Volume 62, Issue 3 Page 669

Stanford Law Review

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In line with accepted theories of environmental law, many prominent environmental law scholars have dismissed the climate change plans of U.S. cities and other local governments, presuming that these efforts will have no more than a trivial effect on greenhouse gas emissions. Drawing upon economic theories, others find local "piecemeal" efforts not only ineffective, but also potentially harmful to the prospects for a successful national emissions reduction program. In contrast, this Article argues that local governments have core regulatory powers in domains that will prove critical to a comprehensive response to climate change. Following a trend in scholarship that moves away from rigid prescriptions for either centralized or decentralized environmental regulation, this Article envisions local governments as important players in a multilevel governmental effort that regulates greenhouse gas emissions from the bottom up and the top down.

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INTRODUCTION

> *Solutions are not coming from Washington. Solutions are coming from our cities. . . . We are the ones that address the issues that matter to people the most. We are the ones that provide the front line, the last hope. . . . When faced with inaction on climate change, it was Mayor Nickels who inspired over 850 of us to implement the Kyoto Protocol. . . . And it does not matter if we are democrats, republicans, or independents. . . . [W]e are all mayors first.*
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> —Miami Mayor Manuel Diaz,
> President, U.S. Conference of Mayors,
> July 2008[1]

At the close of the last presidential administration in 2008, climate change policy in the United States appeared to be upside down. While the federal government had rejected the Kyoto Protocol's treaty-based emissions reductions and offered no meaningful substitute, hundreds of America's mayors and other local government[2] policy makers along with many states had enacted emissions reduction plans to combat a global problem extending far beyond their jurisdictions.

For many observers, the inauguration of President Obama in January of 2009 signaled a potential sea change in federal climate policy. During his campaign, President Obama espoused his support for use of a cap-and-trade system to cut domestic greenhouse gas emissions by eighty percent by 2050 and his intention to make the United States a leader in international efforts to address climate change.[3] In December 2009, he personally brokered the most recent international climate agreement, the Copenhagen Accord.[4] Domestically, he has continued to support cap-and-trade proposals and even wrote the revenues from such a system into his budget.[5] Nonetheless, despite

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1. Manny Diaz, Mayor, Miami, Fla., Address as President of the United States Conference of Mayors (June 22, 2008), *available at* http://www.cfecoalition.org/PDFs/Mayor_Diaz_Speech.pdf.

2. Although scholars and courts sometimes refer to state governments as "local," this Article uses the term "local government" exclusively to refer to jurisdictions smaller than states. City governments in the United States have been the predominant local actors on climate change policy and most of the policies discussed here come from these municipal governments. However, because counties, metropolitan area governance structures, school districts, and special use districts also have adopted programs, this Article refers to "local governments" to capture their activities as well.

3. Org. for Am., New Energy for America, http://my.barackobama.com/page/content/newenergy_more (last visited Jan. 18, 2010).

4. *See* Pew Ctr. on Global Climate Change, Summary: Copenhagen Climate Summit, http://www.pewclimate.org/international/copenhagen-climate-summit-summary (last visited Feb. 13, 2010).

5. *See* Juliet Eilperin & Steven Mufson, *Budget Expects Revenue from Limits on Emissions*, WASH. POST, Feb. 26, 2009, *available at* http://www.washingtonpost.com/wp-dyn/content/article/2009/02/25/AR2009022503360_pf.html.

the President's support, many open questions remain about the contours of a potential national policy; whether it will preempt or accommodate state and local initiatives, and what can get through Congress. As of this writing the prospect for effective federal legislation remains unclear.[6] This Article looks at the role that the smallest jurisdictions—cities, counties, and other local governments—can play in the United States' efforts to reduce its greenhouse gas emissions. Contrary to the conventional wisdom among environmental law scholars that local efforts are insignificant, and challenging claims that city and county plans could impede implementation of an effective national program, this Article argues that local efforts are collectively substantial and complementary to effective national climate change policy.

Given the magnitude of this daunting problem posed by global climate change, most legal scholars have presumed that local governments cannot create meaningful emissions reductions. While acknowledging that local efforts might indirectly influence the adoption of federal climate change legislation, most dismiss local emissions reduction plans, referring to them as "trivial" "inconsequential," or mere posturing.[7] Worse yet, some advocates of a "comprehensive" national cap-and-trade regime view local efforts as not only ineffective but also downright counterproductive.

It is not surprising that scholars are skeptical of local governments' ability to contribute meaningfully to greenhouse gas reductions. The very nature of climate change seems to render it incompatible with local control. Climate change stems from the accumulation of several gases that block the escape of heat from the earth's atmosphere, thereby increasing the average global temperature—hence the term "greenhouse" gases.[8] The qualities of these gases

6. The most recent legislative effort, the American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong., barely squeaked through the House and faces significant opposition in the Senate. *See, e.g.*, GovTrack, House Vote on Passage: H.R. 2454: American Clean Energy and Security Act of 2009, http://www.govtrack.us/congress/vote.xpd?vote=h2009-477 (last visited Feb. 3, 2010) (showing that the House voted 219 to 212 to pass the Act); Josh Nelson, *GOP Candidates Attacking Dems for Positions They Don't Hold*, FIREDOGLAKE, Jan. 14, 2010, http://seminal.firedoglake.com/diary/23944 (describing strong negative response from Republican Party following House passage of the Act). While the Environmental Protection Agency has initiated regulatory action under the Clean Air Act to reduce greenhouse gas emissions, these efforts will be time-consuming and are likely to be tied up in litigation for some time.

7. *See infra* Part II.B.

8. Although carbon dioxide is by far the most prevalent greenhouse gas and receives the most attention (for example, popular climate change efforts often discuss how to reduce one's "carbon footprint"), several other gases cause the same greenhouse effect and are in fact more effective at trapping heat than carbon dioxide. At the most extreme, one metric ton of sulfur hexafluoride has the same heating effect (referred to as "radiative forcing") as 23,900 tons of carbon dioxide. In order to create a common metric for evaluating the effect of these gases, scientists give the radiative forcing caused by carbon dioxide a value of one and describe other gases effect in terms of equivalence to carbon dioxide. Thus, for example, one ton of methane has the radiative forcing value of twenty-one compared to carbon

create vexing regulatory problems. Unlike most familiar pollutants, greenhouse gas emissions stem from hundreds of human activities (as well as natural processes), creating a multitude of possible regulatory targets and potential impacts on many economic sectors. Their environmental impacts are delayed until long after the emissions occur, exacerbating the difficulty of creating political agreement. Most critically, because greenhouse gases mix in the atmosphere and create global effects, reductions from one locale can be offset by increases from another locale on a different continent.

Cities and other small jurisdictions appear to have the least incentive and to be the most poorly situated of all U.S. governments to impact a pollution problem of such magnitude. The sheer scale of the problem and the potential for globally catastrophic impacts appear to dwarf local efforts. Indeed, recent scientific assessments report that global emissions must be cut fifty to eighty-five percent by mid-century—with dramatic cuts within the next decade—to avoid triggering irreversible changes to life-support systems.[9] Absent dramatic global reductions in greenhouse gas emissions, climate destabilization will have devastating effects on human health, oceans, species diversity, water resources, and food supplies, among other things.[10] Moreover, the United States' roughly one-quarter share of global greenhouse gas emissions[11] stems predominantly

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dioxide. This allows greenhouse gas inventories to evaluate the greenhouse effect of all gases combined by providing the total in terms of "metric tons of carbon dioxide equivalent" ($MTCO_2eq.$). *See* Int'l Emissions Trading Assoc., What Are Carbon Dioxide Equivalents?, http://www.ieta.org/ieta/www/pages/index.php?IdSitePage=123 (last visited Feb. 3, 2010).

9. Although human activity has already raised average global temperatures enough to extinguish species, alter weather patterns, increase the frequency and intensity of extreme storm events and heat waves, spread disease vectors, and raise sea levels (among other things), impacts will accelerate between now and 2100 absent dramatic emissions reductions. *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 48 (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf. While the atmospheric lifetime of greenhouse gases commits the planet to some further warming already, scientists predict that catastrophic climate change can be avoided if current global emissions are cut by fifty to eighty-five percent by mid-century. *Id.* at 66-67. A more recent analysis by one of NASA's experts calls for even more rapid and significant emissions cuts to avoid triggering irreversible climatic "tipping points." James Hansen et al., *Target Atmospheric CO_2: Where Should Humanity Aim?*, 2 OPEN ATMOSPHERIC SCI. J. 217 (2008), *available at* http://www.columbia.edu/~jeh1/2008/TargetCO2_20080407.pdf.

10. *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 9, at 48; *see also* Massachusetts v. EPA, 549 U.S. 497, 521 (2007) (stating that "[t]he harms associated with climate change are serious and well recognized" and identifying an "objective and independent" study cataloguing these harms (quoting Control of Emissions from New Highway Vehicles and Engines, 68 Fed. Reg. 52,922-02, 52,930 (effective Sept. 8, 2003)) (internal quotation marks omitted)).

11. While China recently surpassed the U.S. in total emissions, Press Release, Neth. Env't Assessment Agency, China Now No. 1 in CO2 Emissions; USA in Second Position (June 19, 2007), *available at* http://www.pbl.nl/en/news/pressreleases/2007/20070619Chinanowno1inCO2emissionsUSAinsecondposition.html, on a per capita basis, the United States still far exceeds every other country's emissions (with the exception of Australia), producing nearly a quarter of the

from fossil fuel combustion in energy production and transportation.[12] Local governments lack power to regulate vehicle technology, fuel composition, and power plant technology and licensing, all critical determinants of transportation and energy emission levels. Like energy production and transportation, the substantial contribution to the United States' emissions from industrial and agricultural processes[13] is similarly beyond local governments' regulatory jurisdiction. How could local governments play any meaningful role in reducing U.S. emissions given their limited geographical and legal jurisdiction? With the global scale of climate change, why should we care what local governments are doing?

Prominent theoretical perspectives on environmental law make it even easier to dismiss any local role in combating a global environmental problem. Following Garrett Hardin's famous depiction of rationally driven herdsmen destroying the commons necessary for their livelihoods, many scholars have envisioned climate change as a classic "tragedy of the commons"[14]—indeed, one of unprecedented magnitude.[15] Scholars generally presume that small-scale actors lack appropriate incentives to protect common pool resources and thus conclude that this trap has only two escape routes—privatization of the resource or imposition of resource protection by a higher sovereign.[16] In a similar vein, a prominent approach to dividing regulatory power in the environmental federalism literature asserts that the level of governance should match the geographic scale of the harm.[17] More broadly, local governments are

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world's greenhouse gases with only five percent of the population. Union of Concerned Scientists, Each Country's Share of CO2 Emissions, http://www.ucsusa.org/global_warming/science_and_impacts/science/each-countrys-share-of-co2.html (last visited Jan. 18, 2010); *see also* POPULATION REFERENCE BUREAU, 2009 WORLD POPULATION DATA SHEET 2 (2009), http://www.prb.org/pdf09/09wpds_eng.pdf. Projected U.S. population growth of 48.8 percent between 2000 and 2050 (an increase of 137,729,000 people) renders U.S. emissions all the more critical to address. U.S. CENSUS BUREAU, U.S. INTERIM PROJECTIONS BY AGE, SEX, RACE, AND HISPANIC ORIGIN: 2000-2050 tbl.2a (2004), *available at* http://www.census.gov/population/www/projections/usinterimproj/natprojtab02a.pdf.

12. *See* U.S. Envtl. Prot. Agency, U.S. Greenhouse Gas Inventory, http://www.epa.gov/climatechange/emissions/usgginventory.html (last visited Nov. 2, 2009).

13. *Id.*

14. Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243, 1244 (1968).

15. *See, e.g.*, Barton Thompson, Essay, *Tragically Difficult: The Obstacles to Governing the Commons*, 30 ENVTL. L. 241, 246 (2000); *see also* Kirsten Engel, *State and Local Climate Change Initiatives: What Is Motivating State and Local Governments to Address a Global Problem and What Does This Say About Federalism and Environmental Law?*, 38 URB. L. 1015, 1022 (2006) ("Climate change is widely considered an excellent example of the overexploitation of a commons resource similar to that popularized by Garret [sic] Hardin's parable of the tragedy of the commons.").

16. *See* ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 8-13 (1990); Kirsten H. Engel & Scott R. Saleska, *Subglobal Regulation of the Global Commons: The Case of Climate Change*, 32 ECOLOGY L.Q. 183, 191 (2005).

17. *See infra* Part III.A.

largely overlooked as relevant actors in academic discussions of environmental law.[18]

In contrast to scholars who view local efforts as insignificant or even possibly counterproductive, this Article argues that multiple levels of government can play complementary roles under a model of bidirectional climate change policy-making and regulation. It aims to bring local governments into the discussion of environmental law as regulatory entities in their own right by highlighting areas of traditional power—such as land use, waste management, and even proprietary activities—that situate local governments in a potentially influential position to regulate greenhouse gas emissions. Although local policies cannot displace the need for federal regulation,[19] federal climate change policy will be more likely to succeed if its architects recognize this potential local contribution and facilitate the reductions local governments have begun to implement. Dismissing local efforts as trivial may lead scholars and lawmakers to overlook effective means of reducing greenhouse gas emissions that rely on well-studied, mature, and available technologies that can be locally regulated within existing institutions. It may also obscure the potential to create substantial emissions reductions by engaging the state and federal governments in traditionally local domains in which cities are now struggling to regulate. Examining both the local potential and current efforts provides a broader picture of the potential regulatory landscape, both in terms of regulatory targets and in terms of potential regulators.

Despite practical hurdles to efficacy and theoretical models suggesting insignificance, this movement of local governments grew rapidly between 2000 and 2009 with members quickly producing and implementing climate change policies, starkly contrasting with federal inaction. As of November 2009, over a

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18. *But see* John R. Nolon, *In Praise of Parochialism: The Advent of Local Environmental Law*, 26 HARV. ENVTL. L. REV. 365 (2002) (recognizing the emergence of "local environmental law").

19. Some commentators evaluate state and local climate change plans as potential alternatives (rather than complements) to federal regulation. Not surprisingly, they criticize the idea that state and local policies can substitute effectively for federal action. *See, e.g.*, Laura H. Kosloff, Mark C. Texler & Hal Nelson, *Outcome-Oriented Leadership: How State and Local Climate Change Strategies Can Most Effectively Contribute to Global Warming Mitigation*, 14 WIDENER L.J. 173, 174-75 (2004) ("[S]tate and local policies cannot truly substitute for national and international policies and measures in achieving a successful outcome. . . . Thinking globally and acting locally simply isn't sufficient."); Jonathan B. Wiener, *Think Globally, Act Globally: The Limits of Local Climate Change Policies*, 155 U. PA. L. REV. 1961, 1962 (2007) ("[L]ocal action is not well suited to regulating mobile global conduct yielding a global externality. . . . [S]ubnational state-level action, by itself, is of limited value, and may even yield perverse results . . . ."). Yet, there appears to be a general consensus that subnational actions alone are insufficient to mitigate U.S. greenhouse gas emissions. Indeed, state and local governments themselves have strongly advocated for federal action, exhorting, suing, and lobbying the federal government for national climate change regulation and legislation. *See infra* note 33.

thousand mayors representing more than eighty-six million Americans had signed the U.S. Conference of Mayors Climate Protection Agreement,[20] which the Conference unanimously endorsed in 2005.[21] Signatories pledge to meet or beat the Kyoto Protocol's emissions reduction targets in their communities, lobby the state and federal governments to set similar emissions reduction targets, and lobby Congress to pass bipartisan legislation establishing a national cap-and-trade system.[22] One estimate found that if just the first 230 signatory cities succeed, their reductions would equal those expected from Kyoto commitments made by the United Kingdom, the Netherlands, and all Scandinavian countries combined.[23] A 2008 study assessed the potential collective impact of the 684 cities that had signed by that year, finding that their combined effect would be to reduce projected 2020 emissions by seven percent, which would account for twenty-seven percent of the reductions required to lower projected 2020 emissions to 1990 levels.[24]

Meanwhile, 569 U.S. cities participate in the Cities for Climate Protection Campaign (CCP) under the auspices of International Council for Local Environmental Initiatives (ICLEI).[25] Launched in 1993, the CCP Campaign aims "[t]o build and support a worldwide movement of local governments who are engaged in climate protection . . . and whose actions achieve measurable reductions in local greenhouse gas (GHG) emissions."[26] Local governments that join the CCP Campaign must pass a resolution pledging to reduce greenhouse gas emissions from governmental operations and community-wide activities.[27] At the time of its 2006 Progress Report, 159 U.S. cities were

20. Mayors Climate Prot. Ctr., U.S. Conference of Mayors, List of Participating Mayors, http://www.usmayors.org/climateprotection/list.asp (last visited Jan. 18, 2010).

21. Mayors Climate Prot. Ctr., U.S. Conference of Mayors, About the Mayors Climate Protection Center, http://usmayors.org/climateprotection/about.htm (last visited Jan. 18, 2010).

22. MAYORS CLIMATE PROT. CTR., U.S. CONFERENCE OF MAYORS, THE U.S. MAYORS CLIMATE PROTECTION AGREEMENT 1 (2005), *available at* http://usmayors.org/climateprotection/documents/mcpAgreement.pdf.

23. *See* Jennifer Hattam, *Green Streets: Where Great Ideas Are Transforming Urban Life*, SIERRA, July-Aug. 2006, at 36, 36.

24. Nicholas Lutsey, Prioritizing Climate Change Mitigation Alternatives: Comparing Transportation Technologies to Options in Other Sectors 9 tbl.2 (June 2008) (unpublished Ph.D. dissertation, University of California, Davis Institute of Transportation Studies), *available at* http://pubs.its.ucdavis.edu/download_pdf.php?id=1175.

25. Int'l Council for Local Envtl. Initiatives, CCP Participants by Region, http://www.iclei.org/index.php?id=1484&region=NA (last visited Feb. 3, 2010).

26. Int'l Council for Local Envtl. Initiatives, Case Study 84: Cities for Climate Protection Campaign, http://www3.iclei.org/localstrategies/pdf/ccp.pdf (last visited Feb. 3, 2010).

27. Int'l Council for Local Initiatives, The Five Milestone Process, http://www.iclei.org/index.php?id=810 (last visited Feb. 3, 2010). CCP's plan has five requirements: First, members must conduct baseline emissions inventories and forecasts for governmental operations and emissions based on energy consumption and waste generation for the base and forecast years using ICLEI's standardized software. Second, they must

members of ICLEI, representing fifty-five million people, or twenty percent of the U.S. population.[28] As of January 18, 2010, this figure has jumped to 545 cities, demonstrating a rapid growth in membership.[29] In addition, Chicago, Houston, Los Angeles, New York, and Philadelphia have joined the C40, a group of the largest world cities collaborating on climate change projects with the Clinton Foundation.[30]

Obviously, one cannot assume that network memberships will necessarily translate into effective action. However, rapidly increasing levels of network participation do show, at a minimum, that the issue increasingly has salience for these local policymakers. In the last few years a surprising number of geographically and politically diverse locales have adopted emissions reduction schemes. Before dismissing this movement as futile, we should thoroughly examine the potential contribution of local governments to a comprehensive response to climate change. As it turns out, although local governments have not been thought of as players in environmental law, they already exercise power in several areas critical to climate change policy.

This Article examines how local regulatory efforts may contribute to a multilevel, bidirectional approach to climate change. It contends that reducing greenhouse gases from the top down and bottom up can create useful regulatory redundancies while capitalizing on local governments' tools for influencing downstream emissions. To achieve critical climate change goals, we will likely need all levels of government acting in concert, or "all hands on deck."

This Article argues that:

- Viewed collectively, local governments can contribute meaningfully to U.S. climate change mitigation by reducing emissions within their well-accepted domains of power. Ignoring their collective potential could obscure effective, easy, and inexpensive local options to reduce U.S. emissions.
- Local governments are targeting emissions in a manner largely different from and complementary to state and (proposed) federal

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adopt an emissions reduction target for the forecast year. Third, members have to develop a local action plan that describes the policies and measures that they will take to reduce greenhouse gas emissions and meet their targets. Fourth, they must implement the plan. Fifth, they should monitor and verify their results on an ongoing basis. *Id.*; *see also* Int'l Council for Local Envtl. Initiatives, Technical Assistance, http://www.iclei.org/index.php?id=1247 (last visited Jan. 18, 2010).

28. INT'L COUNCIL FOR LOCAL ENVTL. INITIATIVES, ICLEI INTERNATIONAL PROGRESS REPORT: CITIES FOR CLIMATE PROTECTION 17 (2006), *available at* http://www.iclei.org/documents/USA/documents/CCP/ICLEI-CCP_International_Report-2006.pdf.

29. *See* Int'l Council for Local Envtl. Initiatives, Regional Membership Lists by Country: North America, http://www.iclei.org/index.php?id=1387&region=NA (last visited Jan. 18, 2010).

30. *See* C40 Cities Climate Leadership Group, Participating Cities, http://www.c40cities.org/cities/ (last visited Jan. 18, 2010).

measures, which predominantly regulate energy production and transportation technology. Instead, local governments have been targeting emissions much further downstream by reducing the waste stream, the fossil fuel consumption of their operations, the energy demands of buildings within their jurisdictions, and the vehicle usage of their residents.

- Local plans will augment (rather than undermine) the effectiveness of a nationwide cap on emissions by shaping the built environment[31] and developing institutions that can facilitate transition to a more carbon-constrained economy. Even presuming the federal government adopts and effectively enforces a comprehensive cap-and-trade regime, local efforts can continue to play a critical role in reducing demand, thereby stabilizing the cost of the regulatory regime.

- Although local jurisdictions obviously vary in motivation and ability to engage climate change, a number have already adopted potentially effective programs in critical sectors. While this Article does not adopt a "small is beautiful" presumption that all local governments will be motivated and able to enact effective policies, it does argue that small is highly relevant. Although local action cannot substitute for international, national, and state programs, this movement of local governments reflects a real policy effort with implications that need to be considered in the architecture of U.S. climate change policy.

The rest of this Article proceeds as follows. Part I discusses scholars' assessments of local governments' potential to mitigate climate change and reviews how local efforts fit into existing theoretical frameworks. Part II discusses how local governments can employ core powers to reduce greenhouse gas emissions and finds evidence that a number of politically and geographically diverse jurisdictions are already doing this. Part III revisits the question of local governments' role in national climate change mitigation and explores the potential for a multilevel, bidirectional model for climate change regulation. Part IV proposes questions for future research and briefly concludes.

31. The meaning of the term "built environment" as used in this Article is well captured in the following definition: "The buildings, roads, utilities, homes, fixtures, parks and all other man-made entities that form the physical characteristics of a community." Ctrs. for Disease Control and Prevention, Health Places Terminology, http://www.cdc.gov/healthyplaces/terminology.htm (last visited Jan. 18, 2010).

