDERICK C. DOCK, CTR. FOR TRANSP. STUDIES, UNIV. OF MINN., REPORT NO. 11, URBAN DESIGN, TRANSPORTATION, ENVIRONMENT AND URBAN GROWTH: TRANSIT-SUPPORTIVE URBAN DESIGN IMPACTS ON SUBURBAN LAND USE AND TRANSPORTATION PLANNING (2003) (used by the Minnesota Department of Transportation).

143. PUGET SOUND REG'L COUNCIL, CREATING TRANSIT STATION COMMUNITIES IN THE CENTRAL PUGET SOUND REGION (1999) (phrase used by the Puget Sound Regional Council).

144. Douglas R. Porter, *Transit-Focused Development: A Progress Report*, 64 J. AM. PLAN. ASS'N. 475 (1998) (phrase used by the Transportation Research Board).

145. DUNPHY ET AL., *supra* note 135, at 4 ("popularized by Michael Bernick and Robert Cervero in their 1966 book, *Transit Villages for the 21st Century*"). The term is also used by the California and New Jersey legislatures. *California Transit-Orientated Development (TOD) Searchable Database*, CAL. DEP'T OF TRANSP., http://transitorienteddevelopment.dot.ca.gov/ (last visited July 5, 2012); *Transit Village Initiative: Overview*, STATE OF N.J. DEP'T OF TRANSP., http://www.state.nj.us/transportation/community/village/ (last updated Feb. 25, 2009).

cient development.[146] Any attempt to describe a single approach is subject to a host of exceptions in particular places, but some template for discussing the legal underpinnings of this important subject is needed.[147]

When density is increased for both residential and commercial uses, the distance between origin and destination is shorter and walking, bicycling, and mass transit services are more feasible. In order for increased densities to be tolerated, attractive building, landscape, and streetscape design must be employed. Studies have shown that increased population density decreases automobile ownership and the number of VMT. "[D]oubling the population density of a community could reduce per-family driving by as much as 20 to 30 percent."[148] "[O]ne study found that at high density, levels of 10,000 to 50,000 people per square mile, half of all trips were not by automobile, and walking and bicycling increased significantly."[149]

Climate change mitigation requires that we create a less car-dependent society. According to the Presidential Climate Action Project, "[t]he greatest potential for reducing greenhouse gas emissions and imported petroleum is to reduce vehicle miles traveled—the miles Americans drive each year."[150]

TOD land use plans and zoning encourage mixed use, compact development in transit station areas, or transit neighborhoods. They locate housing and jobs near transit stops and significantly reduce the number and distance of vehicle trips.[151] Encouraging land use patterns that house and employ more Americans in urban areas will cause a significant reduction in VMT while placing households in smaller, more energy efficient homes and offices, further reducing fossil fuel consumption and CO_2 emissions.

C. Transportation and Land Use Planning

To make transit systems feasible, land use planning among localities in a transportation region must be coordinated with trans-

146. *See* ITE SMART GROWTH TASK FORCE, INST. OF TRANSP. ENG'RS, SMART GROWTH TRANSPORTATION GUIDELINES: AN ITE PROPOSED RECOMMENDED PRACTICE 23-27, 41-72 (2003) [hereinafter SMART GROWTH TRANSPORTATION GUIDELINES] (many recommendations are proposed concerning how to improve road usage and encourage public transportation, but hardly any space is given to describe how land use regulations can affect these changes).

147. *See, e.g.*, Alden S. Raine, *Waterfront TOD*, URB. LAND, May 2003, at 79; Greg Yager, *Taking Transit*, URB. LAND, July 2006, at 103.

148. SMART GROWTH TRANSPORTATION GUIDELINES, *supra* note 146, at 30.

149. *Id.*

150. PRESIDENTIAL CLIMATE ACTION PROJECT, PRESIDENTIAL CLIMATE ACTION PROJECT PLAN § 7:6 (2007), *available at* http://www.climateactionproject.com/docs/PCAP_12_4_2007.pdf.

151. *Land Use Stabilization Wedge*, *supra* note 1, at 27-28.

portation infrastructure planning and development, which occurs at the metropolitan-area scale. Under federal law, Metropolitan Planning Organizations (MPOs) are created as consortia of state and local agencies and are charged with creating capital plans for roads, highways, and transit services in designated regions.[152] Coordination between local land use planning and MPO transportation planning is critical to the success of efforts to connect higher density urban developments and compact metropolitan developments to transit services.

Such coordination is called for under federal law, which directs MPOs to implement planning processes that "provide for consideration of projects and strategies that will . . . protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns."[153] Federal transportation law also requires each state to carry out a statewide transportation planning process that achieves these same objectives.[154]

The development of transit stations and rail and bus lines is dependent upon land use densities.[155] There must be a large enough number of commuters in a relevant region to provide a base level of ridership within the area served by the transit system. In addition, ridership must be sufficiently diverse to ensure that people are traveling to work, to shop, to seek entertainment, and to go home at various times during the day, thereby increasing the cost efficiency of the transit service. Local land use plans and zoning, which regulate density and the uses to which buildings may be put, determine how much population will increase over time in a certain area, and what transportation needs new people will have. This, in turn, dictates the demand for various types of transportation services. Locally, this planning is done at the neighborhood level with an eye on the city's comprehensive plan. TOD zoning most frequently operates over an area defined by a quarter-mile radius from the transit stop.[156]

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152. *See, e.g.*, John R. Nolon & Jessica A. Bacher, *Climate Change, Zoning and Transportation Planning*, 36 REAL EST. L.J. 211, 220 (2007); SAN ANTONIO-BEXAR CNTY. METROPOLITAN PLANNING ORG., http://www.sametroplan.org (last visited July 5, 2012) (providing an overview of MPOs).

153. 49 U.S.C. § 5303(h)(1)(E) (2006).

154. 23 U.S.C. § 135.

155. For a discussion on transit-oriented development see Robert Cervero, *Transit-Oriented Development*, *in* LOCAL PLANNING: CONTEMPORARY PRINCIPLES AND PRACTICE 374, 374-77 (Gary Hack et al. eds., 2009).

156. *Transit-Oriented Development (TOD): Overview*, SUSTAINABLE CITIES INST. OF THE NAT'L LEAGUE OF CITIES, http://www.sustainablecitiesinstitute.org/view/page.basic/class/feature.class/Lesson_TOD_Overview (last visited July 5, 2012) ("The rule of thumb is that TOD occurs within one-quarter mile, or a five to seven minute walk, of a transit station.").

Many state enabling statutes require or encourage local governments to include a transportation element in their comprehensive plans.[157] Increasingly, these transportation elements have incorporated planning strategies intended to encourage people to drive less and to walk, bicycle, and use mass transportation more frequently. Arizona's statute, for example, requires cities with more than 50,000 people to prepare a bike transportation element as part of of their comprehensive plan.[158] Nevada's enabling legislation supports planning for mass transit, bicycle, and pedestrian infrastructure.[159] This statute encourages local planning to include a transit element that "[s]how[s] a proposed multimodal system of transit lines, including mass transit, streetcar, motorcoach and trolley coach lines, paths for bicycles and pedestrians, satellite parking and related facilities."[160]

In 2008, Florida amended its zoning enabling act that requires local comprehensive plans to consider methods of discouraging urban sprawl, supporting energy efficient development patterns, and reducing GHGs.[161] The law also mandated local governments to address "transportation strategies to address reduction in greenhouse gas emissions from the transportation sector," and to consider energy conservation under its natural resources element.[162]

D. Local TOD Case Studies

The City of Yonkers, New York adopted a highly detailed master plan for its central commuter rail station area that contained certain specifications regarding the types of development the city wanted on available vacant land in the area.[163] The zoning for the area was amended to provide an " 'as-of-right' status for developments that conform to the design standards contained in the [station area] master plan."[164] Compliance with New York State's extensive environmental review requirements is waived for these projects, since the impacts of development contemplated by the

157. *Land Use Stabilization Wedge*, *supra* note 1, at 30.

158. ARIZ. REV. STAT. ANN. § 9-461.05(E)(9) (2011) (West).

159. NEV. REV. STAT. ANN. § 278.160(1)(r) (West 2011).

160. *Id.*

161. FLA. STAT. ANN. § 163.3177(6)(b) (West 2008). While this language was later stricken by the Community Planning Act, 2011 Fla. Sess. Law Serv. 2011-139 (West), the current version of section 163.3177 still discourages urban sprawl and promotes "walkable and connected communities" and the "conservation of water and energy." FLA. STAT. ANN. § 163.3177(6)(b) (2011).

162. *Id.*

163. *See* A PLAN FOR REDEVELOPMENT ON THE YONKERS WATERFRONT, *available at* http://www.ldeo.columbia.edu/edu/plus/Westchester/A PLAN FOR REDEVELOPMENT ON THE YONKERS WATERFRONT.pdf.

164. Nolon & Bacher, *supra* note 152, at 216.

master plan had already been studied in detail and mitigation of adverse environmental impacts provided.[165]

"Early in this process, a developer was selected through a request for proposals process to plan the redevelopment of two centrally-located sites, immediately adjacent to the train station.[166] As the city developed its plan and conducted its environmental impact review, the private [developer] began site planning" and provided information to the city planners regarding economic and market realities.[167]

> Information provided by citizens, environmental consultants, other professionals, and the developer were integrated as the process progressed and the master plan and designs for the two sites were adjusted.
>
> The result is the development of Hudson Park, a [two-phase] project that contains nearly 500 middle-income rental residential units, public pedestrian access to a [revitalized] waterfront, restaurants, office and retail space, and immediate access to the [renovated] train station through carefully designed walkways and entrances that provide security to riders. Hudson Park is a dramatic [TOD] where parking provided is approximately 50% less than the amount required by traditional urban zoning. This is possible because the buildings and area [appeal to] commuters who travel to work by train [and the developer's marketing was designed to attract them]. The developer saved $25,000 in development costs for each parking space not constructed, and residents save $6,000 annually for owning one car instead of two. Three high quality restaurants and a number of retail stores catering to the middle income population[s] of these buildings have appeared [in the neighborhood]. This project and the public amenities provided by the government [to support it] are credited with sparking considerable [additional] private sector interest in the area[,]" bringing in additional riders for the transit system and reducing demand for residential development on greenfields in outlying areas.[168]

Zoning regulations for developments usually require standard numbers of off-street parking spaces depending on the number of dwelling units permitted or the square feet of office or retail space.

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165. *Id.*
166. *Id.* at 216.
167. *Id.* at 217.
168. *Id.*

These standard numbers were created to apply to developments that are not transit oriented or are not compact, mixed use developments where there will be fewer cars and car trips. Reducing parking requirements, like Yonkers did in the example above, both recognizes that fewer cars will need to be accommodated in TOD developments and discourages occupants from driving.

"The suburban Bloomington, Minnesota city code provides for an " 'HX-R' " zoning district (high intensity mixed-use with residential) that is aimed at getting people out of their cars."[169] Bloomington is located toward the end of a light rail system serving the metropolitan Minneapolis area. The zoning provision aims to "[r]educe vehicle trips and vehicle miles traveled . . . by allowing intense development in close proximity to high frequency transit service, and by encouraging multi-purpose trips, walking trips, carpool trips and transit trips."[170] The ordinance prohibits drive-through uses that obstruct sidewalks and discourage walking.[171] It provides a minimum density of thirty dwelling units per acre for residential development.[172] It also provides a minimum floor area ratio of 1.5 and a maximum of 2.0.[173] This maximum may be increased through density bonuses to encourage retail and service businesses, below grade parking, development of plazas or parks, affordable housing, public art, and sustainable design.[174]

Parking is restricted in the ordinance in order to "promote[] walking, biking, and transit use."[175] "[P]arking must be located below grade, within structured ramps, or in individual on-street spaces parallel with and adjacent to low volume streets."[176] Bicycle parking must be provided near building entrances.[177] Development directly adjacent to transit stations must provide sidewalk and bikeway connections to the transit station, as well as to adjacent sites.[178] The Bloomington zoning strategy evinces a commitment to development that is truly transit oriented by restricting parking, connecting to nearby transit, and locating retail and service uses within short walks of residences, thereby reducing vehicle trips and VMT.

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169. *Land Use Stabilization Wedge*, *supra* note 1, at 35.
170. CITY OF BLOOMINGTON, MINN., CODE ch. 19, § 19.29(a)(4) (2011).
171. *See id.* § 19.29(k).
172. *Id.* § 19.29(f)(1).
173. *Id.* § 19.29(g)(1), (4).
174. *Id.* § 19.29(g)(4)(A)-(F).
175. *Id.* § 19.29(i)(2).
176. *Id.* § 19.29(i)(2)(A).
177. *Id.* § 19.29(i)(3).
178. *Id.* § 19.29(k)(6).

E. Transportation Efficient Development

Even where communities are not currently served by transit systems, they can create compact, mixed use neighborhoods that reduce car trips and miles traveled. The country cousin of TOD is Transportation Efficient Development (TED), where the emphasis is on reducing car trips within TED zoning districts. Zoning controls can limit the size of housing units and combine retail, office, and residential land uses, putting services, shops, and jobs in proximity to homes. Zoning controls may also be used to require new construction to meet energy standards and further reduce GHG emissions. Communities not yet served by transit can design one or more priority growth districts of this type and create overlay zones for them that allow greater densities and more land uses than permitted in the underlying zoning districts. By clustering development strategically, these growing localities position themselves for future service by commuter rail or bus rapid transit, thereby becoming "transit ready."

The Town of Malta, located outside of Albany, New York, adopted a TED approach to rezoning its central business district by using an overlay zone to prepare for future transit services.[179] The Malta zoning law provides for compact, mixed use development emphasizing pedestrian amenities. Malta is not currently served by transit, but the regional Capital District Transportation Plan calls for bus rapid transit service to downtown Malta in the future. In anticipation, the overlay zone states that "[t]o promote pedestrian activity and multimodal transportation, developments should be located within 1320 feet of an existing or future transit stop as approved by the Planning Board."[180]

Suburban areas that adopt higher density, mixed use zoning will find it easier politically to adopt strong environmental protection ordinances applicable to the land outside high-density zones. Where state law permits, density bonuses may be allotted in the transportation efficient overlay area, and cash contributions may be secured from developers in exchange. This money can be used to purchase development rights from landowners in valuable open space areas outside the higher density zone, areas that mitigate climate change through sequestration.

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179. *See* TOWN OF MALTA, N.Y., CODE ch. 167, § 167-61(F) (2011).
180. *Id.*

F. LEED for Neighborhood Development

1. Overview of the LEED-ND Rating System

LEED-ND advances the USGB rating system by focusing on developments and their relationship to their adjacent neighborhoods.[181] The Congress for the New Urbanism (CNU) and the Natural Resources Defense Council (NRDC) collaborated with the USGBC to create LEED-ND, which began its pilot phase in 2007.[182] According to the USGBC, the LEED-ND rating system "encourages smart growth and New Urbanist best practices by promoting the location and design of neighborhoods that reduce vehicle miles traveled (VMT) and creating developments where jobs and services are accessible by foot or public transit."[183] It also promotes more efficient energy systems and water use, which are "especially important in urban areas [where these services are expensive or] where the infrastructure is often overtaxed."[184] Though most applicable on the neighborhood scale, there are no size thresholds for projects seeking ND certification. According to the Green Building Certification Institute (GBCI) of the USGBC "[p]rojects may constitute whole neighborhoods, portions of neighborhoods, or multiple neighborhoods."[185] GBCI does recommend, however, that projects not be smaller than two habitable buildings or larger than about half a square mile.[186]

Like the other LEED rating systems, LEED-ND is divided into categories.[187] In each category, there are prerequisites that must be met and a variety of points that may be earned.[188] Developers must meet all prerequisites and earn a specified number of points for basic certification or to achieve certification at higher levels: silver, gold, or platinum.[189]

LEED-ND points and prerequisites are divided into five categories: Smart Location and Linkage (SLL), Neighborhood Pattern

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181. *See LEED for Neighborhood Development*, U.S. GREEN BLDG. COUNCIL, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148 (last visited July 5, 2012).

182. *Id.*

183. *ND-Specific Guidance*, LEED ONLINE, https://www.leedonline.com/irj/servlet/prt/portal/prtroot/docs/guid/30a0a343-df18-2d10-5a85-fe6a8528385b (last visited July 5, 2012).

184. *Id.*

185. *About: LEED for Neighborhood Development*, GREEN BLDG. CERTIFICATION INST., http://www.gbci.org/leednd (last visited July 5, 2012).

186. U.S. GREEN BLDG. COUNCIL, LEED 2009 FOR NEIGHBORHOOD DEVELOPMENT, at xiv (2011), *available at* http://www.usgbc.org/ShowFile.aspx?DocumentID=9449 [hereinafter USGBC, LEED FOR NEIGHBORHOOD DEVELOPMENT].

187. *Id.* at vii-viii.

188. *Id.*

189. *Id.*

and Design (NPD), Green Infrastructure and Buildings (GIB), Innovation and Design Process (IDP), and Regional Priority Credits (RPC).[190] Within the first three categories, (SLL, NPD, and GIB) prerequisites are identified that embody the principles of sustainable development.

The Smart Location and Linkage prerequisites, for example, encourage development within established communities and near public transit.[191] Developments seeking LEED-ND status as new neighborhoods must protect prime farmland, wetlands, and water bodies from development, and avoid floodplains, imperiled species, and ecological communities.[192]

Zoning standards and local laws that foster development in existing neighborhoods or encourage the use of distressed or underutilized older buildings or brownfields will help projects seeking certification to satisfy LEED-ND smart location requirements.[193] Zoning provisions that permit transfer of development rights from farmlands, or other ecologically important areas, to existing neighborhoods also further ND principles. Such provisions manage climate change by preserving the sequestering environment and by promoting more energy efficient human settlements.[194]

The Neighborhood Pattern and Design prerequisites of LEED-ND promote livability, walkability and transportation efficiency, as well as communities that are physically well-connected with the neighborhood beyond the buildings seeking certification.[195] NPD points can be earned by increasing the density permitted by zoning to accommodate a transit agency's need for riders.[196] LEED-ND, for example, requires that projects have a minimum floor-area-ratio of .80 for commercial buildings or a minimum of seven dwelling units per acre for residential structures.[197] These standards are at the lower range of density needed to provide sufficient riders to support transit services.

A prerequisite in the Green Infrastructure and Buildings category offers an example of how LEED-ND standards exceed the provisions of base energy codes. GIB Prerequisite 2 requires "the design and construction of energy-efficient buildings that reduce air, water, and land pollution and [that mitigate] adverse environmental [impacts] from energy production and consumption."[198]

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190. *Id.* at xii.
191. *See id.* at 1-39.
192. *Id.* at 10-21.
193. *Id.* at 26.
194. *See id.* at 15-18.
195. *Id.* at 41-76.
196. *Id.* at 53-54.
197. *Id.* at 42.
198. *Id.* at 78.

This requirement forces developers to engage designers and consultants who understand how to minimize environmental impacts, including CO_2 emissions. LEED-ND encourages developers to exceed the standards imposed by most local energy code regulations. For example, any newly constructed buildings that are four stories or higher must be ten percent more energy efficient than required by ASHRAE 90.1-2007, which is the base energy code requirement for commercial buildings in many states.[199] In addition, buildings undergoing major renovations must be five percent more efficient than this standard.[200] Within a LEED-ND project, ninety percent of all new residential buildings that are three stories or less must meet Energy Star criteria or the equivalent; this too exceeds local energy code standards.[201]

Beyond prerequisites, the credits that may be earned under LEED-ND provide numerous options for developers to make their ND projects sustainable. At the site level, for example, they can choose to design for habitat and wetland conservation or to restore damaged natural resources and earn points for doing so.[202] Regarding VMT, they can adopt transportation demand management for the occupants of their buildings[203] or reduce the footprint of their parking surfaces and buildings.[204] Regarding water efficiency, they can elect to use low-flow plumbing fixtures or to adopt wastewater management protocols.[205] They can earn points by electing to orient buildings for maximum solar exposure,[206] to reduce light pollution,[207] or to install district heating and cooling facilities.[208]

2. Municipal Use of LEED-ND to Guide Land Development

The LEED-ND prerequisites and elective credits serve as an impressive menu of options to achieve sustainability. In the neighborhood context, there are many opportunities for coordinating private sector and public planning, short of adopting LEED-ND standards as mandatory regulations. In some settings, it may be difficult for developers to achieve ND certification without such coordination. Unless they are building a large new neighborhood, for example, it is hard for developers to meet prerequisites such as

199. *Id.*
200. *Id.*
201. *Id.* at 79.
202. *Id.* at 36-37.
203. *Id.* at 65-66.
204. *Id.* at 60-61.
205. *Id.* at 86-87.
206. *Id.* at 96-97.
207. *Id.* at 104-06.
208. *Id.* at 99.

"walkable streets"[209] or a "connected and open community"[210] without compatible local planning and zoning. Points may be earned under LEED-ND for reduced parking footprints, but projects must meet the parking requirements of the zoning code, which might make it impossible to earn those parking credits. Points available for stormwater management are easier to earn if the building fits into a local floodplain management plan and stormwater system. Local capital budgets can help developers earn points for a variety of sustainable features, such as access to recreational facilities, transit stops, and street and bicycle networks.

Where the local government wants to help particular developers earn points or, more ambitiously, to encourage all developers to contribute to more sustainable neighborhoods, LEED-ND standards provide strategic guidance for the reform of local land use law. The principles followed by the USGBC, CNU, and the NRDC in creating LEED-ND apply equally well to the creation of local land use regulations as they do to guiding developers in seeking certification.

Local governments may use ND standards as a checklist to evaluate their comprehensive plans, zoning and other land use regulations, capital budgets, and other activities to determine whether and to what extent they achieve neighborhood sustainability and how they can be improved without imposing undue costs on the development community. To the extent that local governments do this, they make it easier for developers to win ND certification and they promote the development of sustainable neighborhoods at the same time. Points can be earned for projects located in neighborhoods with proper street networks, for example, and for those that provide for district heating systems. Engineering streets to ensure greater connectivity, minimizing building uses that require vehicle drive-through activity on sidewalks (banks and fast food establishments), providing more pedestrian use and amenities, building paths for bikes and scooters, and planning energy systems at the district level are more easily accomplished if fostered by local comprehensive planning, capital spending, and land use regulations.

Zoning can allow for district heating and cooling plants, as well as solar and wind systems, to be installed in certain buildings or their sites; land use review protocols can be used to encourage owners to provide them, and density bonuses can be granted to provide a financial incentive. Green Infrastructure and Buildings credit 11 "encourage[s] on-site renewable energy production to re-

209. *Id.* at 41.
210. *Id.* at 44.

duce the adverse environmental and economic effects associated with fossil fuel energy production and use."[211] Solar, wind, geothermal, small-scale/micro hydroelectric, and biomass facilities that reduce a project's annual energy costs by five percent or more earn points in the GIB category.[212] Greater energy cost savings earn additional points.[213] San Francisco made renewable energy more feasible by amending its zoning regulations to add a special permit system for mounting wind towers to individual buildings in a certain district.[214] With that simple land use change, all developers in the designated zone were then able to provide wind turbines and earn these GIB credits under the LEED-ND system.

One of the historic inefficiencies in our zoning system is the lack of respected standard-setting agencies to guide the drafting of local regulations. Some states have provided, from time to time, technical assistance to localities regarding these matters. In most cases, however, localities are not guided by carefully considered standards. This is due, in part, to the fact that local circumstances differ, and consequently, mandatory standards worked out at the state or federal level may be inappropriate. Since the advent of zoning in the 1920s, there has been a constant need for guidance as localities regulate and make choices to fit their local needs. This need is exacerbated by the complex demands of sustainable development and climate change mitigation. To a degree, the LEED-ND system responds to this need by providing intelligent practices that can be used to guide sustainable neighborhood planning and regulation.

G. District Energy Systems

Buildings can be made up to eighty percent more energy efficient through distributed-generation systems, which capture waste heat and use it for water and space heating and cooling.[215] Such systems operate at a scale larger than the individual building, optimally among a large number of buildings in close proximity to one another where maximum efficiency is possible. Energy ef-

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211. *Id.* at 98.

212. *Id.*

213. *Id.*

214. SAN FRANCISCO, CAL., MUN. PLANNING CODE § 933 (2011).

215. Shankar Karki & Michael D. Mann, *Efficiency Improvements through Combined Heat and Power for On-Site Distributed Generation Technologies*, 22 COGENERATION & DISTRIBUTED GENERATION J. 19, 21 (2007), *available at* http://www.localpower.org/documents/reporto_sk_efficiencydg.pdf; *How Gas Turbine Power Plants Work*, U.S. DEP'T OF ENERGY, http://www.fossil.energy.gov/programs/powersystems/turbines/turbines_howitworks.html (last updated Jan. 26, 2011); *Cogeneration/Combined Heat and Power*, CTR. FOR CLIMATE & ENERGY SOLUTIONS, http://www.pewclimate.org/technology/factsheet/CogenerationCHP (last visited July 5, 2012).

ficiencies of this sort should be a part of the neighborhood planning process and integrated into local efforts that encourage sustainability through compact, mixed/use development. Energy efficient neighborhoods can be planned that encourage green building development, on-site generation, the use of renewable sources of power, efficient distribution systems, and combined heat and power systems shared by multiple buildings. LEED-ND awards a credit for "District Heating and Cooling," which a developer can earn by designing a system to meet eighty percent of a project's heating or cooling consumption or both through district heating and cooling.[216]

In higher density, mixed use neighborhoods there is great potential for energy efficiency through the creation of a District Energy System (DES). A DES produces energy in the form of steam, hot water, or chilled water, which is transported through an underground closed-loop piping system to buildings connected to the district's network.[217] A DES can mitigate climate change even further by deriving its energy from renewable fuels such as biomass, municipal waste, and lower carbon alternatives such as natural gas or, in some areas, wind turbines or solar arrays.[218]

To operate most efficiently, districts should contain buildings with different energy needs, such as multi-family buildings, offices, municipal buildings, warehouses, hospitals, nursing homes, mills, and factories. When they are located in reasonable proximity, the energy loads of each can complement one another (because their energy needs are varied at different times of day) and the costs of heating and cooling can be reduced. In those buildings, heat exchangers can draw the energy needed to meet their space and water heating needs, returning the water to the plant for recirculation within a closed loop system.[219] This eliminates the need to install individual boilers in each building, which reduces capital costs.[220] In older areas where existing furnaces, chillers, water heaters, and other cooling and water facilities are obsolete, the DES approach can cost-effectively address the need for system modernization. There are inherent fuel efficiencies in this system.

A dramatic example of this technology that transcends the neighborhood scale is occurring in Sydney, Australia. The cornerstone of Sydney's new system is trigeneration that employs gas

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216. USGBC, LEED FOR NEIGHBORHOOD DEVELOPMENT, *supra* note 186, at 99.