I. THE PLACE OF LOCAL CLIMATE REGULATION IN ENVIRONMENTAL LAW: THEORY AND PRACTICE

Local governments seem to be on a roll. In collaboration with ICLEI's CCP Campaign, the Mayors Climate Protection Center, and the C40, dozens of cities have inventoried emissions from both governmental operations and community-wide activities and have created climate action plans.[32] Critically, the largest U.S. cities are among the most engaged. Local policymakers have participated in summits, exhorted their citizens and the private sector to reduce emissions, and improved energy efficiency within their own operations. Mayors have lobbied and sued the federal government to implement effective climate change policies and berated individual members of Congress for failing to do so.[33] They have developed green fleet and green power purchasing policies, improved the energy efficiency in their own buildings, and converted stop lights and streetlights to highly efficient bulbs.[34] They have enacted sustainable building policies for their communities, improved recycling, and adopted policies to reduce reliance on automobiles in their communities.[35]

Yet, despite their efforts, local governments' attempts to reduce greenhouse gas emissions have not figured prominently in scholarly assessments of potential strategies to reduce U.S. emissions. To the extent that legal scholars have considered the potential for local governments to reduce emissions, they have largely presumed that any direct effect will be no more than trivial. In addition, most consideration of local policies has been in the context of a combined analysis of "subnational" (or the collective "state and local") policies.[36] As discussed below, this conflation of state and local policies

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32. *See* MAYORS CLIMATE PROT. CTR., U.S. CONFERENCE OF MAYORS, SURVEY ON MAYORAL LEADERSHIP ON CLIMATE PROTECTION (2007), http://www.usmayors.org/climateprotection/climatesurvey07.pdf; Int'l Council for Local Envtl. Initiatives USA, 2008 ICLEI USA Membership Survey: Member Priorities, http://www.icleiusa.org/about-iclei/members/2008-iclei-usa-membership-survey/member-priorities (last visited Jan. 18, 2010).

33. *See, e.g.*, David Roberts, *Sparks Fly When the Mayors Meet the Congressfolk*, GRIST, Nov. 5, 2007, http://gristmill.grist.org/story/2007/11/4/224955/084 (memorializing New York Mayor Bloomberg's attacks on recalcitrant Congressmen); *see also* Massachusetts v. EPA, 549 U.S. 497, 502, 504 (2007) (listing plaintiffs to include New York City, Baltimore, and Washington, D.C and stating that the U.S. Conference of Mayors wrote an amicus brief in support of plaintiffs).

34. *See infra* Part II.B.4.

35. *See infra* Part II.B.1-3.

36. For example, in *Think Globally, Act Globally*, Jonathan Wiener focuses his argument on state-level action but nonetheless uses terms "local" and "state" interchangeably. Wiener, *supra* note 19, at 1962; *see also, e.g.*, Richard B. Stewart, *States and Cities as Actors in Global Climate Change Regulation: Unitary vs. Plural Architectures*, 50 ARIZ. L. REV. 681, 681 (2008) (analyzing the benefits of having climate change policies run by "states, cities, and other sub-national actors," to which he collectively refers as "SNAs"); Carol M. Rose, *Federalism and Climate Change: The Role of the States in a Future Federal Regime—An Introduction*, 50 ARIZ. L. REV. 673, 673 (2008) (adopting

obscures the distinct nature of local action and its unique benefits, and has caused some scholars to anticipate drawbacks to local policies that are unlikely to occur.

The following discusses scholarly views of local government action, explaining why scholars have presumed that local efforts will be either trivial or counterproductive. It then begins to make the case for why these presumptions are unfounded.

A. *Tragedy of the Commons Perspective on Local Plans: Puzzling and Ill-Suited to the Task*

Most legal scholars hold that subnational actions to reduce greenhouse gases will not meaningfully cut emissions, although they may indirectly facilitate federal regulation by serving as regulatory laboratories,[37] spurring technological development and diffusion,[38] or driving industry to lobby for uniform federal climate change law to prevent a patchwork of inconsistent state standards.[39] Most have dismissed the direct ability of local governments to reduce emissions, describing even the combined effect of state and local greenhouse gas reductions as "trivial,"[40] amounting to "not much,"[41] or merely "empty gestures."[42] Similarly, David Victor writes:

> The absence of serious action by the U.S. federal government has catalyzed individual states and even cities to pursue their own policies. But such efforts are too atomized to exert much leverage on the country's emissions, because federal institutions mostly govern the U.S. economy. . . . [E]ffective

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Stewart's acronym "SNA" to describe collective state and local action).

37. *See, e.g.*, Robert B. McKinstry, Jr., *Laboratories for Local Solutions for Global Problems*, 12 PENN ST. ENVTL. L. REV. 15, 64-67 (2004); Wiener, *supra* note 19, at 1963.

38. Wiener, *supra* note 19, at 1963.

39. Following the Elliott-Ackerman-Millian hypothesis that finds industry support for federalization of environmental law in order to avoid a patchwork of inconsistent state standards, E. Donald Elliott, Bruce A. Ackerman & John C. Millian, *Toward a Theory of Statutory Evolution: The Federalization of Environmental Law*, 1 J.L. ECON. & ORG. 313, 326-27 (1985), several scholars argue that subnational actions may have their primary effect by driving industry to lobby for uniform federal climate change legislation. *See, e.g.*, Engel, *supra* note 15, at 1026-29; Wiener, *supra* note 19, at 1963 ("[S]tate level strategies could yield some significant results, including . . . raising the specter of a patchwork of inconsistent state regulations as a political gambit to motivate industry to support broader federal regulation."). Jody Freeman and J.R. DeShazo comprehensively analyze this potential, identifying numerous elements of existing state plans that may have created the perfect storm for prompting industry (and environmentalists) to seek federal preemption of these diverse, inconsistent, and unpredictable state plans. J.R. DeShazo & Jody Freeman, *Timing and Form of Federal Regulation: The Case of Climate Change*, 155 U. PA. L. REV. 1499 (2007); *see also* Engel, *supra* note 15, at 1026-28.

40. Wiener, *supra* note 19, at 1964.

41. Engel, *supra* note 15, at 1026.

42. Robert Michaels, *"Renewable" Electricity Creating Jobs, Destroying Wealth*, HUMAN EVENTS, Aug. 30, 2006, http://www.humanevents.com/article.php?id=16751.

> governance requires assigning the functions of government to the institutions that have leverage and accountability.[43]

Although more optimistic assessments view local government action as a mechanism for developing conservation norms and networks,[44] few have identified a relevant role for local governments in a national regulatory scheme to address climate change and fewer still imagine that local governments can meaningfully reduce greenhouse gas emissions.[45] Indeed, one scholar who finds subnational emissions reduction plans to be critical and potent "performative" acts, nonetheless likens their direct effect to placing a brightly colored hat on the head of a child sitting on the rail tracks in the hopes that the hat will stop an oncoming train.[46]

Theoretical literature on environmental law supports this dismissive view. Because climate change fits so well within the tragedy of the commons model, subnational governments appear to have no rational incentive to take on the cost of reducing emissions when the benefit is global. Moreover, the scale of local governments does not match the scale of the harm, rendering their powers apparently insufficient to address it.

Policies to reduce greenhouse gas emissions by subnational governments in the United States appear to present something of an enigma. First, they turn the familiar environmental regulation formula on its head; since roughly the 1970s, environmental regulation has predominantly been a top down affair—one in which federal environmental legislation creates standards, albeit in a structure that allows states a "cooperative" role in implementing them.[47] Even more puzzling is the "seeming economic irrationality" of subnational actions. According to Kirsten Engel, "[t]he extremely small dent in global greenhouse gas emissions accomplished by state and local governments only seems to underscore the seeming economic irrationality of the state and local government's actions."[48] No state's actions individually—and certainly no city's individual actions—can reduce greenhouse gas levels sufficiently to prevent adverse global warming, yet states and localities are nonetheless unilaterally creating and implementing climate change plans. Climate change appears to present a classic tragedy of the commons: rational actors should be

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43. David G. Victor, Joshua C. House & Sarah Joy, *A Madisonian Approach to Climate Policy*, 309 SCIENCE 1820, 1821 (2005).

44. *See, e.g.*, Hari M. Osofsky & Janet Koven Levit, *The Scale of Networks?: Local Climate Change Coalitions*, 8 CHI. J. INT'L L. 409, 414 (2008) (arguing that local climate plans contribute to the "re-scaling" of the climate change debate by creating bottom-up legal evolution).

45. *But cf. id.* at 430 (noting that cities' "micro-decisions . . . bear hard legal consequences that have an impact on global emissions, especially in light of the substantial aggregate contribution of cities").

46. Kevin L. Doran, *U.S. Sub-Federal Climate Change Initiatives: An Irrational Means to a Rational End?*, 26 VA. ENVTL. L.J. 189, 226 (2008).

47. *See* Engel, *supra* note 15, at 1020, 1028.

48. *Id.* at 1028.

incentivized to overuse the atmosphere because no small entity acting independently can benefit by withholding its pollution and the costs of reducing emissions are localized while the benefits are widespread, indeed worldwide.[49] Thus, Jonathan Wiener explains: "[B]ecause GHGs mix globally and have global impacts, local abatement actions pose local costs, yet deliver essentially no local climate benefits. This in turn suggests that local actions will often be difficult to enact."[50]

Scholarship on the tragedy of the commons largely presumes that only two strategies can prevent over-exploitation of shared resources—privatization or coercion by a sovereign with a jurisdiction greater than the scale of the harmed resource.[51] As the atmosphere is not conducive to private ownership, these theoretical models tell us that any effective response will require intervention from the highest level, likely through international efforts.[52] To the extent the U.S. aims to reduce its national emissions profile—either unilaterally or as part of a treaty obligation—this model also would strongly indicate that the federal government will be the only effective governing entity to intervene.

The influential "Matching Principle" proposed by Henry Butler and Jonathan Macey holds that "the size of the geographic area affected by a specific pollution source should determine the appropriate governmental level for responding to the pollution."[53] Although Butler and Macey aimed primarily to challenge the basis for the centralization of most environmental law that had occurred since roughly the 1970s, which they asserted amounted to highly inefficient "Soviet-style central planning,"[54] the matching principle strongly supports selecting the federal government as the appropriate locus for U.S. climate change regulation. Thus, following Butler and Macey, and despite arguing that most federal environmental laws create a "jurisdictional mismatch" by addressing issues better left to state and local governments, Jonathan Adler finds the one unequivocal case for national regulation to be climate change: "Global climate change is a prime example of increasing state activity where federal action would provide for a greater jurisdictional match. . . . [I]t should be clear that any such action is best undertaken at the

49. *See* Richard B. Stewart, *Pyramids of Sacrifice?: Problems of Federalism in Mandating State Implementation of National Environmental Policy*, 86 YALE L.J. 1196, 1211 (1977) ("The Tragedy of the Commons arises in noncentralized decisionmaking under conditions in which the rational but independent pursuit by each decisionmaker of its own self-interest leads to results that leave all decisionmakers worse off than they would have been had they been able to agree collectively on a different set of policies.").

50. Wiener, *supra* note 19, at 1965.

51. *See* OSTROM, *supra* note 16, at 8-13.

52. One could describe a cap-and-trade system as creating property rights to pollute the atmosphere. In that sense, it could be "privatized" to some degree.

53. *See* Henry N. Butler & Jonathan R. Macey, *Externalities and the Matching Principle: The Case for Reallocating Environmental Regulatory Authority*, 14 YALE L. & POL'Y REV. 23, 25 (1996).

54. *Id.* at 24.

national (if not international) level, rather than by state and local governments."[55]

Related principles of environmental federalism lead to similar conclusions. The prevention of interstate externalities is viewed as one of the best justifications for centralized regulation,[56] even among those who largely prefer a decentralized regime.[57] As climate change creates not only interstate but also international externalities, this principle argues strongly for national regulation (and international agreement).

Among the presumptions that emerged from the long-running scholarly debate over environmental federalism, other well-accepted claims about the relative merits of centralized or decentralized regulation have relevance for analyses of local climate change plans. Decentralized efforts are presumed to create a patchwork of inconsistent standards, although these are thought to potentially catalyze industry demands for uniform national regulation. As noted above, the scholars that have reflected on state and local climate change policies believe these smaller jurisdictions serve as laboratories for experimentation with regulatory design, a prospect drawn from the environmental federalism literature.

B. *Market Perspective on Local Plans: Inefficient and Counterproductive*

Prominent legal scholars and economists have argued that the most efficient way to reduce greenhouse gas emissions to targeted levels would be to constrain greenhouse gas emissions from the top down through a "comprehensive" cap-and-trade regime. The following briefly describes the basic features of a cap-and-trade regime and two specific proposals that highlight benefits of a comprehensive system. It also discusses how, following these models, some scholars have specifically rejected state and local climate change efforts as inefficient and counterproductive.

In recent years, scholars and policymakers have increasingly touted the benefits of market mechanisms to control pollution, which many view as more efficient than the traditional "command and control" regulation based on technological standards.[58] Following this trend, a cap-and-trade approach has

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55. Jonathan H. Adler, *Jurisdictional Mismatch in Environmental Federalism*, 14 N.Y.U. ENVTL. L.J. 130, 175-76 (2005).

56. For a seminal article describing this justification, see Stewart, *supra* note 49, at 1215 ("Even if the commons problem were eliminated, decentralized environmental decisionmaking would remain flawed because spillover impacts of decisions in one jurisdiction on well-being in other jurisdictions generate conflicts and welfare losses not easily remedied under a decentralized regime.").

57. Butler & Macey, *supra* note 53, at 26 ("In general, the most compelling argument for federal regulation is to deal with interstate externalities that cannot be adequately addressed by state and local regulations.").

58. *See* Jonathan B. Wiener, *Radiative Forcing: Climate Policy to Break the Logjam in Environmental Law*, 17 N.Y.U. ENVTL. L.J. 210, 236-37 (2008) ("A generation ago, the

become the most popular proposal for reducing greenhouse gases. Under this approach, policymakers set an overall cap on emissions levels and then distribute the right to pollute up to the cap among various parties. Generally, one emissions allowance is required per ton of carbon dioxide (or its equivalent) emitted. The presumption is that parties that can efficiently reduce their emissions will do so and sell their allowances to parties for whom emissions reductions are more costly, allowing the reductions to be accomplished at the lowest cost. Over time, the cap is ratcheted down for progressively lower emissions.

Robert Stavins of Harvard's Kennedy School argues that a U.S. cap-and-trade regime that is upstream (i.e., targeted at fossil fuel suppliers) and economy-wide "provides the greatest certainty that national emission targets will be achieved."[59] This model, he argues, allows for international coordination among different trading regimes.[60] This comprehensive regime should displace smaller-scale efforts, "provid[ing] for supremacy over U.S. regional, state, and local systems to avoid duplication, double counting, and conflicting requirements."[61] He further contends that regulatory standards operating under the umbrella of a cap-and-trade regime offer no additional benefits and simply create inefficiencies.[62] Thus, the program should also operate in lieu of a standards-based approach to regulation, except to the extent standards are necessary to overcome specific market failures.[63]

In 1992, Jonathan Wiener and Richard Stewart proposed that "full accounting" of all anthropogenic causes of climate change could serve as the basis for an international agreement limiting net greenhouse gas emissions while providing individual nations the flexibility to use the most cost-effective measures to reach their targets.[64] This "comprehensive" approach takes advantage of the myriad sources and sinks for greenhouse gases that are differentially distributed across different countries, heightening the chance for international agreement.[65] Wiener and Stewart argued that "piecemeal" efforts by individual nations acting alone would likely produce perverse results and undermine the possibility of agreement.[66] Assuming agreement could be

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debate raged between advocates of command-and-control technology standards and advocates of market-based incentives. Today this question has largely been settled with broad acceptance of incentive instruments . . . .").

59. Robert N. Stavins, *Addressing Climate Change with a Comprehensive U.S. Cap-and-Trade System*, 24 OXFORD REV. ECON. POL'Y 298, 304 (2008).

60. *Id.* at 302, 309.

61. *Id.* at 303.

62. *Id.* at 314-15.

63. *Id.* at 315.

64. Richard B. Stewart & Jonathan B. Wiener, *The Comprehensive Approach to Global Climate Policy: Issues of Design and Practicality*, 9 ARIZ. J. INT'L & COMP. L. 83, 86, 103-04 (1992).

65. *Id.* at 88, 95-96.

66. *Id.* at 96. The authors also describe policies that target only some greenhouse gases

reached, they argued that an international emissions trading regime would provide the most efficient emissions reductions.[67]

In 2007, Wiener addressed the merits of subnational approaches to greenhouse gas abatement, finding them not only trivial but quite possibly perverse.[68] Although he primarily aimed to question the benefit of state-level climate change plans, his argument is framed in broader terms: "'[T]hink globally, act locally' is not such good advice for protecting global public goods when the externalities arise from widespread and geographically moveable sources, and when local action would have a trivial effect or would merely shift those sources to other locales (potentially causing even greater harm)."[69] By analogy to the problems of a piecemeal, uncoordinated approach by individual national-states that fails to work through a comprehensive international regime, he finds subnational approaches similarly suspect: "Subglobal action (and, a fortiori, subnational action) to reduce GHGs has several disadvantages."[70] The globally widespread and ubiquitous nature of greenhouse gases means that "subglobal regulatory coverage fails to control important sources of pollutants."[71] His greatest concern centers on leakage: "[S]ubglobal regulatory coverage encourages source activities to shift or 'leak' to unregulated areas over time."[72]

Leakage, he explains, can occur from subnational action in three ways: a "capital relocation effect" that occurs when industry responds to increased regulation by shifting to less-regulated regions; a "price effect" that occurs when lower demand in one area reduces fuel prices, triggering increased consumption elsewhere; or through a "slack off effect" that occurs when efforts from one locale to reduce emissions create some additional environmental benefit that reduces the marginal benefit for other locales of doing the same.[73] Because Wiener suspects that leakage will increase activity in areas with the least regulation, he fears that subnational efforts may cause more emissions than they eliminate—that is, leakage could be greater than one hundred percent.[74] Wiener also argues that piecemeal efforts can create path dependency, making inefficient small-scale plans difficult to displace with a subsequent and more effective comprehensive regime.[75]

These concerns have supported other scholars' rejection of local

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or sectors as "piecemeal" and adverse to the development of a comprehensive system. *Id.* at 98-99.

67. *Id.* at 103-10.
68. Wiener, *supra* note 19.
69. *Id.* at 1964.
70. *Id.* at 1967.
71. *Id.*
72. *Id.*
73. *Id.* at 1967-70.
74. *Id.* at 1969-70.
75. *Id.* at 1970-73.

"piecemeal" actions as harmful. Referring to the "perils of incremental responses to climate change," Cary Coglianese and Jocelyn D'Ambrosio argue that "there is good reason to doubt the appropriateness of the current ad hoc[] state and local responses to this global problem."[76] Preferring Stavins's proposal for a comprehensive upstream cap-and-trade approach, they argue that subfederal policies not only fail to contribute meaningful emissions reductions, they also create a range of risks that can undermine a comprehensive policy:

> At their most benign, current incremental reforms will have little or no effect on climate change. Yet at the worst, leakage from unregulated areas can undermine the reductions made in more policy active states. . . . [S]ide effects can exacerbate climate change problems or create other public health problems. Furthermore, disjointed experimentation can entrench interests and lull the public into thinking progress is being made, thus making comprehensive policymaking more challenging to achieve. Under these circumstances, it appears better to wait to develop a comprehensive and effective climate change policy rather than to continue succumbing to pressure to adopt incremental options that will ultimately prove ineffective or otherwise problematic.[77]

Coglianese and D'Ambrosio thus conclude that subnational efforts can subvert the effectiveness of a comprehensive cap-and-trade regime. They fear that these piecemeal efforts will be economically inefficient and ineffective due to leakage, but may nonetheless entrench policies that will render a larger, more efficient and effective regime difficult to enact.

These concerns about state and local climate change policy sweep too broadly in two important respects. First, by failing to distinguish climate policy that operates on the basis of subnational greenhouse gas trading regimes from other emissions reduction strategies, the authors miss the potential benefits of other aspects of state and local policies. While this Article is agnostic on the question of exactly how state or regional trading regimes should be addressed under a federal cap-and-trade scheme, it does argue that federal legislation will not eliminate the need for other forms of aggressive climate regulation at the local (and state) level. Likely recognizing this distinction, Wiener's most recent writing acknowledges a potential role for states (and local governments as a subsidiary of states) in specific areas of traditional authority, so long as it does not impede a national cap-and-trade regime.[78]

Second, the presumption that "local" policies can be subsumed under the

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76. Cary Coglianese & Jocelyn D'Ambrosio, Response, *Policymaking Under Pressure: The Perils of Incremental Responses to Climate Change*, 40 CONN. L. REV. 1411, 1429 (2008).

77. *Id.*

78. Wiener, *supra* note 58, at 253 ("Some key climate policy tools, such as electric utility regulation, building codes, transportation systems, and land use planning, are handled by the states. The new national climate policy should encourage the use of such state and local authorities to reduce GHG emissions, so long as they do not impede the national cap-and-trade program.").

category of state efforts causes scholars to miss the unique nature of local efforts described below. Because Stavins recognizes the need to correct market failures not eliminated by greenhouse gas trading, his work might be compatible with some local strategies, but because he offhandedly dismisses state and local action and broadly supports preemption, he contributes both to the general invisibility of the local contribution and to analyses like that of Coglianese and D'Ambrosio that affirmatively reject all local efforts.

C. *Climate Change Policy in Practice*

1. *Comprehensive caps*

The common elements of regimes advocated by Stavins, Wiener, and others—with a top-down constraint on greenhouse gas emissions and allocation through an exclusive market mechanism—have the potential to provide significant environmental and policy benefits by creating certainty as to the level of reductions and capturing efficiencies. Obviously, unlike individual smaller-scale activities, national and international top-down regimes of any kind have the potential to capture many more entities than individual localized policies because of the jurisdictional reach of national governments. Moreover, the comprehensive approaches described by Stavins and Wiener capture a broad array of sources (and sinks, in Wiener's case) under one regime, reducing the risk of leakage when compared with alternative proposals that focus exclusively on one economic sector or industry.

Yet these benefits can only be realized if the system is designed properly, is enforced effectively, has the initial levels set accurately, and accounts for all critical market failures. The reality of policy formation likely belies the general optimism that pervades discussion of cap-and-trade. As is well recognized, interest group pressures will have a significant role in shaping the form of federal environmental schemes and these pressures are unlikely to make it either more efficient or more effective.[79] Although an effectively designed federal cap would be an important catalyst for reducing U.S. emissions, the likelihood that interest group pressures, along with scientific, economic, and demographic uncertainty and enforcement difficulties, will render a national cap-and-trade regime sub-optimal warrants caution in relying on its superior efficiency to dismiss or preempt "piecemeal" efforts—except to the extent a national or international scheme supersedes specific smaller trading regimes.

Moreover, while piecemeal efforts might create institutions that develop a life of their own, this possibility does not support the presumption that they will

79. *See, e.g.*, Butler & Macey, *supra* note 53, at 45 (arguing against the "race-to-the-bottom" rationale for federal regulation because "[t]he interest group problem is more acute at the federal level"); DeShazo & Freeman, *supra* note 39, at 1560 (discussing the influence of interest groups on federal climate change legislation).

inevitably entrench policies that undercut rather than complement a comprehensive regime. Because a greenhouse gas cap will not be adopted against a static baseline, other policies (or behavioral patterns established in the absence of regulation) will become entrenched regardless. These very well could be policies even more adverse to a comprehensive cap, as the absence of climate change regulation allows further development of vested interests in greenhouse gas-intensive building and manufacturing practices and additional capital investments in equipment adapted to a less carbon-constrained economy. As the automobile industry's decades-long opposition to higher fuel efficiency standards demonstrates, the absence of regulation can entrench practices that create strong political opposition to environmentally protective standards, regardless of technological feasibility.[80]

Although an economy-wide cap-and-trade regime likely will not be created as rationally as hoped, it appears quite possible that some form of cap-and-trade will be adopted in the United States. If it is, local governments' current efforts will interact with it in a manner quite different than existing state and regional efforts. Unlike states, local governments have not been establishing greenhouse gas trading regimes, attempting to directly regulate the utility industry (except in the individual cases when they own the utility), or adopting vehicle emissions standards. Unlike states, there is less obvious overlap with federal law. Assessments of subnational efforts therefore need to disaggregate efforts by the state and local governments because they likely have very different effects.

While the concern that leakage could entirely displace subnational mitigation efforts may assume a rapidity of leakage and comprehensiveness across economic sectors that very well may not happen,[81] even if some leakage occurs it will likely be much less significant with local actions. Because local

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80. The passage of the Energy Independence and Security Act of 2007 overhauled corporate average fuel economy (CAFE) standards for the first time in thirty years, John M. Broder, *House, 314-100, Passes Broad Energy Bill; Bush to Sign It Today*, N.Y. TIMES, Dec. 19, 2007, at A24, despite the fact that technology that could raise average fuel efficiency had been available for quite some time, Maria Godoy, *CAFE Standards: Gas-Sipping Etiquette for Cars*, NAT'L PUB. RADIO, June 18, 2007, http://www.npr.org/templates/story/story.php?storyId=5448289.

81. While it makes sense to reduce potential leakage where it is feasible to do so without harming other objectives, the substantial uncertainties regarding its impact warrant caution in slowing the pace of mitigation efforts out of fear of theoretical leakage. The IPCC's review of economic literature on the international impact of leakage from the Kyoto Protocol suggests why. The review shows widely divergent estimates—ranging from as low as six percent to as high as 130 percent at the extreme. However, the review cites studies finding that the high-end estimates overlook limiting conditions on the ground that favor local production. The latter studies anticipate leakage at "considerably lower" levels than previously projected. *See* Awwad Alharthi et al., *Mitigation from a Cross-Sectoral Perspective*, *in* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: MITIGATION OF CLIMATE CHANGE 619, 665-66 (B. Metz et al. eds., 2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter11.pdf.

actions predominantly target consumption, the built environment, and waste generation, even if they could cause some leakage through price signals from reduced fossil fuel demand they pose little threat of triggering industry relocation when compared with direct regulation of industry. Moreover, the very magnitude of climate change renders a slack-off effect unlikely because each marginal change fails to eliminate the specter of catastrophe.

More importantly, as discussed below, many existing and proposed local policies aim to shift development patterns away from those that impede conservation. These changes to the built environment will facilitate transition to an economy with a fossil fuel supply constrained by a national or international cap. A close look at local efforts shows that they have focused on reducing fossil fuel demand by changing the built environment (in part by overcoming market barriers to efficiencies), reducing the generation of greenhouse gases from waste (an area unrelated to fossil fuel combustion), and capturing efficiencies in governmental operations.

These benefits could be easy to miss because scholars often consider state and local together as part of subnational or subfederal efforts, or use the terms "local" and "state" interchangeably. Although this tendency to analytically submerge local governments into state governments extends beyond this context,[82] it is particularly critical here in obscuring important local regulatory potential. By lumping local plans together with state action that could indeed parallel federal action (such as state or regional cap-and-trade regimes and state regulation of power plants, automobiles, or appliance efficiency standards), literature objecting to piecemeal efforts presumes a conflict between a comprehensive cap-and-trade regime and local actions that largely does not exist. More importantly, it obscures how local actions can facilitate such a comprehensive regime by shaping the built environment, reducing emissions unrelated to fossil fuels, and eliminating market barriers that impede efficiencies (regardless of how a cap constrains supply). And to the extent that a federal regime is ill-designed and does not provide expected emissions reductions, local efforts can help to compensate for these regulatory failures.

Finally, even presuming adoption of a comprehensive cap-and-trade regime that effectively constrains supply and overcomes enforcement problems, local efforts to reduce demand can continue to play an important role be keeping allowance prices low. One of the significant design issues for a cap-and-trade regime concerns cost containment: stakeholders are concerned not

82. Local governments often cooperate directly with the federal government, independent of their respective states, a phenomenon captured by Nestor Davidson in the phrase "cooperative localism." Nestor M. Davidson, *Cooperative Localism: Federal-Local Collaboration in an Era of State Sovereignty*, 93 VA. L. REV. 959, 960 (2007). This independent local relationship remains "submerged" in the "reigning iconography" of dual federalism, which fails to recognize either localities independently or the "ubiquity" of cooperative relationships. *Id.* at 963-66, 1000. Indeed, recent federalism decisions limiting federal power and devolving regulatory power to states may ultimately disempower local governments vis-à-vis states, undermining the localist values. *Id.* at 1000-23.

only about the overall cost to the economy of pricing a previously "free" ability to emit greenhouse gases, but also about the potential for sustained high prices or sudden price spikes.[83] The cap prevents unanticipated or sudden changes in demand (due, for example, to weather extremes that prompt increased use of air conditioning or heating) from being met with increased supply. Instead, the price of allowances will rise. In addition to the economic ramifications, high allowance prices and price volatility could create substantial political pressure for future lawmakers to exempt covered entities, loosen the overall cap, or eliminate the program altogether. In order to avoid these problems, academic and legislative proposals include various mechanisms that aim to reduce both overall cost and volatility.[84] While reducing the risks related to costs, each approach adds design and enforcement complexities that have the potential to undermine the effectiveness of the overall cap.[85] For these reasons, even under a comprehensive regime, local efforts that reduce demand will likely substantially contribute to overall effectiveness by reducing allowance prices. This will both help sustain political will and prevent the need to employ cost containment measures that could undermine the cap.

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83. *See* PEW CTR. ON GLOBAL CLIMATE CHANGE, CONTAINING THE COST OF CLIMATE CHANGE POLICY 1 (2008), *available at* http://www.pewclimate.org/docUploads/Costs.pdf.

84. The most common mechanisms proposed to address these include: banking, or allowing covered sources to hold on to unused allowances for future use; borrowing—either allowing firms to borrow from their own future allowances, or an economy-wide model that gives the program administrator the authority to borrow additional allowances from the future; offsetting, which allows covered entities to pay for reductions from domestic or international uncapped sources in lieu of their own emissions reductions; a strategic allowance reserve that could provide additional allowances if the price exceeds a certain level; multi-year compliance deadlines; provisions to extend compliance periods if prices become too high; and a "circuit breaker" that adjusts the cap or extends the deadline for economy-wide reductions if the price exceeds a certain level. *Id.* at 4-10.

Of the eight major cap-and-trade proposals submitted in the 110th Congress, all but one specified cost-containment measures such as offsets, borrowing, banking, or freezes on the cap if prices exceed a certain level. *Id.* at 13. Both the House and Senate versions of climate legislation pending as of January 2010 in the 111th Congress include cost containment mechanisms. PEW CTR. ON GLOBAL CLIMATE CHANGE, CLEAN ENERGY JOBS AND AMERICAN POWER ACT (2009), http://www.pewclimate.org/docUploads/chairmans-mark-kerry-boxer-10-29-09.pdf. The Senate version allows borrowing, offsets, and creates a reserve stocked with additional offsets and future allowances that could be tapped if the price exceeds a designated threshold. *Id.* The House version also incorporates borrowing, offsets, and banking (with slightly different requirements) and creates a strategic reserve of allowances that could be tapped if the price exceeds a particular threshold. *See* PEW CTR. ON GLOBAL CLIMATE CHANGE, AMERICAN CLEAN ENERGY AND SECURITY ACT AT A GLANCE (2009), http://www.pewclimate.org/docUploads/Waxman-Markey-short-summary-revised-June26.pdf.

85. For example, one approach allows for borrowing from future years' allowances, PEW CTR. ON GLOBAL CLIMATE CHANGE, *supra* note 83, at 5, creating uncertainty around the effectiveness of repayment requirements. Other approaches allow firms to "offset" their emissions by paying for emissions reductions that fall outside of the cap, either domestically or internationally. *Id.* at 6-7. In addition, some devices specifically relax the cap if prices exceed a certain threshold. *Id.* at 7, 9-10.

2. *Multilevel governance*

Although scholars of environmental federalism traditionally presumed exclusive or nearly exclusive regulatory power at one level of government,[86] scholars increasingly question this presumption.[87] A number now envision a multilevel approach—both as a description of the nature of regulation on the ground and as a prescription for more effective environmental governance.[88] Kirsten Engel, for example, "question[s] the fundamental assumption underlying the [environmental federalism] debate: that regulatory authority to address environmental ills should be allocated to one or the other level of government with minimal overlap."[89] She argues that overlapping jurisdiction may jumpstart regulatory initiatives, diminish opportunities for capture by interest groups, and create opportunities for regulatory innovation.[90]

Jody Freeman and Dan Farber identify the complex on-the-ground interactions among various administrative agencies and private actors that belie models envisioning unitary agency actors employing single regulatory tools.[91] Rather, they describe the multi-layered processes that involve various levels of government interacting with stakeholders in scenarios not represented in most theories of environmental or administrative law.[92] Thus, they envision "modular environmental regulation," a model capturing the interaction between public and private actors, with coordination among various levels of government employing a flexible "suite of complementary regulatory tools."[93]

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86. Environmental federalism scholarship in the 1990s generally divided between advocates of centralized and decentralized regulation. For advocates of a centralized regime, see, for example, Kirsten H. Engel, *State Environmental Standard-Setting: Is There a "Race" and Is It "To the Bottom"?*, 48 HASTINGS L.J. 271 (1997), and Peter P. Swire, *The Race to Laxity and the Race to Undesirability: Explaining Failures in Competition Among Jurisdictions in Environmental Law*, 14 YALE L. & POL'Y REV. 67 (1996). Examples of decentralized regime advocacy include, for example, Butler & Macey, *supra* note 53; Richard L. Revesz, *The Race to the Bottom and Federal Environmental Regulation: A Response to Critics*, 82 MINN. L. REV. 535 (1997); Richard L. Revesz, *Rehabilitating Interstate Competition: Rethinking the "Race-to-the-Bottom" Rationale for Federal Environmental Regulation*, 67 N.Y.U. L. REV. 1210 (1992).

87. *See, e.g.*, Daniel C. Esty, *Revitalizing Environmental Federalism*, 95 MICH. L. REV. 570, 572, 74 (1996) (Noting that "[s]implistic notions of regulatory reform—including attempts to establish a single, appropriate level of government intervention—are doomed to fail" and "the challenge is to find the best fit possible between environmental problems and regulatory responses—not to pick a single level of government for all problems.").

88. *See, e.g.*, Ann E. Carlson, *Federalism, Preemption, and Greenhouse Gas Emissions*, 37 U.C. DAVIS L. REV. 281, 312-17 (2003).

89. Kirsten H. Engel, *Harnessing the Benefits of Dynamic Federalism in Environmental Law*, 56 EMORY L.J. 159, 161 (2006).

90. *Id.*

91. Jody Freeman & Daniel A. Farber, *Modular Environmental Regulation*, 54 DUKE L.J. 795, 797-98 (2005).

92. *Id.*

93. *Id.* at 795, 797-98.

This multilevel approach can be extended to the climate context. Richard Stewart, for example, rejects the argument that climate change regulation must be exclusively top-down to be effective. Instead, he argues that "U.S. states, cities, and other subnational actors (SNAs) . . . can and should play important long-term roles in climate regulation . . . even after strong national and international climate regulatory regimes have been adopted."[94] He proposes that a plural (as opposed to singular) regulatory architecture that accommodates action by subnational governments may be most effective because subnational governments can generate and sustain public support for climate change initiatives.[95] Like others, Stewart's collective evaluation of state and local action does not examine the unique nature of local, as opposed to state, action. Although he sounds a more optimistic tone than many, overall he nonetheless seems to expect that the primary contribution of subnational action to U.S. efforts will be indirect rather than through actual significant emissions reductions.[96] The following discussion examines how local regulatory potential could contribute to a climate response involving all three levels of government in the United States. The discussion focuses predominantly on the direct impacts of local action—that is, it addresses the question of whether local governments can contribute meaningfully to actual emissions reductions.

II. LOCAL POTENTIAL TO REDUCE GREENHOUSE GAS EMISSIONS: DEMOGRAPHICS AND RELEVANT POWERS

A. *Viewing Local Efforts Collectively*

The total emissions within the ambit of any single local government are only a fraction of worldwide or even U.S. emissions, again suggesting that the mitigation potential of local policies will be trivial. Yet, if we consider those policies collectively, the picture begins to change. Why should we look at local governments collectively? An empirical review of local governments' climate change activities and current demographics that also takes into account sound policy reasons supports a collective assessment of local governments' potential to reduce greenhouse gas emissions. First, local governments are engaged in collaborative efforts to reduce greenhouse gas emissions. They participate in networks, encourage other local governments to join their efforts, and appear to be part of a blossoming social movement.[97] They are allying themselves with

94. *See* Stewart, *supra* note 36, at 681. Note that Stewart does not draw upon the analogy to a comprehensive international regime, as Wiener does, Wiener, *supra* note 19, at 1966-73, to conclude that subnational action will undermine U.S. federal policy.

95. Stewart, *supra* note 36, at 699-701.

96. *Id.* at 700.

97. *See* Susanne C. Moser, *In the Long Shadow of Inaction: The Quiet Building of a Climate Protection Movement in the United States*, GLOBAL ENVTL. POL., May 2007, at 124, 131-40.

one another, sharing information and techniques, and proselytizing to other local governments. Moreover, their own assessments of potential mitigation often consider these efforts collectively.[98]

Second, when demographics are taken into account, the potential for cities' policies to be collectively substantial becomes apparent. Since 1790, the U.S. has become an increasingly urbanized country; the proportion of the population residing in urban areas increased from 5.1% in 1790 to 79.0% in 2000.[99] Much of this population resides within the jurisdiction of city governments: "Although municipal corporations account for only a tiny portion of the United States' total land area, in 2002 nearly 174 million Americans, or almost sixty-two percent of the population, lived in cities."[100] The five cities participating in the C40 alone contain nearly twenty million people,[101] and ten percent of U.S. emissions come from the ten largest cities in the United States,[102] all of which participate in one or more networks.[103] (For the largest U.S. cities, emissions considered even individually are not entirely insignificant; the city of Los Angeles alone emits approximately the same amount of carbon dioxide as the entire country of Sweden.[104])

From a policy perspective, ignoring local governments' collective capacity to reduce emissions may cause the state and federal governments to overlook ways to facilitate proven and sometimes quick reductions that can be accomplished with existing technology and established local bureaucracies. To

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98. *See, e.g.*, INT'L COUNCIL FOR LOCAL ENVTL. INITIATIVES, U.S. CITIES FOR CLIMATE PROTECTION PROGRESS REPORT 8 (2006), *available at* http://www.icleiusa.org/library/documents/action-center/ICLEI-CCP_US_Report-2006.pdf/at_download/file ("Together we have huge purchasing power, and if we invest wisely, that can have huge implications for the environment." (quoting Charlotte, North Carolina Mayor Patrick McCrory)); City of Portland Bureau of Planning and Sustainability, How Is Our Region Reducing Emissions?, http://www.portlandonline.com/bps/index.cfm?c=41896&a=111833 (last visited Jan. 10, 2010) ("While the actions of one city will have only a small impact on global CO2 emissions, many cities together can achieve meaningful reductions.").

99. U.S. CENSUS BUREAU, U.S. DEP'T OF COMMERCE, UNITED STATES SUMMARY: 2000, POPULATION AND HOUSING UNIT COUNTS 13 tbl.8, 14 tbl.9 (2004).

100. Richard Briffault, *The Central Place of States and Local Governments in American Federalism*, *in* THE HANDBOOK OF MUNICIPAL BONDS 3, 15 (Sylvan G. Feldstein & Frank J. Fabozzi eds., 2008).

101. U.S. CENSUS BUREAU, U.S. DEP'T OF COMMERCE, ANNUAL ESTIMATES OF THE RESIDENT POPULATION FOR INCORPORATED PLACES OVER 100,000, RANKED BY JULY 1, 2008 POPULATION (2008), http://www.census.gov/popest/cities/tables/SUB-EST2008-01.xls; C40 Cities Climate Leadership Group, *supra* note 30.

102. PEW CTR. ON GLOBAL CLIMATE CHANGE & PEW CTR. ON THE STATES, CLIMATE CHANGE 101: LOCAL ACTION 1 (2009), *available at* http://www.pewcenteronthestates.org/uploadedFiles/Climate%20Change%20101,%20Local%20Action.pdf.

103. *See, e.g.*, Mayors Climate Prot. Ctr., *supra* note 20.

104. CITY OF L.A., GREEN LA: AN ACTION PLAN TO LEAD THE NATION IN FIGHTING GLOBAL WARMING 2 (2007), http://www.ladwp.com/ladwp/cms/ladwp010314.pdf.

the extent that fiscal constraints or transaction costs prevent investment in energy efficiency technology with reasonable payback periods, recognizing local governments' collective potential to reduce emissions through efficiency supports new or increased state and federal funding to defray initial capital and administrative costs. Given the presence of over 89,000 local governments,[105] most of which own and operate buildings, use vehicles, and maintain extensive indoor and outdoor lighting structures, among other things, the potential emissions reductions from increased energy efficiency is at least worth evaluating.

Although most local climate change plans that have been adopted address energy efficiency in proprietary activities at least to some degree, as discussed below, the policies of some local governments have gone beyond fiscally wise efficiency improvements in municipal operations to efforts to reduce the emissions of the businesses and residents within their jurisdiction. Because of the large percentage of the population living in cities, such efforts, if successful, could lead to substantial reductions.

B. *Relevant Areas of Local Power*

Although local government scholars debate the relative power or powerlessness of local governments in the federal system, it is fair to say that cities are generally no longer envisioned to exist merely at the whim of state government. Most states have enacted home rule provisions protecting local power and eliminating the presumption under Dillon's Rule[106] that local power is subject to unfettered state discretion.[107]

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105. U.S. Census Bureau, Local Governments and Public School Systems by Type and State: 2007, http://www.census.gov/govs/cog/GovOrgTab03ss.html (last visited Jan. 15, 2010). This figure includes general purpose local governments (i.e., cities and counties), school districts, and special-use districts. *Id.*

106. Dillon's Rule, so named for its author John F. Dillon, a late-nineteenth century Iowa Supreme Court Judge, provides:

> It is a general and undisputed proposition of law that a municipal corporation possesses and can exercise the following powers, and none others: First, those granted in *express words*. *S*econd, those *necessarily or fairly implied* in or incident to the powers expressly granted; Third, those *essential* to the declared objects and purposes of the corporation—not simply convenient, but indispensable. And any fair reasonable doubt concerning the existence of the power is resolved by the courts against the corporation.

Knapp v. Kansas City, 48 Mo. App. 485, 492 (Mo. Ct. App. 1892) (emphases added) (citations omitted) (original emphases omitted); *see also* Nat'l League of Cities, Dillon's Rule, http://www.nlc.org/about_cities/cities_101/154.aspx (last visited Jan. 10, 2010). Dillon's Rule was widely adopted and provided the basis for a narrow reading of local powers starting in the late-nineteenth century and during much of the twentieth century. RICHARD BRIFFAULT & LAURIE REYNOLDS, CASES AND MATERIALS ON STATE AND LOCAL GOVERNMENT LAW 266-69 (6th ed. 2004).

107. *See* David J. Barron, *Reclaiming Home Rule*, 116 HARV. L. REV. 2255 (2003); *see also* BRIFFAULT & REYNOLDS, *supra* note 106, at 268 ("By 1990, forty-eight states provided a measure of home rule for at least some of their cities. In addition, thirty-seven states provided for home rule for some of their counties.").

Nonetheless, these changes hardly make it obvious that local powers are up to the challenge of climate change. Local governments still face constitutional limitations under the Dormant Commerce Clause and potential preemption by state and federal governments that prevent them from regulating industry or even keeping unwanted products or waste out of their jurisdiction. More importantly, the United States's one-quarter share of global greenhouse gas emissions stems predominantly from transportation and energy production, sectors regulated heavily by federal law. These are not areas over which local general-purpose governments have much legislative authority, and regulating these sectors will be absolutely essential to any effective U.S. climate change policy. Indeed, as local governments' regulatory power is limited to their geographic area, outside of their proprietary domain, they cannot mandate that power plants employ cleaner production methods, that automakers produce more fuel-efficient vehicles, or that industries revise carbon intensive practices.

Because of the importance of reducing greenhouse gas emissions from power production and transportation, federal and state proposals have focused predominantly on regulating these sectors.[108] Recognition of how critical regulation of energy production and automobile fuel-efficiency will be to a comprehensive climate change policy might suggest that local efforts are inconsequential because of their limited jurisdiction. However, because emissions from automobiles and power production can be reduced at various stages—upstream, midstream, or downstream—local efforts can nonetheless intervene to reduce transportation and power production emissions by aiming at the farthest downstream targets: consumers.

The range of potential regulatory targets at different points in the supply chain is well captured in the following discussion by Jody Freeman and J.R. DeShazo:

> [I]n the transportation sector, oil importers are upstream, oil refiners are midstream, and gas stations are downstream; in the electricity sector, raw fuel suppliers are upstream and power plants are downstream; and of course, for each sector respectively, consumers who fill their cars with gasoline and consumers who turn on the lights at home are the furthest downstream of all.[109]

Because various regulatory tools are either limited to certain points in the supply chain or more effective at one point than at others, "there are matches and mismatches when it comes to regulatory targets and regulatory tools."[110] For example, attempts to employ tradable permits to reduce emissions by targeting individual automobile owners would likely fail because "[t]he market would be too large, the targets too mobile, and the trades too difficult to

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108. At the federal level, eight cap-and-trade legislative proposals were introduced into the 110th Congress. *See supra* note 84.

109. DeShazo & Freeman, *supra* note 39, at 1546.

110. *Id.*

monitor, among other things."[111] At the same time, targeting "a few hundred power plants with high GHG emissions" with a tradable permit scheme would provide a much better fit between tool and target.[112]

Among the proposed regulatory tools Freeman and DeShazo discuss—"a tradable permit system, a product design standard, an emissions standard and a carbon tax"—only the carbon tax could realistically be directed at consumers, and even that likely would create substantial administrative costs.[113] While this list obviously does not exhaust potential federal regulatory tools, as the following discussion aims to demonstrate, local governments have powers, expertise, and regulatory tools well suited to influencing downstream greenhouse gas emissions.

As discussed below, several areas of local power—such as planning and zoning, waste management, proprietary functions, and building code development and enforcement—provide means for targeting consumption. Local emissions reduction plans can be implemented by amending or replacing existing procurement policies, zoning codes, rules and facilities for waste services, and building codes. Thus, many local plans will not require new administrative structures (such as likely will be required by a federal cap-and-trade scheme, for example) but rather can be implemented by existing bureaucracies such as planning, building and safety, and waste management departments.

This downstream potential might be easy to overlook.[114] Scholars and federal policymakers might focus on upstream regulatory targets because production stage externalities fit a central framework in environmental law; forcing polluters to internalize costs—either through command and control, market, tax, or other mechanisms—is seen as a central project of environmental regulation.[115]

An oft-cited approach to preventing catastrophic climate change relies on the wedge model developed by Pacala and Socolow.[116] These Princeton scientists divided the reductions necessary to flatten the business-as-usual

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111. *Id.*

112. *Id.*

113. *Id.* at 1547-48.

114. This is not to argue that local governments are the only governmental entities that regulate downstream. The state and federal governments already target energy consumption to some degree through such mechanisms as energy efficiency requirements for appliances and tax incentives.

115. *See, e.g.*, Butler & Macey, *supra* note 53, at 29 ("The economic goal of government regulation of pollution is to force polluters to bear the full cost of their activities. In economic jargon, the regulatory goal should be to force the internalization of externalities. Externalities are costs and benefits that are not directly priced by the market system. . . . Externalities in the use of resources often arise where property rights are either nonexistent or poorly specified, as is the case with resources such as the atmosphere.").