217. Baker, *supra* note 132; *see also* R. NEAL ELLIOTT & MARK SPURR, COMBINED HEAT AND POWER: CAPTURING WASTED ENERGY, at V (May 1999).

218. *See* Baker, *supra* note 132.

219. *See* ELLIOTT & SPURR, *supra* note 217, at 25.

220. *Id.*; *see also* Baker, *supra* note 132.

burning engines for electricity generation.[221] The engines burn either natural gas or renewable gas, thereby reducing or eliminating the amount of GHG emissions associated with providing electricity to the city.[222] Through its "Trigeneration Master Plan," the city hopes to meet seventy percent of its energy needs by combining this electrical generation with distributed heating and cooling.[223] Currently eighty percent of Sydney's energy is provided by coal-fired plants, where two-thirds of the energy is lost as heat or in transmission.[224] By reducing Sydney's dependence on coal, trigeneration will reduce Sydney's GHG emissions between 1.1 to 1.7 million metric tons a year.[225] The goal of seventy percent energy through trigeneration is paired with the estimates that the city could bridge the remaining thirty percent through a small amount of grid electricity, renewable sources, and energy efficiency measures.[226] The capital cost of developing this plan would total $950 million and projected annual energy savings are $200 million.[227]

To increase the use of district energy systems, the local land use regulatory system will need to adjust to allow, or even to incentivize, them.[228] They must be allowable uses and practices under local zoning and site plan regulations, as well as local building and energy codes. They may be encouraged through bonus zoning provisions that waive zoning requirements or provide additional development densities for developers who adopt DES technologies.

The City of Burlington, Vermont revised its comprehensive plan to include a commitment to transitioning to renewable sources of energy as well as to cogeneration and district heating, including biomass-fueled district heating technologies.[229] Subsequent to that revision, Burlington residents voted in favor of a smart-grid bond to provide $13.5 million in upgrades, including net

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221. Kinesis Consortium, *City of Sydney Decentralised Energy Master Plan – Trigeneration*, CITY OF SYDNEY 22 (2010), http://www.cityofsydney.nsw.gov.au/Council/OnExhibition/documents/CityofSydney-DEMPTrigeneration-Report20101129-LowRes.pdf [hereinafter *Sydney's Master Plan*].

222. *Id.*

223. *Powering Sydney*, CITY OF SYDNEY, http://www.cityofsydney.nsw.gov.au/2030/makingithappen/AllanJones.asp (last visited July 5, 2012) [hereinafter *Powering Sydney*].

224. *Id.*

225. *Id.*

226. *See id.*; *Sydney's Master Plan*, *supra* note 221, at 4.

227. *Sydney's Master Plan*, *supra* note 221, at 32.

228. *See* John R. Nolon, *Climate Change and Sustainable Development: The Quest for Green Communities–Part II*, 61 PLANNING & ENVTL. L. 3, 3-12 (2009).

229. *See* Annalisa Parent, *South Burlington Comprehensive Plan Nearly Complete*, THE OTHER PAPER (Mar. 31, 2011), http://www.otherpapersbvt.com/south-burlington-comprehensive-plan-nearly-complete.html.

metering.[230] Planners in Washington, D.C. have recognized that the absence of permissive language pertaining to DES in its local zoning law discourages the use of district energy systems.[231] They recommend amending the zoning to expressly permit the use of district energy systems in all zoning districts.[232]

Another example can be found in St. Paul, Minnesota. The co-generation system used in this city is the result of a partnership between Ever-Green Energy and Duke Energy Generation Services.[233] In 2003, Duke Energy opened a wood-fired combined heat and power facility in downtown St. Paul.[234] Before the plant was built, Duke Energy agreed to a twenty-year power agreement with Ever-Green, thereby ensuring a market for the plant's output.[235] The wood is burned to heat water, which then creates steam.[236] This steam then turns a turbine, which creates electricity.[237] Instead of letting the steam evaporate, the steam is then used to heat out-flowing water, thereby providing hot water to the connected buildings.[238] In addition, the wood burned is "clean wood waste generated in the Twin Cities metro area,"[239] which "reduce[s] greenhouse gas emissions by more than 280,000 tons per year."[240] This single plant is capable of producing "25 megawatts of electricity and 65 megawatts of thermal energy."[241] The thermal energy reaches over 31 million square feet of St. Paul building space.[242] This system replaces about sixty percent of the district's use of coal and oil by providing heat and cooling to the majority of the buildings in the downtown St. Paul neighborhood.[243]

One of the most compelling examples of CHP is found on the campus of the University of Texas at Austin. The UT-Austin CHP system provides "100% [of the] power, heating and cooling re-

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230. Joel Banner Baird, *Burlington Approves Smart Grid in Citywide Vote*, BURLINGTON FREE PRESS (June 28, 2011, 8:24 PM), http://www.burlingtonfreepress.com/article/20110628/NEWS02/110628031/Burlington-approves-smart-grid-citywide-vote.

231. CLARION ASSOCS. & FARR ASSOCS., SUSTAINABILITY DIAGNOSIS FOR THE WASHINGTON, D.C. ZONING REVIEW 14-15 (2008), *available at* https://www.communicationsmgr.com/projects/1355/docs/Diagnosis Draft 17.pdf.

232. *See id.* at 15.

233. *St. Paul Cogeneration*, EVER-GREEN ENERGY, http://www.ever-greenenergy.com/clients/cogeneration.html (last visited July 5, 2012) [hereinafter *St. Paul Cogeneration*].

234. *Id.*

235. *Id.*

236. *Id.*

237. *Id.*

238. *Id.*

239. *Id.*

240. Press Release, Trigen-Cinergy Solutions, Combined Heat and Power Plant Begins Operations (May 6, 2003), *available at* http://www.ever-greenenergy.com/pdf/2003_05_06_CHPStartup.pdf.

241. *St. Paul Cogeneration*, *supra* note 233.

242. *Id.*

243. *Id.*

quirements for 16 million [square feet] and 150+ buildings."[244] The CHP system has a capacity of 137 megawatts,[245] and is capable of operating at ninety percent efficiency.[246] In addition, the system has 46,000 tons of chilled water capacity.[247] This system has produced heat and power with 99.9998% reliability over the last thirty-five years.[248]

VI. CONCLUSION: ENERGY CONSERVATION DISTRICTS

Planning to promote District Energy Systems is a nascent notion that is only beginning to influence local land use decisionmakers. So too is the insinuation of the standards contained in the LEED-ND rating system into local plans and regulations. While TOD is a more familiar technique, it is rapidly evolving to incorporate design standards, amenities, and objectives that embrace a variety of sustainability objectives. These innovative neighborhood planning techniques can be integrated into a single program that, in turn, can organize and guide federal and state energy conservation and climate change policies.

At first blush these three strategies may seem incompatible. Each one involves a different type of neighborhood with various shapes and features. District Energy Systems organize around a cluster of diverse types of buildings with varying energy needs; TOD focuses on a transit station and a tight radius of land around it. LEED-ND encompasses district energy and transit orientation in its certification system and provides a broad strategic framework for local governments to follow in improving their land use plans and regulations to achieve sustainable development.[249]

Federal and state policies and programs should encourage localities with the potential for creating district energy systems and transit oriented neighborhoods to rezone them as Energy Conservation Zoning Districts calibrated to achieve multiple objectives of sustainable development. In the orchard of energy conservation and climate change mitigation techniques, this strategy may be the lowest hanging fruit. Over seventy percent of electricity pro-

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244. Juan Ontiveros, Exec. Dir. Util. & Energy Mgmt., Presentation Regarding the University of Texas-Austin's CHP and District Energy System (Nov. 2010) (presentation available at http://www.epa.gov/chp/documents/meeting_110110_Ontiveros.pdf).

245. *Id.*

246. *Id.*

247. *Id.*

248. *Id.*

249. The Land Use Law Center has published a guidebook on this subject through the United States Green Building Council. Land Use Law Ctr., Pace Univ. Sch. of Law, Technical Guidance Manual for Sustainable Neighborhoods: How to Use the LEED for Neighborhood Development Rating System to Audit Local Plans, Codes, and Policies (2011) (unpublished manuscript) (on file with author).

duced in the United States is consumed by buildings, which also account for over forty percent of total domestic energy consumption; the construction of buildings is regulated at the local level through energy codes and land use standards. As much as eighty percent of the energy used to produce electricity is wasted at the point of generation or in line transmission, waste largely eliminated by on-site generation in district energy systems, which land use regulation can facilitate. Energy use in buildings correlates with climate change; over thirty-five percent of CO2e emissions, nearly 2.5 gigatons, are attributable to energy consumed in buildings. Transportation accounts for a third of domestic GHG emissions and well over half of that is traceable to personal vehicles that are used to traverse the sprawling settlement pattern that is the result of prevailing land use policies. Per capita energy consumption and GHG emissions are over double in low density developments when compared to the higher density neighborhoods that Energy Conservation Zoning Districts create.[250]

Local officials must learn how to determine what types of buildings and energy uses should be incorporated into such a zoning district and how to change land use regulations to facilitate district energy systems, more energy efficient construction, renewable energy facilities, transit-oriented development, and other sustainability techniques. Localities need assistance in providing incentives to cover the capital costs of green buildings and district-wide systems. State and federal support for this Energy Conservation Zoning District initiative can unlock the potential these strategies have for energy conservation and climate change mitigation.

One model for such a program is the federal Enterprise Zone initiative and the New York Empire Zone program. In 1988, the Federal government passed the Enterprise Zone Development statute[251] and enhanced it with more effective benefits in 1993.[252] The criteria for identifying qualifying zones were contained in the 1988 legislation.[253] In selecting enterprise zones, the objectives were poverty reduction and urban job development and so the standards for qualifying zones were the area's unemployment rate,[254] poverty rate,[255] and the median income,[256] among other factors.

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250. *See supra* notes 32-34 and accompanying text.

251. Housing and Community Development Act of 1987, Pub. L. No. 100-242, § 701, 101 Stat. 1957 (1988).

252. Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, § 13301(a), 107 Stat. 543 (1993).

253. Housing and Community Development Act § 701.

254. 42 U.S.C. § 11501(c)(3)(C) (2006).

255. *Id.* § 11501(c)(3)(D).

256. *Id.* § 11501 (c)(3)(E).

A similar program was adopted two years earlier in New York, known as the New York State Economic Development Zones, or Empire Zone program.[257] To designate qualifying Empire Zones eligible for state financial and technical assistance and tax incentives, the State Commissioner of Economic Development looked at the area's poverty rate,[258] unemployment rate,[259] and rate of public assistance.[260] Both the Enterprise Zone program and the Empire Zone program used census-based metrics to identify eligible areas within which local governments and employers adding new jobs could receive government benefits. A similar approach could be taken to identify Energy Conservation Zoning Districts (EZ Districts) in which local governments, developers, and building owners could qualify for a range of benefits if they further the strategies for energy conservation, climate change mitigation, and sustainability discussed in this article.

There are a number of available indices that could be considered to determine where maximum energy conservation can be achieved and which neighborhoods should qualify under the EZ District program. Released in March 2011, the *American Housing Survey for the United States: 2009* contains a wide range of information, including residential square footage per person, lot size, and rooms per person.[261] The U.S. Energy Information Administration ("the EIA") reports electricity consumption statistics for various types of residential and commercial buildings on a per household and per employee basis.[262] These EIA reports are instructive. Single-family homes, for example, use 108.4 million Btu per household per year, 2-4 unit apartment buildings use 85.0 million Btu per household per year, while apartment buildings with five or more units consume 54.4 million Btu per household per year.[263] This type of data can be used to target neighborhoods and development patterns where energy efficiency can result. Federally-established Metropolitan Planning Organizations and state departments of transportation conduct regional transit planning

257. N.Y. GEN. MUN. LAW §§ 955-69 (McKinney 2011).

258. *Id.* § 958(a)(i)(A).

259. *Id.* § 958(a)(i)(B).

260. *Id.* § 958(d)(iii).

261. U.S. CENSUS BUREAU, AMERICAN HOUSING SURVEY FOR THE UNITED STATES: 2009 (2009), *available at* http://www.census.gov/prod/2011pubs/h150-09.pdf.

262. *2005 RECS Survey Data*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/consumption/residential/data/2005/index.cfm#summary (last visited July 5, 2012); *2003 Commercial Buildings Energy Consumption Survey: Consumption and Expenditures Tables*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/detailed_tables_2003.html (last visited July 5, 2012).

263. U.S. ENERGY INFO. ADMIN., TABLE US1: TOTAL ENERGY CONSUMPTION, EXPENDITURES, AND INTENSITIES, 2005, at 2 (2009), *available at* http://www.eia.gov/consumption/residential/data/2005/c&e/summary/pdf/tableus1part1.pdf.

and can identify qualifying transit station areas where significant new ridership will further transit development. State tax departments maintain codes for land and building use and can identify tax districts with clusters of building types that are needed in an EZ District.

The federal EZ District program could provide planning grants for local governments, mapping services, statistical data packages, best practices, infrastructure subsidies, technical assistance grants, and tax credits to property owners and developers. This federal initiative could be dependent on the participation of the state government in the EZ Program, patterning itself after the cooperative federalist approach of the Coastal Zone Management Act.[264] States could be told that federal benefits depend on states matching the grant and tax credit allocations and upon programs for helping local governments with best practices, technical assistance, and neighborhood selection. Local governments with qualifying neighborhoods that agree to adopt the EZ District program including enhanced energy code adoption, effective code enforcement, TOD, District Energy System facilities, and neighborhood sustainability standards, would be eligible to participate. With state and federal support, localities willing to adopt an EZ District program could apply for planning grants, secure assistance in adopting best practices, qualify for infrastructure subsidies and, in turn, make property owners and developers in EZ Program neighborhoods available for tax credits.

The EZ District program has the potential to succeed because it lines up with and furthers policy objectives that are bipartisan and ascendant. It lowers the cost of living for middle- and moderate-income Americans, reduces the nation's dependence on energy imports, furthers the development of renewable energy facilities, rests on the initiative of local governments that voluntarily choose to participate, and is flexible enough to fit local circumstances in the fifty states. It is a devolved and democratic approach. Coincidentally, it mitigates climate change and captures the support of those who understand the clear threat it poses to our economy and environment.

264. *See* 16 U.S.C. §§ 1451-64 (2006).

THE KEY TO UNLOCKING THE POWER OF SMALL SCALE RENEWABLE ENERGY: LOCAL LAND USE REGULATION

Patricia Salkin*

I. INTRODUCTION

Myriad federal and state programs have been promoted to incentivize the research and development of renewable energy as a means of achieving sustainability and producing more affordable alternative energy systems, and these programs could potentially have a profound impact on the way that electricity is produced and consumed in the United States. Small-scale renewable energy generation from sources such as solar and wind, that can be used at the consumer level as a source of power for homes and small businesses, is an important part of this paradigm shift. However, regardless of the fiscal incentives offered to clean-tech companies to

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design and market these products, as well as the fiscal incentives to homeowners and business owners to purchase and install these technologies, state and local laws can inadvertently impede their installation. These barriers may be caused by outdated statutes and municipal codes or by historic district and aesthetic regulations. Restrictive covenants and deed restrictions in homeowners association communities may further impede the goal of siting small scale renewable energy sources.[1]

In response to these problems, many state and local governments have sought to promote small-scale renewable energy development through amendments to comprehensive planning and zoning laws, as well as through utility regulations and various financial incentives. This article provides an overview of some of the strategies that have been used to increase the use of small-scale renewables, focusing on non-commercial renewable energy systems installed at the home or business level. The article begins in Part II with a discussion of various renewable energy incentives offered by the federal and state governments to promote the use of these alternative sources of electricity, including financial and permitting incentives. Part III continues with a detailed examination of how the land use regulatory system can be used to promote small-scale renewable energy by employing traditional zoning techniques, asserting that without an appropriate local land use regime, the incentives reviewed in Part II cannot be effectively utilized. Part IV concludes with a warning to local governments that if they fail to accommodate the emerging federal and state policies supporting the siting of renewable energy sources, they may face preemptive statutory measures in the area of land use regulation. This creates perhaps the greatest incentive for local governments to plan and regulate responsibly for promoting the appropriate use of small-scale renewable energy.

II. RENEWABLE ENERGY INCENTIVES

A. Financial Incentives

Financial incentives for small-scale renewable energy systems have been created at the federal, state, and local levels, and include tax abatements, rebates, grants, and low-interest loan pro-

1. *See, e.g.*, Patricia E. Salkin, *Renewable Energy and Land Use Regulation (Part 1)*, A.L.I.-A.B.A. BUS. L. COURSE MATERIALS J., Feb. 2010, at 47; Patricia E. Salkin, *Renewable Energy and Land Use Regulation (Part 2)* A.L.I.-A.B.A. BUS. L. COURSE MATERIALS J., Apr. 2010, at 27.

grams, among other things.[2] At the federal level, for example, Congress created the Residential Renewable Tax Credit in 2005, which provides a tax credit for homeowners for up to thirty percent of the cost of constructing solar electric, solar water heating, fuel cell, small wind, or geothermal heat pump generation systems.[3] The American Reinvestment and Recovery Act provided a significant boost by expanding the federal alternative energy investment tax credit to allow purchasers of small-scale systems to apply thirty percent of the total cost of a small wind system as a tax credit through 2016.[4] Then in February 2011 the President announced the Better Buildings Initiative, which calls upon Congress to redesign tax deductions and offer more government-backed loans to businesses that retrofit existing buildings.[5]

The states have also devised numerous financial incentives for small-scale alternative energy development.[6] For example, in Colorado, independently-owned residential solar electric generation systems that are not used for income production are exempt from property taxes.[7] Another Colorado law authorizes counties to offer property tax or sales tax incentives for residential and commercial property owners who install renewable energy fixtures.[8] The Illinois Renewable Energy Resource Solar and Wind Energy Rebate Program offers a rebate of up to $30,000 for the construction and use of solar and wind energy sources for homeowners, businesses,

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2. *See generally* DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org (last visited July 5, 2012) (providing a comprehensive listing of these incentives).

3. 26 U.S.C.A. § 25D(a) (West 2012).

4. *See* American Reinvestment and Recovery Act of 2009, Pub. L. No. 111-5, § 1603, 123 Stat. 115 (2009) (codified as amended in 26 U.S.C. § 48). Most people prefer tax credits as opposed to deductions, because a tax credit reduces taxes dollar-for-dollar, while a deduction only removes a percentage of the tax that is owed.

5. Press Release, President Barack Obama, President Obama's Plan to Win the Future by Making American Businesses More Energy Efficient through the "Better Buildings Initiative" (Feb. 3, 2011), *available at* http://www.whitehouse.gov/the-press-office/2011/02/03/president-obama-s-plan-win-future-making-american-businesses-more-energy.

6. *See generally Financial Incentives for Renewable Energy*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/summarytables/finre.cfm (last visited July 5, 2012) (providing a summary of the financial incentives that promote renewable energy use). The U.S. Department of Energy also notes that the following organizations play a role in advancing renewable energy policies at the state, regional, and national levels: Association of State Energy Research and Technology Transfer Institutions; Interstate Renewable Energy Council; National Association of Counties Interest Areas; National Association of Regulatory Utility Commissioners; National Association of State and Community Service Programs; National Association of State Energy Officials; National Conference of State Legislatures; Renewable Energy Policy Project; and the State Technologies Advancement Collaborative. *Information Resources: Related Links*, U.S. DEP'T OF ENERGY, http://apps1.eere.energy.gov/states/related_links.cfm (last updated May 1, 2008).

7. COLO. REV. STAT. ANN. § 39-3-102 (West 2012).

8. *Id.* § 30-11-107.3.

public agencies, and non-profit entities.[9] Massachusetts has established a Renewable Energy Trust Fund to make grants, loans, equity investments, rebates, and provide other types of financial assistance for the development and increased use of renewable energy resources.[10] The Fund, in operation with the Massachusetts Clean Energy Center,[11] offers numerous financial incentives,[12] such as the Micro Wind Initiative, which has assisted more than seventy projects to date and "provides rebates for the installation of small wind projects with power capacities from 1 kW to 99 kW and located at residential, commercial, industrial, institutional, and public facilities."[13]

The New York State Energy Research and Development Authority (NYSERDA) provide incentives for on-site wind energy systems based on their annual energy output.[14] A previous NYSERDA program, which is now closed, provided incentives of approximately 40% to 45% of the installation costs for residential and commercial solar electric systems.[15] Residents in Oregon are eligible for income tax credits for adding solar energy systems to their homes, as well as for installing solar water heating equipment and solar pool heating equipment.[16] Separate tax credits are available for active and passive solar space heating systems, and each tax credit is worth up to $1,500 per year.[17] Tax credits of up to $900 are also provided for residential geothermal ground-source heat pumps.[18] In Washington State, sales tax exemptions are available for machinery and equipment used for solar energy systems that generate less than ten kilowatts per year, as well as for labor charges related to the installation of such equipment.[19] Individuals, busi-

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9. *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 July 5, 2012).

10. MASS. GEN. LAWS ANN. ch. 23J, § 9 (West 2012).

11. *Announcement*, MASS. RENEWABLE ENERGY TRUST, http://www.masstech.org/renewableenergy/index.html (last visited July 5, 2012).

12. *Renewable Energy Generation: Programs*, MASS. CLEAN ENERGY CTR., http://www.masscec.com/index.cfm/page/Programs/pid/11159 (last visited July 5, 2012).

13. *Commonwealth Wind – MicroWind*, MASS. CLEAN ENERGY CTR., http://www.masscec.com/index.cfm/cdid/11395/amp;pid/11159 (last visited July 5, 2012).

14. *NYSERDA – On-Site Small Wind Incentive Program*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY35F&RE=1&EE=1 (last updated May 10, 2012).

15. U.S. ENVTL. PROT. AGENCY, STATE INCENTIVES FOR ACHIEVING CLEAN AND RENEWABLE ENERGY DEVELOPMENT ON CONTAMINATED LANDS, *available at* http://www.epa.gov/oswercpa/incentives/ny_incentives.pdf.

16. *Residential Energy Tax Credits for Solar*, OREGON.GOV, http://www.oregon.gov/energy/RENEW/Pages/solar/Support-RETC.aspx (last visited July 5, 2012).

17. *Id.*

18. *Ground-Source Heat Pumps*, OREGON.GOV, http://www.oregon.gov/ENERGY/RENEW/Geothermal/GSHP.shtml (last visited July 5, 2012).

19. WASH. REV. CODE ANN. § 82.08.963 (West 2012).

nesses, and local governments that are not in the power business, as well as participants in community solar projects, are also eligible to apply to the public utility serving the solar energy system for an investment cost recovery incentive of up to $5,000 per year.[20] The public utility, in turn, is given a tax credit equal to the amount it pays out in investment cost recovery incentive payments.[21]

Incentives have also been provided by many local governments, often under local options authorized by state law or with financing provided by state or federal agencies. For example, the Boulder, Colorado City Council approved a solar rebate ordinance in November 2006 that

> [C]reated a renewable energy fund, where [thirty-five] percent of the fund [was] dedicated to rebates on sales tax on solar systems . . . and [sixty-five] percent of the fund [was] dedicated for the purpose of providing financial assistance through grants toward installation of photovoltaic (PV) or solar thermal systems on homes in the city's affordable housing program, on housing for low to moderate income persons owned or developed by nonprofit organizations, and on the facilities of site based nonprofit entities operating in Boulder.[22]

Fort Lauderdale, Florida offers rebates of up to $1,000 for the purchase and installation of residential solar water heaters and solar electric systems.[23] The rebate program is funded through the federal government's Energy Efficiency and Conservation Block Grant Program, which was authorized as part of the American Recovery and Reinvestment Act of 2009.[24] Harford County, Maryland offers property tax exemptions of up to $2,500 each ($5,000 total) for the installation of solar and geothermal energy devices,[25] and the City of Long Beach, California offers rebates of up to $500 for the installation of residential solar hot water heaters.[26] The Honolulu Solar Roof Water Heating Loan Program "provides financing

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20. *Id.* § 82.16.120.

21. *Id.* § 82.16.130.

22. *Solar Rebate and Grant Programs*, CITY OF BOULDER, COLO., http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=7700&ItemiI=2845 (last updated Mar. 30, 2012).

23. *Save Energy and Money with a Smart Watts Rebate*, CITY OF FORT LAUDERDALE, http://www.fortlauderdale.gov/rebates/ (last visited July 5, 2012).

24. *Id.*

25. *Solar/Geothermal Energy Tax Credit Application*, HARTFORD CNTY. GOV'T, http://www.harfordcountymd.gov/Downloads.cfm?FormID=969 (last updated Sept. 16, 2011).

26. *Residential Energy Efficiency Rebate Program*, CITY OF LONG BEACH, http://www.longbeach.gov/news/displaynews.asp?NewsID=4579&TargetID=100 (last visited July 5, 2012).

[for the installation of] solar water heating systems to homes of income-qualified homeowners."[27] The loans are based on income qualifications and are primarily aimed at helping low-income and moderate-income homeowners.[28]

These incentives, which are aimed at encouraging consumers to purchase and install renewable energy systems, are an important component of creating a marketplace for the products resulting from federal and state investments in research and development in the clean-tech industries.[29] However, without a combination of permitting incentives, which are discussed below, and general receptivity in the planning and zoning regulatory framework adopted by individual municipalities, as discussed in the next Part, many of these fiscal incentives cannot be effectively used.

B. Permitting Incentives

Streamlined permitting and other expedited approval procedures provide an alternative (and less expensive) way for government agencies to encourage the development of renewable energy systems. At the federal level, the Department of Energy (DOE) has created fast-track procedures for granting renewable energy loans,[30] and it recently "announced the availability of more than $27 million in new funding that will reduce the non-hardware costs of solar energy projects[.]"[31] States such as California,[32] Colorado, and Vermont have also acted to reduce the time and cost associated with renewable energy development permitting.[33]

The local permitting process can be an even bigger obstacle for residents and business owners seeking to invest in renewable en-

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27. *Housing Loans*, HONOLULU.GOV, http://www1.honolulu.gov/dcs/housingloans.htm (last updated Apr. 26, 2012).

28. *See id.*

29. *See* Garrick B. Pursley & Hannah J. Wiseman, *Local Energy*, 60 EMORY L. J. 877, 909-15 (2011).

30. *Department of Energy Streamlines Loan Guarantee Process for Renewable Energy*, WINDUSTRY, http://www.windustry.org/news/department-of-energy-streamlines-loan-guarantee-process-for-renewable-energy (last visited July 5, 2012).

31. *DOE Announces $27 Million to Reduce Costs of Solar Energy Projects, Streamline Permitting and Installations*, ENERGY.GOV (Jun. 1, 2011, 12:00 AM), http://energy.gov/articles/doe-announces-27-million-reduce-costs-solar-energy-projects-streamline-permitting-and.

32. *DFG's Response to Renewable Energy Development in California*, CAL. DEPT. OF FISH & GAME, http://www.dfg.ca.gov/Climate_and_Energy/Renewable_Energy/ (last visited July 5, 2012); Chris Meehan, *California Bills Streamline Solar Project Permitting*, CLEANENERGYAUTHORITY.COM (Sept. 14, 2011), http://www.cleanenergyauthority.com/solar-energy-news/california-bills-streamline-solar-project-permitting-091411/.

33. Michael Mendelsohn, *Slicing Away at Installation Costs: Federal and State Initiatives Designed to Reduce PV Permitting Costs*, NAT'L RENEWABLE ENERGY LAB. (Sept. 6, 2011), http://www.financere.nrel.gov/finance/content/slicing-away-installation-costs-federal-and-state-initiatives-designed-reduce-pv-permitting-.

ergy, especially in states where small energy projects are exempt from state-level approval requirements. As a 2008 report from the Network for New Energy Choices explained:

> System installers often face planners and building inspectors with little experience permitting renewable energy systems, and with no formal education for certifying system safety and reliability. Complex permitting requirements and lengthy review processes delay installations and add significant costs to distributed renewable energy systems. Multiple permitting standards across jurisdictions create additional complications and inefficiencies for system installers. In many cases, these remaining bureaucratic hurdles stymie efforts by homeowners and business owners to install systems and hinder the development of a national market for distributed renewable energy systems.[34]

The report recommends that the states should adopt uniform standards for interconnection and permitting requirements in order to mitigate the problems caused by inconsistent local laws.[35] For example, in New York State, interconnection of small scale distributed generation systems to the electric power grid, which involves compliance with both design requirements and operating requirements, was made easier when the state's standard interconnection requirements (SIR) were established by the Public Service Commission.[36] Specifically, SIR defines the application process and sets deadlines for applications while providing the technical interconnection requirements that apply to systems which generate two MW of power or less.[37] "In 2008, SIR was modified to incorporate newly passed net metering laws and to simplify the application process for projects which are 25 kW of power and below."[38] Under SIR, local utilities are also required

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34. DAMIAN PITT, TAKING THE RED TAPE OUT OF GREEN POWER: HOW TO OVERCOME PERMITTING OBSTACLES TO SMALL-SCALE DISTRIBUTED RENEWABLE ENERGY 1 (2008), *available at* http://www.newenergychoices.org/uploads/redTape-rep.pdf.

35. *See id.* at 2, 18, 50.

36. *See* JOHN FORBUSH, GOV'T LAW CTR. OF ALBANY LAW SCH., SITING BACKYARD WIND POWER FACILITIES UNDER THE ZONING LAWS OF NEW YORK STATE 6-7 (2011), *available at* http://www.albanylaw.edu/media/user/esb/Siting_Backyard_Wind_Systems_080311.pdf.

37. *See generally* N.Y. STATE PUB. SERV. COMM'N, NEW YORK STATE STANDARDIZED INTERCONNECTION REQUIREMENTS AND APPLICATION PROCESS FOR NEW DISTRIBUTED GENERATORS 2 MW OR LESS CONNECTED IN PARALLEL WITH UTILITY DISTRIBUTION SYSTEMS (2010), *available at* http://www.cenhud.com/pdf/New York State Standardized Interconnection Requirements.pdf.

38. ALBANY LAW SCH., GOV'T LAW CTR., LEGAL HANDBOOK FOR EARLY STAGE BUSINESS 202 (2010), *available at* http://www.scribd.com/doc/61878429/310/III-NYS-Standardized-Interconnection-Requirements-SIR.

to "implement a web-based system for interconnection project status and, for systems 25 kW and below, allow customers the ability to submit application via the web."[39] This type of legislation was also adopted in Arizona in 2008.[40] It requires municipalities to adopt certain standards for issuing permits for the use of solar photovoltaic and solar water heating systems, and it also prohibits local governments from charging permitting fees in excess of the actual cost of issuing a permit.[41] New Jersey law prohibits municipalities from charging fees altogether for solar energy system construction permits.[42]

One of the primary recommendations in the Network for New Energy Choices report is for local governments to "[s]implify [photovoltaic] permit application forms and review processes."[43] Many municipalities have followed this advice and created expedited permitting procedures for renewable energy projects. In Portland, Oregon, for example, plans and applications can be submitted electronically with a turn-around time of about twenty four hours.[44] A streamlined process for solar hot water and solar electricity projects is also available in Miami-Dade County.[45] The report also recommends "adopt[ing] flat permit fees or fee waivers for [photovoltaic] and small wind systems."[46] One city where this approach has been adopted is Asheville, North Carolina, which waives building permit and plan review fees for certain renewable energy projects.[47] Santa Monica, California also waives application fees for solar energy systems.[48] In New York, the Town of Yorktown offers a fifty percent reduction in the building permit fee for projects that include solar improvements,[49] and the Town of Rotterdam exempts projects that include solar energy systems from site plan application fees.[50]

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39. *Id.*

40. *See* ARIZ. REV. STAT. ANN. §§ 9-468(A), 11-323(A) (2012) (West).

41. *Id.* § 9-468(B); § 11-323(B).

42. N.J. STAT. ANN. § 52:27D-130.2 (West 2012).

43. PITT, *supra* note 34, at 2.

44. *Solar Permitting in Portland*, BUREAU OF PLANNING & SUSTAINABILITY, http://www.portlandonline.com/bps/index.cfm?c=47394& (last updated Nov. 2010).

45. *Miami-Dade County – Expedited Green Buildings Process*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=FL73F&re=1&ee=1 (last updated Sept. 26, 2011).

46. PITT, *supra* note 34, at 2.

47. *City of Asheville – Building Permit Fee Waiver*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NC46F&re=1&ee=1 (last updated Sept. 22, 2011).

48. *City of Santa Monica – Building Permit Fee Waiver for Solar Projects*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA129F&re=1&ee=1 (last updated Nov. 30, 2011).

49. YORKTOWN, N.Y., TOWN Code § 15-16(F) (2012).

50. ROTTERDAM, N.Y., CODE § 270-137.1(A)(1) (2012).

The issue of permitting incentives has recently been the subject of some debate, especially where governments provide the up-front incentives of streamlined and quicker review processes as well as fee waivers in advance of the ability to inspect the final built-out project.[51]

> In municipalities where applicants for green projects [(which may include the installation of renewable energy sources)] are offered a streamlined permit review process up-front, these governments should consider whether they may impose monetary penalties should applicants later fail to comply with promised green standards. Further, governments may consider disqualifying applicants who fail to deliver promised "green" results from receiving offered incentives for a period of time. Municipalities may also explore whether authority exists to require refundable permit fees to cover the cost of third-party independent compliance audits to verify whether the project has met the promised or expected green standards.[52]

C. Renewable Portfolio Standards

A majority of states have enacted mandatory Renewable Portfolio Standards (RPS) that require an increasing percentage of electricity sold by utilities to be generated by renewable energy sources such as solar, wind, and geothermal.[53] When coupled with incentive programs, RPS goals may be more easily met.[54] For example, Oregon's Renewable Energy Act of 2007 requires the state's largest utilities to generate at least five percent of their electricity from renewable sources by 2011, increasing to twenty-five percent by 2025.[55] While large public utilities may seek to meet RPS requirements primarily through industrial-scale renewable energy projects, small-scale projects can still contribute significantly to meeting these goals.

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51. *See* Graham Grady et al., *Government "Green" Requirements and "LEEDIGATION"*, 40 REAL EST. L.J. 496, 498-503 (2012).

52. *Id.* at 513.

53. *Rules, Regulations, & Policies*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/incentives/allsummaries.cfm?ImplementingSector=S&SearchType=RPS&&re=1&ee=0 (last visited July 5, 2012).

54. *See* U.S. DEP'T OF ENERGY, SOLAR POWERING YOUR COMMUNITY: A GUIDE FOR LOCAL GOVERNMENTS 25-26 (2d ed. 2011), *available at* http://www4.eere.energy.gov/solar/sunshot/resource_center/sites/default/files/solar-powering-your-community-guide-for-local-governments.pdf.

55. S.B. 838, 74th Leg. Assemb., Reg. Sess. § 6(1)(a), (d) (Or. 2007).

D. Net Metering and Feed-In Tariffs

Another regulatory mechanism intended to bolster renewable energy production is net metering, which allows electricity customers with qualified renewable energy systems to sell excess electricity back to their local utility.[56] Most states have enacted legislation requiring net metering. Under the Arkansas Renewable Energy Development Act of 2001, for example, the state Public Service Commission is charged with establishing rates, terms, and conditions for net metering contracts between utilities and their net metering customers.[57] In New York, recent amendments to the law expanded the state's solar net metering program applying it to businesses and increased the size of eligible solar photo-voltaic systems to 25 KW for residential customers and to 2 MW for non-residential customers.[58] Net metering is also authorized for wind technology for all utility customer classes.[59] Furthermore, "net-metering customers are billed only when they consume more power than they generate."[60] If, at the conclusion of a billing period, a customer providing power back to the grid "through net metering technology has produced 'a net surplus of power,' the customer will receive a rebate from the utility instead of a bill."[61] Several states, including New York, permit customers to net meter under a "Time of Use" (TOU) tariff, a cost allocation method that rewards customers for putting surplus energy onto the grid during peak hours. This time of use cost compensation structure enables net metering customers to be compensated more when they produce surplus power during peak load periods. Net metering is expected to

> play a significant role in New York's effort to achieve its . . . [RPS] goal of obtaining 30% of its electricity from renewable sources by 2015, by allowing for surplus power produced at distributed locations to reduce the overall demand for power generated by far-away fossil-fuel burning generators.[62]

Feed-in tariffs are similar to net metering laws, but they require utilities to purchase renewable energy at a fixed rate and

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56. FORBUSH, *supra* note 36, at 9.
57. ARK. CODE ANN. § 23-18-604(b)(1) (West 2012).
58. S. 7171-B, 2008 Gen. Assemb., Reg. Sess. § 2 (N.Y. 2008).
59. S. 8481, 2008 Gen. Assemb., Reg. Sess. §§ 1-2 (N.Y. 2008).
60. David Kirby, *The Year in Ideas; Net Metering*, N.Y. TIMES, Dec. 15, 2002 (magazine), http://www.nytimes.com/2002/12/15/magazine/the-year-in-ideas-net-metering.html.
61. FORBUSH, *supra* note 36, at 9.
62. *Id.* at 10.

they are typically covered by long-term contracts.[63] Local governments have the option to use feed-in tariffs with RPS as a way to encourage the production of renewable energy and meet the public policy goals set forth in the RPS.[64] Gainesville, Florida became the first city in the United States to require a solar feed-in tariff in 2009, requiring utility companies to buy electricity produced from solar panels at a fixed rate of $0.35 per KwH over a twenty year period.[65] While the tariff may be more attractive to large-scale solar energy facilities that intend primarily to sell electricity, residents and business owners that produce excess energy using solar voltaic cells will also benefit from the tariff.[66] The feed-in tariff model has been very successful in Europe, and although implementation issues remain,[67] its popularity in the United States is growing.[68] Rhode Island, for example, adopted a limited feed-in tariff law in June 2011.[69]

E. Property Assessed Clean Energy Financing

Another recent trend at the state and local level has been to authorize Property Assessed Clean Energy (PACE) financing, which allows property owners to borrow money from their local government to pay for the installation of renewable energy systems.[70] The costs are then paid back through assessments attached to their property tax bills.[71] PACE financing is attractive because it offers long-term, fixed-rate financing, and because the loans are transferable with the property.[72] Since 2009, when only California and Colorado authorized PACE financing, more than twenty states have enacted legislation authorizing local governments to

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63. *See Feed-In Tariffs*, NAT'L RENEWABLE ENERGY LAB., http://www.nrel.gov/applying_technologies/state_local_activities/basics_tariffs.html (last updated June 30, 2011).

64. U.S. DEP'T OF ENERGY, *supra* note 54, at 33.

65. *See* GAINESVILLE, FLA., CODE OF ORDINANCES app. A (2012).

66. U.S. DEP'T OF ENERGY, *supra* note 54, at 33-35; *See Gainesville Solar Feed-in Tariff a Done Deal*, RENEWABLE ENERGY WORLD (Feb. 9, 2009), http://www.renewableenergyworld.com/rea/news/article/2009/02/gainesville-solar-feed-in-tariff-a-done-deal.

67. *Feed-In Tariffs*, *supra* note 63.

68. U.S. DEP'T OF ENERGY, *supra* note 54, at 33-36; *See* John Farrell, *Overcoming the Roadblocks to Democratizing the Electricity System – Part 5 of 5*, RENEWABLE ENERGY WORLD BLOG (Sept. 22, 2011), http://www.renewableenergyworld.com/rea/blog/post/2011/09/overcoming-the-roadblocks-to-democratizing-the-electricity-system-part-5-of-5.

69. *See* Paul Gipe, *Rhode Island Rapidly Implementing Feed-in Tariffs for Distributed Generation*, RENEWABLE ENERGY WORLD (Sept. 15, 2011), http://www.renewableenergyworld.com/rea/news/article/2011/09/rhode-island-rapidly-implementing-feed-in-tariffs-for-distributed-generation.

70. U.S. DEP'T OF ENERGY, *supra* note 54, at 41.

71. *Id.*

72. *Id.* at 43.

create PACE financing districts.[73] In December 2009, New York State passed the Municipal Sustainable Energy Loan Act, authorizing municipalities to establish loan programs to finance efficiency improvements and renewable energy measures.[74] Municipalities issue revolving loans with federal grant money paid back through a PACE model, whereby the loan is recovered through property taxes.[75] The Act requires an energy audit and/or feasibility study of the residence and limits the availability of loans to those projects that are economically feasible.[76] There is also a restriction that limits the loan amount to ten percent of the total value of the property.[77]

Unfortunately, the prospects for PACE financing dimmed in 2010 when the Federal Housing Finance Authority (FHFA) declared that PACE programs with first liens posed problems and risk management challenges for mortgage lenders.[78] As a result, FHFA directed Fannie Mae and Freddie Mac to limit financial assistance for homeowners living in PACE-designated districts.[79] Several states, however, have attempted to resolve this problem. As an expert from the Brookings Institution recently explained:

> Maine introduced enabling legislation for municipalities to create loans to property owners for clean energy technologies that placed the lien in a subordinate position behind a mortgage. For its part, Michigan passed PACE legislation that limits the tool's use to commercial and industrial property owners and requires those with outstanding mortgages to show written consent from their mortgage holders.[80]

At the federal level, the PACE Assessment Protection Act was introduced in Congress in 2011 and would direct "the Federal entities responsible for mortgage lending to adopt underwriting standards that are consistent with the PACE guidelines issued by

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73. *See id.* at 41-42. For example, in 2008, voters in Boulder County, Colorado voted to set aside $40 million in funds to offer financing for solar energy for local property owners. *Id.* at 44. In Boulder County, these "loans to homeowners are repaid over 15 years as a special assessment on the homeowner's property tax bill." *Id.* In its inaugural form, 393 Boulder County residents were provided loan assistance at an interest rate of 5.20% and 6.68%. *Id.* Uniquely, the county places all the applicants into a pool and then issues a larger bond based on demand as opposed to several smaller bonds. *Id.*

74. *See* N.Y. GEN. MUN. LAW § 119-ee (McKinney 2012).

75. *Id.* § 119-gg(1), (9).

76. *Id.* § 119-gg(7).

77. *Id.* § 119-gg(6).

78. Mark Muro & Devashree Saha, *Bringing the Property Assessed Clean Energy Program Back to Life*, BROOKINGS: UP FRONT BLOG (Aug. 30, 2011 1:21 PM), http://www.brookings.edu/opinions/2011/0830_clean_energy_muro_saha.aspx.

79. *Id.*

80. *Id.*

DOE."[81] It "would also ensure that no Federal agency can discriminate against communities implementing or participating in a PACE program, offering critical protection and security to home owners, businesses, and local governments."[82]

In August 2011, a federal district court in California refused to dismiss a case challenging the FHFA's attempt to shut down PACE financing programs and ruled that the federal agency must allow public input in its PACE directive.[83] The court also found that the FHFA failed to comply with the National Environmental Policy Act, explaining that "[t]he FHFA's dual obligations to ensure that the regulated entities operate safely and soundly and in the public interest do not indicate that the agency's consideration of the environmental impact resulting from its actions with regard to the PACE programs is precluded."[84]

III. USING THE LAND USE REGULATORY SYSTEM TO PROMOTE RENEWABLE ENERGY

Through their land use control authority, local governments are adopting a variety of ordinances and regulations to ensure that solar, wind, and geothermal energy sources can all be appropriately utilized in a community.[85] Recently scholars have described the potential for local land energy rules as the key to ensuring the successful implementation of a national renewable energy policy.[86] However, this potential must be balanced with the realization that some localities have ordinances that have the effect of inhibiting the installation of renewable energy facilities.[87] As a result, some states have enacted laws that preserve the right to install and use solar panels despite the local regulatory regime. For example, the

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81. Bryan Howard, *USGBC Lends Support to get PACE Programs Moving*, U.S. GREEN BLDG. COUNCIL BLOG (Sept. 12, 2011), http://usgbcblog.blogspot.com/2011/09/usgbc-lends-support-to-get-pace.html.

82. *Id.*

83. California ex rel. Harris v. Fed. Hous. Fin. Agency, No. C 10-03084 CW, 2011 U.S. Dist. LEXIS 96235, at *53-55 (N.D. Cal. Aug. 26, 2011).

84. *Id.* at *45-46.

85. *See, e.g.*, Dwight H. Merriam, *Regulating Backyard Wind Turbines*, 10 VT. J. ENVTL. L. 291 (2009); Patricia E. Salkin, *Cooperative Federalism and Climate Change: New Meaning to "Think Globally- Act Locally,"* 40 ENVTL. L. REP. (Envtl. Law Inst.)10562 (2010).

86. *See* Pursley & Wiseman, *supra* note 29, at 937 (asserting that revision of local land energy laws in order to enable deployment of small wind turbines and distributed solar energy technologies "requires consideration of a variety of site-specific conditions").

87. For example, former Vice-President Al Gore encountered such an ordinance when he attempted to install solar panels on his Belle Meade home, and he petitioned the town board to have the ordinance altered. Belle Meade's ordinance prevented the placement of "power generating equipment" anywhere but on the ground. *Gore's Solar Plans Thwarted by Upscale Neighborhood's Rules*, USA TODAY, Mar. 22, 2007, http://www.usatoday.com/weather/climate/globalwarming/2007-03-20-gore-solar_N.htm.

Solar Rights Acts in Florida[88] and Arizona[89] provide the right to install solar panels, regardless of any local ordinances or community covenants that would otherwise prohibit the installation, and Maryland's Solar Protection laws require that restrictions not impose an "unreasonable limitation" on the installation of solar collection systems.[90] What follows is a description of a variety of planning and zoning techniques that can be used to advance local policies to encourage the siting of small-scale residential and commercial renewable energy systems.

A. Comprehensive Planning

Most state enabling statutes require that zoning regulations be developed and implemented in accordance with a comprehensive land use plan. Comprehensive plans represent an articulation of the shared vision for the future growth and development of a municipality through a variety of elements addressing housing, public infrastructure needs, recreational facilities, transportation, economic development, open space, and agriculture.[91] Some of these elements are required to be included in local plans under state enabling acts, while others are optional or are independently developed by local governments. Some states have encouraged comprehensive planning that focuses on sustainability and renewable energy by including language in their enabling statutes that expressly requires the consideration of energy conservation and emission reductions. Since 2007, for example, Arizona's larger cities and counties have been required to prepare an energy element as part of their comprehensive plans.[92] This element must describe incentives and other strategies to encourage the efficient use of energy and the growth of renewable energy use.[93] And Colorado municipalities are advised to include in their comprehensive plans strate-

88. FLA. STAT. § 163.04 (2011); *See also* FLA. SOLAR ENERGY INDUS. ASS'N, FLORIDA SOLAR RIGHTS LAWS 1-2, *available at* http://www.flaseia.org/Legislative/SolarLaws/SolarRightsLaw.pdf.

89. ARIZ. REV. STAT. ANN. § 33-439 (2012) (West).

90. MD. CODE ANN., Real Property § 2-119(b) (West 2012); *Maryland: Solar Easements & Rights Laws*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=MD01R&state=MD&CurrentPageID=1&RE=1&EE=1 (last updated Mar. 8, 2012). For other solar access laws, see *Green Building Codes/Ordinances,* SMART CMTYS. NETWORK, http://www.smartcommunities.ncat.org/buildings/gbcodtoc.shtml#solar (last updated Apr. 20, 2004).

91. *See, e.g.*, AM. PLANNING ASS'N, GROWING SMART LEGISLATIVE GUIDEBOOK: MODEL STATUTES FOR PLANNING AND THE MANAGEMENT OF CHANGE, 7-201 to -304 (Stuart Meck ed., 2002), *available at* http://www.planning.org/growingsmart/guidebook/.

92. ARIZ. REV. STAT. ANN. § 9-461.05(E)(10) (2012) (West) (mandatory part of plan for cities with over 50,000 people); *Id.* § 11-804(B)(4) (mandatory part of plan for counties with over 125,000 people).

93. ARIZ. REV. STAT. ANN. § 9-461.05(E)(10); *Id.* § 11-804(B)(4).

gies for ensuring "access to appropriate conditions for solar, wind, or other alternative energy sources[.]"[94] Pennsylvania's enabling statute also suggests that municipalities include an energy conservation element in their comprehensive plans.[95] The statute explains that this element should assess current and future energy needs and develop strategies "to reduce energy consumption and to promote the effective utilization of renewable energy sources."[96] Connecticut planning commissions are directed to consider "the objectives of energy-efficient patterns of development [and] the use of solar and other renewable forms of energy and energy conservation[.]"[97] New Jersey[98] and Florida[99] have also emphasized renewable energy in their comprehensive planning enabling acts.

At the local level, the Marin County, California plan includes dozens of policies and goals relating to sustainability.[100] Some of the more specific strategies relating to renewable energy include using energy efficient building techniques by emphasizing renewable energy[101] and encouraging agricultural operations to adopt methane recovery technology.[102] The King County, Washington comprehensive plan supports solar energy through land use policies, building regulations, and incentives.[103] A number of municipalities in New York, including the Town of Bethlehem,[104] the Town of East Hampton,[105] and the Town of Kent,[106] specifically indicate that solar energy and access to sunlight are important public purposes of their general land use regulations. The Village of Alta-

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94. COLO. REV. STAT. ANN. § 30-28-106(3)(a)(VI) (West 2012) (counties); *Id.* § 31-23-206(1)(f) (cities and towns).

95. 53 PA. CONS. STAT. ANN. § 10301.1 (West 2012).

96. *Id.*

97. CONN. GEN. STAT. ANN. § 8-23(d) (West 2012).

98. *See* N.J. STAT. ANN. § 40:55D-28(b)(16) (West 2012).

99. *See* FLA. STAT. § 163.3177(6) (2011).

100. MARIN CNTY. CMTY. DEV. AGENCY, MARIN COUNTYWIDE PLAN *passim* (2007), *available at* http://www.co.marin.ca.us/depts/cd/main/fm/cwpdocs/CWP_CD2.pdf.

101. *Id.* at 3-75 to -91.

102. *Id.* at 2-104.

103. KING CNTY., KING COUNTY COMPREHENSIVE PLAN 2008: WITH 2010 UPDATE, 4-15 (2010), *available at* http://www.kingcounty.gov/property/permits/codes/growth/CompPlan/2008_2010update.aspx#cover.

104. "The purpose and objectives of this chapter are . . . [t]o facilitate, as far as environmental conditions may permit, the accommodation of solar energy systems and equipment and access to sunlight necessary therefor." BETHLEHEM, N.Y., CODE § 128-8(A)(8) (2012), *available at* http://www.ecode360.com/ecode3-back/getSimple.jsp?custId=BE1011&guid=8993782.

105. "It is the Planning Board's policy to encourage the use of alternative energy sources, including but not limited to solar, wind and water power, as a conservation measure." EAST HAMPTON, N.Y., CODE § 220-1.05(G)(2) (2012), *available at* http://www.ecode360.com/ecode3-back/getSimple.jsp?&guid=8163507&j=256.

106. "This chapter is adopted . . . [t]o make provision for access to sunlight and the accommodation of solar energy systems and equipment and other alternative energy systems." KENT, N.Y., CODE § 77-2(B)(7) (2012) *available at* http://www.ecode360.com/ecode3-back/getSimple.jsp?&guid=8322939&j=256.

mont, New York also articulates a sustainability policy in its comprehensive land plan which provides, among other things, that the Village "[e]stablish zoning and development standards that encourage use of and remove impediments to using solar and green buildings[,]"[107] and that the Village "[e]ncourage and offer incentives for cooperative sharing of residential solar power."[108]

B. General Zoning Regulations

As previously noted, due to control over zoning and other land use controls, local governments may be the most important players when it comes to encouraging the development of small-scale renewable energy systems. Fortunately, municipal governments are adopting a variety of ordinances and regulations to ensure that solar, wind, and geothermal energy sources can all be appropriately utilized in a community. Some local governments have determined that renewable energy devices should be permitted as of right,[109] which simplifies the development process for residents and business owners seeking to install small-scale solar or wind devices. Municipalities may have free-standing wind or solar ordinances or both, or they may incorporate siting requirements into local zoning laws and codes.

Rooftop and small-scale freestanding wind turbines are gaining momentum in the renewable energy sector.[110] The DOE observed that "[s]mall wind turbines added a total of 17.3 megawatts of generating capacity throughout the United States in 2008, according to the American Wind Energy Association (AWEA). That growth equaled a 78% increase in the domestic market for small wind turbines . . . ."[111]

The Texas State Energy Conservation Office observed that:

> [t]he small wind turbine industry estimates that 60% of the United States has enough wind resources for small turbine use. Small wind energy systems cost from $3,000 to $5,000 for every kilowatt (kW) of generating capacity. One

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107. VILL. OF ALTAMONT COMPREHENSIVE PLANNING COMM., FINAL COMPREHENSIVE PLAN VILLAGE OF ALTAMONT 27 (2006), *available at* http://www.altamontvillage.org/Pages/AltamontNY_Building/masterplan.pdf.

108. *Id.*

109. *See, e.g.*, TUCSON, ARIZ., LAND USE CODE § 3.2.12.1 (1995) (solar energy collectors); ITHACA, N.Y., CODE § 270-219.4 (2012) (small wind energy facilities); ITHACA, N.Y., CODE § 270-219.1 (2012) (solar collectors and installations).

110. *See Small Wind Power Market to Double by 2015—$634 Million*, W. FARM PRESS (Oct. 5, 2011, 9:14 AM), http://westernfarmpress.com/management/small-wind-power-market-double-2015-634-million.