116. S. Pacala & R. Socolow, *Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies*, 305 SCIENCE 968 (2004).

(BAU) trajectory into seven conceptual wedges of one billion $MTCO_2eq$.[117] that, taken together, equaled the triangular space between BAU and climate stabilization levels. Each wedge thus represented one seventh of the necessary global emissions reduction, which, they argued, could be accomplished through existing, readily available technology. They provide fifteen policy examples, any seven of which could reduce emissions enough to stabilize the climate.

Two of these policy areas fall squarely within local governments' power and core competence: halving car travel through urban design, mass transit, and telecommuting; and cutting carbon emissions by one-fourth in buildings. (The impediment identified to accomplishing the latter wedge was simply "weak incentives."[118]) While scientists have recently argued that lower atmospheric concentrations are required for climate stabilization than those presumed by Pacala and Socolow, thus requiring more "wedges"[119] and possibly earlier implementation, their paper nonetheless identifies, at a minimum, at least two areas in which local governments have both the legal power and the expertise to contribute to substantial reductions with existing and mature technology.

To examine how local governments can collectively reduce greenhouse gas emissions, this Article next reviews four areas of well-accepted local power: (1) buildings and energy efficiency; (2) zoning and land use, including the setting of parameters for building permits; (3) garbage and waste collection and processing; and (4) local governments as proprietors—of buildings, public utilities, and streetlights, among many other things.

1. *Buildings and energy efficiency*

Building energy efficiency provides perhaps the most straightforward and dramatic opportunity to reduce greenhouse gas emissions downstream by shrinking demand. Improving buildings' environmental performance—through green building programs, efficiency standards, and/or building code changes—provides a particularly attractive means for reducing greenhouse gases. Mature, available, and well-studied technologies render building energy efficiency a technologically easy, proven, and often cost-effective emissions reduction strategy.[120]

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117. *See supra* note 8 (providing an explanation of this measurement, which stands for "metric tons of carbon dioxide equivalent emissions").

118. Pacala & Socolow, *supra* note 116, at 970 tbl.1.

119. Pacala and Socolow presumed that stabilizing carbon dioxide concentrations in the atmosphere at 500 ppm, a commonly referenced figure, would be sufficient to prevent catastrophic climate change. Pacala & Socolow, *supra* note 116, at 968. James Hansen of NASA, among others, has recently argued that much lower levels are necessary for climate stabilization, roughly 350 ppm. Hansen, *supra* note 9, at 226.

120. Widely available technologies and building methods to improve energy efficiency include: improving the building's thermal envelope; improving heating system efficiency; reducing the cooling load through such methods as reflective roofs and shade trees; using passive and low energy cooling techniques; building energy management systems; using

Because reduction in demand continues throughout a building's lifespan, employing these technologies reduces both immediate and long-term greenhouse gas emissions. Moreover, because these reductions are built in to the physical environment, construction or rehabilitation of existing building stock creates lasting emissions savings regardless of subsequent political changes. Forecasts of future construction underscore the potential to reduce emissions through improved building efficiency: between now and 2050, U.S. residents will build or replace an estimated 89 million residential units and construct 190 billion square feet of commercial, office, institutional, and other non-residential space.[121]

Why is this a local issue? In the United States, local governments have significant power to regulate building construction and renovation through their traditional authority to adopt and enforce building codes.[122] While a number of studies have identified potential emissions savings from these improved efficiencies, the regulatory role of local governments in implementing these changes has not received much attention. However, as detailed below, many cities and some counties have enacted new green building programs, largely in response to climate change.

The following describes buildings' contribution to energy demand, the estimated potential to reduce this demand through improved efficiency, and barriers that have prevented adoption of energy efficient practices, even when they are cost-effective. It then situates the local power over buildings in historical and legal context. This context provides a backdrop for reviewing current local programs to improve building energy efficiency and then, in Part IV, evaluating the potential impact of these efforts vis-à-vis potential regulation by the state or federal government.

a. *Energy demand from buildings, potential reductions, and barriers*

The majority of U.S. electricity production serves buildings' energy demands; residential and commercial structures consume sixty-eight percent of the electricity used in the United States, and thirty-nine percent of all of the energy of any kind.[123] This power demand creates thirty-eight percent of the

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solar energy for power, heat, and hot water; using highly efficient electric lighting; daylighting (using natural light); and using highly efficient appliances, electronics, and office equipment, among other things. Kornelis Blok et al., *Residential and Commercial Buildings*, *in* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 81, at 387, 395-403, *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter6.pdf.

121. REID EWING ET AL., GROWING COOLER: THE EVIDENCE ON URBAN DEVELOPMENT AND CLIMATE CHANGE § 1.7.3 (2007), *available at* http://postcarboncities.net/files/SGA_GrowingCooler9-18-07small.pdf.

122. *See infra* Part II.B.1.b.

123. *See* U.S. Envtl. Prot. Agency, Why Build It Green?, http://www.epa.gov/greenbuilding/pubs/whybuild.htm (last visited Jan. 10, 2010).

U.S.'s carbon dioxide emissions.[124]

Contrary to the common perception that governmental policies to reduce pollution are disproportionately costly, significant reductions in energy demand from buildings can be achieved at a fiscal savings when considered across the structure's lifetime. After surveying eighty studies on the building sector, the Intergovernmental Panel on Climate Change (IPCC) concluded that "there is a global potential to reduce approximately 29% of the projected baseline emissions by 2020 cost-effectively."[125] The authors expressed "high agreement" and found much evidence for the chapter's "key conclusion" that:

> [S]ubstantial reductions in CO_2 emissions from energy use in buildings can be achieved over the coming years using mature technologies for energy efficiency that already exist widely and that have been successfully used. . . . A significant portion of these savings can be achieved in ways that reduce life-cycle costs, thus providing reductions in CO_2 emissions that have a net benefit rather than cost.[126]

Even more dramatic figures come from recent studies by the Department of Energy. After extensive modeling by industry and climactic zone, the National Renewable Energy Laboratory reported how mature, available technologies for commercial buildings can cost-effectively reduce energy demand compared with those built to commonly adopted standards. It found, for example, that grocery stores, general merchandise stores, highway lodgings, and medium-sized office buildings could cost-effectively cut their energy demand by fifty percent.[127] Where payback periods were estimated, all were under twenty years

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124. *Id.* Cities vary in the proportion of their greenhouse gas profile that stems from building energy demand, but regardless it accounts for a substantial part. Los Angeles estimates that building energy demands account for two-thirds of the electricity use in the city, and generates thirty-two percent of the city's annual carbon dioxide emissions. L.A. DEP'T OF CITY PLANNING, BUILDING A GREEN LOS ANGELES: FRAMEWORK FOR THE CITY'S GREEN BUILDING PROGRAM 1 (2008), http://cityplanning.lacity.org/code_studies/GreenLa/Brochure.pdf. The city of New York estimates that seventy-nine percent of the 58.3 million metric tons of CO_2 eq. generated in the city in 2005 went toward meeting the energy needs of buildings. OFFICE OF LONG-TERM PLANNING & SUSTAINABILITY, MAYOR'S OFFICE OF OPERATIONS, INVENTORY OF NEW YORK CITY: GREENHOUSE GAS EMISSIONS 7 (2007), http://www.nyc.gov/html/om/pdf/ccp_report041007.pdf.

125. Blok et al., *supra* note 120, at 389.

126. *Id.*

127. *See* ELAINE HALE ET AL., U.S. DEP'T OF ENERGY, GENERAL MERCHANDISE 50% ENERGY SAVINGS: TECHNICAL SUPPORT DOCUMENT (2009), http://www.nrel.gov/docs/fy09osti/46100.pdf; W. JIANG ET AL., U.S. DEP'T OF ENERGY, TECHNICAL SUPPORT DOCUMENT: 50% ENERGY SAVINGS DESIGN TECHNOLOGY PACKAGE FOR HIGHWAY LODGING BUILDINGS (2009), http://www.pnl.gov/main/publications/external/technical_reports/PNNL-18773.pdf; MATTHEW LEACH ET AL., U.S. DEP'T OF ENERGY, GROCERY STORE 50% ENERGY SAVINGS: TECHNICAL SUPPORT DOCUMENT (2009), http://www.nrel.gov/docs/fy09osti/46101.pdf; B.A. THORNTON ET AL., U.S. DEP'T OF ENERGY, TECHNICAL SUPPORT DOCUMENT: 50% ENERGY SAVINGS DESIGN TECHNOLOGY PACKAGES FOR MEDIUM OFFICE BUILDINGS (2009), http://www.pnl.gov/main/publications/external/technical_reports/PNNL-19044.pdf.

and some were much shorter, such as that for office buildings, which could be under five years.[128]

Despite providing a net economic benefit, numerous barriers impede these economically and environmentally rational actions. As the IPCC explains, "due to the long lifetime of buildings and their equipment, as well as the strong and numerous market barriers prevailing in this sector, many buildings do not apply these basic technologies to the level life-cycle cost minimization would warrant."[129] Some barriers simply stem from the absence or cost of gathering information.[130] In addition to general lack of familiarity with energy efficiency technologies, many developers operate using highly inflated estimates of the cost of green building—sometimes more than three times higher than actual costs.[131] Homeowners also overestimate the cost and simultaneously undervalue efficiency gains, missing fiscally prudent weatherization improvements with rapid payback periods.[132]

At the same time, even with adequate information, improper incentives may act as a barrier. Landlords have little financial incentive to pay for energy efficiency when tenants realize the benefits through reduced energy bills.[133] Similarly, developers have little motivation to pay for efficiency features that will reduce costs for future owners unless they are certain that the added cost can be more than recouped.[134] Homeowners also may be deterred from investing in more expensive retrofitting if it exceeds their anticipated duration of ownership—on average seven to ten years. Nonetheless, most homeowners

128. JIANG ET AL., *supra* note 127, § 6.0; THORNTON ET AL., *supra* note 127, § 5.1.

129. Blok et al., *supra* note 120, at 389.

130. *Id.* at 390.

131. COMM'N FOR ENVTL. COOPERATION, GREEN BUILDING IN NORTH AMERICA 55 (2008), http://www.cec.org/files/PDF//GB_Report_EN.pdf ("Higher perceived or actual first costs of many green building strategies and technologies are a significant disincentive. A survey released in August 2007 by the World Business Council on Sustainable Development found that key players in the real estate industry overstated the cost of green building by an average of 300 percent, estimating the cost to be 17 percent above conventional construction, more than triple the cost estimated by the study's authors of 5 percent.").

132. *See* Alan Pears, Misconceptions About Energy Efficiency—Its Real Potential: Some Perspectives and Experiences 1 (2004), *available at* http://www.naturaledgeproject.net/Documents/ENERGYEFFICIENCYbackgroundpaperPears.doc ("Most people choose not to invest in energy efficiency measures with a simple payback period of more than a few years. Yet this is economically and environmentally irrational behaviour."); Nat'l Trust for Historic Preserv., Conversation with an Energy Auditor: David W. Malone, http://www.preservationnation.org/issues/weatherization/audits/malone.html (last visited Jan. 10, 2010) ("I think the biggest misconception is that energy efficient measures cost a lot of money and aren't sound financial investments. To the contrary, when a homeowner in our part of the country takes the basic steps of insulating, weatherizing, and solar shading their home properly, the cost is not substantial. The 'break even' point only takes a few years and the financial payback continues for decades—not to mention the immediate improvement in comfort.").

133. Blok et al., *supra* note 120, at 390.

134. *Id.* at 419.

fail to invest in simple measures with quick payback periods, likely stemming from inadequate information combined with a general bias against up-front costs.[135]

Other barriers arise from inadequate institutional development. Within the building industry, a lack of trained professionals and the fragmentation of the design and construction process into many professions, trades, work stages, and industries render the necessary collaboration to construct green buildings difficult.[136] Within both the industry and governmental agencies that regulate construction, inertia and familiarity with established practices also likely impede adoption of new approaches.

Although these factors create diverse impediments to energy efficiency, regulatory options that some local governments are currently employing address at least some of these barriers simultaneously. As discussed below, a number of locales have adopted green building programs that create incentives, mandates, or both to improve the environmental performance in governmental, residential, and commercial construction and retrofitting projects. Some have revised building codes to mandate increased efficiency, an approach identified by the IPCC as central to overcoming impediments to improving building efficiency.[137]

To the extent that insufficient knowledge or lack of skilled professionals impede use of green building technology, both incentives and mandates potentially remedy this lacuna; the increasing demand for green building generated by code changes and green building policies will increase developer knowledge and push growth of trained professions who can implement these programs. Mandates and financial incentives also directly address the problem of split incentives, although they are not necessarily equally effective. (The variable mix of incentives and mandates in current local programs will likely provide useful data for future comparison.) These changes also familiarize local bureaucracies with new standards for environmental performance that they will then enforce through permitting, fees, or incentives. Over time, staff will develop increased knowledge of green building practices, increasing institutional capacity and allowing the pace of efficient construction projects to increase. Local governments also will likely continue to share best practices through networks, allowing diffusion of institutional expertise.

b. *Local regulatory power over buildings*

Building codes are generally understood to be a function of the police power, and thus squarely within state and local jurisdiction.[138] Historically,

135. *Id.* at 419-20.

136. *Id.* at 419, 422-23.

137. *Id.* at 421.

138. *See* David Listokin & David B. Hattis, *Building Codes and Housing*, 8

cities have been the primary governmental bodies enacting and enforcing building codes.[139] While a few local governments enacted building codes early in the twentieth century, code adoption increased dramatically after the Housing Act of 1954 made federal funding for urban renewal contingent upon adoption of housing and building codes.[140] By 1968, roughly half of all local governments in the United States had enacted building codes.[141] By the mid-1970s, a survey of jurisdictions with populations larger than 10,000 found that over ninety-five percent had enacted them.[142] These local codes developed amidst ongoing discussion over urban renewal between Congress, local governments, and the U.S. Conference of Mayors, which largely bypassed state governments.[143]

Although building codes were initially understood as tools to require structural safety, something seen as distinct from zoning regulation, over time these powers have become quite intertwined as cities have restricted such things as building height, setbacks, and density in order to shape neighborhood character.[144] Moreover, because the issuance of an occupancy permit is often the last step in the local control over development, building permits have been used as leverage to support goals beyond structural integrity, such as the creation of affordable housing, smart growth, and funding for infrastructure.[145] The interconnection between these two areas adds to the local dimension of building codes.

The last few decades have seen two broad shifts in building regulation. First, an increasing number of states have enacted building codes.[146] This shift has, to some extent, started to alter the traditional locus of regulatory authority. Nonetheless, this change only partially limits the traditional local power over buildings because few states entirely preempt local codes, although a number set regulatory floors. Moreover, a number of states still have no statewide building codes, leaving the issue entirely to local governments. Finally, even where states have enacted building regulations, they often do not adopt

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CITYSCAPE: J. POL'Y DEV. & RES. 21, 23 (2005). Often a "building code" is not one document but rather a set of interrelated codes covering different aspects of building construction including the building itself (structural system, fire safety, general safety, enclosure, interior environment, materials), plumbing, mechanical and combustion equipment, electrical systems, and energy. *Id.*

139. *Id.* at 31.

140. JULIAN CONRAD JUERGENSMEYER & THOMAS E. ROBERTS, LAND USE PLANNING AND DEVELOPMENT REGULATION LAW § 8.2 (2d ed. 2007).

141. Listokin & Hattis, *supra* note 138, at 31.

142. *Id.*

143. *See* Clifford C. Ham, *Urban Renewal: A Case Study in Emerging Goals in an Intergovernmental Setting*, 359 ANNALS AM. ACAD. POL. & SOC. SCI. 44 (1965).

144. JURGENSMEYER & ROBERTS, *supra* note 140, § 8.3.

145. *Id*. § 8.8.

146. Listokin & Hattis, *supra* note 138, at 31.

comprehensive codes, leaving gaps for local regulation.[147]

Second, while state and local governments have long relied on model codes created by professional organizations, regional differences are disappearing as jurisdictions converge in adopting one of two model national codes. Increasingly, building code regulations rely on model codes created by either the International Code Council or the National Fire Protection Association.[148] In addition, as discussed below, where local governments have adopted green building programs, the vast majority have employed the LEED program developed by the United States Green Building Council. Thus, minimum building requirements are often more uniform than the specter of state and local standards might suggest.

c. *Trends in local adoption of green building programs*

An increasing number of local governments are incentivizing or mandating improved building design as part of their climate action plans. This recent upsurge in green building program adoption encompasses geographically, politically, and demographically diverse locales. A nationwide inventory of green building programs conducted for Madison, Wisconsin's Mayor's Energy Task Force identified 113 local policies across the country.[149] The vast majority were adopted in the prior few years—more than tripling from thirty-six in 2004 to 113 in 2007.[150] During this period some local governments also increased minimum certification levels in existing programs and extended coverage to additional sectors.[151] By 2007, fifty-five percent of the programs applied to private commercial development.[152]

The American Institute of Architects (AIA) conducted a study in 2007 of cities with populations greater than 50,000 that produced similar results.[153] Of the 606 cities that responded to the survey, ninety-two had green building programs and an additional thirty-six were in the advanced stage of developing

147. While statewide codes rose from twenty-two in the mid-1970s to forty-six by 2003, many apply only to specific types of properties, such as government-owned buildings or multi-unit dwellings. *Id.* Most create minimum requirements allowing for higher local standards and even for those few states that set maximum requirements, local governments nonetheless regulate properties not covered by statewide standards. *Id.* at 31-32.

148. *Id.* at 29.

149. SHERRIE GRUDER, UNIV. OF WIS. EXTENSION, GOVERNMENT GREEN BUILDING PROGRAMS INVENTORY 1 (2007), http://www4.uwm.edu/shwec/publications/cabinet/reductionreuse/Government%20Green%20Buildling%20Programs%20Inventory3.pdf.

150. *Id.*

151. *Id.*

152. *Id.*

153. BROOKS RAINWATER, AM. INST. OF ARCHITECTS, LOCAL LEADERS IN SUSTAINABILITY: A STUDY OF GREEN BUILDING PROGRAMS IN OUR NATION'S COMMUNITIES 4 (2007), http://www.aia.org/aiaucmp/groups/aia/documents/pdf/aias075288.pdf.

such programs.[154] Established programs disproportionately fell into larger cities, so that cities with green building programs represented thirty-nine percent of the total population of contacted cities.[155] Like the Madison inventory, the AIA study also showed disproportionate development in the last few years: seventy-five out of the ninety-two green building programs were authorized in the four years prior to the study.[156]

In 2008, the AIA also surveyed the 200 most populous counties in the United States, finding that county-level green building programs had more than quadrupled, from eight to thirty-nine in the prior four years.[157] In combination, these two AIA studies show that, at a minimum, well over 71 million Americans live in a jurisdiction with some form of green building program.[158]

Most of the programs rely on the United States Green Building Council's Leadership in Energy and Environmental Design (LEED) program. The LEED program, the first nationwide green rating system for buildings and the most well recognized, employs a point system for various sustainable practices including energy efficiency. Depending on the number of points, a building can be rated (in descending order) as LEED Platinum, Gold, Silver, or simply LEED certified.[159] On average, LEED certified buildings use thirty-two percent less electricity than other buildings.[160]

Almost all surveyed cities require green building standards for their own buildings. Cities mandating LEED standards for municipal buildings include many historically pro-environment jurisdictions such as Portland, Seattle, Boston, and numerous California cities.[161] However, it might surprise some observers to see local governments adopting these standards in areas not

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154. *Id.*

155. *Id.* at 13. The total population in the cities contacted was 107,918, 963. *Id.* at 4. Of these, at least 42,374,499 people lived in a city with a green building program. *Id.*

156. *Id.* at 16.

157. BROOKS RAINWATER & COOPER MARTIN, AM. INST. OF ARCHITECTS, LOCAL LEADERS IN SUSTAINABILITY: GREEN COUNTIES 15 (2008), http://www.aia.org/advocacy/local/counties/AIAS078508.

158. The AIA reaches this figure by adding the population for cities that are not within counties with green building programs to its county findings. *Id.* at 18. This figure likely underestimates the total, as the studies only included the 200 most populous counties and cities with populations greater than 500,000. *Id.*

159. U.S. Green Bldg. Council, FAQ: LEED Green Building Certification System, http://www.usgbc.org/ShowFile.aspx?DocumentID=3330 (last visited Jan. 11, 2010).

160. Press Release, U.S. Green Bldg. Council, Building Design Leaders Collaborating on Carbon-Neutral Buildings by 2030: Goal to Meet Specific Energy Reduction Targets (May 7, 2007), http://www.usgbc.org/News/PressReleaseDetails.aspx?ID=3124 ("Building green is one of the best strategies for meeting the challenge of climate change because the technology to make substantial reductions in energy and CO2 emissions already exists. The average LEED® certified building uses 32% less electricity and saves 350 metric tons of CO2 emissions annually.").

161. GRUDER, *supra* note 149, at 2, 9-11, 18, 22, 25-26, 32, 35-36, 38, 40, 42-49, 51-52, 54, 59; *see also* RAINWATER, *supra* note 153, at 24, 26, 45-47.

generally associated with environmentalism. Since 2003, Atlanta, Georgia has required all municipal buildings to be built to LEED Silver Standards.[162] Nashville-Davidson, Tennessee requires LEED certification for municipal buildings over 2000 square feet and costing over two million dollars.[163] Salt Lake City and Dallas mandate LEED Silver standards for city projects.[164] In 2005, the City Council of Scottsdale, Arizona unanimously passed a resolution requiring all new city buildings to be built to LEED Gold standards.[165] The City Council of Greensburg, Kansas—a town that was virtually wiped out by a tornado in 2007—passed a resolution requiring that all new municipal buildings greater than 4000 square feet be built to LEED Platinum standards.[166]

While initial efforts focused on improved energy efficiency in municipally owned or funded buildings, increasingly cities are also creating incentives, mandates, or both for commercial and residential projects.[167] Diverse cities employ a range of local incentives for green building, including options such as fee waivers or reimbursements, subsidized LEED fees, discounted energy star appliances, property tax abatement, awards, green loan funding, training, and permit fee reductions.[168]

In contrast to the financial incentives, a number of additional carrots are uniquely local. Among the most coveted by developers is expedited permitting, which is offered by a number of cities as an incentive to build green.[169] Local governments also draw on their traditional power over zoning to create incentives to induce developers to exceed regulatory minimums for energy

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162. RAINWATER, *supra* note 153, at 40.

163. *Id.* at 55.

164. Ross C. Anderson, Mayor, Salt Lake City, Executive Order (Jan. 19, 2006), *available at* http://www.slcgreen.com/pdf/execorderLEED.pdf; Press Release, City of Dallas, "Green" Is New Building Standard in Dallas (Apr. 9, 2008), http://www.dallascityhall.com/pdf/pio/green_building_standard_040908.pdf.

165. U.S. GREEN BLDG. COUNCIL, LEED INITIATIVES IN GOVERNMENTS AND SCHOOLS 60 (2009), http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1852.

166. *Id.* at 37; Jeff Robinson, *Small Kansas Town Rebuilds as a Green City*, KCPW, Nov. 19, 2009, http://kcpw.org/blog/local-news/2009-11-19/small-kansas-town-rebuilds-as-green-city/.

167. RAINWATER, s*upra* note 153, at 18.

168. *Id.* at 18-19. Unlikely examples include: Gaithersburg, Maryland, which offers reduced permitting fees and rebates to cover LEED fees, *Id.* at 54; Cincinnati, Ohio, which offers property tax abatement as an incentive for green building, *Id.* at 55; and Flower Mound, Texas, which employs green building awards and other local recognition, Town of Flower Mound, Tex., Environmental Resources: Green Building, http://www.flower-mound.com/env_resources/env_resources_green.php (last visited Jan. 11, 2010) ("The Town has developed a voluntary, incentive-based program to encourage builders and developers to: [d]esign and build energy efficient homes and commercial buildings[;] [e]ncourage water conservation[; and s]upport waste minimization[.] Each Green Builder certified by the Town will be recognized on this website. The home or building owner will receive an official Green Building Logo that can be prominently displayed. The builder or developer may use their Green Building status in marketing and advertising campaigns.").

169. RAINWATER, *supra* note 153, at 18.

efficiency and other green building practices. A number of cities use density bonuses, for example, to offer developers the financial benefit of exceeding existing zoning limits on the number of saleable units that they can develop on a particular site.[170] Cities may offer similar incentives through other aspects of zoning codes by allowing developers to exceed limits on building height, ratio of floor space to lot size, or by reducing the amount of required parking.[171]

Tools employed by local green building programs are not limited to incentives. Some cities have created fees or fines applied to projects that fail to meet the city's standards.[172] Geographically and politically diverse cities have also revised building codes to mandate LEED or other energy efficiency standards for commercial and even for residential projects. Large cities that now mandate green building standards for commercial properties, a requirement that forms a component of climate change programs, include Boston, Chicago, Dallas, Houston, and Los Angeles.[173] Dallas, Washington, D.C. and Los Angeles also have requirements for large new residential projects. Many local governments passed these new mandates based on a stated purpose to reduce greenhouse gas emissions. The Dallas, Texas City Council, for example, justified its adoption of green building requirements as part of the city's efforts to become "Carbon Neutral by 2030 and . . . the Greenest City in the U.S."[174] A number of smaller cities across the country have adopted green

170. *Id.* at 19.

171. *Id.*

172. In Arlington, Virginia, for example, all projects must employ LEED-certified professionals and require submission of a LEED Scorecard. Certain projects must earn twenty-six points, or else face a $.03 per square foot fee that goes to support green building education. *Id.* at 56. Normal, Illinois imposes fines of up to $1000 a day for failing to meet its commercial building standards. GRUDER, *supra* note 149, at 31.

173. As part of its climate action plan, Los Angeles revised its building code to mandate basic LEED standards and to provide incentives for projects attaining LEED Silver or higher levels. L.A. DEP'T OF CITY PLANNING, *supra* note 124, at 2. Starting on November 1, 2008, new commercial buildings over 50,000 square feet, high-rise residential buildings over 50,000 square feet, and low-rise residential buildings of the same size that have 50 or more units will be required to meet LEED certification standards; reconstruction of existing buildings will also trigger the requirement if the cost meets a certain threshold. *Id.*

Boston, the first city to require LEED standards for commercial in its zoning code, requires that all private buildings over 50,000 square feet meet LEED standards. RAINWATER, *supra* note 153, at 16, 42. In 2003, Chicago amended its building code to increase energy efficiency requirements for all new residential buildings and additions to existing buildings. *See* City of Chi., Introduction to the Chicago Energy Code, http://egov.cityofchicago.org/city/webportal/home.do (follow "Your Government" hyperlink and select "City Departments" hyperlink under "Local Government"; then select "Buildings," "Chicago Building Code," "Chicago Energy Conservation Code," and "Introduction to the Chicago Energy Code") (last visited Jan. 11, 2010) (describing Chicago Energy Conservation Code's application to residential buildings).

174. GREEN DALLAS, DALLAS CITY HALL, SUMMARY OF TASK FORCE RECOMMENDATIONS AND ORDINANCE REQUIREMENTS 6 (2008), http://www.dallascityhall.com/pdf/OEQ/green_building_ordinance040908.pdf; *see also* Press Release, City of Dallas, *supra* note 164.

building mandates as well.[175] While the efforts of smaller jurisdictions obviously have a smaller impact on emissions, their actions, like those of larger cities, suggest both the widespread nature of this local government movement and the political feasibility of imposing these standards at the local level in diverse jurisdictions.

d. *Potential impact of local green building programs on a national cap*

How well does this story match the standard view of local actions? The presence of individual cities exceeding state floors is not captured in a model that presumes small-scale actors are inevitably motivated to overuse the commons. Local adoption of green building programs addresses barriers to cost-effective action, and have the potential to significantly reduce power demand—hardly a trivial impact. Their rapid adoption (unparalleled at higher levels) builds efficiencies into the environment while waiting for national legislation. Rather than undermining a comprehensive regime, these efficiencies are more likely to ease transition to a future with a carbon-constrained economy for residents of more efficient homes. These efforts also facilitate institutional development in the green building industry in local permitting offices to further ease such transition.

Presuming a comprehensive federal regime effectively regulates upstream sources, why would bottom-up efforts to reduce demand continue to be relevant? As is clear from the uncaptured potential for cost-effective energy savings, market barriers prevent prices alone from catalyzing adoption of available efficiency improvements for buildings. Continued efforts on the part of local governments to overcome these barriers will have a salutary effect on the price of allowances, helping to ensure the continued efficacy of the program.

2. *Zoning and land use power: reducing vehicle use*

Local governments also substantially shape the built environment through

175. For example, Frisco, Texas requires all four categories of construction—municipal, commercial, multifamily, and single-family—to meet efficiency standards; residential construction must meet EPA Energy Star standards and commercial or multifamily buildings have Frisco-specific standards based on LEED. RAINWATER, *supra* note 153, at 56. Normal, Illinois requires all private and public buildings in the city's Central Business District over 7500 square feet to meet LEED standards, with fines of up to $1000 a day for failing to meet the ordinance's requirements. GRUDER, *supra* note 149, at 31. The city of West Hollywood, California adopted a local ordinance creating a mandatory sustainability point system for commercial buildings and residential buildings of three or more units, with incentives for exceeding the minimum number of points. City of West Hollywood, About Green Building, http://www.weho.org/index.cfm/fuseaction/detail/navid/53/cid/5234/ (last visited Jan. 11, 2010).

their well-accepted power over zoning and land use.[176] This power places local governments in a potentially critical position for reducing transportation emissions because land use and urban form shape vehicle usage.

a. *Approaches to reducing transportation emissions*

The transportation sector produces nearly a third of U.S. CO_2 emissions.[177] This end-use produces more CO_2 emissions than any other sector in the U.S., and consumes seven out of every ten barrels of oil used in the United States.[178] The transportation sector's emissions have also been growing the fastest,[179] accounting for nearly half of the net increase in U.S. emissions between 1990 and 2007.[180] Motor vehicle usage accounts for roughly eighty percent of transportation emissions.[181]

Policies aimed at reducing transportation's role in U.S. greenhouse gas emissions have focused largely on increasing vehicle fuel efficiency and promoting low-carbon fuels. At the federal level, the Energy Independence and Security Act of 2007 (EISA) mandated that automobile manufacturers raise Corporate Average Fuel Economy (CAFE) standards to thirty-five miles per gallon by 2020.[182] Yet, projected increases in the average daily driving of

176. *See, e.g.*, ROBERT C. ELLICKSON & VICKI L. BEEN, LAND USE CONTROLS: CASES AND MATERIALS 29 (3d ed. 2005) ("Public land use regulation in the United States traditionally has been mainly the province of local governments."); Richard Briffault, *Our Localism: Part I—The Structure of Local Government Law*, 90 COLUM. L. REV. 1, 3 (1990) ("Land use control is the most important local regulatory power. . . . [S]tate-delegated power, supported by judicial attitudes sympathetic to local control, has resulted in real local legal authority, notwithstanding the nominal rules of state supremacy."); *see also* Rapanos v. United States, 547 U.S. 715, 738 (2006) ("Regulation of land use, as through the issuance of the development permits sought by petitioners in both of these cases, is a quintessential state and local power. The extensive federal jurisdiction urged by the Government would authorize the Corps to function as a *de facto* regulator of immense stretches of intrastate land—an authority the agency has shown its willingness to exercise with the scope of discretion that would befit a local zoning board." (citations omitted)).

177. EWING ET AL., *supra* note 121, § 2.1; *see also* Eileen Claussen, *Foreword* to DAVID L. GREENE & ANDREAS SCHAFER, PEW CTR. ON GLOBAL CLIMATE CHANGE, REDUCING GREENHOUSE GAS EMISSIONS FROM U.S. TRANSPORTATION, at ii, ii (2003), *available at* http://www.pewclimate.org/docUploads/ustransp.pdf.

178. GREENE & SCHAFER, *supra* note 177, at 2-3.

179. *Id.* at 3.

180. STEVE WINKELMAN ET AL., CTR. FOR CLEAN AIR POLICY, COST-EFFECTIVE GHG REDUCTIONS THROUGH SMART GROWTH & IMPROVED TRANSPORTATION CHOICES, at v (2009), http://www.ccap.org/docs/resources/677/CCAP%20Smart%20Growth%20-$%20per%20ton%20CO2%20_June%202009_%20FINAL.pdf.

181. EWING ET AL., *supra* note 121, § 1.7.6; *see also* U.S. ENVTL. PROT. AGENCY, GREENHOUSE GAS EMISSIONS FROM THE U.S. TRANSPORTATION SECTOR 1990-2003, at 7 (2006), http://www.epa.gov/otaq/climate/420r06003.pdf.

182. Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492 (2008). The EISA also requires the establishment of annual fuel economy increases for

Americans, or their "vehicle miles traveled" (VMT), threatens to undermine the effect of these policies.

A recent EPA study finds that "[b]y far the most significant factor to past growth in GHG emissions [from transportation] has been increases in the number of vehicles on the road and in vehicle usage."[183] Similarly, the Center for Clean Air Policy warns that growth in VMT in the United States "has outpaced population growth and is projected to continue to outstrip improvements in vehicle efficiency."[184] Nationwide, VMT has been increasing at three times the rate of population growth.[185] In 2007, the U.S. Department of Energy projected that Americans will increase their average annual driving from 13,000 to 17,000 miles by 2030.[186] The EPA thus finds that the most effective approaches to flattening transportation's upward emissions curve between now and 2050 incorporate efforts to reduce VMT.[187]

Similarly, the California Energy Commission has concluded that reductions in VMT will be essential to meeting California's emissions reduction goals.[188] Even assuming California's Low Carbon Fuel Standard[189] and Clean Car Law (which provides for progressively more stringent tailpipe emissions standards for new motor vehicles sold in the state)[190] succeed, projected increases in VMT would nonetheless eliminate greenhouse gas savings from these legislative efforts.[191]

Thus, while improvements in fuel efficiency and mandates for low carbon fuels could reduce transportation emissions compared to business as usual, increasing VMT and growing population makes flattening the VMT curve critical to reducing transportation emissions—at least absent much more

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automobiles beginning in 2011 in order to reach the thirty-five miles per gallon target in 2020. 49 U.S.C.A. § 32902(b)(2)(C) (West 2009).

183. SIMON MUI ET AL., U.S. ENVTL. PROT. AGENCY, A WEDGE ANALYSIS OF THE U.S. TRANSPORTATION SECTOR 16 (2007), http://www.epa.gov/OMS/climate/420r07007.pdf.

184. Progressive Policy Inst., Driving Down Carbon Dioxide, http://www.ppionline.org/ppi_ci.cfm?knlgAreaID=116&subsecID=900039&contentID=252224 (last visited Feb. 8, 2010) (quoting the Center for Clean Air Policy).

185. EWING ET AL., *supra* note 121, § 1.3.

186. MUI ET AL., *supra* note 183, at 17 n.39 (citing ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, ANNUAL ENERGY OUTLOOK (2007)).

187. *Id.* at 18.

188. CAL. ENERGY COMM'N, INTEGRATED ENERGY POLICY REPORT 208-09 (2007), http://www.energy.ca.gov/2007publications/CEC-100-2007-008/CEC-100-2007-008-CMF.PDF ("It is imperative that land use planning and infrastructure investments place a high priority on reducing the growth of [VMT].").

189. Exec. Order No. S-01-07 (Cal. 2007), *available at* http://gov.ca.gov/executive-order/5172/ (calling for a ten percent reduction in the carbon intensity of California's transportation fuels).

190. Assem. B. 1493, 2001-02 Reg. Sess. (Cal. 2002).

191. CAL. ENERGY COMM'N, *supra* note 188, at 10, 209. California is the world's third largest consumer of transportation fuel, exceeded only by China and the United States. *Id.* at 9. Transportation accounts for forty percent of California's greenhouse gas emissions. *Id.* at 10.

stringent fuel content or fuel efficiency standards than have thus far been deemed politically feasible. Transportation experts refer to approaches that capture all three elements—increased vehicle fuel efficiency, low carbon fuel standards, and VMT reduction—as the "three-legged stool."[192]

b. *Sprawl: traditional Euclidean zoning and vehicle miles traveled*

Sprawling[193] residential and commercial development combined with decades of infrastructure developed to facilitate car travel have been key drivers of the upward trajectory in VMT.[194] Low-density land use patterns based on conventional zoning increase VMT by requiring most Americans to drive (or at least by making it difficult to walk) to their jobs, stores, entertainment, services, and social events.[195] Even over relatively small distances, planning decisions can dramatically affect VMT. Traditional Euclidean zoning aims to separate different types of uses and thus places major arterial streets between commercial, residential, and industrial districts, rendering it impractical to walk between areas even if the distance between zones is small.[196] Yet short local car trips, unrelated to commuting, account for nearly forty percent of VMT.[197] In metropolitan areas, almost half of the total vehicle trips are no more than three miles, and twenty-eight percent are less than one mile.[198] Both the prevalence of these short trips and the fact that

192. EWING ET AL., *supra* note 121, § 1.1.

193. Although scholars debate the proper definition of "sprawl," the following captures its common features:

> [Sprawl is] the process in which the spread of development across the landscape far outpaces population growth. The landscape sprawl creates has four dimensions: a population that is widely dispersed in low-density development; rigidly separated homes, shops, and workplaces; a network of roads marked by huge blocks and poor access; and a lack of well-defined, thriving activity centers, such as downtowns and town centers. Most of the other features usually associated with sprawl—the lack of transportation choices, relative uniformity of housing options or the difficulty of walking—are a result of these conditions.

REID EWING, ROLF PENDALL & DON CHEN, SMART GROWTH AM., MEASURING SPRAWL AND ITS IMPACTS 3 (2002), http://www.smartgrowthamerica.org/sprawlindex/MeasuringSprawl.pdf.

194. MATTHEW E. KAHN, GREEN CITIES: URBAN GROWTH AND THE ENVIRONMENT 111-12 (2006). Since World War II, the predominant pattern in land use development has presumed and supported automobile travel and has pushed development farther and farther from central cities. EWING ET AL., *supra* note 121, at Executive Summary.

195. For example, in 2000, eighty-eight percent of Americans commuted to work by car (seventy-six percent in single occupancy vehicles). U.S. CENSUS BUREAU, JOURNEY TO WORK: 2000 at 1 (2004), www.census.gov/prod/2004pubs/c2kbr-33.pdf.

196. *See, e.g.*, Zoning Matters, Types of Zoning Codes, http://www.zoningmatters.org/facts/trends (last visited Jan. 5, 2010).

197. Videotape: Land Use and Building the American Community (Rocky Mountain Land Use Institute 1996) (on file with the University of Denver Law Library).

198. Marge Fahey, *Soaring Gas Prices Forcing Changes in Transportation Policy*, THE GROUND FLOOR, July 22, 2008, http://thegroundfloor.typepad.com/the_ground_floor/2008/07/soaring-gas-pri.html.

sixty-two percent of vehicle travel currently occurs within urban areas[199] makes cities' zoning decisions critical to VMT reduction.[200]

Transportation scholars vigorously debate the appropriate definition of sprawl and the precise contours of its impact, so much so that some scholars describes this as "the most heavily researched subject in urban planning."[201] It is well established, however, that dense, transit-friendly, walkable communities, such as New York City, find their residents spending much less time in the car than low-density, automobile-oriented places such as Atlanta.[202]

After conducting a comprehensive literature review of the relationship between urban form and automobile use, the authors of *Growing Cooler: The Evidence on Urban Development and Climate Change* concluded that "much of the rise in vehicle emissions can be curbed simply by growing in a way that will make it easier for Americans to drive less."[203] In their assessment, Ewing and his colleagues reviewed numerous studies analyzing the relationship between sprawl and driving behavior from diverse angles, concluding that "regardless of the approach, researchers have found significant potential for compact development to reduce the miles that residents drive."[204] Overall, "the weight of the evidence shows that, with more compact development, people drive 20 to 40 percent less, at minimal or reduced cost, while reaping other fiscal and health benefits."[205]

c. *How local governments can influence VMT*

Local governments have an array of short- and long-term tools to affect VMT. Local governments can reduce VMT by "concentrat[ing] growth in core service areas with existing infrastructure and housing . . . modifying zoning ordinances to allow mixed-use development, [and] providing tax credits and incentives for transit-oriented development."[206] Changing zoning to redirect

199. EWING ET AL., *supra* note 121, § 1.7.4. This figure is adjusted for CO_2 emissions. *Id.*

200. *Id.* This figure has been projected to reach eighty percent by 2050. *Id.*

201. *Id.* at Executive Summary.

202. *See* EWING, PENDALL & CHEN, *supra* note 193, at 17, 22; *see also* David G. Burwell, *Beyond Congestion: Transportation's Role in Managing VMT for Climate Outcome*, *in* REDUCING CLIMATE IMPACTS IN THE TRANSPORTATION SECTOR 117, 125 (Daniel Sperling & James S. Cannon eds., 2009). This likely explains why 4.7% of Americans that took public transportation to work in 2000 were disproportionately likely to be found in the state of New York, which accounted for one-third of all of the public transportation users. U.S. CENSUS BUREAU, *supra* note 195, at 8.

203. EWING ET AL., *supra* note 121, at Executive Summary.

204. *Id.*

205. *Id.* In terms of health, compact urban form correlates with fewer traffic fatalities, significantly lower levels of asthma-inducing ozone, and increases in trips that are taken by walking. *Id.* § 3.1.2.

206. CTR. FOR CLEAN AIR POLICY, STATE AND LOCAL LEADERSHIP ON CLIMATE CHANGE 16 (2003),

future growth away from sprawl and single-use zoning to more compact, mixed forms that allow residents to walk, bike, or use transit to reach amenities can reduce VMT in both the short and long run.[207] Notably, part of this can be accomplished with a deregulatory approach to zoning that eliminates restrictions on commercial uses in residential areas, allows construction of higher density apartments and condominiums, reduces or eliminates setback and parking requirements, and allows homeowners to create small housing units known as "granny flats."

Local governments' short-term options to reduce VMT predominantly focus on methods other than zoning. They can, for example, incentivize their own employees to reduce car usage in commuting,[208] encourage large businesses to allow telecommuting,[209] or require large employers to provide parking cash-outs.[210] They can also reduce parking requirements (many of

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http://www.siame.gov.co/siame/documentos/documentacion/mdl/03_VF_Bibliografia/Baseline/State%20and%20local%20leaderrship%20on%20transportation.pdf; *see also* EWING ET AL., *supra* note 121, § 3.1.2.

207. *See* Dan Sperling, James Cannon & Nic Lutsey, *Climate Change and Transportation*, *in* REDUCING CLIMATE IMPACTS IN THE TRANSPORTATION SECTOR, *supra* note 202, at 1, 8 ("The real key to reduced vehicle travel is creating more choice for travelers, . . . especially increased densification of land use. Research shows that residents in more densely populated areas and in areas with better mixes of land uses tend to emit far less GHG emissions from their travel. They tend to walk more, use more public transportation, and drive less." (internal citations omitted)).

208. The 2007 SURVEY ON MAYORAL LEADERSHIP ON CLIMATE PROTECTION found that fifty-two percent of the 134 cities responding (representing over twenty-five million people) provide financial or other incentives to encourage their employees to commute to work via public transportation, carpools, vanpools, car-sharing, bicycle or by foot. MAYORS CLIMATE PROT. CTR., *supra* note 32.

209. The Mayor of Houston, for example, developed the Flexible Workplace Initiative that encourages businesses to reduce traffic and congestion by allowing employees to telecommute or work on a compressed schedule. The City provides toolkits, information, and mobility studies, among other services, to support workplace flexibility. *See* City of Houston, Flexible Workplace Initiative (Flexworks), http://www.houstontx.gov/flexworks/index.html (last visited Jan. 9, 2010). As part of his effort to reduce traffic through workplace flexibility, Mayor White also launched a two-week program, Flex in the City, during which employers could sample flexibility options. The program monitored the impact on traffic, reported the savings, and provided awards for participation. *See* City of Houston, Flex in the City, http://www.houstontx.gov/flexworks/flexinthecity/index.html (last visited Jan. 9, 2010); *see also* Press Release, City of Houston, *Flex in the City* Demonstrates Commuter Time Cuts, Millions in Yearly Cost Savings (Oct. 12, 2006), http://www.houstontx.gov/mayor/press/20061012.html ("More than 140 organizations registered for two-week *Flex in the City* program [sic] as participants and/or supporters, anticipating more than 20,000 employees eliminating an additional peak-time commute through teleworking/telecommuting; compressed workweeks (same number of work hours in fewer days); or shifting their commute to before or after peak-time commute hours.").

210. Santa Monica, California, for example, requires certain large employers to offer employees the equivalent cash value of employer subsidized parking. U.S. Envtl. Prot. Agency, Clean Air Cookbook: Parking Cash-Out Program Case Study, http://www.epa.gov/air/recipes/cashout.html (last visited Jan. 17, 2009). By incentivizing the

which have little empirical backing) or price parking according to market demand.[211] Although compact development is a long-term strategy, even small steps to increase density can reduce VMT. Numerous studies demonstrate that residents of well-done infill housing drive much less than those in developments on the urban fringe.[212] Modeling of the 138-acre Atlantic Station redevelopment project in Midtown Atlanta, for example, showed reductions of residents' VMT by thirty-five percent compared with the same project in a suburban location.[213]

In the long term, projected population growth gives local governments substantial potential to shape urban form (and consequently VMT) by changing zoning to support compact development. Studies estimate that "two-thirds of the development on the ground in 2050 will be built between now and then."[214] While cities cannot instantly change development patterns that have existed since World War II, they can shift the direction of this new development through a combination of zoning and policy changes that promote infill, provide a mix of uses, and create pedestrian and transit-oriented development. This combination of policies is often referred to as "smart growth."[215]

Because new development will be built regardless of whether policies change or not, redirecting the shape of the built environment provides a low-cost strategy for reducing greenhouse gas emissions. Moreover, unlike beneficial but shorter-term strategies such as carbon taxes, parking fees, and demand management efforts, the relative permanence of the built environment means that these changes cannot be repealed.[216]

How much of a difference can urban form make? Ewing and colleagues estimate that "shifting 60 percent of new growth to compact patterns would save 85 million metric tons of CO_2 annually by 2030" while providing numerous co-benefits.[217] It should be recognized, however, that Ewing's analysis considers only VMT reductions from urban compact development independently,[218] which compounds when complemented by other strategies (e.g., expanded transit availability, parking cash-outs, congestion pricing,

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use of public transportation, this program is estimated to save 544,000 miles of driving per year. CTR. FOR CLEAN AIR POLICY, *supra* note 206, at 21.

211. *See generally* DONALD C. SHOUP, THE HIGH COST OF FREE PARKING (2005).

212. EWING ET AL., *supra* note 121, § 3.4.3 figs.3-30 (citing studies of various projects showing between thirteen and seventy-two percent reductions in VMT for infill when compared with greenfield development).

213. *Id.* § 3.4.1.

214. *Id.* at Executive Summary.

215. U.S. Envtl. Prot. Agency, Smart Growth: About Smart Growth, http://www.epa.gov/dced/about_sg.htm (last visited Jan. 17, 2010).