111. *AWEA: U.S. Market for Small Wind Turbines Grew 78% in 2008*, U.S. DEP'T OF ENERGY (Jun. 10, 2009), http://apps1.eere.energy.gov/news/news_detail.cfm/news_id=12571.

> kW is equal to 1,000 watts, which is the amount of electricity that can illuminate ten 100-watt light bulbs. According to the U.S. Department of Energy (DOE), a small wind-powered electric generator can reduce a homeowners [sic] electric bills by 50% to 90%. . . . Small wind energy systems may be connected to the electricity distribution system, the grid. Grid-connected, residential-scale models (1-10 kW) are the fastest growing market segment. A grid-connected wind turbine can reduce consumption of utility-supplied electricity for lighting, appliances, and electric heat. When the turbine cannot deliver the amount of energy needed, the utility makes up the difference.[112]

Despite the many advantages of wind energy relative to conventional forms of energy, a number of obstacles inhibit its widespread development, including connectivity and economic issues. Local opposition to wind turbines, often labeled NIMBYism,[113] is also common.[114] In fact, some communities have adopted moratoria on siting wind turbines.[115] As an example of the various complaints made about wind turbines, consider *Muscarello v. Ogle County*

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112. *Small Wind Systems*, TEX. STATE ENERGY CONSERVATION OFFICE, http://www.seco.cpa.state.tx.us/re_wind_smallwind.htm (last visited July 5, 2012). *See also* GLOBAL ENERGY CONCEPTS, WIND TURBINE TECHNOLOGY: OVERVIEW 9-10 (2005), *available at* http://www.cedengineering.com/upload/Wind Turbine Technology.pdf (discussing small wind turbines).

113. *See* William A. Fischel, *Voting, Risk Aversion, and the NIMBY Syndrome: A Comment on Robert Nelson's "Privatizing the Neighborhood*," 7 GEO. MASON L. REV. 881, 881, 884-85 (1999) (providing an economic explanation for NIMBYism).

114. *See* Robert D. Kahn, *Siting Struggles: The Unique Challenge of Permitting Renewable Energy Power Plants*, ELEC. J., Mar. 2000, at 21, 26 (describing NIMBY opposition to the Kenetech Windpower project in the early 1990s, where residents from over thirty miles away complained about "visual pollution"); Mark Clayton, *America's Future Wind Web?*, CHRISTIAN SCI. MONITOR (Feb. 18, 2009), http://www.csmonitor.com/Innovation/Responsible-Tech/2009/0218/americas-future-wind-web (describing local opposition to transmission lines); Op-Ed., *Wind Power, Rhetoric*, TIMES UNION (New York), Oct. 8, 2008, at A10, *available at* http://albarchive.merlinone.net/mweb/wmsql.wm.request?oneimage&imageid=7039338 (describing NIMBY opposition to a wind energy project in upstate New York). In Long Island, a citizen group known as the Save Jones Beach Ad Hoc Committee was formed to prevent the installation of forty offshore wind turbines. *Ad Hoc Committee to Save Jones Beach*, SAVEJONESBEACH.ORG, http://www.savejonesbeach.org/who-we-are.html (last visited July 5, 2012); Mark Harrington, *Green vs. Green: Environmental Activists Differed on LIPA's offshore wind farm proposal*, NEWSDAY (New York), Aug. 29, 2007, at A43 (discussing recommended postponement of the Long Island Power Authority offshore project for cost reasons).

115. *See, e.g.*, Ecogen, LLC v. Town of Italy, 438 F. Supp. 2d 149, 152, 162 (W.D.N.Y. 2006) (upholding moratorium on wind turbines enacted after producer sought to build twenty-three turbines in town); Zimmerman v. Bd. of Cnty. Comm'rs of Wabaunsee Cnty., 218 P.3d 400, 405-07 (Kan. 2009) (town enacted moratorium on wind farms after being contacted by a wind farm company that was interested in building wind farms in the county); Emerging Energies, LLP v. Manitowoc Cnty., No. 2008AP1508, 2009 WL 529910 (Wis. Ct. App. Mar. 4, 2009) (town enacted moratorium one month after energy company applied for conditional use permit to build a seven turbine wind energy system).

Board of Commissioners, a Seventh Circuit case in which the plaintiff, complaining about the siting of turbines, alleged that:

> she would be deprived of the full extent of the kinetic energy of the wind and air as it enters her property[,] . . . [that] her property would be subject to 'shadow flicker' and reduction of light[,] . . . [that] she [would] have to endure severe noise[,] . . . [that] ice [might] be physically thrown onto her property by the rotating blades[, that] there was risk of . . . 'blade throw' meaning that . . . the rotor blades [could] come loose and be thrown onto her property[, that] the windmills [would] cause radar interference on her property . . . [and interfere with cell phone and GPS service, that the turbines would] enhance her risk of sustaining damage from lightening[sic][, that] she [would] be exposed to higher levels of electromagnetic radiation [and could] suffer injury from stray voltage[,] and [that the turbines would] prevent her from conducting crop-dusting operations on her fields.[116]
>
> Based on these complaints, she asserted a takings claim arguing that there would be uncompensated adverse impacts for her and other nonresidential property owners nearby.[117] The court found that her takings claim was not ripe because she failed to exhaust all administrative remedies, and that regardless, it failed on the merits, because the wind farm would not cause her to lose all economically beneficial use of her land.[118]

1. Setback and Height Limitations

When dealing with the installation of small-scale solar energy systems, municipalities may treat the equipment as a non-specified accessory use and hence typically require such use to be screened, which may affect solar access.[119] Such requirements, including setback requirements, should be designed in a way that will not adversely affect the functionality of the solar energy system. For example, Berkeley's code "allows solar energy equipment to project into required yard setbacks with an administrative use permit, if the zoning office finds that the modification is necessary for the effective use of the equipment and that the principal build-

116. Muscarello v. Ogle Cnty. Bd. of Comm'rs, 610 F.3d 416, 419 (7th Cir. 2010).
117. *Id.* at 420.
118. *Id.* at 422-24.
119. Brian Ross & Suzanne Sutro Rhees, *Solar Energy and Land-Use Regulation*, *in* ZONING PRACTICE 4 (2010).

ing meets city standards for energy conservation."[120] Portland, Oregon provides that "solar installations that are six feet or less in height may be placed in setbacks[,]" and that "[i]nstallations taller than six feet may be allowed within setbacks through a land-use review adjustment process."[121] "Architectural features that are part of a solar energy system [in Tucson, Arizona] may project up to four feet into required front yard setbacks."[122]

To mitigate impacts and prevent opposition over proposed wind energy systems, local governments often enact setback and height limitations, as well as other zoning regulations. Meriden, Connecticut, for example, does not permit wind turbines to be more than eighty feet tall.[123] The city also prohibits windmills from required yard areas and requires them to be setback from all lot lines a distance at least equal to their height.[124] In Wells, Maine, the required setback is equal to the height of the wind turbine plus the underlying setback for structures in the district.[125] In Dagsboro, Delaware windmills must be located on the rear of the property, and "[a]ll principal parts of the windmill and tower [must] be set back from all property lines . . . a distance not less than 1.1 times the total height of the tower."[126] The Town of Ithaca, New York limits small-scale wind turbines to 145 feet in height and prohibits them within 500 feet of any public park, natural area, nature preserve, "or within 500 feet of the ordinary high-water line of the Cayuga Lake shoreline," unless the property owner receives special permission from the planning board.[127] Ithaca's wind turbine zoning also provides that "the number of wind energy towers per lot shall be limited to one for lots of less than two acres in size[,]" and for larger lots, one additional tower will be available subject to special permit requirements.[128] However, "there is no limit on the number of building-mounted small wind energy facilities."[129]

For safety reasons, wind ordinances also often specify the lowest minimum distance permitted between the ground and the tips of the blades. In Ithaca, for example, the lowest part of the turbine blade must pass no closer to the ground than thirty feet, and for building mounted turbines, Ithaca requires the blades to be at least fifteen feet above the ground and above any "outdoor surfaces

120. *Id.*
121. *Id.* at 4-5.
122. *Id.* at 5.
123. MERIDEN, CONN., CODE § 213-53(A)(1) (2011).
124. *Id.* § 213-53(A)(2)-(3).
125. WELLS, ME., CODE § 145-59.1(D)(7) (2011).
126. DAGSBORO, DEL., CODE § 275-26(F)(4)(c)-(d) (2011).
127. ITHACA, N.Y., CODE § 270-219.4(C)(1)-(2) (2008).
128. *Id.* § 270-219.4(C)(6).
129. *Id.*

intended for human occupancy. . . that are located directly below the facility."[130] The wind ordinance in the Town of Eden, New York takes a slightly different approach and measures the thirty-foot minimum turbine blade height from "the highest existing major structure or tree within a [250]-foot radius."[131]

Another step that municipal governments can take to promote small-scale renewable energy development is to permit solar panels and wind energy systems to exceed the maximum height regulations for their zoning districts. Height limits that exist in municipal codes may have an adverse effect on the functionality of a solar energy system because they may impede the collectors' ability to access necessary sunlight.[132] In Los Angeles, for example, property owners who wish to install solar panels on their roofs are permitted to exceed the maximum height of the building by five feet.[133] The additional height allowance in Tucson is ten feet,[134] while Sacramento permits building owners to exceed the maximum allowable height of a structure by twenty percent when installing solar panels.[135] In the Village of Airmont, New York, the Planning Board has the authority to modify any height restriction in the code for solar energy systems.[136] This is if the system is erected only so high as necessary for proper functioning and the correct amount of sunlight to accomplish its energy purpose.[137] Renewable energy equipment may also be exempted from other land use provisions. For example, in Northhampton, Massachusetts, solar energy systems are exempted from historic preservation regulations,[138] and in Tucson they are excluded from lot coverage calculations.[139] Marin County, California similarly exempts freestanding solar devices from minimum yard requirements.[140]

2. Visual Impact Assessments

Height restrictions and setbacks are only two of the ways in which local governments have attempted to mitigate the aesthetic impacts of wind turbines. Many wind ordinances require the completion of a visual impact assessment as part of the permitting

130. *Id.* § 270-219.4(C)(4).
131. EDEN, N.Y., CODE § 217-4(C)(11) (2008).
132. *See* Ross & Rhees, *supra* note 119, at 5.
133. L.A., CAL., MUN. CODE § 12.21.1(B)(3)(a) (2012).
134. TUCSON, ARIZ., LAND USE CODE § 3.2.7.3(A)(2) (2012).
135. SACRAMENTO, CAL., CODE § 17.60.040(A) (2012).
136. AIRMONT, N.Y., CODE § 210-40(C) (2012).
137. *Id.*
138. *See* NORTHAMPTON, MASS., CODE § 156-5(C)(10) (2012).
139. TUCSON, ARIZ., LAND USE CODE § 3.2.9.3(A)(5) (2012).
140. MARIN COUNTY, CAL., CODE § 22.72.015I(B) (2012).

process.[141] In Cohocton, New York, the visual impact analysis must address impacts within a five mile radius, and applicants may be required to submit scenic resource maps, viewshed maps, photographic simulations, and suggested visual mitigation strategies.[142] Other common provisions require turbines and blades to be painted in neutral, non-reflective colors,[143] and many wind ordinances prohibit wind facilities from displaying advertisements.[144] Lighting is generally limited to that required by the Federal Aviation Administration,[145] and transmission lines are typically required to be placed underground.[146] A few ordinances require wind turbine applicants to assess the "shadow flicker" effect. In the Town of Bethany, New York, for example, the shadow flicker[147] must be limited to less than thirty hours per year and thirty minutes per day.[148]

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141. *See, e.g.*, BETHANY, N.Y., LOCAL LAW NO. 1 § V, art. VI(C)(8), (D)(6)-(7) (2008), *available at* http://www.townofbethany.com/other pdf files/WindEnergyZoningAmendments.pdf; LACKAWANNA, N.Y., CODE § 230-85(A)(1)(c) (2008); SOUTH BRISTOL, N.Y., LOCAL LAW NO. 2, §§ 170-40(B)(7), 170-41(B)(7) (2003), *available at* http://www.gflrpc.org/programareas/wind/LL/TofSouthBristol.pdf; WESTFIELD, N.Y., CODE § 185-43(J)(3)(a)(2), (3) (2008).

142. COHOCTON, N.Y., WINDMILL LOCAL LAW §§ I(B)(7), II(B)(6) (2006), *available at* http://www.gflrpc.org/programareas/wind/LL/CohoctonWindmillLaw.pdf.

143. *See, e.g.*, BETHANY, N.Y., LOCAL LAW NO. 1 § V, art. VI(D)(6) ("The system's tower and blades shall be painted a non-reflective unobtrusive color . . . ."); ITHACA, N.Y., CODE § 270-219.4(F)(2) (2008) ("Small wind energy facilities shall be painted or finished with a non-reflective, unobtrusive color . . . ."); SOUTH BRISTOL, N.Y., LOCAL LAW NO. 2 § 170-40(C)(3) (requiring residential windmills to be battleship gray).

144. *See, e.g.*, BETHANY, N.Y., LOCAL LAW NO. 1 § V, art. VI(D)(11) ("No brand names, logo or advertising shall be placed or painted on the tower, rotor, generator or tail vane where it would be visible from the ground, except that a system or tower's manufacturer's logo may be displayed on a system's generator housing in an unobtrusive manner."); ITHACA, N.Y., CODE § 270-219.4(F)(1) ("No small wind energy facilities shall be used for signage, promotional or advertising purposes . . . . Reasonable identification of the manufacturer or owner of the small wind energy facility is permitted.").

145. *See, e.g.*, BETHANY, N.Y., LOCAL LAW NO. 1 § V, art. VI(D)(8) ("Exterior lighting on any structure associated with the system shall not be allowed except that which is specifically required by the Federal Aviation Administration (FAA)."); EDEN, N.Y., CODE § 217-4(C)(16) (2008) ("Lighting of the tower for aircraft and helicopters will conform with FAA standards for wattage and color, when required."); SOUTH BRISTOL N.Y., LOCAL LAW NO. 2 § 170-40(B)(6)(a); WESTFIELD, N.Y., CODE § 185-43(J)(3)(f)(5)("The permittee shall meet all FAA requirements for lighting.").

146. *See, e.g.*, BETHANY, N.Y., LOCAL LAW NO. 1 § V, art. VI(D)(9) (providing that all wiring is to be underground or on existing wires, except for tie-in lines and by permission of the town board for reasons relating to the terrain); ITHACA, N.Y., CODE § 270-219.4(D)(2)(a)-(b) (requiring underground wires, except for wires going from the turbine to the base, and all wiring associated with building-mounted turbines); SOUTH BRISTOL, N.Y., LOCAL LAW NO. 2 § 170-40(C)(9).

147. The "shadow flicker effect" refers to the blinking shadows that may be caused by spinning turbine blades. GLOBAL ENERGY CONCEPTS, OTHER POTENTIAL ENVIRONMENTAL IMPACTS 7 (2005), *available at* http://www.envirothonpa.org/pdfs/8bOtherPotentialEnvImpacts.pdf.

148. BETHANY, N.Y., LOCAL LAW NO. 1 § V, art. VI(F).

3. Accessory Uses

In some municipalities, renewable energy devices may be regulated as accessory uses. In the Village of Briarcliff Manor, New York, for example, a local law enacted in 2007 allows solar energy collectors as permitted accessory uses in single-family residential districts, multi-family residential districts, and commercial districts.[149] Also in New York, Albany's solar energy regulations permit solar energy equipment as accessory uses in all zoning districts, and the law expressly states that "[w]hile there are aesthetic considerations, the City has determined that the environmental and economic benefits outweigh potential aesthetic impacts."[150] Wind energy systems may also be limited to noncommercial, accessory uses. The Town of Wells, Maine, for example, provides that "[t]he primary purpose of a proposed wind energy conversion system will be to provide mechanical or electrical power for the principal use of the property whereon said wind energy conversion system is to be located."[151] In Ithaca, New York small wind energy facilities are permitted "as accessory structures [when they provide] power primarily to structures on the same lot, [or] as principal structures providing power primarily to structures on an adjacent lot."[152]

> [T]he Town of Brighton designates "[s]olar energy and wind energy collection devices" as a special accessory use available to the residents of the district and subject to the approval of the Brighton Planning Board.[153] Brighton's zoning code defines "accessory structures" and "accessory uses" which are "detached from a principal building, located on the same lot and customarily incidental and subordinate to the principal building or use."[154] The implications of this designation are that Brighton exempts wind energy conversation facilities, as "accessory uses," from site plan review by the town planning board.[155]

149. BRIARCLIFF MANOR, N.Y., CODE § 220-9.1(C)-(D) (2009).
150. ALBANY, N.Y., CODE § 375-93(C)(2) (2009).
151. WELLS, ME., CODE § 145-59.1(A)(1) (2009).
152. ITHACA, N.Y., CODE § 270-219.4 (C) (2008).
153. FORBUSH, *supra* note 36, at 23 (citing TOWN OF BRIGHTON, N.Y., CODE § 203-146(B)(4) (2010)).
154. *Id.* (citing TOWN OF BRIGHTON, N.Y., CODE § 201-5).
155. *Id.*

C. Site Plan Review

In some jurisdictions site plan review may be required. The purpose of a site plan review is to evaluate the plans for specific types of development to ensure compliance with all appropriate land development regulations and consistency with the municipality's permitting and building codes. The process is usually initiated when an application for a building permit is submitted. Upon receipt, the appropriate authority within the municipality will determine whether the project is subject to a site plan review. If the project is subject to such a review, the plans are usually transmitted to the planning board or zoning board for review and action. No permit for the development or use of the project will be issued until an approved site development plan is authorized by the municipality.[156] The Town of Southport, New York mandates that a "solar access plan" be included in the site plan submitted for review for residential development that is over 100 acres or more than 200 dwelling units.[157] Such a solar access plan shall detail requirements for the siting of the solar energy system on the property to enhance the access to sunlight.[158] Further, the installation of solar energy systems can also be waived from the traditional site plan review process to encourage the use of renewable energy.[159]

D. Special Permit Review

Some municipalities opt to require applicants for small-scale renewable energy systems to obtain special use permits.[160] By using the special use permit process, municipalities indicate that the use is allowed in a given zoning district but that an additional set of articulated review criteria is applied when considering the application to ensure compatibility with the community.[161] Also, municipalities declaring backyard wind generators to be "accessory uses" often impose additional requirements on applicants through a special use permit or site plan review provision.[162] Special permit procedures are generally more restrictive than accessory use stat-

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156. PATRICIA E. SALKIN, AMERICAN LAW OF ZONING § 36:9 (5th ed. 2011) [hereinafter AMERICAN LAW OF ZONING].

157. SOUTHPORT, N.Y., CODE § 525-86 (2008).

158. *See id.*

159. BOULDER CNTY., COLO., LAND USE CODE § 4-802(C)(7) (2011).

160. *See, e.g.*, NISKAYUNA, N.Y., CODE § 218-5(A)(1) (2010).

161. For a general discussion of special use permits, see AMERICAN LAW OF ZONING, *supra* note 156, at Ch. 14.

162. *See, e.g.*, ROCHESTER, N.Y., CODE § 120-163(A)(1)(m) (2010).

utes, but they often contain similar criteria focusing on aesthetics and safety.[163]

E. Subdivision Requirements

Making sure that subdivisions and planned developments are designed in a manner conducive to the future installation of renewable energy systems is another method that state and local governments can use to promote small-scale alternative energy generation. In Eugene, Oregon, for example, seventy percent of the lots in subdivisions located in the R-1 and R-2 districts must be designed as "solar lots" and laid out so as to have increased solar access.[164] The Marin County Code similarly provides that

> [t]he design of a subdivision . . . shall provide, to the extent feasible, for future passive or natural heating or cooling opportunities in the subdivision . . . . Examples of passive or natural heating opportunities in subdivision design include design of lot size and configuration to permit orientation of a structure in an east-west alignment for southern exposure. Examples of passive or natural cooling opportunities in subdivision design include design of lot size and configuration to permit orientation of a structure to take advantage of shade or prevailing breezes.[165]

Boulder also has solar siting requirements for subdivisions and planned use developments, but they vary depending on which Solar Access Area the property is located in.[166] Unlike the regulations in Eugene and Marin County, Boulder also requires certain structures to be capable of supporting solar collectors.[167]

New Jersey goes beyond requiring subdivisions to accommodate future solar energy development and mandates that "[w]here technically feasible . . . a developer shall offer to install . . . a solar energy system into a dwelling unit when a prospective owner enters into negotiations with the developer to purchase a dwelling unit."[168] The law applies to all residential developments with twenty-five or more units.[169] Similar legislation was enacted in Colorado in 2009, requiring homebuilders to offer purchasers

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163. *See, e.g.*, EAST ROCHESTER, N.Y., CODE § 193-60(H) (2011).
164. EUGENE, OR., CODE § 9.2790(2) (2002).
165. MARIN CNTY., CAL., CODE § 20-20-030 (2011).
166. BOULDER, COLO., CODE § 9-9-17(c) (2009).
167. *Id.* § 9-9-17(g)(1).
168. N.J. STAT. ANN. § 52:27D-141.4(a) (West 2012).
169. *Id.* § 52:27D-141.3.

an option for solar pre-wiring and to provide them with a list of solar installers.[170]

F. Planned Unit Development

To facilitate greater design flexibility and community density, local governments may adopt "planned unit development" (PUD) provisions in their municipal zoning codes.[171]

> PUDs allow "the owners of several adjacent parcels [to] apply for a special permit to create a higher density, mixed use development, with considerable design flexibility." . . . Since a primary rationale for PUDs is to promote wider availability of more environmentally sustainable communities, these provisions often include allowance for on-site renewable energy generation, including small-scale [wind energy conversion systems].
>
> PUDs could serve as an effective venue to experiment with and demonstrate the advantages of smaller-scale wind power[, and] PUD provisions in zoning ordinances represent an opportunity for partnership between wind or real estate developers and local leadership, particularly if a local comprehensive plan aspires to adopt more renewable energy production and there is land available for development not already tapped for green space preservation.[172]

G. Renewable Energy Protection Laws

As previously noted, a number of states have acted to preempt local ordinances or deed restrictions that interfere with the development of solar energy systems, and a smaller number apply similar laws to wind energy equipment. In Arizona, "[a]ny covenant, restriction or condition contained in any deed, contract, security agreement or other instrument affecting the transfer or sale of, or any interest in, real property which effectively prohibits the installation or use of a solar energy device . . . is void and unenforceable."[173] Colorado[174] and Maryland[175] have similar statutes. In Wis-

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170. COLO. REV. STAT. ANN. § 38-35.7-106(1)-(2) (West 2012).
171. FORBUSH, *supra* note 36, at 22.
172. *Id.* at 22-23.
173. ARIZ. REV. STAT. ANN. § 33-439(A) (2012) (West).
174. COLO. REV. STAT. ANN. § 38-33.3-106.7(1)(A) (West 2012).
175. MD. CODE ANN., REAL PROP. § 2-119(b)(1) (West 2012).

consin[176] and New Mexico[177] municipal restrictions on solar collectors are preempted, although the New Mexico law provides an exception for historic districts. Florida's solar rights law preempts local ordinances as well as private deed restrictions that attempt to prohibit the installation of solar collectors or other renewable energy devices.[178] And similarly, in addition to prohibiting private restrictions on solar energy development,[179] California law provides that

> [a] city or county may not deny an application . . . to install a solar energy system unless it makes written findings based upon substantial evidence . . . that the proposed installation would have a specific, adverse impact upon the public health or safety, and there is no feasible method to satisfactorily mitigate or avoid the specific, adverse impact.[180]

Other solar protection laws relate to solar access and attempt to prevent neighboring landowners from blocking the sunlight needed to supply preexisting solar collectors. The California Solar Shade Control Act, for example, provides that

> [a]fter the installation of a solar collector, a person owning or in control of another property shall not allow a tree or shrub to be placed or, if placed, to grow on that property so as to cast a shadow greater than [ten] percent of the collector absorption area upon that solar collector surface at any one time between the hours of 10 a.m. and 2 p.m. . . . ."[181]

In Wisconsin, local governments are authorized to adopt ordinances relating to the trimming of vegetation that blocks solar or wind energy.[182] "The ordinance may not require the trimming of vegetation that was planted by the owner or occupant of the property on which the vegetation is located before the installation of the solar or wind energy system."[183]

Another approach to solar protection taken in some states is to authorize the creation of solar easements. These laws protect

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176. WIS. STAT. ANN. § 66.0401(1m) (West 2012).
177. N.M. STAT. ANN. § 3-18-32(A) (West 2012).
178. FLA. STAT. § 163.04 (2011).
179. CAL. CIV. CODE § 714(a) (West 2012).
180. CAL. HEALTH & SAFETY CODE § 17959.1(a) (West 2012); CAL. GOV. CODE § 65850.5(c) (West 2012).
181. CAL. PUB. RES. CODE § 25982 (West 2012).
182. WIS. STAT. ANN. § 66.0401(2) (West 2012).
183. *Id.*

property owners' interests in sunlight but also recognize the rights of neighboring land owners. Under the North Dakota solar easement law, for example, solar easements must include "any terms or conditions . . . under which the . . . easement was granted or will be terminated," as well as "[a]ny provisions for compensation of the owner of the property benefiting from the solar easement in the event of interference with the enjoyment of the solar easement or compensation of the owner of the property subject to the solar easement for maintaining the solar easement."[184] The New Jersey solar easement law is mostly identical.[185] Solar rights can also be officially claimed in New Mexico, and once vested, they are considered to be easements appurtenant.[186] The statute also provides that

> [i]n disputes involving solar rights, priority in time shall have the better right except that the state and its political subdivisions may legislate, or ordain that a solar collector user has a solar right even though a structure or building located on neighborhood property blocks the sunshine from the proposed solar collector site.[187]

Similar types of solar protection laws have also been enacted at the local level. Regulations in Boulder, Colorado, for example, divide the city into three solar access areas and provide varying levels of solar access protections in order "to provide maximum solar access protection . . . consistent with planned densities, topography, and lot configurations and orientations."[188] The code creates hypothetical "solar fences" for properties located in two of the three solar access areas and explains that "[e]ach solar fence completely encloses the lot in question, and its foundation is contiguous with the lot lines. Such fence is vertical, opaque, and lacks any thickness."[189] In the most protective solar access area, the code states that "[n]o person shall erect an object or structure on any other lot that would shade a protected lot . . . to a greater degree than the lot would be shaded by a solar fence twelve feet in height . . . ."[190] For the next solar access area, the regulation stipulates a twenty-five foot high solar fence,[191] and no solar fences are hypothesized

184. N.D. CENT. CODE ANN. § 47-05-01.2(2)-(3) (West 2012).
185. N.J. STAT. ANN. § 46:3-26(b)-(c) (West 2012).
186. N.M. STAT. ANN. § 47-3-8 (West 2012).
187. *Id.* § 47-3-4(B)(2).
188. BOULDER, COLO., CODE § 9-9-17(c) (2009).
189. *Id.* § 9-9-17(d)(1).
190. *Id.* § 9-9-17(d)(1)(A).
191. *Id.* § 9-9-17(d)(1)(B).

for lots located in the least protected solar access area.[192] Property owners who want to build a structure that would interfere with these solar rights provisions can apply for an exception,[193] and property owners who believe that their solar protection is inadequate can apply for solar access permits.[194]

The City of Eugene, Oregon protects solar access in R-1 and R-2 districts through the use of solar setback standards.[195] Properties are exempt from these requirements, however, under several circumstances, as where the land is already shaded or the shadow to be created would have only insignificant impacts.[196] In Tucson, shadows are to be taken into account during the development process, and "[w]here such shadows adversely affect solar energy systems between the hours of 9:00 a.m. and 3:00 p.m., a site plan shall show that the multistory structure has been reoriented on the site to mitigate this effect."[197]

Municipal regulations may allow solar energy collectors as permitted accessory uses in some or all zoning districts,[198] or provide exemptions from height restrictions for solar energy equipment.[199] In another approach, the Town of Oro Valley requires all single family and two family residences to be built to accommodate the future connection of solar systems.[200]

Another example of local innovation is from Chattanooga, Tennessee, where "The Green Power Switch Program" was initiated for local energy providers to offer environmentally friendly electric energy to consumers.[201] This program encourages community members to utilize alternative energy sources, such as solar panels and wind turbines, to help promote the city's efforts to reduce emissions.[202]

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192. *Id.* § 9-9-17(d)(1)(C).