216. EWING ET AL., *supra* note 121, at Executive Summary.

217. *Id.* Co-benefits include public health improvements from reductions in other pollutants, improved transportation choices, and lower infrastructure and operating costs. *Id.* § 7.2.1.

218. *Id.* § 1.7.7.

etc.).[219] Thus, the potential emissions savings from local governments' efforts to reduce VMT with smart growth and other policies are actually much higher. Indeed, a 2009 study by the Center for Clean Air Policy finds that the combination of smart growth best practices, expanded transportation choices, and targeted transportation pricing could reduce VMT by ten percent per capita, netting emissions reductions of 145 $MMTCO_2$ per annum.[220] This equates to the yearly emissions of thirty million cars, or thirty-five large coal plants.[221]

Compact development could also reduce greenhouse gases in ways unrelated to VMT. Sprawling development increases length requirements for city infrastructure, generating additional miles of streets, sidewalks, sewers, bridges, electrical transmission lines, curbs and gutters, storm drains, sidewalks, and medians, among other things. Why does this matter? The U.S. EPA identifies the manufacture of iron, steel, and cement—core components of infrastructure—as among the most greenhouse gas-intensive industrial processes in the United States.[222] Compact development also reduces the area generating heat islands[223] while potentially preserving more open space with vegetation that can serve as carbon sinks. In addition, compact design reduces distances for trash removal, school bus routes, and other services that create vehicle emissions and heat island effects from tailpipes.

Compact development benefits communities in additional ways unrelated to climate benefits: it can reduce the cost of creating infrastructure and providing services while also benefiting public health by increasing the amount

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219. *Id.* Ewing's emissions reduction estimate excludes documented energy demand reductions of approximately twenty percent in compact areas which stems from shared exterior walls in attached and multi-family housing and generally smaller floor areas of homes in high density areas. *Id.*

220. WINKELMAN ET AL., *supra* note 180, at v.

221. *Id.*

222. U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2007 fig.ES-4 (2009), http://www.epa.gov/climatechange/emissions/downloads09/InventoryUSGhG1990-2007.pdf. Compact design is estimated to result in eleven percent infrastructure cost savings compared with sprawl, indicating greenhouse gas savings from materials and construction. EWING ET AL., *supra* note 121, § 1.6.

223. For an explanation of how this effect raises temperatures in urban areas compared to rural ones, see U.S. Envtl. Prot. Agency, Heat Island Effect: Basic Information, http://www.epa.gov/hiri/about/index.htm (last visited Jan. 17, 2010) ("As urban areas develop, changes occur in their landscape. Buildings, roads, and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist become impermeable and dry. These changes cause urban regions to become warmer than their rural surroundings, forming an 'island' of higher temperatures in the landscape. . . . On a hot, sunny summer day, the sun can heat dry, exposed urban surfaces, such as roofs and pavement, to temperatures 50-90°F (27-50°C) hotter than the air, while shaded or moist surfaces—often in more rural surroundings—remain close to air temperatures. . . . The annual mean air temperature of a city with 1 million people or more can be 1.8-5.4°F (1-3°C) warmer than its surroundings. On a clear, calm night, however, the temperature difference can be as much as 22°F (12°C).").

residents walk and reducing criteria air pollutants.[224] Indeed, some estimates show that compact development can generate a net cost savings.[225] Thus, Ewing and colleagues describe smart growth as the "low hanging fruit" of the transportation sector.[226]

Cities are going to grow; the question is how will they do it? Will they help to flatten the VMT curve? Or will they exacerbate it?

d. *What are local governments doing?*

While variation in urban form and the context-specific nature of land use planning renders smart growth strategies difficult to compare across jurisdictions,[227] several data points suggest growing adoption of these principles among at least some local governments. Since 2000, many cities have adopted or begun developing zoning and land use codes based on smart growth principles—some amending codes to create special districts and others completely overhauling the existing code rather than amending it around the edges. As with green building policies, these geographically and demographically diverse efforts have included such metropolitan areas as El Paso, Louisville, and Miami—not jurisdictions usually associated with Berkeley-style environmentalism.[228]

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224. The term "criteria air pollutants" refers to several pollutants regulated under the Clean Air Act that have direct public health effects, by, for example, contributing to asthma, cancer, and heart disease. *See* U.S. Envtl. Prot. Agency, The Plain English Guide to the Clean Air Act: Cleaning Up Commonly Found Air Pollutants, http://www.epa.gov/air/caa/peg/cleanup.html (last visited Jan. 17, 2010).

225. *See, e.g.*, WINKELMAN ET AL., *supra* note 180, at 7.

226. EWING ET AL., *supra* note 121, § 1.5.

227. Unlike inventories of jurisdiction-wide building code changes, extensive research did not uncover equivalent inventories demonstrating the extent of local adoption of smart growth and New Urbanist planning models.

228. In 2007, for example, El Paso, Texas performed a major rewrite on its zoning code for the first time since the early 1980s. Telephone Interview with Linda Castle, Senior Planner, City of El Paso Dev. Servs.: Planning Div. (Jan. 4, 2009). The rewrite aimed to facilitate "smart growth" through increased density, mixed uses, and reduced setback requirements, among other things. *See, e.g.*, EL PASO, TEX., MUN. CODE §§ 21.50.080, 21.40.020, and 21.50.060 (2009), *available at* http://library7.municode.com/default-test/home.htm?infobase=16180&doc_action=whatsnew_20.10.520. Also in Texas, San Antonio adopted a new code for the entire city in 2001, directed at similar goals. PAUL CRAWFORD, CONG. FOR THE NEW URBANISM, CODIFYING NEW URBANISM: HOW TO REFORM MUNICIPAL LAND DEVELOPMENT REGULATIONS 92-93 app. A (2004); Patrick Driscoll, *City Adopts New Development Code*, SAN ANTONIO EXPRESS-NEWS, May 4, 2001, at A1. The Louisville, Kentucky Metro Government adopted a new zoning code in 2002, replacing the land development laws for all of Jefferson County with a plan guided by New Urbanist principles. CRAWFORD, *supra*, at 90-91 app. A. This plan stands to influence a comparatively large population, as Jefferson is Kentucky's most populous county with almost 714,000 residents, more than twice the size of the next largest county. U.S. CENSUS BUREAU, U.S. DEP'T OF COMMERCE, ANNUAL ESTIMATES OF THE RESIDENT POPULATION FOR COUNTIES OF KENTUCKY: APRIL 1, 2000 TO JULY 1, 2008 (2009), http://www.census.gov/popest/

Many medium-sized cities have adopted SmartCode, a model code released in 2003[229] that can be customized "to create a generic medium-sized American city structured into walkable neighborhoods" through a mix of land uses, pedestrian-oriented transportation design, and public spaces.[230] Between 2003 and 2009, it was adopted by twenty-five jurisdictions either as a mandatory replacement for existing zoning or as an optional alternative for all or parts of the cities.[231] Another sixty-five jurisdictions are in the process of customizing SmartCode for adoption.[232] The vast majority of these cities are not environmental coastal enclaves, but rather fast-growing suburbs and exurbs in the South.[233] Meanwhile, the Congress for the New Urbanism has identified twenty-six additional local governments with such regulations ranging from Seattle[234] to St. Paul[235] to San Antonio to Albuquerque.

However, it is also clear that local governments face a range of impediments to smart growth, and some have initially been antagonistic to consideration of greenhouse gas emissions in their transportation planning.[236]

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counties/tables/CO-EST2008-01-21.xls. In 2001, Fort Collins, Colorado adopted a new jurisdiction-wide land use code that included mixed-use neighborhood districts with minimum densities, among other smart growth/New Urbanism features. CRAWFORD, *supra*, at 88-89, app. A. Miami, Florida is in the final stages of developing the Miami 21 Zoning Code, which is "guided by tenets of New Urbanism and Smart Growth." The City of Miami, Miami21: Your City, Your Plan, http://www.miami21.org/ (last visited Jan. 17, 2010).

229. Duany Plater-Zyrberk & Co., Services: Codes, http://www.dpz.com/services.aspx (follow "Codes" hyperlink) (last visited Jan. 17, 2010).

230. HURLEY~FRANKS & ASSOCS., WHAT IS THE SMARTCODE? (2007), http://www.smartcodecomplete.com/documents/WhatIsSmartCode_071123.pdf.

231. SmartCode Complete, Links and Resources, http://www.smartcodecomplete.com/learn/links.html (last visited Jan. 17, 2010).

232. *Id.*

233. The following cities have adopted the code for all or part of their jurisdiction either as a mandatory overlay to the existing zoning or as an alternative option to existing zoning: Abbeville, Louisiana; Conway, Arkansas; Dardenne Prairie, Missouri; Flagstaff, Arizona; El Paso, Texas; Flowood, Mississippi; Elmore, Alabama; Fort Myers, Florida; Germantown, Tennessee; Gulfport, Mississippi; Jefferson County, Alabama; Kona, Hawaii; Lake Charles, Louisiana; Lawrence, Kansas; Leander, Texas; Liberty, Missouri; Mesquite, Texas; Montgomery, Alabama; Pass Christian, Mississippi; Petaluma, California; Pike Road, Alabama; San Antonio, Texas; Sarasota, Florida; St. Charles, Missouri; and Taos, New Mexico. *Id.*

234. In July 2001, Seattle, Washington adopted a mandatory zoning code addressing creating New Urbanist design in eight areas surrounding planned rail stations. CRAWFORD, *supra* note 228, at 92-93 app. A. In 2006 it again revised its land use codes to support its climate action plans. OFFICE OF SUSTAINABILITY AND ENV'T, CITY OF SEATTLE, 2007-2008 SEATTLE CLIMATE ACTION PLAN: PROGRESS REPORT 2 (2007), http://www.seattle.gov/climate/docs/SeaCAP percent20Progress percent20Report2007.pdf.

235. In April 2004, Saint Paul, Minnesota adopted the Saint Paul Urban Village Code, which creates mandatory requirements for infill and major reuse sites, providing for mixed uses and density improvements. CRAWFORD, *supra* note 228, at 92-93 app. A.

236. For example, San Bernardino County, California initially refused to consider the increases in VMT caused by their proposed General Plan (a strategic plan for how the region will grow required by California law) until the California Attorney General filed suit. The

e. *Potential impact*

Nonetheless, even in the absence of state mandates at least some local governments, including many in areas not known for environmentalism, have shown that they are willing to use their land use power to adopt smart growth policies that can reduce VMT. And, as discussed above, this power appears to be critical to reducing transportation emissions—hardly a trivial or insignificant area of contribution. Will adoption of smart growth plans potentially harm the effectiveness of a comprehensive cap-and-trade regime? It is hard to see how since by their very nature, land use policies in one area cannot leak into others. While leakage could occur through price signals, this theoretical concern hardly warrants maintaining policies that are well known to create material limitations on the ability to reduce fossil fuel use. Like building codes, the benefits of smart growth policies are built into the physical environment.

While one could conceivably argue that local smart growth policies interfere with the ability of top-down regulation to project demand or that they create policy "lock in" (preventing an even better national plan), these arguments would founder on the baseline issue. Failing to act at the subnational level does not hold the economic or physical environment in stasis, preventing the "lock in" feared by Coglianese. Rather, policy and behavior patterns will become established whether or not they incorporate climate concerns. With the built environment, absent changes in land use laws physical patterns impeding VMT reduction will be imprinted upon the landscape. In contrast to fears that subnational efforts undermine future national or international comprehensive schemes, local smart growth plans (like green building programs) are more likely to facilitate transition to a more carbon-constrained economy by facilitating conservation.

But what about the future relevance of local government action, assuming an effective cap-and-trade system is enacted? Because driving demand is relatively inelastic[237]—that is, increased fuel prices do not reduce driving in proportion to the increased price—a cap-and-trade scheme alone will not reduce VMT or demand to the extent possible with concomitant land use changes and other demand-side strategies. However, to the extent local governments create environments that reduce the demand for car travel, they will help to lower the price of fuel. By reducing demand, local governments can help keep prices low and prevent the need for additional allowances.

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settlement led to a revised plan with substantial emission reduction strategies in the form of a "Greenhouse Gas Emission Reduction Plan." *See* People v. County of San Bernardino, No. CIVSS 0700329 (Cal. Super. Ct. Aug. 28, 2007) (order regarding settlement).

237. WINKELMAN ET AL., *supra* note 180, at v ("The price signal from a cap-and-trade system will not be effective in reducing VMT, due to market imperfections and limited transportation choices in many parts of the country." (citing STEVE WINKELMAN, TIM HARGRAVE & CHRISTINE VANDERLAN, CTR. FOR CLEAN AIR POLICY, TRANSPORTATION AND DOMESTIC GREENHOUSE GAS EMISSIONS TRADING (2000))).

Second, lower prices make it easier for nonprofits, other organizations, and individuals to purchase and retire credits, thereby lowering the cap more quickly. Finally, by facilitating transportation choices and reducing the need to drive, local governments can soften the economic impact of a cap-and-trade regime, which should help maintain political support for continued reductions of the cap.

3. *Waste and garbage*

Waste management, another typical and well-accepted area of local power, has the potential to decrease energy demand while simultaneously eliminating new sources of greenhouse gas emissions. Because landfills and sewage treatment plants generate methane from discrete sites, they can also generate power to displace demand for energy from greenhouse gas-intensive sources.

a. *Recycling*

Local governments operate the majority of municipal solid waste programs in the country, making them critical regulators of the volume of waste and the rate of recycling. Recycling has salutary effects on emissions both by reducing energy demand and eliminating sources of methane, a potent greenhouse gas. Recycling lessens emissions from collection and transportation of waste to landfills while also lowering the demand for raw materials and the energy needs to transform them into products.[238] Less waste in landfills also means fewer anaerobic processes in landfills that generate methane.[239] Finally, recycling prevents the release of carbon dioxide from waste disposal systems that rely on incineration.[240]

Local governments' efforts to increase recycling (and thereby reduce the waste stream) can potentially have dramatic effects. According to the EPA, in 2003 U.S. communities recycled an estimated 30.6 percent of their total municipal solid waste.[241] The EPA estimated that increasing the average to thirty-five percent would result in total energy savings of about 1,720 trillion Btu—the equivalent of 13.7 billion gallons of gasoline or 297 million barrels of crude oil.[242] This would have the same effect on carbon dioxide emissions as

238. U.S. Envtl. Prot. Agency, Climate Change—Waste: General Information on the Link Between Solid Waste and Greenhouse Gas Emissions, http://www.epa.gov/climatechange/wycd/waste/generalinfo.html (last visited Jan. 17, 2010).

239. *Id.*

240. *Id.*

241. ANNE CHOATE ET AL., U.S. ENVTL. PROT. AGENCY, WASTE MANAGEMENT AND ENERGY SAVINGS: BENEFITS BY THE NUMBERS 6 (2005), http://www.epa.gov/climatechange/wycd/waste/downloads/Energy%20Savings.pdf.

242. *Id.*

removing twenty-seven million passenger cars from the roadway each year.[243]

Historically, local governments have been at the forefront of the national push towards recycling. Concerns about climate change have caused them to redouble their efforts. Many local governments' climate action plans target diversion of solid waste from landfills and incinerators to recycling facilities.[244] As described below, plans employ a range of carrots and sticks to increase recycling rates, including education and outreach, improved access with new or expanded curbside pickup, mandatory increased recycling of a percentage of construction debris, and in some cases penalties for failing to recycle.

One critical target of many plans is construction waste, which accounts for somewhere between twenty-five and forty percent of the U.S. solid waste stream.[245] Recognizing this as a critical sector, cities have added new recycling requirements for the construction industry and have significantly increased preexisting recycling requirements for construction waste. For example, until 2005 when it began requiring tracking of construction waste, Chicago had no requirements in this area. The 2005 amendments to its Construction Waste Ordinance mandated that contractors begin to track the quantity of waste generated from construction sites; during 2006 they were required to monitor and "strive" for a twenty-five percent recycling goal.[246] The ordinance requires contractors to recycle fifty percent of the debris from the job site for any permit sought after January 1, 2007.[247] For another example, see San Francisco, which

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243. *Id.*

244. *See, e.g.*, CITY OF BOSTON, CLIMATE: CHANGE 18 (2007), http://www.cityofboston.gov/climate/pdfs/CAPJan08.pdf (including a goal of increasing recycling of all materials by 2012); CITY OF CHI., CHICAGO CLIMATE ACTION PLAN 36 (2008), http://www.chicagoclimateaction.org/filebin/pdf/finalreport/ccapreportfinal.pdf (setting a goal to reduce, reuse, or recycle ninety percent of the city's waste by 2020); CITY OF L.A., *supra* note 104, at 23 (setting a goal to increase waste diversion from sixty-two to seventy percent by 2020); CITY OF SAN DIEGO, CLIMATE CHANGE ACTION PLAN 6 (2005), http://www.sandiego.gov/environmental-services/sustainable/pdf/action_plan_07_05.pdf (proposing adoption of ordinances for demolition recycling, commercial paper recycling, and multiple family recycling).

245. Nat'l Inst. of Bldg. Scis., Whole Building Design Guide: Executive Order 13423 Technical Guidance - Construction Waste, http://www.wbdg.org/references/mou_cw.php (last visited Jan. 17, 2010) ("In 2003, the US EPA estimated roughly 164 million tons of C&D [construction and demolition] waste from buildings were generated in the US annually. Of this quantity, 9% was construction waste, 38% was renovation waste material, and 53% was demolition debris. C&D waste constitutes an estimated 25% to 40% of the national solid waste stream.").

246. City of Chi., Construction and Demolition Recycling, http://egov.cityofchicago.org/city/webportal/home.do (follow "City Departments" hyperlink; then select "Environment" hyperlink, followed by "Initiatives & Programs," "Recycling," and "Recycling" hyperlinks; then follow "Construction/Demolition Sites" hyperlink under "Commercial Recycling") (last visited Jan. 17, 2010).

247. *Id.* Recyclables in demolition and construction include bricks, concrete, masonry, rock, scrap metal, plaster, dry wall, glass, plastic, shingles, and non-asbestos insulation. *Id.*

adopted an ordinance in 2006 requiring diversion of sixty-five percent of construction debris as an explicit part of its climate change program.[248]

Seattle has tackled recycling in a particularly noteworthy fashion. In January 2005, the city began prohibiting residences and businesses from placing "significant" amounts of recyclables in their garbage, meaning that they could not have more than ten percent of the garbage composed of recyclable materials.[249] Seattle's program combines carrots and sticks: In addition to an increased ability to dispose of recyclables and an education campaign to promote the program, Seattle's system includes "consequences" that began in 2006.[250] Under the plan, inspectors tag residential bins that appear to contain more than ten percent recyclables.[251] These bins are not collected until the waste has been separated.[252] Apartment buildings and other businesses are fined if they fail to meet the requirements.[253] At the same time, Seattle has facilitated increased residential and commercial recycling by allowing apartments and commercial businesses to sign up for a second weekly pickup and by making yard waste collection for composting less expensive than garbage pickup.[254]

At least some of these ramped up recycling programs have proven effective. For example, Salt Lake City reports an increase of eighty-five percent in its residential recycling program since 2000.[255] Portland, Oregon attributes part of its success in reducing per capita emissions to its achievement of one of the highest recycling rates in the country. Portland diverts fifty-four percent of its waste from landfills.[256] The city offers recycling services to all residential buildings and requires businesses to develop a plan to divert at least half of their waste from landfills.[257] Recent additions to Portland's programs include a commercial food waste collection program.[258] Los Angeles boasts a recycling rate of sixty-two percent, giving it the highest recycling rate among the nation's top five big cities.[259] It nonetheless plans to expand to multi-unit residential

248. S.F., CAL., ENVTL. CODE, ch. 14, § 1402(b) (2006), *available at* http://www.sfenvironment.org/downloads/library/ondemolitionordinancefinal.pdf.

249. City of Seattle, Ban on Recyclables in Garbage, http://www.seattle.gov/util/About_SPU/Recycling_System/History_&_Overview/Ban_on_Recyclables_in_Garbage/index.asp (last visited Jan. 17, 2010).

250. *Id.*

251. *Id.*

252. *Id.*

253. *Id.*

254. *Id.*

255. Salt Lake City Green, Climate Action Plan, http://www.slcgreen.com/CAP/current.htm (last visited Nov. 15, 2009).

256. OFFICE OF SUSTAINABLE DEV., CITY OF PORTLAND, GLOBAL WARMING PROGRESS REPORT 26 (2005), http://www.portlandonline.com/shared/cfm/image.cfm?id=112118.

257. *Id.*

258. *Id.* at 28.

259. CITY OF L.A., *supra* note 104, at 4.

buildings, commercial buildings and restaurants.[260]

b. *Methane capture*

For solid waste that cannot be eliminated through recycling or that sits in pre-existing landfills, methane-to-energy systems can capture methane emissions and generate energy to replace demand for fossil fuel based power. Sewage and water treatment plants similarly generate methane that can be captured in this manner.

The EPA's 2007 U.S. emissions inventory finds that methane from waste processes—landfills and sewage treatment—comprise approximately two percent of U.S. emissions of greenhouse gases.[261] Landfills were the second leading source of methane gases in the United States (the first being enteric fermentation—that is, fermentation that takes place in the digestive systems of ruminant animals such as cows and sheep); sewage waste treatment systems also ranked high.[262] In addition to being commonly owned and operated by local governments, both of these sources can be used to generate power via methane capture. Thus, local governments have the potential not only to eliminate a major source of methane emissions by reducing the amount of waste going into landfills, but also to create green energy from closed landfills, working landfills, and sewage treatment.[263]

A number of local governments have made methane capture a central component of their climate change programs. Salt Lake City, for example, has begun capturing methane at the city's municipal waste site, producing enough energy to power over 2500 homes.[264] The city also estimates that it saves $160,000 per year by capturing digester gas from a wastewater reclamation plant for cogeneration while reducing its greenhouse gas emissions.[265]

Although a number of local governments have begun to use landfill

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260. *Id.* at 23.

261. U.S. ENVTL. PROT. AGENCY, *supra* note 222, at fig.8-1.

262. Both of these sources also emit nitrogen oxide, another greenhouse gas. *Id.* Meanwhile, municipal solid waste combustion also contributes to carbon dioxide emissions. *Id.*

263. It should be noted that some critics of landfill methane-to-power programs fear that mismanagement will lead to heightened release of toxic chemicals from landfills. *See, e.g.*, ENERGYJUSTICE.NET, LANDFILL GAS FACT SHEET (2008), http://www.energyjustice.net/lfg/factsheet-lfg.pdf.