193. *Id.* § 9-9-17(f).

194. *Id.* §9-9-17(h).

195. EUGENE, OR., CODE § 9.2795(2)(a)-(b) (2006).

196. *Id.* § 9.2795(3).

197. TUCSON, ARIZ., LAND USE CODE § 3.2.12.2 (1995).

198. *See, e.g.*, BRIARCLIFF MANOR, N.Y., CODE § 220-9.1(C), (D) (2007); ALBANY, N.Y., CODE § 375-93 (1995); ITHACA, N.Y., CODE § 270-219.1(A) (2008); ERIE, PA., CODE § 305.54 (2010); POTTSTOWN, PA., CODE § 503(1) (2009).

199. *See, e.g.*, AMSTERDAM, N.Y., CODE § 250-15 (2010); BEDFORD, N.Y., CODE § 125-20 (2011); SEATTLE, WASH., MUN. CODE § 23:43.040(B)(2) (2011) (solar collectors can exceed height limits in the residential small lot section by four feet).

200. ORO VALLEY, ARIZ., CODE § 6-1-7 (2009).

201. CHATTANOOGA GREEN COMM., THE CHATTANOOGA CLIMATE ACTION PLAN 28 (2009), *available at* http://www.chattanooga.gov/images/citymedia/chattgreen/Sustainability/ClimateActionPlanFinalPrint.pdf.

202. *See id.*

IV. CONCLUSION

Local governments hold the critical key to the siting of small-scale renewable energy in residential and business/commercial districts. Despite the growing number of fiscal incentives designed to encourage market growth for renewable energy products, from outright grants and loans to tax credits, as well as the possibility of credits for contributing unused generated renewable energy back to the grid, the fact remains that the ultimate use of these energy sources require land use and building permits from local governments. Therefore, federal and state governments must do more to educate, train, and provide technical assistance to local governments who in turn must conduct a "renewable energy audit" of local comprehensive plans and land use regulations to ensure that the regulatory regime is designed to accommodate and welcome the use of small-scale renewable energy.

While some have touted the benefits of local control and the creation of laboratories of innovation, to the design and customization of regulatory regimes that best meet unique community needs,[203] the industry has already expressed concern that variation in local permitting processes adds to the time and cost of siting renewable energy technology.[204] The call for uniformity, if successful, will at worst preempt or at best significantly diminish local siting and permitting control. Industry concerns should not be taken lightly as other industries have had reasonable success in advocating for federal standards and guidelines.[205] Local governments will only be successful in maintaining control over the renewable energy siting process for small scale systems if they step up to the plate and adopt and incorporate some of the examples of best practices described in part III.

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203. *See, e.g.*, Pursley & Wisemann, *supra* note 29, at 937.

204. *E.g.*, SUNRUN, THE IMPACT OF LOCAL PERMITTING ON THE COST OF SOLAR POWER: HOW A FEDERAL EFFORT TO SIMPLIFY PROCESSES CAN MAKE SOLAR AFFORDABLE FOR 50% OF AMERICAN HOMES 3-8 (2011) (estimating that it costs on average $2,516 per installation for local compliance).

205. *See, e.g.*, Telecommunications Act of 1996, Pub. L. No. 104-04, 110 Stat. 56 (codified as amended in scattered sections of 47 U.S.C.) (setting forth a national framework for the siting of wireless communications facilities).

SMART FROM THE START – GOOD PLANNING PROMISES SUSTAINABLE ENERGY FUTURE

Sharon Buccino*

The fresh air blows through my front door, cooling our living space as it passes through the house and out the back door to the deck. The sun is shining. The birds are singing. The touch of fall is in the air bringing a crispness and coolness after the weight of the Washington, D.C. summer heat. I am upbeat. I am energized.

My two daughters just departed on the bus to school. They are excited about what the day promises. I am excited about what the future promises for them. I am secure in the knowledge of where our energy comes from – the energy to heat my home, the energy to fuel my car, the energy to power America's businesses. The Safeway down the street has solar panels on its roof. A wind turbine at the high school provides the school's power. Both childhood asthma and unemployment are at record lows. The wars in Iraq and Afghanistan are over. The year is 2020.

How do we get from here to there? How much energy will America need in 2020? In 2035? In 2050? How will we get the energy we need without sacrificing the places we love? Smart planning from the start provides the key.

I. HOW MUCH ENERGY DO WE NEED?

According to the United States Energy Information Administration (EIA), the nation consumed 98 quadrillion Btus of energy in 2010.[1] Americans used almost forty percent of this energy to generate electricity.[2] Coal has traditionally supplied the largest

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1. U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY REVIEW 2010, at 4 fig.1.1 (2011), *available at* http://www.eia.gov/totalenergy/data/annual/pdf/aer.pdf [hereinafter 2010 ENERGY REVIEW].

2. *Id.* at 37 fig.2.0.

source of fuel for electricity generation.[3] Today, coal generates about forty-eight percent of America's electricity.[4] Having grown over the last four decades, nuclear power now provides twenty-one percent of America's electricity.[5] The second largest use of energy in America is for transportation.[6] Currently, oil fuels almost all of America's transportation needs.[7] For example, in 2010, Americans used 13.5 million barrels of oil per day to fuel their cars, trucks, buses, trains and planes.[8]

Securing the Btus to light our homes, fuel our cars, and power our businesses requires a lot of drilling and digging. A Btu – British thermal unit – provides a common unit of measurement of energy content across different fuel sources.[9] One quadrillion Btu, often referred to as a "quad," represents about one percent of the United States current annual energy use.[10] In terms of physical energy, "[one] quad represents [approximately] 172 million barrels of oil . . ., 50 million tons of coal . . ., or about 1 trillion cubic feet [(tcf)] of natural gas . . . ."[11] While we import millions of barrels of oil a year,[12] most of the natural gas and coal that America uses comes from our land.[13] Of the more than 24 trillion cubic feet of natural gas consumed by Americans in 2010, the nation imported approximately 3.7 trillion cubic feet.[14] For coal, the nation imported around 19 million tons – under two percent – of the coal consumed.[15] Most of the coal the nation uses comes from the mountains of West Virginia and Kentucky, as well as the rolling hills of Wyoming.[16] The consequences to the land and to the health of the local residents as a result of coal mining activity can be devastating.[17] Yet, pressure is growing to excavate even more coal for ex-

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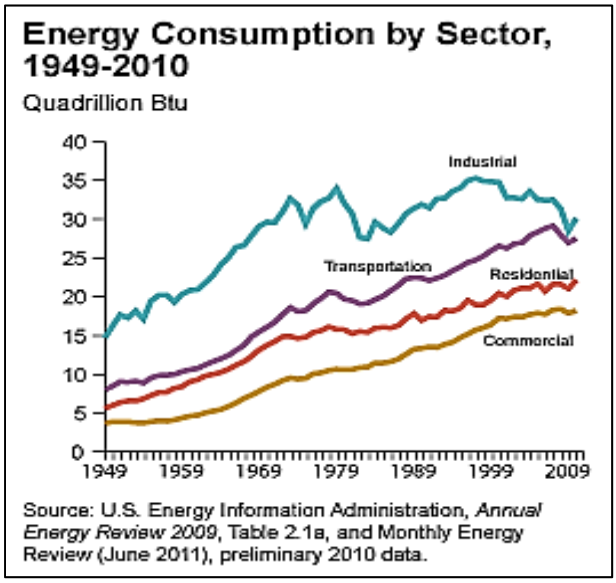
3. *Id.* at 216 fig.7.3, 217 tbl.7.3.
4. *Id.* at 37 fig.2.0.
5. *Id.*
6. *Id.*
7. *Id.*
8. *Id.* at 131 fig.5.0.
9. *See* U.S. Energy Info. Admin., *Energy in Brief - What Are the Major Sources and Users of Energy in the United States?*, EIA.GOV, http://www.eia.gov/energy_in_brief/major_energy_sources_and_users.cfm (last updated Oct. 25, 2011) [hereinafter EIA, *Major Sources and Users of Energy*].
10. *Id.*
11. *Id.*
12. *See* 2010 ENERGY REVIEW, *supra* note 1, at 134 tbl.5.1a.
13. *See id.* at 191 fig.6.0, 193 tbl.6.1, 211 fig.7.0.
14. *Id.* at 191 tbl.6.0.
15. *See id.* at 213 tbl.7.1.
16. *U.S. Coal Production and Number of Mines by State and Coal Type, 2010*, NAT'L MINING ASS'N, http://www.nma.org/pdf/c_production_mines_state_type.pdf (last updated Dec. 2011).
17. *See* George Black, *Coal on a Roll*, ONEARTH, Fall 2011, *available at* http://www.onearth.org/article/coal-on-a-roll.

port to fuel the increasing demand in China and India.[18] In response to this pressure, more mines are opening throughout the United States, including in areas that have never been home to coal mines, such as Alton, Utah, where a new strip mine recently opened, despite its proximity to the pristine wilderness of Bryce Canyon National Park and the tourist dependent historic town of Panguitch.[19] From this area, the federal government is considering leasing almost 50 million tons of coal.[20]

Population and economic growth are the main drivers that increase energy demand. From 1949 to 2010, energy consumption in the United States tripled as the economy grew and population expanded.[21]



The economic recession in 2009 brought a sharp contrast to the upward trend in energy consumption.[22] Energy consumption declined by nearly five percent as the nation's real gross domestic product (GDP) fell by two percent from the previous year.[23] Yet, we

18. *See id.*

19. *See* Robert Redford, *Utah Approves a Mine Next to Bryce Canyon for Coal America Doesn't Need*, THE HUFFINGTON POST (Dec. 13, 2010, 1:28 PM), http://www.huffingtonpost.com/robert-redford/utah-approves-a-mine-next_b_795955.html.

20. BUREAU OF LAND MGMT., U.S. DEP'T OF THE INTERIOR, ALTON COAL TRACT LEASE BY APPLICATION DRAFT ENVIRONMENTAL IMPACT STATEMENT, at ES-1 (2011), *available at* http://www.blm.gov/pgdata/etc/medialib/blm/ut/lands_and_minerals/coal/alton_coal_project.Par.6148.File.dat/5__Alton DEIS Executive Summary.pdf.

21. *See* U.S. Energy Info. Admin., *Use of Energy in the United States Explained*, EIA.GOV, http://www.eia.gov/energyexplained/?page=us_energy_use (last updated July 20, 2011).

22. *Id.*

23. *Id.*

can reasonably expect modest average annual growth over the next few decades leading to increased energy needs. In its most current energy outlook, EIA assumes gross domestic product growth averages 2.7 percent per year in its reference case from 2009 to 2035.[24] During this time the population of the United States is expected to grow from its current 313 million to 390 million – an increase of almost twenty percent.[25]

While we can expect to increase the efficiency with which we use energy, we will still need to generate significantly more energy than we currently do to meet the future demand. Higher efficiency standards for vehicles and appliances will lower per capita energy use. The good news is that the nation is implementing higher standards. The United States Environmental Protection Agency has proposed new vehicle efficiency standards to deliver 54.5 mpg by 2025.[26] The Department of Energy has adopted new efficiency standards for residential furnaces, central air conditioners, and heat pumps that will result in significant energy savings as well.[27] For example, "[i]mproved air conditioner efficiency will reduce hot-summer-day electric demand by [approximately] 4,000 megawatts, or roughly the output of [thirteen] large, gas-fired power plants."[28] Finally, the Energy Independence and Security Act of 2007 provided for the adoption of other consensus-based efficiency standards for various appliances.[29]

Furthermore, the economy of the United States continues to shift away from energy-intensive manufacturing.[30] The EIA projects that seventy-nine percent of the total United States' economic output will come from services while energy-intensive manufacturing will only account for five percent of the nation's economic output.[31] With this shift, we will continue to use less and less energy for each dollar of GDP generated.

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24. U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2011, at 58 (2011), *available at* http://www.eia.gov/forecasts/aeo/pdf/0383(2011).pdf [hereinafter 2011 ENERGY OUTLOOK].

25. U.S. CENSUS BUREAU, PROJECTED POPULATION BY SINGLE YEAR OF AGE, SEX, RACE, AND HISPANIC ORIGIN FOR THE UNITED STATES: JULY 1, 2000 TO JULY 1, 2050 (2008), *available at* http://www.census.gov/population/www/projections/downloadablefiles.html (follow the "Excel" hyperlink for the report).

26. 2017 and Later Model Years Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 76 Fed. Reg. 74,854, 74,859 (proposed Dec. 1, 2011) (to be codified at 40 C.F.R. pts. 85, 86, and 600).

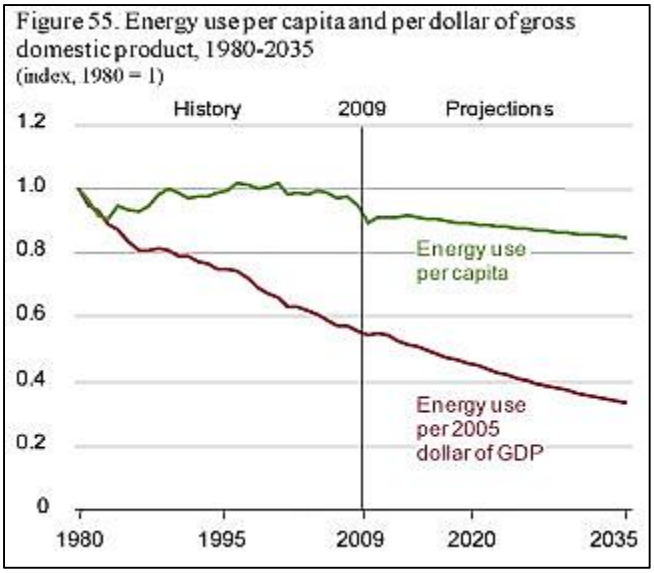
27. Energy Conservation Program: Energy Conservation Standards for Residential Furnaces and Residential Air Conditioners and Heat Pumps, 76 Fed. Reg. 37,408 (June 27, 2011) (to be codified at 10 C.F.R. pt. 430).

28. Press Release, Natural Res. Def. Council, U.S. Sets First Regional Energy-Saving Standards for ACs and Furnaces, Upgrades National Heat Pump Standards (June 10, 2011), *available at* http://www.nrdc.org/media/2011/110610.asp.

29. 42 U.S.C.A. § 6295(o)(6) (West 2012).

30. 2011 ENERGY OUTLOOK, *supra* note 24, at 62.

31. *Id.*



Despite increased efficiency and lower energy-intensive production, continued population and economic growth, even at modest levels, will increase energy demand significantly from today's level. EIA projects energy demand to grow to 114.2 quadrillion Btus by 2035, an increase of over eighteen percent from current overall consumption.[32]

II. WHAT DO WE WANT TO PROTECT?

Energy development has significant impacts on our communities and the Western public lands that help define America's identity. Land is needed to produce energy, whether it is to support roads, or well pads for drilling oil and gas, or panels for concentrating solar energy. Yet, the roads fragment wildlife habitat. The drilling rigs and waste pits pollute the air and water. The trucks and noise disturb the safety and quiet of neighborhoods.

Certain areas are worth avoiding as we develop our energy resources. These areas include watersheds that a city uses for its drinking water, national parks, forests, and wildlife refuges which provide valuable recreational opportunities. State parks are also valuable assets for local economic development and are often home to critical habitats for endangered and threatened species. Developers can use several criteria to shape new generation or transmission lines in a way that will minimize controversy and speed up the project approval. When looking to federal lands as a location for a wind or solar project, the developer must obtain a right-of

32. *Id.* at 63.

way authorization.[33] Such right-of-way authorizations are prohibited under federal law in certain areas, including national parks, national wildlife refuges, and designated wilderness areas.[34] These areas are specifically excluded because Congress established them for purposes that are fundamentally at odds with large-scale energy generation projects.[35] Individual land use plans developed by the Bureau of Land Management (BLM) may also identify other areas that are excluded from right-of-way authorization.[36] The BLM must incorporate extensive public involvement in the development of the land use plan for each area it manages.[37] Federal law prohibits the approval of a project that is inconsistent with the land use plan for the area.[38]

The BLM has also established a list of screening criteria that the agency will use to prioritize the processing of solar and wind energy development right-of-way applications.[39] The agency's first category in the screening criteria for the processing of solar and wind energy applications covers lands with low potential for conflict for which there is an increased potential for expedited project approval.[40] These lands include: "[(1)] previously disturbed sites or areas adjacent to previously disturbed or developed [areas]; . . .

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33. Most of the federal land suitable for solar and wind energy development is managed by the Bureau of Land Management, an agency within the United States Department of the Interior. The discussion herein focuses on the approval process applicable to BLM lands. For more information on the approval process and the right-of-way program see 43 C.F.R. pt. 2800.

34. *See* 43 C.F.R. § 2802.10(a) (2011); 16 U.S.C. §§ 1131-1132 (2006).

35. The Wilderness Act, for example, secures for the American people of present and future generations land "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." 16 U.S.C. § 1131(c).

36. *See, e.g.*, BUREAU OF LAND MGMT., DEP'T OF THE INTERIOR, AGUA FRIA NATIONAL MONUMENT: RECORD OF DECISION APPROVED RESOURCE MANAGEMENT PLAN 44 (2010), *available at* https://www.blm.gov/epl-front-office/projects/lup/4507/13346/13412/Agua_Fria_National_Monument_Record_of_Decision_and_Approved_Resource_Management_Plan_PDF.pdf. The plan provides that "[n]ew transportation corridors, whether interstate, intrastate, or local, would not conform to the proclamation. Therefore, such corridors within the monument will not be considered." *Id.*

37. 43 U.S.C. § 1712(a). For example, the BLM is currently in the process of revising the Colorado River Valley Resource Management Plan and in order to facilitate public involvement the agency collected comments on the draft plan until February 29, 2012. In addition, the agency has held several public meetings to explain what is included in the draft and solicit public comments. *See* Bureau of Land Mgmt., Dep't of the Interior, *Colorado River Valley Draft Resource Management Plan Revision*, BLM.GOV, http://www.blm.gov/co/st/en/BLM_Programs/land_use_planning/rmp/kfo-gsfo/crv.html (last updated Mar. 8, 2012).

38. 43 U.S.C. § 1732(a) states "[t]he Secretary shall manage the public lands . . . in accordance with the land use plans developed by him . . . ."; 43 C.F.R. § 1610.5-3(a) (2011) states "[a]ll future resource management authorizations and actions . . . shall conform to the approved plan."

39. *See generally* Robert Abbey, Dir. Bureau of Land Mgmt., Instruction Memorandum No. 2011-061, Solar and Wind Energy Applications – Pre-Application and Screening (Feb. 7, 2011), *available at* http://solareis.anl.gov/documents/docs/IM2011-061_Prescreening.pdf.

40. *Id.* at 5-6.

[(2)] lands adjacent to designated transmission corridors; . . . [and (3)] lands identified as suitable for disposal [(i.e., transfer out of public ownership)] in BLM land use plans."[41] A second category of lands covered are those that "have resource conflicts that can potentially be resolved."[42] In order to obtain project approval in these areas, developers will need to invest time and resources to avoid adverse impacts on the existing uses of the area. These lands include "sensitive habitat areas, including important eagle use areas, priority sage grouse habitat, riparian areas, and areas of importance for Federal or state sensitive species."[43] Department of Defense operating areas also fall in this category.[44] Finally, BLM identified a third category of areas with high potential for conflict for which the agency indicates project approval may not be feasible.[45] These areas include "[d]esignated critical habitat for federally threatened and/or endangered species."[46] The agency also has included in this high-conflict category "[l]ands near or adjacent to lands designated by Congress, the President, or the Secretary for the protection of sensitive viewsheds, resources, and values."[47] Thus, the screening criteria of the BLM recognizes the need to consider the impacts of a proposed solar or wind project on important conservation areas nearby even if the project is outside the borders of the conservation unit.

The Natural Resources Defense Council (NRDC) has worked with local partners to collect data sets for various important conservation areas in the Western United States and incorporate them in a Google Earth map that allows energy project developers to identify areas that will be less controversial to develop.[48] In addition to areas in which large-scale energy generation projects are prohibited by law, the NRDC Google data sets identify areas that have certain restrictions such as timing stipulations that limit activity to certain parts of the year to protect wildlife nesting and breeding areas.[49] These areas include lands that the BLM has identified as Areas of Critical Environmental Concern (ACECs).[50] The BLM designates these areas in land use plans to protect im-

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41. *Id.* at 5-6.
42. *Id.* at 6.
43. *Id.*
44. *Id.*
45. *Id.* at 6-7.
46. *Id.* at 6.
47. *Id.*
48. *See Clean Energy and Conservation*, NATURAL RES. DEF. COUNCIL (May 27, 2009), http://www.nrdc.org/land/sitingrenewables/default.asp.
49. *Id.* (follow hyperlink "Launch the Mapping Tool" on main page in order to access the actual data sets).
50. *Id.*; *see also* 43 C.F.R. § 1610.7-2 (2011) for more detail on how ACEC areas are designated.

portant historic, scenic or cultural values, fish and wildlife resources, or natural systems and processes.[51] Restricted areas also include areas protected through Habitat Conservation Plans developed by the United States Fish and Wildlife Service to reduce or mitigate the loss of federally protected endangered or threatened species.[52] For example, the BLM has used Habitat Conservation Plans for the protection of the desert tortoise in Nevada, Utah, and California.[53] By combining certain conservation data in one place, NRDC's Google mapping tool can help project developers identify sites outside of prohibited and restricted areas that can accelerate the project approval as BLM considers right-of-way applications. While not an exhaustive set of possible conservation values, collecting some of the nationally significant information related to conservation values gives developers a place to start in minimizing conflict to their projects.

III. HOW DO WE DO IT?

We can get the energy we need for a secure and prosperous future without sacrificing the places we love. Smart planning from the beginning is the key. Planning can help America use land in a more productive way that reduces the energy we need. For example, local governments can use zoning authority and development incentives to concentrate residential and commercial development around transportation hubs.[54] Additionally, America's energy needs can be reduced further by building more energy efficient offices and homes.[55] Planning can also help us generate energy in a

51. *See* 43 U.S.C. § 1712(c)(3)(2006); 43 C.F.R. § 1610.7-2.

52. *Clean Energy and Conservation*, *supra* note 48 (follow hyperlink "Launch the Mapping Tool" on main page in order to access the actual data sets and details on the restricted areas). The U.S. Fish and Wildlife Service approves Habitat Conservation Plans (HCPs) as part of applications for incidental take permits. *Endangered Species Program - Habitat Conservation Plans: Overview*, U.S. FISH & WILDLIFE SERV., http://www.fws.gov/endangered/what-we-do/hcp-overview.html (last updated Dec. 28, 2011). HCPs are authorized under the Endangered Species Act. 16 U.S.C. § 1539(a)(1)(B), (2)(A).

53. *Desert Tortoise Management,* BUREAU OF LAND MGMT., http://www.blm.gov/nv/st/en/fo/lvfo/blm_programs/more/desert_tortoise_management.print.html (last visited July 5, 2012).

54. *See generally* NATURAL RES. DEF. COUNCIL, IF YOU BUILD IT, THEY WILL COME (2007), *available a*t http://www.nrdc.org/smartGrowth/files/smartgrowth.pdf (discussing how smart growth land use strategies often place an emphasis on reducing transportation needs by concentrating development and thereby reducing overall travel time, as well as offering other environmentally friendly transportation options such as walking, biking, and public transit.).

55. *See generally* NATURAL RES. DEF. COUNCIL, UNLOCKING THE POWER OF ENERGY EFFICIENCY IN BUILDINGS (2008), *available at* http://www.nrdc.org/energy/unlocking.pdf (discussing how increased building efficiency can reduce energy needs); *Building Green: From Principle to Practice*, NATURAL RES. DEF. COUNCIL, http://www.nrdc.org/buildinggreen/default.asp (last visited July 5, 2012) (illustrating how building green can reduce energy needs).

way that preserves the land we love. Taking the time up front to identify the places with the most energy potential and the least environmental impacts will reduce delay and conflict later.

A. Increased Efficiency

The public lands of the American West hold resources that can help deliver a sustainable energy future. The lands and waters managed by the Department of the Interior "account for nearly 30 percent of America's natural-gas production and more than 30 percent of its oil production."[56] Federal "public lands account for more than 40 percent of the nation's coal production."[57] In the Southwest, the BLM manages over 30 million acres with solar potential.[58] Public lands also provide some of the best wind and geothermal resources in the country.[59]

We can limit the impact on these lands by pursuing available opportunities for energy efficiency and conservation. By using less to get the same amount done, we can reduce the need for new energy generation and the associated land impacts. Analysis by McKinsey & Company projects that currently available efficiency measures could "reduce end-use energy consumption in 2020 by 9.1 quadrillion [Btus] . . . ."[60] This number represents a reduction of almost eight percent of the projected demand. Such measures cost significantly less per Btu of energy than new generation, and include more efficient residential water heaters, improved maintenance of home heating and cooling systems, and industrial waste heat recovery.[61] Researchers at The Nature Conservancy estimate that based on this analysis efficiency savings could avoid "between 2.4 million and 8.4 million acres of energy . . . development."[62]

B. Master Leasing Plans

Planning has a long history in the management of America's public lands. In 1879, the United States Geological Survey was es-

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56. *New Energy Frontier,* U.S. DEP'T OF THE INTERIOR, http://www.doi.gov/whatwedo/energy/index.cfm (last visited July 5, 2012).

57. *Id.*

58. *Id.*

59. *See id.*

60. HANNAH CHOI GRANADE ET AL., MCKINSEY & CO., UNLOCKING ENERGY EFFICIENCY IN THE U.S. ECONOMY, at iii (2009), *available at* http://www.mckinsey.com/en/Client_Service/Electric_Power_and_Natural_Gas/Latest_thinking/Unlocking_energy_efficiency_in_the_US_economy.aspx (follow "Read full report" hyperlink).

61. *See id.* at 32.

62. Rob McDonald, The Nature Conservancy, *The Lessons I've Learned from 'Energy Sprawl',* COOL GREEN SCIENCE BLOG (Sept. 17, 2009), http://blog.nature.org/2009/09/energy-sprawl-rob-mcdonald-nature-conservancy/.

tablished to survey and classify all public domain lands.[63] The previous year John Wesley Powell's Report on the *Lands of the Arid Region of the United States* was published.[64] This report proposed a regional plan that would foster settlement of the arid west while conserving scarce water resources.[65] Congress, however, did not pass a legal framework for using planning in the management of the public lands until the 1970s. The Forest Management of Act of 1976 required the development of land use plans for each of the national forests.[66] In the same year, Congress passed the Federal Land Policy and Management Act requiring the BLM to develop land use plans for the public lands it manages.[67]

The BLM oversees approximately 245 million acres of America's public lands.[68] The agency also develops a Resource Management Plan (RMP) for each area it manages.[69] Each plan sets general parameters for the use of the area including items such as the designation of what land is available for oil and gas leasing.[70] When dealing with oil and gas leasing, the RMP sets a level of reasonably foreseeable development (number of wells) for the life of the plan, generally 15 years.[71] For example, the RMP for the Rawlins Resource Management Area in Wyoming, projects almost 9,000 new oil and gas wells,[72] and designates almost all of the 3.5 million acres included in the Rawlins area as open to oil and gas drilling.[73]

Federal law provides for regular oil and gas lease sales.[74] The agency generally offers parcels for sale that have been nominated by companies interested in drilling.[75] Although the opportunity exists for public involvement in the development of RMPs, conflict often occurs as development moves forward in areas that are val-

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63. *About USGS: Who We Are*, USGS.GOV, http://www.usgs.gov/aboutusgs/who_we_are/ (last updated Oct. 1, 2009).

64. *The Vision of John Wesley Powell*, NAT'L PUB. RADIO (Aug. 26, 2003), http://www.npr.org/programs/atc/features/2003/aug/water/part1.html.

65. *See id.*

66. 16 U.S.C. § 1600 (2006).

67. 43 U.S.C. § 1701 (2006).

68. *Decision Support, Planning & NEPA*, BUREAU OF LAND MGMT., http://www.blm.gov/wo/st/en/prog/planning.html (last updated Apr. 5, 2011).

69. 43 C.F.R. § 1601.0-1 to .0-4.

70. *Id.*; *Land Use Planning*, BUREAU OF LAND MGMT., http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/leasing_of_onshore/og_planning.html (last updated Oct. 20, 2009).

71. *Frequently Asked Questions*, BUREAU OF LAND MGMT., http://www.blm.gov/wo/st/en/prog/planning/planning_overview/frequently_asked_questions.html (last updated Apr. 7, 2011).

72. BUREAU OF LAND MGMT., APPROVED RMP/RECORD OF DECISION - RAWLINS RMP, at A33-3 (2008), *available at* http://www.blm.gov/wy/st/en/programs/Planning/rmps/rawlins/rod_armp.html.

73. *Id.* at 2-22.

74. 43 C.F.R. § 3120.1-2 (2011).

75. 43 C.F.R. § 3120.3-2.

ued for their wilderness character, wildlife habitat, water, air, or recreational uses. For example, citizen groups have protested the sale of many of the oil and gas lease parcels leading to delays.[76]

In order to maximize oil and gas development while limiting impact on recreational, biological, cultural, and other resources, the BLM has created a new mechanism called a Master Leasing Plan (MLP).[77] For areas where there is significant development interest but other valuable assets, a MLP allows the agency to take a comprehensive look at impacts and plan accordingly. Using a MLP, the agency can evaluate different configurations for development and different options for the pace of development.[78] In Utah, for example, the BLM has identified five areas in which to pursue MLPs: Moab, San Rafael River, Vernal, Glen Canyon, and Bookcliffs/Divide/Grand Valley/Cisco Desert.[79] MLPs provide a mechanism for looking at a landscape and finding a solution that delivers the oil and gas the nation needs, while preserving other irreplaceable assets the land holds. Such a plan offers an alternative to leasing parcels on a case-by-case basis as each is nominated for sale by oil and gas companies.

C. Renewable Energy Zones

Even greater opportunity for smart planning from the start exists for the development of renewable energy on public lands. The Department of the Interior is working with the Department of Energy to develop a Programmatic Environmental Impact Statement (PEIS) to support construction of large-scale solar energy projects.[80] The agencies are developing analyses as part of the PEIS, that will help site solar energy development in the best areas that will maximize energy output while minimizing environmental

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76. *See* 43 C.F.R. § 3120.1-3 (providing the statutory mechanism for public protest against the sale of BLM lands); *see also, e.g.*, *Competitive Lease Sale Notices and Results*, BUREAU OF LAND MGMT., http://www.blm.gov/wy/st/en/programs/energy/Oil_and_Gas/Leasing.html (last updated Mar. 13, 2012) (providing a list of recent pending protests of lease sales in Wyoming).

77. *See* Robert Abbey, Dir. Bureau of Land Mgmt., Instruction Memorandum No. 2010-117, Oil and Gas Leasing Reform – Land Use Planning and Lease Parcel Reviews, at II (2010), *available at* http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2010/IM_2010-117.html [hereinafter Abbey, Oil and Gas Leasing Memorandum]. *See also Oil and Gas Leasing Reform*, BUREAU OF LAND MGMT., http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE_PROTECTION_/energy/leasing_reform.Par.54947.File.dat/Leasing_Reform_05-11-2011.pdf.

78. Abbey, Oil and Gas Leasing Memorandum *supra* note 77, at II.B.

79. *Approved Master Leasing Plans (MLP) for Utah*, BUREAU OF LAND MGMT., http://www.blm.gov/ut/st/en/prog/energy/oil_and_gas.html (last updated Mar. 23, 2011).

80. Solar Energy Dev. Programmatic EIS Info. Ctr., *Project Summary,* http://www.solareis.anl.gov/index.cfm (last visited July 5, 2012).

damage.[81] The PEIS covers six western states: Arizona, California, Colorado, New Mexico, Nevada, and Utah.[82] The BLM was evaluating 24 proposed solar energy zones in these states to determine the areas in which it would prioritize development.[83] As part of the PEIS, the agency is considering whether to limit approval for development to designated solar energy zones, precluding development elsewhere.[84] The PEIS also provides analysis that helps fulfill BLM's obligations under the National Environmental Policy Act to evaluate environmental impacts prior to approving energy development on the public lands.[85]

The Western Governors' Association (WGA) has also initiated a process to identify the best areas for renewable energy development with the least environmental impacts.[86] The WGA is calling these areas Western Renewable Energy Zones.[87] The effort incorporates both public and private land. In its Phase I Report, the WGA identified the potential energy output of various resource hubs.[88] Working with various stakeholders, WGA also identified certain areas to avoid.[89] The WGA is now working with the Western Electricity Coordinating Council to plan new transmission capacity to support new renewable energy generation.[90] The Western Electricity Coordinating Council (WECC) is a "[r]egional [e]ntity responsible for coordinating and promoting bulk electric system reliability in the [w]estern" part of the country.[91] Members include utilities such as the Los Angeles Department of Water and Power; government regulators such as California Public Utilities Commission; energy developers such as BrightSource Energy; and non-profit organizations such as the American Wind Energy Association.[92]

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81. *See* Solar Energy Dev. Programmatic EIS Info. Ctr., *Why the PEIS is Needed*, http://www.solareis.anl.gov/eis/why/index.cfm (last visited July 5, 2012).

82. Solar Energy Dev. Programmatic EIS Info. Ctr., *What's in the Solar Energy Development Programmatic EIS*, http://www.solareis.anl.gov/eis/what/index.cfm (last visited July 5, 2012).

83. *Id.*

84. *Id.*

85. *See* Solar Energy Dev. Programmatic EIS Info. Ctr., *RMPs and BLM Planning Criteria*, http://www.solareis.anl.gov/eis/rmps/index.cfm (last visited July 5, 2012).

86. W. GOVERNORS' ASS'N & U.S. DEP'T OF ENERGY, WESTERN RENEWABLE ENERGY ZONES – PHASE I REPORT 3-5 (2009), *available at* http://www.westgov.org/wga/publicat/WREZ09.pdf.

87. *Id.*

88. *Id.* at 10-14.

89. *Id.*

90. *See Regional Transmission Expansion Planning,* W. GOVERNORS' ASS'N, http://www.westgov.org/initiatives/rtep (last visited July 5, 2012).

91. *About WECC*, W. ELEC. COORDINATING COUNCIL, http://www.wecc.biz/About/Pages/default.aspx (last visited July 5, 2012).

92. *See WECC Members*, W. ELEC. COORDINATING COUNCIL, http://www.wecc.biz/About/Company/Pages/WECCMembers.aspx (last visited July 5, 2012).

The Desert Renewable Energy Conservation Plan provides another excellent example of stakeholders coming together to plan where and how to site projects for renewable energy. The creation of the plan was mandated in an Executive Order signed by the former California Governor, Arnold Schwarzenegger, on November 17, 2008.[93] Work began on the plan in 2008, in response to California's desire to generate thirty-three percent of all electricity sales from renewable energy by 2020.[94] One goal of the plan is to identify critical habitat to protect endangered and threatened species so that permits can be issued in compliance with the Endangered Species Act.[95] A Renewable Energy Action Team is currently working with various stakeholders to develop a "Draft Conservation Strategy that clearly identifies and maps areas for renewable energy project development and areas intended for long-term natural resource conservation."[96] The Renewable Energy Action Team has also developed a set of best management practices to be considered for specific projects to minimize environmental impacts.[97]

D. Regional Transmission Planning

Recognizing that solar and wind resources are often located far from where energy is needed, the Federal Energy Regulatory Commission (FERC) has taken several recent actions to ensure that regional planning for transmission needs occurs. On July 21, 2011, FERC issued Order 1000 providing new requirements for transmission planning and cost allocation.[98] The order requires utilities to participate in regional transmission planning as a prerequisite to approval of new transmission lines.[99] Now, local and regional transmission planning processes must consider public policy requirements–such as Renewable Energy Portfolio standards–in assessing transmission needs.[100] Many states now have renewa-

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93. *What Is DRECP?*, CAL. ENERGY COMM'N, http://www.drecp.org/about/index.html (follow hyperlink "Executive Order # S-14-08" for additional details regarding the mandate of the creation of such a plan) (last updated Jan. 11, 2012).

94. *Id.*

95. *See id.*

96. *Id.*

97. *Id.*; *See generally* RENEWABLE ENERGY ACTION TEAM, BEST MANAGEMENT PRACTICES AND GUIDANCE MANUAL (2010), *available at* http://www.energy.ca.gov/2010publications/REAT-1000-2010-009/REAT-1000-2010-009.PDF.

98. Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities, 76 Fed. Reg. 49,842 (Aug. 11, 2011) (to be codified at 18 C.F.R. pt. 35).

99. Fed. Energy Regulatory Comm'n*, Order No. 1000 - Transmission Planning and Cost Allocation*, FERC.GOV, http://www.ferc.gov/industries/electric/indus-act/trans-plan.asp (last updated Mar. 27, 2012).

100. *Id.*; *See also* Allison Clements, *FERC's Order 1000: Outside of Congress, Hope for a Clean Energy Future Abounds*, SWITCHBOARD (July 26, 2011), http://switchboard.nrdc.org/blogs/aclements/fercs_order_1000_there_is_hope.html.

ble portfolio standards in place that require that a certain percentage of electricity used within the state come from renewable energy sources.[101] Such policies provide critical drivers for solar and wind generation projects, as well as the transmission necessary to support such projects.

As discussed above, the WECC is engaged in extensive planning for new transmission capacity which can support the new FERC requirements for regional transmission planning. The WECC received $14.5 million from the Department of Energy under the American Recovery and Reinvestment Act to conduct planning studies in the Western interconnection.[102] This funding has allowed WECC to consider additional factors, and for the first time WECC is working to incorporate economic values for environmental goods and services into its planning scenarios.[103] This funding has also given WECC the flexibility to develop a traditional 10-year plan as well as a 20-year Transmission Plan.[104]

CONCLUSION

Regardless of whether we identify as a Democrat or Republican, part of the tea party, or the Occupy Wall Street movement, we all want a prosperous and secure future. Finding sustainable energy solutions will deliver this future. While increased efficiency and conservation can reduce the amount of new energy generation needed, we will need significant new generation to meet our future needs. Smart planning from the start can help site this new generation in places that deliver the greatest energy output with the least environmental damage preserving what is special about America's public lands.

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101. *RPS Policies*, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/documents/summarymaps/RPS_map.pdf (last visited July 5, 2012). Currently 29 states, plus the District of Columbia, have renewable energy portfolio standards in place. *Id.*

102. *Regional Transmission Expansion Planning*, W. ELEC. COORDINATING COUNCIL, http://www.wecc.biz/PLANNING/TRANSMISSIONEXPANSION/RTEP/Pages/default.aspx (last visited July 5, 2012).

103. *Id.*

104. *Environmental Data Task Force*, W. ELEC. COORDINATING COUNCIL, http://www.wecc.biz/committees/BOD/TEPPC/SPSG/EDTF/default.aspx (last visited July 5, 2012); *Long Term Planning Tools*, W. ELEC. COORDINATING COUNCIL, http://www.wecc.biz/Planning/TransmissionExpansion/RTEP/LTPT/default.aspx (last visited July 5, 2012).

EXEMPTING WATER TRANSFERS: WATERING DOWN CLEAR STATUTORY PROTECTIONS

JON HARRIS MAURER*

I. INTRODUCTION

Whether in New York City or Los Angeles, most people give little thought to where the water originates when they turn on their taps. Nevertheless, both of these major metropolitan areas depend on water transfer systems to convey water from distant sources to satisfy their needs.[1] In fact, thousands of water transfer systems provide public water supply and facilitate power generation, flood control, irrigation, and environmental restoration for cities across the United States.[2]

In 1972, Congress passed the Clean Water Act (CWA, the Act),[3] which declared the importance of protecting the nation's water resources. However, Congress failed to address a question particularly salient to water transfer regulation: Is all water, whether in New York City or Los Angeles, the same water, as a matter of law?

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1. National Pollutant Discharge Elimination System (NPDES) Water Transfers Rule, 73 Fed. Reg. 33,697, 33,698-99 (June 13, 2008) (to be codified at 40 C.F.R. pt. 122).

2. *Id.* at 33,698.

3. 33 U.S.C. § 1251(a), (b), (g) (2006).

In 2008, the Environmental Protection Agency (EPA) responded affirmatively through rule-making under the CWA, but not all courts are so convinced.

The touchstone of the CWA is its prohibition on the "discharge of any pollutant[s]" into navigable waters without a permit protecting water quality, known as a National Pollution Discharge Elimination System (NPDES) permit.[4] A discharge occurs when a point source causes an "addition" of pollutants to navigable waters.[5] Water transfers often move polluted water[6] from a donor water body to a receiving water body. In effect, the issue is whether such transfers constitute an "addition" requiring an NPDES permit. The answer turns on whether all waters are one and the same as a matter of law.

In 2008, the EPA adopted the National Pollution Discharge Elimination System (NPDES) Water Transfers Rule to exempt water transfer discharges from the CWA's NPDES permit program, unless the water transfers involve an "intervening industrial, municipal, or commercial use."[7] Thus, for the EPA's rule to be consistent with the CWA, water transfers must not result in the "addition" of a pollutant.[8]

The EPA's rule rests upon the unitary theory of water, which posits that all "navigable waters"[9] in the United States "should be viewed unitarily" as the same, singular water.[10] This theory arises from the dictionary definition of "addition"—" 'to join, annex, or unite' so as to increase the overall number or amount of something."[11] Proponents of the theory also note that the CWA prohibits "addition . . . to navigable waters," without distinction among nav-

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4. *Id.* §§ 1311(a), 1342. For an in-depth discussion of water quality permit enforcement of state water quality standards, see Jeffrey M. Gaba, *Generally Illegal: NPDES General Permits Under the Clean Water Act*, 31 HARV. ENVTL. L. REV. 409, 410-415 (2007).

5. 33 U.S.C. § 1362(12). The CWA defines point sources as "any discernible, confined and discrete conveyance . . . from which pollutants are or may be discharged," including infrastructure such as pipes, tunnels, and conduits. *Id.* § 1362(14).

6. The CWA very broadly defines pollutants to include, for example, solid waste; chemical waste; industrial, municipal, or agricultural waste; biological materials; sand; and even heat. *Id.* § 1362(6).

7. *See* 40 C.F.R. § 122.3(i) (2011).

8. An alternative explanation is that the EPA's new rule intentionally contradicts the CWA's "discharge of pollutants" provisions. However, the EPA went to great lengths to explain that the NPDES Water Transfers Rule is consistent with the Act. *See* discussion *infra* Part II.B. All water transfers addressed in this Comment involve point sources and water containing pollutants.

9. The CWA defines "navigable waters" as "the waters of the United States, including the territorial seas." 33 U.S.C. § 1362(7).

10. *See* S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 106 (2004).

11. Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210, 1217 (11th Cir. 2009) (quoting WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 24 (1993)).

igable waters by including "any" to modify "navigable waters."[12] In the context of water transfer,

> [t]he unitary waters theory holds that it is not an 'addition . . . to navigable waters' to move existing pollutants from one navigable water to another. An addition occurs, under this theory, only when pollutants first enter navigable waters from a point source, not when they are moved between navigable waters.[13]

Under the unitary waters theory, combining two water sources results in the unification of the same water, not an "addition" of distinct waters. Thus, water transfer is comparable to lifting a ladle of soup from a pot and replacing it in the same pot, which would not be considered an "addition."[14] Significantly, the resulting lack of an "addition" does not trigger NPDES permit requirements.

The EPA and other parties have relied on the unitary waters theory to assert that because a donor water body and a receiver water body are the same unit of water, water transfers do not result in an "addition" to navigable waters.[15] Nevertheless, reliance on the unitary waters theory may seriously compromise water quality because it reduces the scope of the EPA's jurisdiction to regulate water quality. The EPA's rule allows a person to transfer water from "the most loathsome navigable water in the country into the most pristine one" without an NPDES permit.[16]

In *Friends of the Everglades v. South Florida Water Management District*, the Eleventh Circuit Court of Appeals recently upheld the EPA's Water Transfers Rule in the context of water transfers from polluted runoff canals into Lake Okeechobee in Florida.[17] This decision illustrates how the rule unravels CWA protection of water quality and may put sensitive areas, such as the adjacent Florida Everglades, at risk. Exempting the transfer of polluted waters from the NPDES program undermines the CWA's goal of addressing water pollution from point sources.

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12. *Miccosukee*, 541 U.S. at 106 (referring to 33 U.S.C. § 1362(12)).

13. *Friends of the Everglades*, 570 F.3d at 1217; *see also* James H. Andreasen, *Still Defining "Discharge of a Pollutant" After Thirty Years*, 24 NAT. RESOURCES & ENV'T 52, 54 (2010) ("Under this theory, once pollutants are in the waters of the United States, they cannot be 'added' to the waters of the United States by transferring them between different bodies of the waters of the United States.").

14. *See infra* note 72 and accompanying text.

15. *See, e.g.*, *Miccosukee*, 541 U.S. at 105-06.

16. *Friends of the Everglades*, 570 F.3d at 1226.

17. *Id.* at 1210.

To provide context for the EPA's rule, Part II of this Comment discusses the relevant CWA statutes and the conflicting interpretations of the Act's use of the term "addition." Next, Part III explains how the Act applies to water transfers through examples from case law, while demonstrating how different federal circuit courts of appeals have selectively applied these varying interpretations. This Part also details the EPA's final NPDES Water Transfers Rule which sought to resolve these discordant rulings and then reviews the Eleventh Circuit's decision upholding the rule. Part IV considers the rule's policy implications and practical impacts. Now that the EPA has written itself out of regulating a substantial portion of water transfers, the burden will fall upon states to control water transfer pollution. Addressing the future of water transfers, Part V analyzes the potential for a grant of *certiorari* from the Supreme Court. The Comment then concludes with recommendations for state-operated permit programs that focus on navigable waters' natural flow to determine when an addition occurs.

II. CLEAN WATER ACT BASICS AND THE PROBLEM OF "ADDITION"

The CWA's objective is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[18] To achieve this goal, it prohibits the discharge of any pollutant to navigable waters, except in compliance with specific statutory provisions, including the NPDES permit program.[19] The CWA defines "discharge of a pollutant" as "any addition of any pollutant to navigable waters from any point source."[20] Thus, an "addition" is among the key elements for a discharge, which triggers the requirement of an NPDES permit.[21] However, the Act does not define "addition" or give guidance regarding when such an event occurs.[22]

Three alternative interpretations of "addition" have been tested through cases that Part III examines. The first interpretation ("point source only") posits that additions occur only when the point source itself is the original source the pollutant. This approach represents a very literal reading of discharges "from any

18. 33 U.S.C. § 1251(a) (2006).
19. *Id.* §§ 1311(a), 1362(12).
20. *Id.* § 1362(12).
21. Nat'l Wildlife Fed'n v. Gorsuch, 693 F.2d 156, 165 (D.C. Cir. 1982) (referring to dams requiring NPDES permits).
22. *See* 33 U.S.C. § 1362.

point source."[23] Under this interpretation, "addition from a point source occurs only if the point source itself physically introduces a pollutant" that was not present in the navigable water before transport.[24] For example, assume Person A dumps Pollutant X into a lake in California, then a pipe pumps that polluted water from California into a pristine lake in New York, without the pipe contributing any new pollutants along the way. Under the point source only interpretation, no "addition" of pollutants occurs when the pipe releases the polluted California water into the lake in New York. Consequently, the water transfer does not need an NPDES permit.[25] Conversely, if the pipe itself leeched some pollutant into the water in transit, an "addition" would have occurred.

The second interpretation ("outside world" or unitary waters) finds that an "addition" occurs exclusively when a pollutant first enters *any* navigable water from the outside world.[26] Thus, in the example of water transfer from California, the addition of pollutants occurred when Person A dumped Pollutant X in California, representing Pollutant X's first entry to "navigable waters."[27] No subsequent addition of pollutants occurred when the polluted California water reached the New York lake because the addition could only occur once and had already taken place.

Therefore, the outside world interpretation's emphasis on a pollutant's first entry into navigable water is significant to pinpointing when an "addition" occurs.[28] By asserting that a pollutant enters navigable waters as a whole only once, the interpretation treats all navigable waters in the United States as a single resource. This is, in effect, the unitary waters theory. Thus, in the context of water transfers, once a pollutant is added to the donor navigable water, no later addition of the pollutant occurs when it reaches the receiver navigable water. Transferring polluted water, unaltered, between the water bodies would not constitute an "addi-

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23. *Id.* § 1362(12)(A).

24. *Gorsuch*, 693 F.2d at 174-75 (the EPA's litigation position); *see also* Nat'l Wildlife Fed'n v. Consumers Power Co., 862 F.2d 580, 583-84 (6th Cir. 1988) (Consumers Power Co. and the EPA's litigation position).

25. *See Gorsuch*, 693 F.2d at 165 (reasoning that when polluted water "merely passes through [a] dam from one body of navigable water (the reservoir) into another (the downstream river)," no addition occurs because the dam itself did not contribute any new pollutants).

26. *See Consumers Power Co.*, 862 F.2d 580 (finding no "addition"); *Gorsuch*, 693 F.2d 156 (same).

27. *See Gorsuch*, 693 F.2d 156.

28. *See* Catskill Mountains Chapter of Trout Unlimited, Inc. v. City of New York (*Catskills I*), 273 F.3d 481, 492 (2d Cir. 2001) ("[U]nder this argument, pollutants would be 'added' only when they are introduced into navigable waters for the first time.") (quoting Dague v. City of Burlington, 935 F.2d 1343, 1354 (2d Cir. 1991)).

tion" of a pollutant, regardless of water quality differences between the waters or whether such transfer violated any natural water flow between them.[29]

The third interpretation ("natural flow") focuses on whether a natural connection exists from the donor water body to the receiver water body involved in the water transfer. "Additions" occur when a point source moves polluted water to a hydrologically distinct navigable water, contrary to the natural flow.[30] Under this approach, pumping water uphill or transferring water from one water basin to a different water basin would constitute an "addition."[31] However, an "addition" would not occur when a point source moves polluted water from the top of the pond to the bottom of the same pond.[32] Under this interpretation, the transfer of polluted water from California to the New York lake would trigger the CWA's permit requirements for a discharge of pollutants because the transfer is inconsistent with any natural hydrological connection.

As explained in Part III.A, the Supreme Court eventually dismissed the narrow, point source only interpretation of addition in the CWA as "untenable."[33] However, it has not resolved the tension between the outside world interpretation and the natural flow interpretation of "addition."[34] A split among circuit courts precluded a clear consensus on this issue. Part III.B explains how the EPA's NPDES Water Transfers Rule attempted to resolve this uncertainty.

III. WATER TRANSFERS AND THE CLEAN WATER ACT

A. Pre-Rule Case Law

An extensive body of case law from around the country demonstrates the numerous attempts to determine the proper definition of "addition" under the CWA. This section traces the two dominant lines of cases: "the dams cases,"[35] favoring the point source only

29. S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 106 (2004).

30. *See* Dubois v. U.S. Dep't of Agric. 102 F.3d 1273, 1298 (1st Cir. 1996); *Catskills I*, 273 F.3d at 491.

31. *See Dubois*, 102 F.3d at 1298.

32. *Id.* at 1297 ("There is no barrier separating the water at the top of a pond from the water at the bottom of the same pond; chemicals, organisms, and even heat are able to pass from the top to the bottom or *vice versa*, at rates determined only by the laws of science.").

33. *Miccosukee*, 541 U.S. at 105.

34. *See Miccosukee*, 541 U.S. at 96 (preserving the unitary waters theory for remand).

35. Nat'l Wildlife Fed'n v. Consumers Power Co., 862 F.2d 580 (6th Cir. 1988); Nat'l Wildlife Fed'n v. Gorsuch, 693 F.2d 156 (D.C. Cir. 1982).

interpretation and outside world interpretation, and "the pumping cases,"[36] favoring the natural flow interpretation. These cases provide factual application for the various interpretations addressed in Part II and contextualize the EPA's reasoning for the final NPDES Water Transfers Rule.