264. Salt Lake City Green, *supra* note 255.

265. *Id.*; *see also* Salt Lake City, Alternative Energy Projects in City Buildings, http://www.slcgov.com/slcgreen/energy/altEnergy.htm (last visited Jan. 14, 2010) ("Salt Lake City's Public Utilities Department began capturing methane, a byproduct of wastewater treatment, at the City's wastewater plant in 2005. This methane is used to power two large electrical generators, generating both electricity and heat needed to power treatment plant operations. Today, this co-gen facility produces almost 6 million kilowatt hours of electricity per year, reducing the City's GHG emissions by 2,700 tons annually.").

methane to produce energy, a lot of untapped potential still exists, likely due to lack of knowledge, inertia, and upfront costs. The EPA's Landfill Methane Outreach Program (LMOP), a voluntary program to assist landfill owners in converting landfill methane to power sources, has identified approximately 509 operational LFG energy projects in the United States and 530 landfills that are good candidates for projects as of December 2009.[266] The Project's database shows that over 300 landfills identified by the EPA as particularly good candidates for landfill methane projects are owned by local governments—cities, counties, and local waste management authorities.[267] Using the methane emissions from these landfills to generate energy could reduce greenhouse gas emissions by approximately 26,320,200 $MTCO_2eq./yr.$ through the combined effect of eliminating direct methane emissions from the landfill and avoiding generation of fossil fuel-based power.[268] This is equivalent to taking 4,820,464 vehicles off the road, saving 2,987,483,916 gallons of gasoline, providing electricity for 3,486,057 homes for a year, or eliminating 5.7 coal-fired power plants.[269] Reductions could be multiplied if methane-to-energy systems incorporated co-generation, also known as "combined heat and power," a system that uses the waste heat from power generation to provide onsite heat or perform other functions.[270]

While fully implementing methane capture at the local level would come nowhere near to eliminating the critical need for effective national regulation of large power producers, it is surely low-hanging fruit that can complement these efforts. Methane capture relies on mature technology with proven potential to generate known amounts of power while simultaneously eliminating direct methane emissions. Moreover, because these programs are generally used on-site or very nearby, they avoid implementation delays associated with

266. U.S. Envtl. Prot. Agency, Landfill Methane Outreach Program: Basic Information, http://www.epa.gov/lmop/basic-info/index.html (last visited Jan. 17, 2010).

267. U.S. ENVTL. PROT. AGENCY, CANDIDATE LANDFILLS, SORTED BY STATE AND LANDFILL NAME, http://www.epa.gov/lmop/documents/xls/candlfslmopdata.xls.

268. The total volume of waste was determined by removing all candidate landfills not owned by a local government from EPA's spreadsheet. This total landfill volume was then converted to megawatts of electricity using a conversion factor of 0.8 MW per million tons of waste. *See* Sarah J. Simon, Amanda R. Singleton & John F. Carter, *Landfill Gas as Fuel for Combined Heat and Power*, COGENERATION & DISTRIBUTED GENERATION J., Winter 2007, at 33, 35 ("As a rule of thumb, about 432,000 cubic feet per day of LFG is produced from every 1 million tons of MSW placed in a landfill, which can produce about 0.8 MW of electricity."); *see also* LANDFILL METHANE OUTREACH PROGRAM, U.S. ENVTL. PROT. AGENCY, AN OVERVIEW OF LANDFILL GAS ENERGY IN THE UNITED STATES (2009) (on file with author). The EPA provides a calculator that converts megawatts power produced from landfill gas into avoided emissions. U.S. ENVTL. PROT. AGENCY, 2010 LFGE BENEFITS CALCULATOR, http://www.epa.gov/lmop/documents/xls/lfge_benefitscalc.xls.

269. These figures were generated from the EPA's website. U.S. Envtl. Prot. Agency, Clean Energy: Greenhouse Gas Equivalencies Calculator, http://www.epa.gov/RDEE/energy-resources/calculator.html (last visited Jan. 18, 2010).

270. *See* Simon, Singleton & Carter, *supra* note 268, at 33.

establishing green sources for large power producers because the latter often require new property purchases and establishment of transmission lines, a potentially lengthy and politically charged process. This technologically proven and quickly accessible source of green power can also provide side benefits by reducing operating costs of cash-strapped local governments. For example, in 1997, a St. Louis County high school combined state loans and county grants to retrofit boilers to run on methane and to install a pipeline to a nearby landfill, which donated the methane.[271] At the time of installation, the school expected to save $40,000 annually in energy costs.[272]

4. *Proprietary functions of local governments*

> *We are the ones building roads, designing mass transit, buying the police cars and dump trucks and earth-movers. We're the ones lighting up the earth when you look at those maps from space. Together we have huge purchasing power, and if we invest wisely, that can have huge implications for the environment.*
>
> —Mayor Patrick McCrory, Charlotte, North Carolina[273]

Local governments' most direct (and likely least politically challenging) route to reducing downstream energy consumption is through targeting their own resources and operations. Potential reductions from proprietary activities alone may be substantial given the sheer number of local governments, the size of their operations, and the types of things that they own and operate. In 2002, the United States had nearly 40,000 general-purpose local governments.[274] When combined with school districts and special use districts, the number is nearly 88,000.[275] The collective number of local employees as compared with the federal and state governments provides a rough sense of the size of local government operations. As of the 2006 census, local governments in the United States employed nearly twelve million[276] full-time equivalent workers as compared to the federal government's 2.5 million[277] and the collective 4.25

271. Connie Farrow, *Methane from Neighboring Landfill Heats Up High School*, FREE-LANCE STAR, Apr. 3, 1997, at C3.

272. *Id.*

273. INT'L COUNCIL FOR LOCAL ENVTL. REGULATIONS, *supra* note 98, at 10.

274. Specifically it had 38,971 general purpose local governments. U.S. CENSUS BUREAU, U.S. DEP'T OF COMMERCE, GOVERNMENT UNITS IN 2002 1 (2002), http://ftp2.census.gov/govs/cog/2002COGprelim_report.pdf. This figure includes 3034 counties, 19,431 municipalities, and 16,506 townships. *Id.* An additional 13,522 school districts and 35,356 special district governments brings the total of local governments in the United States to 87,849. *Id.*

275. *Id.*

276. U.S. CENSUS BUREAU, U.S. DEP'T OF COMMERCE, 2006 PUBLIC EMPLOYMENT DATA: LOCAL GOVERNMENTS, http://ftp2.census.gov/govs/apes/06locus.txt.

277. U.S. CENSUS BUREAU, U.S. DEP'T OF COMMERCE, FEDERAL GOVERNMENT CIVILIAN EMPLOYMENT BY FUNCTION: DECEMBER 2006 (2006), http://ftp2.census.gov/govs/apes/06fedfun.pdf.

million of all fifty states combined.[278] (Even discounting the employees from independent school districts and special purpose districts, general-purpose local governments still employed more people than the governments of all fifty states combined.[279]) In addition to buildings, vehicles, lighting structures, and schools, local governments own utilities, airports, landfills, and ports, among many other things.

Large cities provide a particularly useful lens through which to grasp the potential impact of proprietary activities and operations. Los Angeles estimates that municipal operations accounted for nearly seventeen million metric tons of CO_2, comprising one-third of the carbon dioxide output from the area.[280] Part of the reason this figure is so high is that, like a number of large local governments, the city owns its utility company.[281] It also directly controls large sources of emissions, including several airports and the Port of Los Angeles.[282]

A 2007 survey of cities participating in the Mayors Agreement conducted by the United States Conference of Mayors provides overview data on how climate policies have influenced proprietary activities.[283] The survey found that, of the 134 cities responding, representing populations of over twenty-five million people, all but four had upgraded to more energy efficient lighting in "public buildings, streetlights, parks, traffic signals, and other applications, or plan[ned] to do so in the next year."[284] Overall, eighty-nine percent "ha[d] already installed more energy-efficient [lighting] technologies such as compact fluorescents, LEDs or photovoltaic street lights; [and] another eight percent [were] considering doing so in the next year."[285] Eighty-eight percent of cities required or planned to require within the next year, that new city buildings meet improved energy efficiency standards, and eighty-seven percent required or

278. U.S. CENSUS BUREAU, U.S. DEP'T OF COMMERCE, STATE GOVERNMENT EMPLOYMENT DATA: MARCH 2006 (2006), http://ftp2.census.gov/govs/apes/06stus.txt.

279. U.S. CENSUS BUREAU, U.S. DEP'T OF COMMERCE, COMPENDIUM OF PUBLIC EMPLOYMENT: 2002, at 1 (2004), http://www.census.gov/prod/2004pubs/gc023x2.pdf.

280. CITY OF L.A., *supra* note 104, at 14.

281. *See* L.A. Dep't of Water & Power, Our Service and History, http://www.ladwp.com/ladwp/cms/ladwp000508.jsp (last visited Jan. 18, 2010).

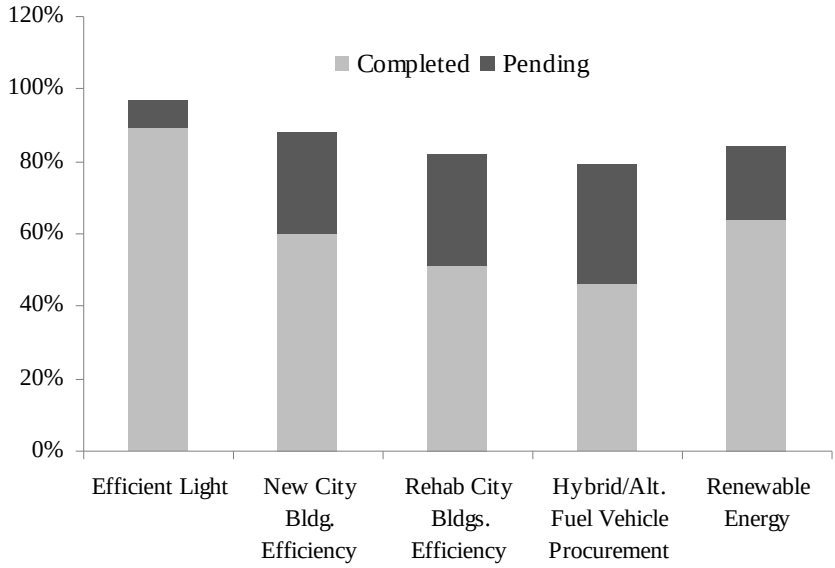
282. The city's emissions inventory includes all sources of emissions directly controlled or operated by the City of Los Angeles. CITY OF L.A., *supra* note 104, at 14. Its government operations include the Port of Los Angeles, Los Angeles World Airports, and the Los Angeles Department of Water & Power (LADWP). *Id.* Because the city owns and operates LADWP, it takes responsibility for the utility's emissions, which account for ninety-eight percent of its municipal carbon footprint, although it does not separately list emissions from use of electricity for city operations to avoid double counting. *Id.* (This Article presumes this to mean that the city takes responsibility for all electricity use, whether it goes to residential, commercial, or industrial uses, because LADWP is municipally operated.) However, it excludes emissions from private activities that occur at the port and airports, such as aircraft and ship emissions. *Id.*

283. MAYORS CLIMATE PROT. CTR., *supra* note 32.

284. *Id.*

285. *Id.*

Figure 1: 2007 Mayor's Survey



would soon require that any city buildings undergoing major rehabilitation upgrade energy efficiency.[286] Forty-six percent of cities had established procurement policies favoring alternative fuel vehicles or hybrids and, another thirty-three percent were considering instituting them.[287] Most responding cities also already used or planned to soon use renewable energy to meet some portion of their operating needs: sixty-four percent of the cities already used some renewable energy, and another twenty percent planned to start using renewables in the next year.[288] Cities employing renewables estimated that, on average, eighteen percent of their total city energy was being provided by these sources.[289] These statistics are depicted below in Figure 1. [290]

Local governments can and have targeted a long list of energy-consuming activities, ranging from lighting, fleets, direct energy purchase, reduced paper use, and even simple management efforts to reduce resource consumption.[291]

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286. *Id.*
287. *Id.*
288. *Id.*
289. *Id.*
290. *Id.*
291. *See, e.g.*, AMANDA EICHEL, OFFICE OF SUSTAINABILITY & ENV'T, CITY OF SEATTLE, SEATTLE CLIMATE PROTECTION INITIATIVE (2007), http://www.mayorsinnovation.org/pdf/Article7_CC.pdf (describing Seattle's campaign to save paper, which reduced paper consumption in 2006 by twenty-one percent, thereby eliminating 125.4 tons of greenhouse gas emissions).

Energy supply and lighting, discussed below, provide two important examples of potential emissions reductions from propriety activities.

a. *Energy supply*

A significant number of local governments have adopted green power purchasing or generation programs, and approximately 100 of these governments participate in the EPA's Green Power Partnership (GPP).[292] Partners include large cities (such as Houston, Dallas, and Albuquerque), as well as counties, small towns and boroughs, and special use districts.[293] Green power purchases by the top twenty local governments alone total more than 1.8 billion kilowatt-hours annually, which is comparable to powering more than 172,000 average American homes for that same time period.[294] The combined efforts of these twenty local governments alone saved 1,292,695 $MTCO_2$ eq.[295]

Though not large enough to make the GPP Top 20 list, a number of local governmental entities purchase or generate a hundred percent of their power from renewable sources.[296] The largest of these, Montgomery County, Pennsylvania, is powered entirely by wind, while Whatcom County, Washington, provides all of its power through a combination of biomass, solar, and wind energy.[297]

Cities in Texas, a state not oft-associated with radical environmentalism, topped EPA's list of green power purchasers. Houston, which was not included in the Mayors survey,[298] recently ranked first on the EPA's list of top purchasers of green power among local governments.[299] As of July 1, 2008, Houston supplied twenty-five percent of its energy needs with wind power.[300]

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292. Green Power P'ship, U.S. Envtl. Prot. Agency, Partner List, http://www.epa.gov/grnpower/partners/index.htm (last visited Jan. 18, 2010). GPP works with governments at all levels, as well as with businesses, universities, and nonprofits. *Id.*

293. *Id.*

294. GREEN POWER P'SHIP, U.S. ENVTL. PROT. AGENCY, TOP 20 LOCAL GOVERNMENT PARTNER LIST: OCT. 6, 2009 (2009), http://www.epa.gov/grnpower/documents/top20localgov_oct2009.pdf. These rankings are updated on a quarterly schedule.

295. This figure results is obtained by putting the kilowatt hours figure into the EPA's Greenhouse Gas Equivalencies Calculator. U.S. Envtl. Prot. Agency, *supra* note 269.

296. Green Power P'ship, U.S. Envtl. Prot. Agency, 100% Green Power Purchasers, http://www.epa.gov/grnpower/toplists/partner100.htm (last visited Jan. 18, 2010). Updated rankings are available on a quarterly schedule.

297. *Id.*

298. Houston participates in the C40, C40 Cities Climate Leadership Group, *supra* note 30, but has not signed the Mayors Agreement, Mayors Climate Prot. Ctr., U.S. Conference of Mayors, List of Participating Mayors, http://www.usmayors.org/climateprotection/list.asp (last visited Nov. 25, 2009).

299. GREEN POWER P'SHIP, *supra* note 294.

300. Lindsay Chapman, *Houston Turns to Wind for Power, Savings*, FINDING DULCINEA, July 3, 2008, http://www.findingdulcinea.com/news/business/July-08/Houston-Turns-to-Wind-for-Power--Savings.html.

Just one year later, Houston met thirty-four percent of its total demand with wind.[301] When adopted, the move was expected to appreciably reduce Houston's energy costs, given a rate of 7.5 cents per kilowatt-hour (kWh) for wind, compared to 9.5 cents for the same amount of conventionally generated power.[302] Thus, when announcing the move, Houston Mayor White touted both its environmental benefits and its potential for cost savings: "We begin taking this wind power today as a benefit for both the environment and the taxpayer. . . . As the energy capital of the world, Houston is committed to becoming the clean, sustainable energy capital of the world as well."[303]

Dallas, the number two purchaser of green power, meets forty percent of its needs from wind, while Austin meets fourteen percent of its energy demand with wind and biogas, and the Austin Independent School District meets thirty-nine percent of its energy needs with wind and biogas.[304]

Because a number of cities across the country own the local utility, they can leverage their proprietary actions to reduce not only their own emissions but also those of their residents. Cleveland, Ohio, for example, has committed its public power company to meet a standard of twenty-five percent renewable sources by 2025.[305] In 2005, the largest public utility in the country, the Los Angeles Department of Water and Power (LADWP),[306] set significant targets—aiming to increase the portion of renewables in its portfolio to twenty percent by 2010 and to thirty-five percent by 2020.[307] It plans to let contracts with coal-fired plants expire, aiming to eliminate its reliance on coal.[308]

Most strikingly, in 2005 Seattle City Light, the city-owned utility, achieved "zero net emissions" of greenhouse gas through a combination of conservation, energy efficiency, and offsets.[309] After losing a subsequent court battle to

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301. GREEN POWER P'SHIP, U.S. ENVTL. PROT. AGENCY, TOP 20 LOCAL GOVERNMENT PARTNER LIST: JULY 7, 2009 (2009) http://www.epa.gov/grnpower/documents/top20localgov_july2009.pdf; *see also* Ford Gunter, *City of Houston a Leader in Purchasing Green Power*, HOUSTON BUS. J., Jan. 28, 2008, http://houston.bizjournals.com/houston/stories/2008/01/28/daily10.html.

302. Chapman, *supra* note 300.

303. *Id.*

304. GREEN POWER P'SHIP, *supra* note 294.

305. MAYORS CLIMATE PROT. CTR., U.S. CONFERENCE OF MAYORS, THE POWER OF 86 MILLION AMERICANS: 1000 MAYORS COMMITTED TO CLIMATE ACTION 20 (2009), http://www.usmayors.org/climateprotection/documents/2009-cityprofiles.pdf.

306. L.A. Dep't of Water & Power, *supra* note 281.

307. L.A. Dep't of Water & Power, Renewable Energy Policy, http://www.ladwp.com/ladwp/cms/ladwp005864.jsp (last visited Nov. 26, 2009).

308. *See id.*; Mayor Antonio Villaraigosa, City of L.A., Environment: Five Goals, Four Years, http://mayor.lacity.org/Issues/Environment/Next4/index.htm (last visited Jan. 18, 2010) ("Our second goal for the next four years is to put LA on a path to permanently break our addition [sic] to coal. Moving forward, we're aiming to get 40 percent of our power from renewable sources by 2020 and 60 percent carbon-free by the end of the next decade.").

309. EICHEL, *supra* note 291. A 2007 Washington Supreme Court decision complicated the utility's efforts to maintain its zero net emissions status by holding that state law

support its continued use of ratepayer dollars to purchase carbon offsets to compensate for emissions from fossil fuel sources, Seattle Light prevailed in the Washington legislature, which amended the utility's authorizing legislation to allow it to buy carbon offsets.

b. *Lighting*

Although slogans urging "change a light bulb, save the planet" may sound absurd when compared with the magnitude of necessary emissions reductions, lighting turns out to create substantial energy demand. Indeed, more than one-fifth of U.S. electricity powers lighting in some form or other. Newer technology can substantially reduce this demand. Light emitting diode (LED) bulbs produce the same amount of light as traditional incandescent bulbs using less than half the electricity. While the initial cost of LED bulbs is higher, they last substantially longer than either traditional or fluorescent bulbs.

How much of a difference can lighting make? The U.S. Department of Energy (DOE) estimates that rapid adoption of LED lighting nationwide over the next twenty years could reduce electricity demand by a full thirty-three percent, eliminate the need for forty new power plants, and save approximately $265 billion.[310]

Local governments own and maintain streetlights, traffic lights, and lights for public parks and athletic fields, while also providing illumination for the interior and exterior of their own buildings, among other things. In the context of these proprietary domains, conversion to LED bulbs creates ecological benefits while providing dramatic fiscal savings. The cost of powering streetlights alone, for example, can be quite significant. The annual utility bill for Los Angeles's 242,000 streetlights is approximately $17 million,[311] while the entire budget for the Bureau of Street Lighting in 2004-05 was just over $18 million.[312] The City, which has been using high-pressure sodium streetlights,[313] began in 2009 to retrofit 140,000 of its residential fixtures with

precluded Seattle from using utility fees to buy carbon offsets because this exceeded its proprietary powers. Okeson v. City of Seattle, 150 P.3d 556 (Wash. 2007). In response, the Washington Legislature passed and the Governor signed House Bill 1929, expressly reversing the result reached by the court and allowing utilities to bank, credit, or trade greenhouse gas offsets or credits. WASH. REV. CODE § 35.92.430 (2008).

310. Energy Star, U.S. Envtl. Prot. Agency & U.S. Dep't of Energy, Learn About LEDs, http://www.energystar.gov/index.cfm?c=lighting.pr_what_are (last visited Nov. 26, 2009); *see also* MAYORS CLIMATE PROT. CTR., *supra* note 305, at 27 (discussing the large energy and cost savings and emissions reductions that Los Angeles will realize by adopting LED lighting).

311. Bureau of Street Lighting, City of L.A., Facts and Figures About Street Lighting in Los Angeles, http://www.bsl.lacity.org/ (follow "Information" hyperlink; the click on "Facts and Figures") (last visited Jan. 18, 2010).

312. L.A. Almanac, City of Los Angeles Adopted Budget - 2004-2005, http://www.laalmanac.com/government/gx06.htm (last visited Jan. 18, 2010).

313. Bureau of Street Lighting, City of L.A., Basic Street Lighting Information,

efficient LEDs.[314] The move is forecast to reduce greenhouse gas emissions by 40,500 tons per year, and save taxpayers $10 million annually.[315] Indeed, it is thought that if the entire Los Angeles-Santa Ana-Long Beach metropolitan region installed LED systems, up to 244.9 million kWh and 190,399 metric tons of emissions could be avoided, at a monumental cost savings.[316]

The movement of cities converting to LED technologies includes smaller cities as well. In 2007, Ann Arbor, Michigan announced a plan to convert all of its downtown streetlights to LED bulbs, with anticipated savings of $100,000 annually; at this rate, the project will pay for itself in less than four years.[317] And in July 2009, the small town of Fairview announced "the opening of the first new street in Texas lit entirely by LED street lights," a move expected to both save money and reduce emissions.[318]

Cities that have begun installing LEDs in traffic signals have also experienced considerable benefits. Salt Lake City estimates that it saves $55,000 per year simply by having installed LED bulbs in its traffic signals.[319] Chicago, meanwhile, anticipates that the program it began in 2004 to retrofit all the traffic lights at 2900 intersections saves the city $2.55 million annually in energy costs and another $100,000 in materials, while reducing its emissions of carbon dioxide by 23,000 tons a year.[320] The U.S. has at least 272,000 traffic

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http://www.bsl.lacity.org/slinfo2.htm (last visited Feb. 4, 2010).

314. *Clinton Hails L.A.'s Shift to LED Street Lights*, NBC L.A., Feb. 17, 2009, http://www.nbclosangeles.com/news/green/clinton-hails-las-shift-to-led-street-lights.html. According to Lighting Components LED Corp., LED lights approach eighty percent efficiency (the rate at which energy is converted to light), whereas incandescent bulbs operate at about twenty percent efficiency. Lighting Components LED Corp., The Advantages of LED Lights, http://www.lc-led.com/articles/ledlights.html (last visited Jan. 18, 2010). LEDs also last twenty to fifty times longer than incandescent bulbs. Frank Shinneman, *Cool and Efficient LED Lights: Their Time Is Now*, GREENBANG, July 3, 2009, http://www.greenbang.com/cool-and-efficient-led-lights-their-time-is-now_10582.html.

315. *Clinton Hails L.A.'s Shift to LED Street Lights*, *supra* note 314.

316. ROBERT T. GROW, GREATER WASH. BD. OF TRADE, ENERGY EFFICIENT STREETLIGHTS: POTENTIALS FOR REDUCING GREATER WASHINGTON'S CARBON FOOTPRINT 19 tbl.6 (2008), http://rrc.dc.gov/green/lib/green/pdfs/Energy_Efficient_Street_Lights.pdf.

317. Press Release, LED City, Ann Arbor Embraces LED Technology to Reduce Consumption, Greenhouse Gas Emissions (Oct. 16, 2007), http://ledcity.org/press-room/ann-arbor-joins-led-city.html.

318. Press Release, LED City, Fairview, Texas, Joins Cree LED City® Program (July 23, 2009), http://ledcity.org/fairview_joins.htm (quoting Fairview Mayor Sim Israeloff). Propelled by the town's aggressive stance against light pollution, the four-lane Fairview Parkway was designed specifically for LEDs. *Id.* Though the community boasts just over 8000 residents, it expects to avoid 1000 pounds in carbon emissions per year, and to save $250,000 over the lifetime of the bulbs. Town of Fairview, Tex., Our Community, http://www.fairviewtexas.org/ (follow "Our Community" hyperlink) (last visited Jan. 17, 2010).