In 1982, the United States Court of Appeals for the D.C. Circuit heard the first of the two dams cases, *National Wildlife Federation v. Gorsuch* (*Gorsuch*).[37] Damming of a river created water quality issues including "low dissolved oxygen [levels], dissolved minerals and nutrients, water temperature changes, sediment release, and supersaturation," impacting both water in the reservoir and water downstream.[38] The National Wildlife Federation thus argued that the dam's release of pollutants required an NPDES permit.[39] Opposing the requirement of an NPDES permit, the EPA focused on the fact that the dam itself did not contribute a new pollutant, arguing that no "addition from a point source" occurred if the point source did not contribute a pollutant "from the outside world."[40] Evincing some skepticism, the D.C. Circuit concluded:

> [i]t is not our function to decide whether EPA's interpretation . . . is the best one or even whether it is more reasonable than the Wildlife Federation's interpretation. We hold merely that EPA's interpretation is reasonable, not inconsistent with congressional intent, and entitled to great deference; therefore, it must be upheld.[41]

The United States Court of Appeals for the Sixth Circuit revisited this issue in the second dams case, *National Wildlife Federation v. Consumers Power Co.* (*Consumers Power*), in 1988.[42] The Consumers Power Company operated a hydrological power plant by forcing water uphill from Lake Michigan, releasing it through turbines, and then depositing it back into the lake.[43] The plant pumped water that included fish and other aquatic organisms.[44] In fact, the facility released millions of pounds of live fish, dead fish, and fish remains into these waters annually.[45]

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36. *Dubois*, 102 F.3d 1273; *Catskills I*, 273 F.3d 481 (2d Cir. 2001).
37. *Gorsuch*, 693 F.2d 156.
38. *Id.* at 161.
39. *See id.*
40. *Id.* at 175.
41. *Id.* at 183.
42. Nat'l Wildlife Fed'n v. Consumers Power Co., 862 F.2d 580 (6th Cir. 1988).
43. *Id.* at 581.
44. *Id.* at 582.
45. *Id.* at 583.

The CWA considers such biological materials to be pollutants.[46] Nevertheless, the court emphasized that while the "turbine changes the form of the pollutant from live fish to a mixture of live and dead fish," there was no "addition" from the outside world of the lake water.[47] Approving the *Gorsuch* ruling, the court found the EPA's position a permissible construction of the statute and held that the releases of water and biological materials did not constitute an addition of pollutants requiring an NDPES permit.[48]

Whereas in the dams cases the courts deferred to the EPA's point source only interpretation and outside world interpretation to find that no additions occurred, in the pumping cases the courts applied the natural flow interpretation. The United States Court of Appeals for the First Circuit decided the first water pumping case, *Dubois v. United States Department of Agriculture* (*Dubois*), in 1996.[49] Ski resort owners pumped water from Loon Pond, East Branch, and Boyle Brook through snowmaking equipment and then back into Loon Pond.[50] The state had previously designated Loon Pond as a Class A water body and an Outstanding Resource Water, which imposed water quality standards and protections.[51] Loon Pond served as a drinking water source and was recognized regionally for its especially low phosphorus content and high water clarity.[52] Conversely, East Branch was a "relatively unprotected Class B waterway" containing phosphorus, *Giardia lambia*, and turbidity.[53] Although both Loon Pond and East Branch eventually drained into the Pemigewasset River, the ski resort's pump transported water uphill from East Branch into Loon Pond, opposite the direction of East Branch's natural flow.[54]

The plaintiff, Dubois, alleged that the Forest Service violated the CWA by approving the ski resort's expansion plan without an NPDES permit.[55] The First Circuit found that the water transfer involved distinct navigable waters, such that water from the pol-

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46. *Id.*

47. *Id.* at 585. The dissent, however, did view this process as a creation of pollutants and thus would have required an NPDES permit for the facility. *Id.* at 591 (Jones, J., dissenting).

48. *Id.* at 584, 590 (majority opinion). The court applied *Chevron* deference to find that this was a "permissible construction." *Id.* at 584. For a brief discussion of courts' exercise of *Chevron* deference to agency statutory interpretation, see *infra* notes 148-51151 and accompanying text.

49. Dubois v. U.S. Dep't of Agric., 102 F.3d 1273 (1st Cir. 1996).

50. *Id.* at 1278.

51. *Id.* at 1277.

52. *Id.*

53. *Id.* at 1278-79.

54. *See id.* at 1298.

55. *Id.* at 1280.

luted donor source would not otherwise reach the receiving source absent the transfer.[56] As such, the court ruled that the water transfer constituted an "addition" requiring an NPDES permit.[57] "The Forest Service's determination to the contrary was arbitrary and capricious and not in accordance with the law."[58]

In 2001, the United States Court of Appeals for the Second Circuit decided *Catskill Mountains Chapter of Trout Unlimited v. City of New York* (*Catskills I*).[59] New York City transferred water from the Schoharie Dam and Reservoir through several miles of tunnel into Esopus Creek, in an entirely separate watershed.[60] The transferred water contained suspended solids.[61] No natural hydrological connection existed between the two bodies of water.[62] The Second Circuit's analysis focused on the lack of "sameness" between the waters involved and the artificial diversion to "a body of water utterly unrelated in any relevant sense."[63] This lack of sameness represented a fundamental factual difference between the case at hand and the dams cases, where "the water from which the discharges came is the same as that to which they go."[64]

Emphasizing the difference between the donor navigable water and the receiver navigable water, the court held that the plain language of the CWA would not permit "a 'singular entity' theory of navigable waters, in which an addition to one water body is deemed an addition to all of the waters of the United States."[65] The Second Circuit in *Catskills I* paid lip service to *Gorsuch* and *Consumers Power*, claiming to adopt "the outside world" approach from those cases while distinguishing them on their facts.[66] However, in reality the court subverted that interpretation by including the caveat that "the outside world" must be "construed as any place outside the particular water body to which pollutants are introduced."[67] Thus, the Second Circuit—in a fundamental shift from the dams cases—rejected the unitary waters theory by requiring consideration of the receiver body as an entity separate from the

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56. *See id.* at 1298-99.
57. *See id.* at 1299.
58. *Id.*
59. *Catskills I*, 273 F.3d 481 (2d Cir. 2001).
60. *Id.* at 484, 492.
61. *Id.* at 492.
62. *Id.* at 484.
63. *Id.* at 492.
64. *Id.* The court also specifically did not comment on whether the sister circuits' rulings were proper on their cases' unique facts. *Id.* at 492 n.3.
65. *Id.* at 493 (citing Dubois v. U.S. Dep't of Agric., 102 F.3d 1273, 1296-97 (1st Cir. 1996)).
66. *Id.* at 491-92.
67. *Id.* at 491.

donor water body and considering natural flow connections. The court reversed the lower court's judgment that the tunnel did not add a pollutant and remanded for further consideration under the circuit court's interpretation of "addition."[68]

In sum, the pumping cases contemplated the relationship between the donor water body and receiver water body, holding that "addition" occurred when transfers "cause water to move in a direction it would not ordinarily flow," such that water moves "from one body to another distinct body."[69] The pumping cases did not purport to contradict the dams cases,[70] but instead they distinguished the dams cases on their facts.[71] As the Second Circuit analogized the dams cases, "[i]f one takes a ladle of soup from a pot, lifts it above the pot, and pours it back into the pot, one has not 'added' soup or anything else to the pot."[72] In contrast, the pumping cases represented a transfer between pots. This factual distinction further highlighted the need to determine whether transfers moved water between distinct bodies of water, requiring a permit, or simply moved the same polluted water from one part of a water body to another.

If regulated entities or regulators hoped to get a decisive interpretation of "addition" from the Supreme Court, they were disappointed by the Court's ruling in *South Florida Water Management District v. Miccosukee Tribe of Indians* (*Miccosukee*) in 2004.[73] The South Florida Water Management District (SFWMD) operated a pumping station that was part of the Central and South Florida Flood Control Project ("C & SF Project").[74] The S-9 pump station moved polluted water from a drainage canal into a "water conservation area" about sixty feet away, comprising what was once part of the Florida Everglades.[75] The Miccosukee Tribe of Indians and Friends of the Everglades alleged that the CWA required an NPDES permit for the S-9 pump.[76] The Court granted *certiorari* to review the Eleventh Circuit's ruling that this water transfer did

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68. *Id.* at 485, 494. The Second Circuit Court of Appeals revisited this matter after certain intervening legal developments, but reached the same conclusion. Catskill Mountains Chapter of Trout Unlimited, Inc. v. City of New York (*Catskills II*), 451 F.3d 77, 82 (2d Cir. 2006); *see infra* notes 204-09.

69. National Pollutant Discharge Elimination System (NPDES) Water Transfers Rule, 73 Fed. Reg. 33,697, 33,701 (June 13, 2008) (to be codified at 40 C.F.R. pt. 122) (citing *Dubois*, 102 F.3d at 1297 and *Catskills I*, 273 F.3d at 491, 493-94).

70. *Catskills I*, 273 F.3d at 492 n.3.

71. *See, e.g.*, *id.* at 492.

72. *Id.*

73. S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95 (2004).

74. *Id.* at 98-99.

75. *Id.* at 100.

76. *Id.* at 99.

constitute an "addition" of pollutants and therefore required an NPDES permit.[77]

The Supreme Court first dismissed any interpretation of "addition" that limited the NPDES permit requirement to instances where the point source itself generated the pollutant.[78] This holding thus effectively closed the debate on the point source only interpretation of addition. The federal government, as *amicus curiae*, however, advanced an alternative theory for why the pumping station transfer would not qualify as an addition that required an NPDES permit.[79] The government relied on the outside world interpretation and the unitary waters theory, under which all navigable waters are the same unitary entity.[80] As such, no addition to navigable waters occurred in the S-9 pumping, because the pollutants were already part of the navigable waters.[81]

The Court expressed concern in dicta that the government's theory might be at odds with several NPDES provisions and current regulations, as well as the EPA's own position historically.[82] However, the Court noted that the parties had not raised the appropriateness of the unitary waters theory in lower court proceedings, and thus the Court refrained from deciding the issue, preserving it for the district court on remand.[83]

The Supreme Court hypothesized that, in the absence of the C & SF Project infrastructure, natural conditions may lead to flooding which would connect the areas separated by the pumping station and that natural seepage linked the canal basin and the conservation area.[84] The Court vacated the Eleventh Circuit's judgment and remanded the decision for further factual findings to clarify whether the two water bodies involved were "meaningfully distinct."[85] The decision stated only that water transfers between water bodies that are not "meaningfully distinct" do not require an NPDES permit.[86] The decision did not establish whether a water

77. Miccosukee Tribe of Indians v. S. Fla. Water Mgmt. Dist., 280 F.3d 1364, 1368 (11th Cir. 2002), *vacated,* 541 U.S. 95 (2004).

78. *Miccosukee*, 541 U.S. at 104-05.

79. *Id.* at 105-06.

80. *See id.*

81. *Id.* at 106.

82. *Id.* at 107.

83. *Id.* at 109 (remanding for factual issues on the connectedness of the waters involved). The dissent concurred that the unitary waters theory should not be decided in this case, but based this assessment on the finding that Court of Appeals had rejected the unitary waters theory in effect, if not in name. *Id.* at 112-13 (Scalia, J., dissenting).

84. *Id.* at 110 (majority opinion).

85. *Id.* at 112.

86. *Id.*

transfer from one navigable water to another distinct navigable water required a permit.[87]

Following *Miccosukee*, permitting for water transfers within the C & FS Project again arose in *Friends of the Everglades, Inc. v. South Florida Water Management District*.[88] Plaintiffs, including conservation organizations and the Miccosukee Tribe of Indians, sought an order requiring an NPDES permit for pumping stations discharging water into Lake Okeechobee.[89] The SFWMD, joined at trial by the Army Corps of Engineers and the EPA as defendants,[90] pumped water from Everglades Agriculture Area drainage canals, through the S-2, S-3, and S-4 pumping stations, and into Lake Okeechobee.[91] These pumps conveyed water fewer than sixty feet without introducing any new pollutants to the water, "without subjecting the waters to any intervening industrial, municipal or commercial use."[92]

The United States District Court for the Southern District of Florida noted that *Miccosukee* had not affirmatively resolved whether transfer between meaningfully distinct navigable waters satisfied the definition of "addition," nor had the Supreme Court resolved the legal viability of the unitary waters theory, despite viewing it unfavorably.[93] After a review of circuit court case law,[94] the court conducted its own interpretation of the statutory language,[95] the structure of the Act,[96] and the appropriate standard of deference.[97] It concluded that "water transfers between distinct water bodies that result in the addition of a pollutant to the receiving navigable water body are subject to the NPDES permitting program."[98] Ultimately, the district court found the navigable waters at issue "meaningfully distinct" on the evidence presented[99]

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87. *Id.*

88. Friends of the Everglades Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309, 2006 WL 3635465, at *27-28 (S.D. Fla. 2006), *rev'd,* 570 F.3d 1210 (11th Cir. 2009).

89. *Id.* at *1. The court noted confusion during the course of the trial: "because the EPA does not currently issue permits for water transfers, there is no consensus on what type of permit the SFWMD and/or its Director should be required to seek, if one is required under the CWA." *Id.* at *29.

90. *Id.* at *2.

91. *Id.* at *13.

92. *Id.*

93. *Id.* at *38.

94. *Id.* at *39-41.

95. *Id.* at *41-43.

96. *Id.* at *43-47.

97. *Id.* at *47-48. The court also recognized the EPA's Agency Interpretation and Proposed rule, but found that "unambiguous congressional intent expressed in [the] statute" precluded deference to the documents. *Id.* at *48.

98. *Id.* at *48.

99. *Id.* at *51. For a highly detailed record of the interconnection and distinction among water flows in the Everglades historically and today, see *id.* at *3-32.

and declared that operation of the pumps without an NPDES permit violated the CWA.[100]

After the Southern District of Florida issued its decision in *Friends of the Everglades*, but before the Eleventh Circuit addressed the appeal, the EPA issued its Water Transfers Rule. That rule changed the course of litigation.

B. The EPA's Water Transfers Rule

Following the *Miccosukee* decision in 2004, the EPA issued an interpretive memorandum concerning "whether the movement of pollutants from one navigable water to another by a water transfer is the 'addition' of a pollutant potentially subjecting the activity to the permitting requirement under [the NPDES program]."[101] Conclusions in the interpretive memorandum served as the basis for the EPA's proposed regulation in 2006 and the nearly identical final rule issued in 2008.[102] The EPA relied on a holistic reading of the CWA to determine that Congress intended for state water resource management agencies and authorities outside of the NPDES program to regulate water transfers, as consistent with the EPA's practice.[103] The EPA thereby selectively concluded that it lacked jurisdiction over these matters. The EPA inveigled its final rule from the CWA's statutory language, structure, and legislative history, without ever explicitly putting forth the unitary waters theory in its final rule promulgation.[104]

Furthermore, the EPA asserted that the Supreme Court in *Miccosukee* "undercut" the logic of the water pumping cases by employing a broader analysis of hydrological connection.[105] According to the EPA, the Court expanded the concept of hydrological connection in *Miccosukee* by considering "seepage between the waters and the long-term effects if pumping were ceased," rather than directional flow by gravity.[106] The EPA appeared to take some liberties in extrapolating that "the Court's decision casts significant doubt on the validity of simplistically apply-

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100. *Id.* at *61.

101. Memorandum from the U.S. Envtl. Prot. Agency to Regional Administrators, Agency Interpretation on Applicability of Section 402 of the Clean Water Act to Water Transfers 2 (Aug. 5, 2005), *available at* http://www.epa.gov/ogc/documents/water_transfers.pdf [hereinafter Agency Interpretation].

102. National Pollutant Discharge Elimination System (NPDES) Water Transfers Rule, 73 Fed. Reg. 33,697, 33,699 (June 13, 2008) (to be codified at 40 C.F.R. pt. 122).

103. Agency Interpretation, *supra* note 101, at 3.

104. *See* NPDES Water Transfers Rule, 73 Fed. Reg. at 33,698-99.

105. Agency Interpretation, *supra* note 101, at 14.

106. *Id.* at 15.

ing a 'but for/natural flow' test followed by the appellate courts . . . and instead calls for a broader evaluation of the relationship between waters."[107]

The NPDES Water Transfers Rule added the following exemption to the NPDES permit program:

> (i) Discharges from a water transfer. Water transfer means an activity that conveys or connects waters of the United States without subjecting the transferred water to intervening industrial, municipal, or commercial use. This exclusion does not apply to pollutants introduced by the water transfer activity itself to the water being transferred.[108]

Thus, the EPA effectively codified the unitary waters theory, though no mention of theory by name appears in the final rule analysis.[109] The EPA's own "broader evaluation of the relationship between waters" led it to make no distinctions among navigable waters at all in the rule.[110]

The EPA explained that its rule arose from the CWA's language, structure, and legislative history.[111] First, regarding statutory language, the EPA reviewed the pre-rule case law discussing the meaning of "addition."[112] The dams cases supported the EPA's understanding of addition, limiting instances of addition to a point source's physical introduction of a pollutant and holding that NPDES permits are not required when previously polluted water passed through a dam or hydropower facility.[113] Conversely, the EPA cited the pumping cases and *Miccosukee* as "construing the term 'addition' so as to include transfers of water from one body to another distinct body" and recognized the rule's departure from these cases.[114] The final rule analysis also included reference to

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107. *Id.*

108. 40 C.F.R. § 122.3(i) (2008).

109. *See generally* NPDES Water Transfers Rule, 73 Fed. Reg. 33,697.

110. Agency Interpretation, *supra* note 101, at 15.

111. NPDES Water Transfers Rule, 73 Fed. Reg. at 33,700.

112. *Id.*

113. *Id.* (citing Nat'l Wildlife Fed'n v. Consumers Power Co., 862 F.2d 580, 584 (6th Cir 1988); Nat'l Wildlife Fed'n v. Gorsuch, 693 F.2d 156, 175 (D.C. Cir 1982)). In its interpretive memorandum, the EPA attempted to further distinguish—and discredit—the water pumping cases, asserting that those cases focused only on statutory language, without considering the Act as a whole to determine congressional intent. *See* Agency Interpretation, *supra* note 101, at 10-12.

114. NPDES Water Transfers Rule, 73 Fed. Reg. at 33,700-01 & 33,700 n.4 (noting that the following cases declined to extend *Chevron* deference: Miccosukee Tribe of Indians v. S. Fla. Water Mgmt. Dist., 280 F.3d 1364 (11th Cir. 2002); *Catskills I*, 273 F.3d 481, 491-93 (2d Cir. 2001); Dubois v. U.S. Dept. of Agric., 102 F.3d 1273, 1298–1300 (1st Cir. 1996)).

litigation, pending at that time, in which the United States effectively applied the unitary theory of water.[115]

Noting the lack of a clear consensus among the courts on the meaning of "addition," the EPA next analyzed the CWA's structure as a whole, as evident from several particular sections.[116] Among these sections, the EPA noted CWA section 101(b), which emphasizes the "primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water resources."[117] Furthermore, CWA section 101(g) clarifies that the Act does not supersede or impair states' authority over water quantity allocation and that "[f]ederal agencies shall cooperate with State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources."[118] In addition, CWA section 510(2) reserves for states the rights and jurisdiction over their waters, unless expressly stated in the Act.[119] Lastly, CWA section 304(f) addresses nonpoint pollution sources and "processes, procedures, and methods to control pollution resulting from . . . changes in the movement, flow, or circulation of any navigable waters or ground waters, including changes caused by the construction of dams, levees, channels, causeways, or flow diversion facilities."[120]

Based on these provisions, the EPA distilled "general direction against unnecessary Federal interference with State allocations of water rights" and asserted that requiring federal NPDES permits could interfere if they affected water allocation decisions.[121] In addition, the EPA focused on the Act's deference to states on issues of water allocation and its recognition of states' primary responsibility for water development and use.[122] The EPA strained its analysis of CWA section 304(f) to find that inclusion of "water management activities" with activities of a nonpoint source nature[123] in the same section "reflects an understanding by Congress that water movement could result in pollution, and that such pollution

115. *Id.* at 33,701 (citing Brief for the United States, Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009) (No. 07-13829-H)).

116. *Id.* at 33,701-03.

117. 33 U.S.C. § 1251(b) (2006).

118. *Id.* § 1251(g).

119. *Id.* § 1370(2).

120. *Id.* § 1314(f)(2)(F).

121. NPDES Water Transfers Rule, 73 Fed. Reg. at 33,702 (discussing 33 U.S.C. § 1251(g)).

122. *Id.* (discussing 33 U.S.C. §§ 1251(b), 1370(2)).

123. Nonpoint sources are beyond the realm of the NPDES program and left to state regulation.

would be managed by States under their nonpoint source program authorities, rather than the NPDES program."[124]

Finally, the EPA looked to the legislative history of the Act and determined that Congress did not intend to establish federal regulation of water transfers.[125] Regarding CWA section 101(g), the EPA's rule justification quoted a congressional CWA legislative history report that stated, "[i]t is the purpose of this [provision] to insure that State [water] allocation systems are not subverted."[126] In addition, the EPA believed that a House Committee Report suggested that "water flow management," which would include water transfers, was "an area where EPA would provide technical guidance to States for their nonpoint source programs, rather than an area to be regulated under [the NPDES provisions]."[127]

The EPA concluded its searching review of the CWA's legislative history with an analysis of CWA section 208, which concerns "areawide waste treatment management plans."[128] A House Committee Report regarding the provision refers to avoiding duplication of effort in water quality control.[129] The report noted that where a state has a water resource management agency that considers water quality, and the state also has authority over the NPDES permit program, the state should retain primary authority.[130] Therefore, according to the EPA, Congress "did not intend a wholesale transfer of responsibility for water quality" to the NPDES authority, but rather that the NPDES program "work in concert with water resource agencies' oversight . . . to ensure a 'balanced management control system.' "[131] This demonstrated that Congress did not intend for the NPDES program to be the sole regulator of water quality issues.[132]

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124. NPDES Water Transfers Rule, 73 Fed. Reg. at 33,702 (examining the implications of 33 U.S.C. § 1314(f)). However, the EPA was careful to note that sources that may also qualify as point sources are not explicitly exempted from NPDES regulation, and that reference to activities in this section characteristic of water transfer does not mean the activity is nonpoint source in nature. *See id.* (citing Miccosukee Tribe of Indians v. S. Fla. Water Mgmt. Dist., 541 U.S. 95, 106 (2004)).

125. *Id.* at 33,703.

126. *Id.* (quoting 3 CONG. RESEARCH SERV., U.S. LIBRARY OF CONGRESS, SERIAL NO. 95-14, A LEGISLATIVE HISTORY OF THE CLEAN WATER ACT OF 1977, at 532 (1978) (alterations in original) (referring to 33 U.S.C. § 1251(g)).

127. *Id.* at 33,703 (citing H.R. REP. NO. 92-911, at 109 (1972)). However, provision of technical guidance is not limited to states by statute, but also should be issued to federal agencies, water pollution control agencies, and agencies responsible for areawide waste treatment management. *See* 33 U.S.C. 1314(f).

128. NPDES Water Transfers Rule, 73 Fed. Reg. at 33,703 (referring to 33 U.S.C. § 1288).

129. *Id.* (citing H.R. REP. NO. 92-911, at 96 (1972)).

130. *Id.*

131. *Id.*

132. *See id.*

In light of this structure and legislative history analysis, the EPA determined that the Act sought to balance power between state and federal government and that water transfer regulation falls primarily within the domain of the states.[133] Moreover, having determined a permissible construction of the Act, the EPA's analysis "clarifie[d] that NPDES permits are not required for transfers of waters of the United States from one water body to another."[134]

C. Eleventh Circuit Review of the Water Transfers Rule

In 2009, the Eleventh Circuit reviewed the district court's decision in *Friends of the Everglades v. South Florida Water Management District* (*Friends of the Everglades*) with the finalized EPA Water Transfers Rule in place.[135] Distinguishing this case from the dams cases, the pumping cases from other judicial circuits, and its own vacated decision in *Miccosukee*, the Eleventh Circuit emphasized the finalization of the EPA's NPDES Water Transfers Rule as a crucial development.[136] Therefore, the Eleventh Circuit reviewed the case *de novo* and had to resolve whether the EPA's rule was entitled to highly deferential *Chevron* deference.[137] This question required direct analysis of the reasonableness of the unitary waters theory as applied to water transfers.[138]

At trial, the United States joined the defendant, the SFWMD, on behalf of the EPA and the Army Corps of Engineers.[139] Plaintiffs Friends of the Everglades and Fishermen Against the Destruction of the Environment sought to enjoin the SFWMD from pumping water from a drainage canal of the Everglades Agricultural Area into Lake Okeechobee.[140] This water "contain[ed] a loathsome concoction of chemical contaminants," among other water quality issues.[141] The parties did not dispute that the pumping stations "do not add anything to the canal water; they simply move it through pipes," or that the pumping stations were point sources.[142] As a result, the Eleventh Circuit focused on the question of "whether moving an existing pollutant from one navigable

133. *Id.* at 33,700-03.

134. *Id.* at 33,700.

135. *See* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009).

136. *Id.* at 1218.

137. *See id.* at 1217-19. For an explanation of *Chevron* deference, see *infra* notes 151-53153 and accompanying text.

138. *See id.* at 1217-18.

139. *Id.* at 1214.

140. *Id.*

141. *Id.*

142. *Id.*

water body to another is an 'addition . . . to navigable waters' of that pollutant" under the CWA.[143]

The SFWMD's argument against requiring an NPDES permit for these pumping stations relied upon the unitary waters theory and its implication for the meaning of "addition."[144] The court noted that the unitary waters theory "has struck out in every court of appeals where it has come up to the plate" and "[e]ven the Supreme Court has called a strike or two on the theory . . . . The Court has not, however, called the theory out yet."[145] Although the Eleventh Circuit had previously rejected the unitary waters theory, that decision was vacated, making it void.[146] Moreover, neither the appellate court decisions nor the district court's decision counted as precedent against the theory because the courts had not considered the new EPA regulation.[147]

Considering the application of *Chevron* deference to the new rule, the Eleventh Circuit first had to assess whether the existing statute was ambiguous.[148] If the CWA were unclear, the court then would assess whether the EPA's rule constituted a reasonable interpretation among two or more reasonable alternatives.[149] The court would uphold any such reasonable interpretation by the EPA. However, if either the statutory language was unambiguous or the rule was not a reasonable interpretation of ambiguous language, *Chevron* deference would not apply.[150] If the court upheld the rule under *Chevron* deference, then the pumping station would not require an NPDES permit.[151]

The court considered the decisions "pitched" by the plaintiffs and the defendants as to whether the meaning of "addition" in the CWA is ambiguous.[152] The SFWMD relied on the dams cases, which were deferential to the EPA because of ambiguity, but the court ultimately distinguished these cases because they did not

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143. *Id.* at 1216.

144. *Id.* at 1217.

145. *Id.* at 1217-18 (referring to S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95 (2004);*Catskills II*, 451 F.3d 77 (2d Cir. 2006); N. Plains Res. Council v. Fidelity Exploration and Dev., 325 F.3d 115 (9th Cir. 2003); *Catskills I*, 273 F.3d 481 (2d Cir. 2001); Dubois v. U.S. Dep't of Agric., 102 F.3d 1273 (1st Cir. 1996); Dague v. City of Burlington, 935 F.2d 1343 (2d Cir. 1991)).

146. *Id.* at 1218.

147. *Id.*

148. *Id.* at 1219.

149. *Id.*

150. *See id.* at 1219, 1223.

151. *See id.* at 1219 (noting that *Chevron* deference does not consider whether the rule was issued after litigation began, was proposed in response to similar litigation, nor whether it represents a dramatic shift in agency policy). *See also id.* at 1228 (holding, after *Chevron* analysis, that no permit was required).

152. *See id.* at 1220-22.

deal with pollutants moving between different bodies of water.[153] As the Eleventh Circuit specifically pointed out, "*Gorsuch* and *Consumers Power* involved water that wound up where it would have gone anyway."[154]

The plaintiffs, in turn, relied on the water pumping cases and *Miccosukee*, which found that an "addition" occurred with the movement of pollution between meaningfully distinct bodies of water.[155] However, the Eleventh Circuit rejected these cases as well. It clarified that those cases illustrated "how best to construe statutory language[, which] is not the same thing as deciding whether a particular construction is within the ballpark of reasonableness" for *Chevron* deference.[156] Moreover, the court declared that any inferences about ambiguity from those cases were inapplicable because the EPA's final rule did not exist at the time.[157]

Having dismissed both the plaintiffs' and defendants' arguments concerning ambiguity, the Eleventh Circuit embarked on its own investigation of whether the statutory language was clear.[158] It proceeded to review the plain meaning of the statute, the context of the discharge provisions in light of other parts of the CWA, and the broader policy of the Act as a whole, revisiting many points considered in the EPA's final rule analysis.[159] The court considered the Act's larger policy's "lofty goals" of protecting and restoring the nation's waters, but lamented that "[w]hat emerges . . . to become the enactment is often less pure than the preamble promises."[160] Ultimately, the court concluded that the statute was ambiguous.[161]

The Eleventh Circuit then found that the parties had put forward two reasonable interpretations to construe "addition" in the statute.[162] The plaintiffs suggested "any addition . . . to [any] navigable waters," while the defendants, including the government on behalf of the EPA, suggested "any addition . . . to navigable waters [as a whole]."[163] With that, the court passed quickly to the issue of reasonableness. Finding that the EPA's rule was not "arbitrary,

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153. *Id.* at 1220-21.
154. *Id.* at 1221.
155. *Id.*
156. *Id.*
157. *Id.* at 1221-22.
158. *Id.* at 1222-23.
159. *Id.* at 1222-27.
160. *Id.* at 1227. The court notes that the Act fails to directly regulate non-point sources of pollution, leaving a huge portion of its stated goals unattainable. *See id.* at 1226-27.
161. *Id.* at 1227.
162. *Id.*
163. *Id.*

capricious, or manifestly contrary to the statute," the court upheld the EPA's interpretation and held that water transfer did not require an NPDES permit.[164]

Despite its legal obligation to uphold the unitary waters theory under *Chevron* deference, the Eleventh Circuit expressed skepticism. The court took care to note that the interpretation upheld under *Chevron* deference need not be the court's preferred interpretation.[165] Convinced that conclusive interpretation was not possible, the court decided to "strip [the] legal question of the contentious policy interests attached" and considered a hypothetical.[166]

> Two buckets sit side by side, one with four marbles in it and the other with none. There is a rule prohibiting "any addition of any marbles to buckets by any person." A person comes along, picks up two marbles from the first bucket, and drops them into the second bucket. Has the marble-mover "add[ed] any marbles to buckets"?[167]

This captures the ambiguity of "addition" in the CWA. However, as other writers have suggested, the significance of upholding the Water Transfers Rule is not as banal as marbles and buckets.[168]

IV. IMPACTS OF THE NPDES WATER TRANSFERS RULE

A. How the Rule Would Apply to Existing Cases

As a policy measure, the NPDES Water Transfers Rule creates a vacuum of oversight and regulation for water transfers that does not involve an intervening industrial, municipal, or commercial use. Pennsylvania is the only state that requires NPDES permits for all water transfers.[169] Thus, with the exception of water trans-

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164. *Id.* at 1227-28 (quoting Chevron, U.S.A, Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837, 844 (1984)).

165. *Id.*

166. *Id.* at 1228.

167. *Id.*

168. "[T]he allocation of marbles among buckets is not likely to have a meaningful impact on the lives of people, plants, and animals that live in or around those buckets." Cozette Tran-Caffee, Note, *The Water Transfers Rule: Weakening the Clean Water Act One Reasonable Interpretation at a Time*, 37 ECOLOGY L.Q. 751, 758 (2010).

169. NPDES Water Transfers Rule, 73 Fed. Reg. 33,697, 33,699 (June 13, 2008) (to be codified at 40 C.F.R. pt. 122). In *Miccosukee*, Pennsylvania filed an amicus brief in support of the Miccosukee Tribe, which advocated requiring NPDES permits where point sources change the natural flow of water bodies and cause a discharge into a distinct water body. Brief of Amici Commonwealth of Pennsylvania, Department of Environmental Protection in Support of Respondents, S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95 (2004) (No. 02-626), 2003 WL 22793537 at *1-2 [hereinafter Pennsylvania Brief].

fers in Pennsylvania, an entire class of water transfers now escapes the NPDES permitting scheme, which Congress intended to regulate pollutant discharges. While the Water Transfers Rule avoids the increased costs and regulatory burdens that a permit requirement would create, the new rule misses an enforcement opportunity for state water quality standards and ultimately leaves the water quality goals of the CWA unfulfilled.[170]

From a practical standpoint, applying the NPDES Water Transfers Rule to the pumping cases demonstrates the regulatory gaps that the rule creates. Both of these cases involved pollutant transfers—contrary to natural flow—between navigable waters. Under the Water Transfers Rule, the fact that the Schoharie Reservoir and the Esopus Creek in *Catskills I* were "utterly unrelated," lacking any semblance of "sameness," no longer provides a statutory basis for requiring a permit under federal law.[171] Because there is no intervening industrial, municipal, or commercial use, the new rule places this water transfer in the category of activities excluded from NPDES permit requirements. Thus, any protection and enforcement of water quality standards for the receiving drinking water source must come from elsewhere.

However, in *Dubois*, the water transfer did involve an intervening commercial use for snowmaking.[172] Thus, this transfer would not be exempt from NPDES permit requirements even under the Water Transfers Rule. Nevertheless, the lack of a natural hydrological flow from East Branch to Loon Pond, which was a deciding factor for the First Circuit,[173] would be irrelevant. Thus, the question of whether the navigable waters were "meaningfully distinct"—on which grounds the Supreme Court remanded *Miccosukee*—would be entirely without consequence. The new rule's implementation of the unitary waters theory preempts consideration of any distinction between water bodies.

Another compelling example of the impacts of the new rule comes from a brief in support of the petition for a writ of *certiorari*

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170. The Supreme Court has noted the potentially distribution-prohibitive "significant practical consequences" of requiring NPDES permits for all water transfers. These consequences include the issuance of thousands of new permits, particularly in Western states dependent on engineered water supply networks; expenses for compliance with water quality criteria; and potential infringement on state's authority over water allocation. However, the Court also recognized that Pennsylvania has undertaken such costs as "necessary to protect water quality." S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 108-09 (2004).

171. *See Catskills I*, 273 F.3d 481, 492 (2d Cir. 2001).

172. Dubois v. U.S. Dep't of Agric., 102 F.3d 1273, 1280 (1st Cir. 1996).

173. *Id.* at 1299.

in *Friends of the Everglades*.[174] The Town of Grand Lake, Colorado, along with business and homeowners' groups, filed the amicus brief because "[t]he Eleventh Circuit's decision would eliminate [the NPDES as a] critical regulatory tool, which is essential to Grand Lake's future."[175] Grand Lake, the state's largest and deepest natural water body, located near the west entrance of Rocky Mountain National Park, serves as the "lifeline" of the tourist town.[176] The Town of Grand Lake and its residents "depend[] on the natural scenery and recreational wealth . . . ."[177] Prior to implementation of a water transfer system, Grand Lake ranked in the top 2% of all lakes in the country for clarity.[178]

Currently, the Colorado-Big Thompson Project (CBTP) engineers seasonal water transfers from the man-made Shadow Mountain Reservoir into Grand Lake.[179] The CBTP's pumping forces this water against the natural flow of the Colorado River.[180] Water from Grand Lake is then diverted to meet agriculture demands in a separate Colorado basin.[181]

Before the water transfer, Grand Lake's water clarity and transparency extended to 9.2 meters in depth, but now it measures only 3.2 meters.[182] Temporary cessation of pumping showed a potential for 30% improvement in water clarity.[183] In 2008 the Colorado Water Quality Control Commission adopted water clarity standards for Grand Lake as a protective measure.[184] In addition, nutrient-loading problems previously found in the Shadow Mountain Reservoir have presented in Grand Lake since the water transfer began.[185]

The Shadow Mountain Reservoir water transfer and the Town of Grand Lake's municipal stormwater system are the only two point-source discharges to the lake.[186] Given the town's small population, its stormwater system does not require an NPDES permit.[187] Nevertheless, the Town of Grand Lake voluntarily filters

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174. Brief of Amici Curiae Town of Grand Lake, Colorado et al. in Support of Petitioners, Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009) (No. 10-196), 2010 WL 3611704 [hereinafter Grand Lake Brief].

175. *Id.* at 14.

176. *Id.* at 1, 3.

177. *Id.* at 2.

178. *Id.* at 11.

179. *Id.* at 10-11.

180. *Id.* at 5.

181. *Id.* at 5-6.

182. *Id.* at 11.

183. *Id.* at 12.

184. *Id.* at 16-17.

185. *Id.* at 9-11.

186. *Id.* at 17.

187. *Id.*

its discharges to protect the quality of the valuable lake resource.[188] The Shadow Mountain Reservoir transfer is "by far, the most significant factor affecting the water quality of the lake," but under the new NPDES Water Transfers Rule, residents have no grounds to seek NPDES regulation.[189]

> As a result there is no mechanism to achieve the clarity standards for the lake. Moreover, if the effluent funneled from Shadow Mountain Reservoir to Grand Lake is excluded from the NPDES program, there is no practical way to control the discharge of phosphates, nitrogen, toxic algae, chlorophyll, dissolved solids, sediment and heat, all of which are flushed from Shadow Mountain Reservoir into Grand Lake when pumping begins each summer.[190]

Clearly the Water Transfers Rule creates a gap in oversight that constitutes an actual threat to water quality. However, by eliminating this water quality control mechanism, the rule also impacts numerous other considerations, recreational and economic, far beyond the outfall of an individual water transfer.

B. Need for a Response

The EPA's final rule explanation clearly suggested that states should step in to fill the undisputed regulatory void.[191] Under authority from the EPA, states may establish and administer the NPDES permit program—the "centerpiece" of the CWA[192]—to regulate the type and quantity of pollutants discharged from point sources.[193] Considering the Act's statutory language and structure, the EPA stated, "Congress intended to leave primary oversight of water transfers to state authorities in cooperation with Federal authorities."[194] Furthermore, according to the EPA, "[w]ater transfers are an integral part of water resource management; they embody how States and resource agencies manage the nation's water resources and balance competing needs for water."[195]

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188. *Id.*
189. *Id.* at 17-18.
190. *Id.*
191. *See* National Pollutant Discharge Elimination System (NPDES) Water Transfers Rule, 73 Fed. Reg. 33,697, 33,701-03 (June 13, 2008) (to be codified at 40 C.F.R. 122).
192. Friends of Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210, 1225 (11th Cir. 2009).
193. 33 U.S.C. § 1342(b) (2006).
194. NPDES Water Transfers Rule, 73 Fed. Reg. at 33,701.
195. *Id.* at 33,703.

As amici in *Friends of the Everglades*, certain states—mostly in the arid West—also pushed to retain control over water transfers.[196] These states asserted, "[a]uthorizing EPA to expand the NPDES program to include water transfers may interfere with the States' ability to use their full legal entitlement to scarce water . . . ."[197] Thus, these states argued that requiring NPDES permits for water transfers would interfere with states' prerogatives to allocate water resources. Nevertheless, their statements in support of the Water Transfers Rule all focus on water transfers as an issue of quantity, not quality, ignoring the potential for the CWA to work in concert with state water law.

Although states are not limited to using the NPDES program to enforce water quality standards, the EPA's Water Transfers Rule largely precludes states' use of this tool in conjunction with federal enforcement to address pollution spread among water bodies through water transfers. Commentators have noted that "litigation over EPA's water transfer rule, particularly the unitary waters issue, will have a profound impact on achieving the important goals of the CWA while also ensuring adequate and safe water supply for essential public needs."[198]

V. THE FUTURE OF WATER TRANSFERS

A. Potential Supreme Court Resolution

The Supreme Court denied *certiorari* for *Friends of the Everglades* in November 2010, leaving the enigma of "addition" unsolved and the validity of the unitary waters-based EPA rule in question.[199] Furthermore, the Eleventh Circuit's finding of ambiguity in the Act raised questions about states' sovereignty to allocate water in light of federal authority to protect water quality.[200]

More importantly, the Eleventh Circuit's decision further entrenched the inconsistency among the federal courts of appeal re-

196. These states included Alaska, California, Colorado, Florida, Idaho, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Texas, Utah and Wyoming. Brief of Amici Curiae the State of Colorado et al. in Support of Respondents at 2-3, Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009) (Nos. 10-196, 10-252), 2010 WL 4232627 [hereinafter Colorado et al. Brief].

197. *Id.* at 14.

198. Lawrence R. Liebesman & Steve Kelton, *Clean Water Act NPDES Water Transfer Issue: The Implications for the Water Supply and Water User Communities*, 39 ENVTL. L. REP. 10181, 10185 (2009) (noting the impacts of the NPDES Water Transfers Rule on both individuals and the regulated community).

199. *See* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009), *cert. denied*, 313 S. Ct. 643 (2010).

200. *See* Colorado et al. Brief, *supra* note 196, at 4.

garding the proper interpretation of "addition" and the corollary requirement of NPDES permits. The Eleventh Circuit upheld the EPA's final rule under *Chevron* deference because of the CWA's ambiguity,[201] whereas the Second Circuit decisively found the CWA unambiguous regarding the meaning of "addition."[202] Such inconsistency may induce the Supreme Court to ultimately resolve the validity of the unitary waters theory as presented in the Water Transfers Rule and its interpretation of "addition."

Although there is a difference between the deference owed to the EPA promulgations that the Second Circuit considered (the draft rule), and that the Eleventh Circuit considered (the final rule), that difference does not resolve this circuit split. Regardless of the final rulemaking, the Second Circuit's stern opinion on the plain meaning of the CWA strongly suggests that the court would neither find ambiguity in the CWA that would entitle the NPDES Water Transfers to *Chevron* deference nor accept unitary waters theory as a reasonable interpretation of the CWA.[203] Specifically, in 2006, on appeal from the remand of *Catskills I*, the Second Circuit begrudgingly revisited its original holding in *Catskills II*.[204] As the court chastised in its second-round decision, "[T]he City basically serves us warmed-up arguments that we rejected in *Catskills I*, with the additional contention that either the Supreme Court's *Miccosukee* decision, the EPA interpretation, or both compel a result different from the one we reached earlier. We disagree."[205]

Specifically, in *Catskills II* the Second Circuit again discounted the unitary waters "theory as inconsistent with the ordinary meaning of the word 'addition[,]' "[206] noting that the Supreme Court approved of the *Catskills I* " 'soup ladle' analogy and the distinction between inter- and intra-basin transfers."[207] On the issue of state power to allocate water, the Second Circuit quoted its own holding in *Catskills I*, restating the sweeping language that although "the CWA balances a welter of consistent and inconsistent goals, . . . none of the statute's broad purposes sways us from what we find to be the plain meaning of its text."[208] Such challenges "simply over-

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201. *Friends of the Everglades*, 570 F.3d at 1227-28.

202. *Catskills I*, 273 F.3d 481, 493-94 (2d Cir. 2001) (based on the statute's plain meaning).

203. The Second Circuit did concede that "[i]f the EPA's position had been adopted in a rulemaking or other formal proceeding, deference of the sort applied by the *Gorsuch* and *Consumers Power* courts might be appropriate." *Id.* at 490.

204. *Catskills II*, 451 F.3d 77 (2d Cir. 2006).

205. *Id.* at 82. *Catskills II* preceded the EPA's final rule and the Eleventh Circuit's decision upholding the rule.

206. *Id.* at 81.

207. *Id.* at 83.

208. *Id.* at 81-82.

look [the CWA's] plain language."[209] Thus, the Second Circuit clearly considers any approach to CWA regulation that relies on the unitary waters theory to be inconsistent with the Act. As such, the Second Circuit is likely to create a formal circuit split in the near future over the final Water Transfers Rule's validity and the EPA's proper regulatory authority, perhaps finally inducing the Supreme Court to grant review of the rule.

B. Predicting the Court's Resolution

If such a clear split emerges and if the Supreme Court does grant *certiorari* to resolve it, the Court could—like the Eleventh Circuit—uphold the EPA's rule under *Chevron* deference. However, the Court might find that such deference is unwarranted. This inapplicability of *Chevron* would arise if the CWA's language of "addition" is unambiguous, as the First and Second Circuits have suggested,[210] or if the NPDES Water Transfers Rule amounts to an unreasonable interpretation of the Act.

If *Chevron* deference is inapplicable, the Supreme Court's ruling in *Miccosukee* conveys the Court's profound skepticism that the unitary waters theory is a reasonable approach to implementing the CWA and suggests that the Court may not in fact uphold the Water Transfers Rule. Although the Court's opinion in *Miccosukee* centered on whether the navigable waters involved were "meaningfully distinct," the unitary waters theory would make such a hydrological distinction irrelevant.[211] Moreover, the Court noted that "several NPDES provisions might be read to suggest a view contrary to the unitary waters approach," citing the Act's differentiation among individual water bodies with unique water quality goals based on their state-designated uses.[212] The *Miccosukee* Court also considered the statements of former EPA officials, which referenced a conflict between the unitary waters theory and a previous EPA decision on the applicability of NPDES permits.[213] Finally, the Court weighed the significant administrative burdens that could arise from increased NPDES permit requirements and the related conflicts with states' water allocation authority, but balanced these concerns against the importance of protecting wa-

209. *Id.* at 84.

210. *Id.*; *Catskills I*, 273 F.3d 481 (2d Cir. 2001); Dubois v. U.S. Dep't of Agric. 102 F.3d 1273 (1st Cir. 1996).

211. *See* S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 112 (2004).

212. *Id.* at 107.

213. *See id.*

ter quality and Pennsylvania's example of successful implementation of NPDES permits for its water transfers.[214]

The Supreme Court's previous skepticism regarding the unitary waters theory, consistent with the theory's negative treatment in all courts of appeals when considered on its merits,[215] does not suggest a warm reception for the theory or the NPDES Water Transfers Rule based on the theory's construction of "addition." If *Chevron* deference is not extended, the current Supreme Court may also focus on policy concerns regarding states' rights to allocate water, as clearly stated in the statute,[216] and the EPA's authority to promulgate a rule in opposition of federal court decisions.[217] The amount of variables involved and their abilities to cut in opposite directions makes predicting the Supreme Court's resolution of this issue difficult at best, especially considering the Supreme Court's recent splits in interpreting the CWA when federalism issues are involved.[218]

C. The Form of State Legislation

The NPDES Water Transfers Rule's future before the Supreme Court is uncertain. However, such uncertainty need not prevent states from reforming their own point source permitting for discharges of pollutants from water transfers. States should require permits based on achieving water quality standards for those water transfers that involve discharges of pollutants, defining "addition" as occurring whenever a pollutant is moved into navigable waters *against the natural flow* of such waters. In this construction of "addition," whether navigable waters are "meaningfully distinct" is determined specifically in accordance with the navigable waters' natural direction of flow. Defining an "addition" this way shifts the regulatory focus from when a pollutant is first introduced into navigable waters to whether a hydrological connection exists between these waters and if so, in what direction.

In practice, states should require natural flow permits for water transfers in which a pollutant reaches a receiving navigable

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214. *See id.* at 108-09; *see also supra* note 169 and accompanying text.

215. *See supra* note 145 and accompanying text.

216. *See Miccosukee,* 541 U.S. at 108 (citing 33 U.S.C. § 1251(g) (2006)).

217. *See* Nat'l Cable & Telecomms. Ass'n v. Brand X Internet Servs., 545 U.S. 967, 982-83 (2005) (acknowledging that agencies may properly promulgate interpretations of statutes that contradict lower courts' prior interpretations); *see also* Robin Kundis Craig, *Agencies Interpreting Courts Interpreting Statutes: The Deference Conundrum of a Divided Supreme Court*, 61 EMORY L.J. 1 (2011).

218. *See, e.g.*, Rapanos v. United States, 547 U.S. 715 (2006); Solid Waste Agency v. U.S. Army Corps of Eng'rs, 531 U.S. 159 (2001).

water that the pollutant would not have reached but for the water transfer. This "but for" analysis would not consider the relative concentrations of the pollutant in the donor navigable water and the receiving navigable water, nor differences in natural versus artificial flow timing. Thus, in cases like *Gorsuch* that involve dams where, but for the impoundment, the water from the reservoir would freely flow into the river downstream, no "addition" would occur and no natural flow permit would be required.[219] In contrast, cases like *Dubois* where the donor navigable waters and the other navigable water source would not naturally join until farther downstream, would require a permit under the recommended state permit program.[220] Similarly, cases of inter-basin transfer would require natural flow permits, because the water would not naturally flow beyond its own basin.

Admittedly, this natural flow permit system for water transfers does not eliminate all difficulties in determining when an addition of pollutants occurs. For example, applying a natural flow direction test in the Florida Everglades would be challenging given the extremely porous soil of the Everglades and the cyclical flow of water, as the Supreme Court noted when remanding *Miccosukee*.[221] Nevertheless, the district court in *Friends of the Everglades* stated that "natural flow of water has been replaced by a series of man-made structures," suggesting that many pumps may artificially move water against its natural path.[222] Where flow due to water transfer can be determined to be contrary to natural movement, natural flow permits would be required to enforce compliance with goals like phosphorus load reduction.

Of the forty-five states to which the EPA has delegated authority for NPDES permitting,[223] only Pennsylvania requires NPDES permits for all water diversions "from one body of water to another."[224] Pennsylvania's program espousing this natural flow approach incorporates several key features that reduce administrative and financial burdens associated with requiring NPDES permits for water transfers. Other states should strongly consider adopting these measures into their natural flow permit programs.[225]

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219. *See* Nat'l Wildlife Fed'n v. Gorsuch, 693 F.2d 156 (D.C. Cir. 1982).

220. *See* Dubois v. U.S. Dep't of Agric., 102 F.3d 1273 (1st Cir. 1996).

221. *Miccosukee,* 541 U.S. at 110.

222. Friends of the Everglades Inc. v. S. Fla. Water Mgmt. Dist., 2006 WL 3635465, at *10 (S.D. Fla. 2006), *rev'd* 570 F.3d 1210 (11th Cir. 2009).

223. Grand Lake Brief, *supra* note 174, at 14.

224. Pennsylvania Brief, *supra* note 169, at *13.

225. Depending on the future of the NPDES Water Transfers Rule, states may be able to directly adopt the measures that Pennsylvania implements into the states' own NPDES

First, Pennsylvania notes that the NPDES program allows for the use of general permits in certain cases, which can expedite administrative review.[226] General NPDES permits may apply to multiple facilities that "have the same type of discharge and are located in a specific geographic area," holding all such dischargers to the same or similar requirements.[227] Second, the NPDES program authorizes the use of Best Management Practices in lieu of numeric effluent limitations.[228] Pennsylvania found that this increased flexibility in its NPDES permitting and would reduce the "litany of problems" predicted by those opposing NPDES permits for water transfers.[229] Finally, Pennsylvania notes the use of a "schedule of compliance" for achieving water quality standards required to obtain a permit.[230] This form of remediation over time is desirable for situations like the Everglades where water quality restoration will be a long-term process.[231]

VI. CONCLUSION

Various interpretations of "addition" as used to define the discharge of pollutants under the CWA have inconsistently surfaced in federal courts of appeals and the Supreme Court. The EPA took initiative to settle these interpretive issues through rulemaking, but it relied on the ultimately unsatisfying unitary waters theory. The result is a highly questionable rule that excludes water transfers from NPDES regulation, except in cases of intervening commercial, municipal, or industrial use.

Of course, any definition of "addition" that increases the number of NPDES permits required may pose burdens upon states, upon entities conducting transfers, and upon water recipients. As commentators point out, the NPDES permitting process can be highly time consuming and costly, involving application and compliance assessments.[232] Furthermore, stricter permit requirements could lead "[w]ater management systems battling these regulatory

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permitting schemes. This Comment, however, assumes that such measures would be adopted in a separate natural flow permitting scheme.

226. Pennsylvania Brief, *supra* note 169, at *16 (citing 40 C.F.R. §§ 122.28, 123.25).

227. U.S. Envtl. Prot. Agency, *NPDES Individual and General Permits*, EPA.GOV, http://cfpub.epa.gov/npdes/permitissuance/genpermits.cfm (last updated May 13, 2011).

228. Pennsylvania Brief, *supra* note 169 at *17 (citing Rybachek v. Envtl. Prot. Agency, 904 F.2d 1276 (9th Cir. 1990)).

229. *Id.* at *16.

230. *Id.* at *18.

231. *Id.* at *18-19.

232. Liebesman & Kelton, *supra* note 198, at 10184.

challenges [to] alter or abandon their operations," jeopardizing drinking water supply.[233]

Despite such costs of increased NPDES permitting, the Supreme Court has noted that "it may be that such permitting authority is necessary to protect water quality."[234] Fortunately, a water transfer permit program consistent with the flexibility of Pennsylvania's program for water transfers would bypass many of the feared costs of such regulation and allow regulating bodies to consider site-specific implications for unique population and geography. Moreover, a natural flow-based NPDES permit program could fulfill the CWA's goal of protecting water quality in cases where discharges of pollutants would not otherwise reach navigable waters, avoiding overregulation of water transfers where pollutants would be present regardless of the water transfer.

233. *Id.* (citing Brief of Amici Curiae the Nationwide Public Projects Coalition et al. in Support of Petitioner, S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95 (2004) (No. 02-626), 2003 WL 22137031).

234. *See* S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 108 (2004) (commenting on Pennsylvania's NPDES permitting program).