319. Salt Lake City Corp., Current and Completed Sustainability Initiatives, www.newkirkcenter.uci.edu/Bennett_handout.pdf (last visited Jan. 18, 2010).

320. C40 Cities Climate Leadership Group, Best Practices: Lighting, http://www.c40cities.org/bestpractices/lighting/chicago_led.jsp (last visited Jan. 18, 2010).

signals,[321] ninety-four times the number in Chicago. Extrapolating from Chicago's experience, we can estimate that converting all of these to LED bulbs could yield net emissions savings of nearly 2.2 million tons per year.[322]

c. *Emissions reductions and implications*

Lighting and energy are only two examples of the myriad of ways in which local governments can reduce emissions through their proprietary activities and many others can contribute important reductions. Los Angeles, for example, expects to reduce carbon dioxide emissions by one million metric tons simply by synchronizing its traffic lights[323] and other cities have employed many diverse activities—such as limiting idling of City vehicles[324] to installing solar panels on municipal buildings.[325]

Some cities report substantial overall emissions reductions in governmental operations. Salt Lake City, Utah, for example, reduced its corporate energy consumption by thirty-one percent since 2001, surpassing its commitment under the Mayor's Agreement to meet Kyoto Protocol standards by 148 percent.[326] By 2007, Seattle, Washington had reduced its greenhouse gas emissions by sixty percent compared to 1990 levels through changes in its proprietary activities[327] and Albuquerque reported a sixty-seven percent

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Thus far, only about 1000 intersections have actually been retrofitted, *id.*, though the city plans to use American Recovery and Reinvestment Act (ARRA) funds to retrofit an additional 800 sites, COMM. ON FINANCE & COMM. ON BUDGET & GOV'T OPERATIONS, CITY OF CHI., AMERICAN RECOVERY AND REINVESTMENT ACT 11 (2009), http://www.explorechicago.org/etc/medialib/explore_chicago/doit/special_pages.Par.95689.File.dat/ARRAJointBudgetFinanceCommittee.pdf.

321. NAT'L TRANSP. OPERATIONS COAL., NATIONAL TRAFFIC SIGNAL REPORT CARD: EXECUTIVE SUMMARY 2 (2007), http://www.ite.org/reportcard/NTSRC%20Exec%20Summary%20final.pdf. The Report also finds that improperly timed lights contribute to excess gas consumption on the order of twenty-six gallons per year per traveler. *Id.* at 1. This is simply a question of better management.

322. LED City claims a nationwide switch to LED streetlights could eliminate 258 million metric tons of CO_2 emissions, save over $200 billion, and reduce electricity demands from lighting by one-third. LED City, Welcome to LED City, http://www.ledcity.org/ (last visited Nov. 26, 2009). It is worth noting that, though LED City calls itself a "community of government and industry parties working to evaluate, deploy and promote LED lighting technology across the full range of municipal infrastructure," *id.*, it is essentially the project of Cree, Inc., a manufacturer of LEDs and related products. *See* LED City, Press Room, http://ledcity.org/press-room/ (last visited Nov. 26, 2009). Although this might suggest bias in projected emissions savings, its figures match those of provided by the Department of Energy. *See supra* note 311.

323. MAYORS CLIMATE PROT. CTR., *supra* note 305, at 27.

324. *Id.* at 17.

325. *Id.* at 29.

326. Salt Lake City Corp., *supra* note 319.

327. EICHEL, *supra* note 291.

reduction in the greenhouse gas emissions.[328]

In 2007, New York Mayor Michael Bloomberg announced PlaNYC, a combination of sustainability initiatives to improve housing, transportation, energy production and delivery, open space, and air and water quality.[329] Ultimately, PlaNYC aims to reduce greenhouse gas emissions from city operations by at least thirty percent in ten years, and to reduce citywide greenhouse gas emissions (including those from homes and businesses) by at least thirty percent by 2030.[330] These goals were subsequently codified by the City Council's Climate Protection Act.[331]

PlaNYC aims to reduce New York's carbon dioxide emissions to 33.6 million metric tons in a thirty-year period, around fifty percent of which will come from improved efficiencies in buildings, particularly existing buildings, which account for sixty-nine percent of the city's emissions.[332] In addition, greener power generation and transportation improvements will result in savings of approximately thirty-two percent and eighteen, respectively.[333] Further reductions will come from repairs to leaking pipes and broken windows, changing to higher efficiency pumps, and methane capture at water treatment plants, among other things.[334]

PlaNYC requires more than $2 billion to achieve its municipal target, but taxpayers ultimately should benefit from annual savings of $300 million in

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328. MAYORS CLIMATE PROT. CTR., U.S. CONFERENCE OF MAYORS, CLIMATE PROTECTION STRATEGIES AND BEST PRACTICES GUIDE 3 (2007), http://usmayors.org/climateprotection/documents/2007bestpractices-mcps.pdf.

329. Press Release, Office of the Mayor, City of N.Y., Mayor Bloomberg Presents PlaNYC: A Greener, Greater New York, (Apr. 22, 2007), http://www.nyc.gov/html/om/html/2007a/pr119-07.html.

330. Dan Hendrick, *New York City Council Passes Climate Protection Act*, N.Y. LEAGUE OF CONSERVATION VOTERS, Nov. 29, 2007, http://www.nylcv.org/node/2737/print.

331. *Id.*

332. PLANYC, CITY OF N.Y., A GREENER, GREATER NEW YORK 135 (2007) http://www.nyc.gov/html/planyc2030/downloads/pdf/full_report.pdf.

333. *Id.* at 136. Despite increases in population, per capita energy use, and on-road vehicle miles driven, New York's city-wide carbon footprint in 2007 was approximately 2.5 percent lower than in 2005. PLANYC, CITY OF N.Y., INVENTORY OF NEW YORK CITY GREENHOUSE GAS EMISSIONS 5 (2009), http://www.nyc.gov/html/planyc2030/downloads/pdf/inventory_nyc_ghg_emissions_2008_-_feb09update_web.pdf. Since PlaNYC was only released in April 2007, this does not reflect the plan's impact on greenhouse gas emissions; it does, however, indicate a positive foundation upon which PlaNYC can be implemented effectively. *Id.*

334. Press Release, Office of the Mayor, City of N.Y., Mayor Bloomberg Announces Long-Term Plan to Reduce Municipal Energy Consumption (July 7, 2008), http://www.nyc.gov/html/om/html/2008b/pr264-08.html ("[L]eaking pipes, clogged steam traps, and inefficient air distribution, pumps, or fan systems will be systematically identified and repaired. The plan also includes retrocommissioning, a process that identifies the most wasteful inefficiencies that technicians can correct in a cost-effective manner. Energy-saving projects at wastewater treatment plants account for the second largest opportunity for greenhouse gas reductions, 17 percent of the total.") [hereinafter PlaNYC Announcement].

operating costs.[335] The city projects that, by 2013, it will break even and will begin to see notable fiscal savings by 2015.[336]

The potential for these proprietary actions alone to contribute to climate change mitigation is not insignificant; the municipal government accounts for roughly 6.5 percent of the entire city's energy consumption,[337] while the city emits nearly 0.25 percent of the world's total greenhouse gases.[338]

As New York's projections show, many of the actions local governments are taking in their proprietary domain—such as changing over to highly efficient LED lightbulbs in their traffic lights and street lights, buying energy efficient equipment, increasing energy efficiency in municipal buildings, and even simply paying for the manpower to repair leaks—turn out to be fiscally prudent. For these actions, the vision of local climate change policies as economically irrational may stem from an inaccurate presumption that the costs of environmentally beneficial policies outweigh the benefits. Instead, climate change has, in part, merely raised awareness of a number of energy efficiency improvements that have relatively reasonable payback periods.

Indeed, ICLEI's CCP Campaign emphasizes the co-benefits that local governments can receive by engaging in climate change mitigation in the form of reduced operating costs, improved local air quality, and accomplishment of other municipal goals.[339] For example, its 2006 report touts the fact that the twenty-three million tons of emissions reduced by its U.S. participants also saved in excess of $535 million in energy and fuel costs, eliminating more than 43,000 tons of local air pollutants."[340] This focus undercuts rhetoric that pits

335. PLANYC, CITY OF N.Y., PROGRESS REPORT 2009: A GREENER, GREATER NEW YORK 30 (2009), http://www.nyc.gov/html/planyc2030/downloads/pdf/planyc_progress_report_2009.pdf. Not surprisingly, money does present one potential stumbling block. For example, the state legislature recently failed to bring one relied-upon measure (congestion pricing) to a vote, thereby losing promised federal funds. *See The PlaNYC Report Card*, CITY HALL, Apr. 27, 2009, http://www.cityhallnews.com/newyork/article-671-the-planyc-report-card.html; *see also* PlaNYC, City of N.Y., Transportation Initiatives: Pilot Congestion Pricing, http://www.nyc.gov/html/planyc2030/html/plan/transportation_congestion-pricing.shtml (last visited Jan. 18, 2010).

336. PlaNYC Announcement, *supra* note 334 ("The City is expected to break even on its investment in 2013 on an annual cash flow basis, and by fiscal year 2015 it is projected that the City will have saved more on its energy bills than it has spent on all the planned investments to that point.").

337. Specifically, New York City government CO_2 emissions in fiscal year 2007 equaled 4.3 million metric tons (MMT) of carbon dioxide equivalent, with city-wide emissions of 61.5 MMT. PLANYC, *supra* note 333, at 15. An update to this inventory is to be published annually.

338. PLANYC *supra* note 332, at 130.

339. INT'L COUNCIL FOR LOCAL ENVTL. INITIATIVES, *supra* note 98. One result of the ongoing monitoring that can be observed among the longer-term members is the opportunity to iterate their programs.

340. *Id.* ("[This] is equivalent to the emissions produced annually by: 4 million passenger vehicles[;] 1.8 million households[; and] 2.1 billion gallons of gasoline.").

environmental and economic development concerns against one another, encouraging local governments to capture low-hanging fruit, such as energy efficiency improvements with rapid payback periods. This also reframes what could be viewed as a collective action problem into a good fiscal and public health policy.[341] In the local governments' proprietary domain, the salience of climate change may have merely provided necessary information and motivation to overcome barriers to fiscally rational policies—from simple lack of knowledge, to inertia, to accounting methods that hide efficiency savings by separating building from operating budgets.[342]

Many of the changes that local governments can make to reduce emissions through their proprietary functions are actually fiscally prudent and can be accomplished with mature technology, some of which has long been available. The critical question here may be just the opposite of what initial intuitions about local climate change policies suggest. Rather than asking why local governments are acting unexpectedly or irrationally in the face of collective action problems, we may instead want to ask why they have not captured these fiscal and environmental savings sooner. Answers to this question can inform federal and state policies aimed at eliminating barriers to cost-effective local greenhouse gas emissions reductions. Nonetheless, it is not clear how far these innovations can go in overcoming a lack of upfront capital that prevents investment in energy-saving technology without financial support from higher levels of government.

Thus, the U.S. Conference of Mayors lobbied extensively for an Energy Efficiency and Conservation Block Grant (EECBG) program, modeled on the Community Block Grant Program, to fund investment in energy-saving technology as well as to compensate for informational and fiscal barriers in the private sector by, for example, providing commercial and residential energy audits and establishing financial incentives to undertake energy efficiency improvements.[343] The Conference's efforts seemed to have paid off with congressional passage of the Energy Independence and Security Act of 2007, which established legislation for the federal portion of the EECBG, but the subsequent budget bill provided no funding for the program and it was not

341. *See, e.g.*, Ion Bogdan Vasi, *Organizational Environments, Framing Processes, and the Diffusion of the Program to Address Global Climate Change Among Local Governments in the United States*, 21 SOC. FORUM 439 (2006) (describing how ICLEI's framing of climate change programs in terms of financial savings has assisted in the recruiting of local government participants).

342. *See* COMM'N FOR ENVTL. COOPERATION, *supra* note 131, at 54 (describing how separate capital and operating budgets create accounting scenarios where the energy cost savings cannot be used to offset increased initial green building costs).

343. U.S. Conference of Mayors, The Energy Efficiency and Conservation Block Grant (EECGB), http://www.usmayors.org/climateprotection/list.asp (last visited Feb. 4, 2010); *see also* Kevin McCarty, *EECBG Spending Plans Begin to Take Shape in Cities Across U.S.*, U.S. MAYOR NEWSPAPER, Apr. 27, 2009, http://usmayors.org/usmayornewspaper/documents/04_27_09/pg3_eecbg.asp.

funded during the Bush Administration. Then, for the first time, the American Recovery and Reinvestment Act (ARRA) of 2009 set aside $3.2 billion for EECBG.[344] Of this, approximately $1.9 billion was delegated to cities and counties for community energy efficiency and conservation projects, as well as renewable energy installations on government buildings.[345] As of August 2009, ARRA spending on both energy and weatherization programs totaled approximately $7.8 billion, with an additional $7.4 billion going to transit.[346] By way of comparison, however, these environmentally friendly ventures received less than sixty percent of the $26.6 billion going to highways and bridges.[347] Continued funding of the EECBG program is now a top priority for U.S. Conference of Mayors. Past President and Trenton, New Jersey Mayor Douglas Palmer emphasized the need for a forty-year funding commitment to enable long-term planning.[348]

Overall, the potential collective impact of local governments' proprietary activities is unlikely to be either trivial or counterproductive. Rather than locking in policies that undermine the potential for a comprehensive cap-and-trade regime, a number of local governments appear to be developing new procedures that reduce emissions and that will render their budgets more resilient to increased fuels prices that stem from a cap-and-trade regime. Finally, as with buildings and transportation, demand reduction from changes in proprietary activities can also stabilize prices, assuming an effective federal cap-and-trade regime is enacted. While it is unlikely that many scholars would object to efficiency improvements in local governmental operations, failing to recognize these improvements as a potentially significant sources of emissions reductions contributes to the invisibility of local governments in the development of national climate change policy.

III. COORDINATING LEVELS OF GOVERNMENT: TOWARDS A MODEL OF BIDIRECTIONAL CLIMATE CHANGE REGULATION

In the effort to discern what level of government can and will respond effectively to climate change, focusing exclusively on the size of the resource being harmed (here, the global atmosphere)—as Butler and Macey's matching

344. U.S. Dep't of Energy, Energy Efficiency & Conservation Block Grant Program, http://www.eecbg.energy.gov/about/default.html (last visited Nov. 26, 2009).

345. *Id.*

346. Derived from charts showing the allocation of funds by program for each state and the District of Columbia at Recovery.org, Economic Recovery Spending by State, http://www.recovery.org/for_taxpayers.aspx (follow "Graphs: Spending by Program for Each State" and click on each state group on the right) (last visited Feb. 4, 2010).

347. *Id.*

348. *USCM Presses Senators on Energy Block Grant, Climate Change*, AM. CITY & COUNTRY, Aug. 20, 2009, http://americancityandcounty.com/topics/green/uscm-lobby-day-20090820/.

principle[349] and the tragedy of the commons model direct us to do—obscures the potential collective contribution of local actions to a comprehensive regime. As noted above, one of the few studies to review the collective impact of local climate change initiatives found in 2008 that if only the 684 signatories to the Mayors Agreement succeeded in reaching their GHG goals, they would reduce projected 2020 emissions by seven percent.[350] Since 2008, over 300 more signatories have joined, cities have improved programs, and other networks have added members and iterated programs. Although federal legislation is clearly needed, these local efforts are hardly trivial.

Instead of presuming that the scale of the harm determines the possibilities for a regulatory response, looking empirically at the various causes of greenhouse gas emissions and various means of targeting these sources provides a much broader vision of the regulatory landscape. Dismissing local actions as counterproductive "piecemeal" efforts without observing their potential to shape the built environment, eliminate barriers to cost-effective energy efficiencies, and reduce greenhouse gas emissions generated by waste (an area unrelated to fossil fuel combustion) similarly obscures important benefits. In this sense, local governments have provided a service simply by raising the profile of a set of effective and easy means to accomplish a critical goal, which nonetheless could be overlooked because of their failure to fit into common frameworks for resolving environmental problems.

Many of the local governments' potential reductions rely on established and available technologies. The relationship between potential policies and activities that cause emissions is often well studied, (e.g., travel demand and smart growth), and a number of these emissions reductions can be captured in a short time frame. Many of these can be implemented with existing bureaucracies such as planning, waste management, and building and safety departments. Local governments can additionally provide unique regulatory tools to alter emissions patterns. They can directly reduce their own emissions while structuring the local environment to influence residents to recycle, live in efficient buildings, and get around without their cars. In addition, because some local programs provide fiscal benefits, they may face fewer political hurdles than federal and state efforts to reduce emissions.

But does local potential to reduce emissions tell us anything about whether or not local governments are the *best* level of government to target these

349. *See supra* note 57 and accompanying text.

350. *See* Lutsey, *supra* note 24, at 8-9. By way of comparison, the cap-and-trade proposal passed by the House of Representatives, the American Clean Energy and Security Act of 2009, targets a twenty percent reduction in U.S. emissions by 2020 as compared with 2005 levels. *See* H.R. 2454, 111th Cong. § 702 (2009) ("The goals of the Safe Climate Act are to reduce steadily the quantity of United States greenhouse gas emissions such that . . . in 2020, the quantity of United States greenhouse gas emissions does not exceed 80 percent of the quantity of United States greenhouse gas emissions in 2005 . . . .").

domains? Indeed, perhaps states or the federal government should take over these initiatives wherever possible, given the urgency of reducing emissions. Although it does not answer this question, the following discussion offers some preliminary guideposts for assessing where to place the locus of regulatory power.

A. *Levels of Government*

First, even were higher levels of government to assume regulatory power over many of these efforts, local governments would nonetheless still play an important role. Were it to prove practical and beneficial for the states or federal government to usurp local power to set standards for the built environment, waste management, or even some proprietary activities, local governments would necessarily remain the locus of implementation in most of these areas. With building codes and development applications, the existing administrative apparatus and the sheer volume of permit applications renders local implementation almost inevitable, as state or federal permitting regimes would likely be unmanageable and would at a minimum require establishment of large new bureaucracies, creating substantial cost and delay. Established local institutions for waste management and provision of other services would similarly be difficult to replace. As local governments can create unique incentives and disincentives, any higher-level mandates will likely be most effective if they allow for substantial flexibility in implementation.

Second, any state and federal standards in these traditional local domains will be most beneficial as floors not ceilings.[351] As William Buzbee argues, regulatory floors "retain the benefits of multiple regulatory voices, protections, and diverse regulatory modalities," thus serving as an "antidote[] to common forms of regulatory dysfunction" by helping to diminish the status quo bias and render agency capture more difficult.[352] The presence of multiple regulatory voices makes it more likely that changing conditions will be recognized and regulations adapted before they become obsolete.[353] In contrast, ceiling preemption "runs counter to many of the most valuable elements of federalist schemes" that are "skeptical about the capacity and will of government," or at least the impact of placing too much power in one body.[354] Ceiling preemption creates a "heighted risks of dysfunction and stasis."[355]

Buzbee's analysis of how federal ceilings can exacerbate regulatory failures by eliminating correctives provided by multilevel governance applies similarly to state ceiling preemption of local regulations. Many local

351. *See generally* William W. Buzbee, *Asymmetrical Regulation: Risk, Preemption, and the Floor/Ceiling Distinction*, 82 N.Y.U. L. REV. 1547 (2007).

352. *Id.* at 1555.

353. *Id.* at 1608.

354. *Id.* at 1555, 1584.

355. *Id.* at 1576.

governments have shown that they can generate sufficient political will to exceed existing state minimums or to mandate efficiency in their own operations in the absence of standards at higher levels. A number of local leaders have been able to either convince local businesses and residents that more stringent plans are worthwhile[356] or to create mandates despite opposition. Others may simply be capturing regulatory opportunities to enact popular or cost-effective sustainability programs that could have gone unnoticed absent climate change. Allowing them to exceed minimum standards capitalizes on cities' initiative in this area. At the same time, because many local entities have not yet acted, providing regulatory floors where feasible will capture reductions across a broader playing field.

Third, and rather obviously, different domains vary substantially in their conduciveness to higher-level regulation. Traditional theories that envision sharply delineated distinctions between centralized and decentralized regulation based on presumed benefits at each level are of far less help than a contextual consideration of specific activities. For that reason, it is useful to examine the details of existing programs and regulatory requirements to identify domain-specific considerations.

With building efficiency, the total population affected, the geographic and demographic range of cities adopting programs, and the participation of many localities in areas not traditionally associated with environmentalism all support some optimism about local programs.[357] Nonetheless, while local green building programs are spreading rapidly, many jurisdictions have not adopted them. Moreover, thus far, only a limited number of cities mandate improved building efficiency in commercial and residential buildings, leaving design predominantly to the effectiveness of incentives. In light of these facts, what role should the state and federal governments play in ensuring that national climate change policy captures the substantial savings available from building energy efficiency? Should they intervene more directly or indeed even usurp this traditional local power?

Many traditional arguments for more centralized standards fail to provide clear answers. As opposed to the common theoretical vision that local regulation necessarily creates a confusing patchwork of inconsistent standards that hampers compliance or causes economic inefficiency, the predominant use of two model building codes creates a degree of standardization across jurisdictions that is generally unexpected from decentralized regulation. These have been created by private organizations of industry professionals rather than

356. Pursuant to Houston Mayor Bill White's proposal, for example, the Houston City Council voted unanimously to amend its commercial building code, with Houston's Construction Industry Council supporting the measure as a "landmark step" for the city. Carolyn Feibel, *City OKs "Green" Energy Code for New Businesses*, HOUSTON CHRON., Apr. 30, 2008, *available at* http://www.cleanenergyfortexas.org/news_houstonchronicle_43008.html.

357. The total impact awaits further empirical research not yet available.

by the government agencies themselves. Most of the local green building programs discussed above rely on the United States Green Building Council's (USGBC) LEED program, another standard created by industry professionals.[358] LEED's flexibility allows architects and builders to select from a menu of elements to reach the necessary point level for certification. Local governments have little incentive to modify this format, as it already allows for adaptation to local conditions or tastes, and modification would eliminate the possibility of obtaining nationally recognized certification.

Another common argument for federal regulation—the benefit of centralized resources to conduct research and disseminate technical information—also assumes less importance given local reliance on the USGBC and other private code councils that regularly update codes based on ongoing research. Local governments also share best practices through both professional and climate change networks, creating further research efficiencies.

Yet, reliance on privately created codes also cuts the other way. Use of model codes and LEED certification across diverse jurisdictions suggests that common features could be incentivized or mandated from the top down despite variation in local climatic conditions. While the flexibility of LEED and the option to amend council codes certainly facilitates adaptation to local conditions, federal or state programs could incorporate similar flexibility or simply use LEED. Top-down standards could more widely eliminate barriers to cost-effective energy efficiencies than locally implemented plans by affecting a broader population. An economy-wide cap that simply constrains fuel supply and increases prices, however, would be unlikely to eliminate barriers to building efficiency such as split incentives, inaccurate cost estimations, and industry fragmentation.

Stavins does recognize that market failures warrant the use of standards in an otherwise market-based approach,[359] a position likely shared even if unarticulated by other advocates of a preemptive top-down cap-and-trade regime. However, none of these scholars have recognized the critical role local governments will need to play in addressing the multiple interacting barriers that impede efficient building practices. The presence of these impediments suggests a need for caution in dismissing local efforts, because other similarly complex market failures may be difficult to identify at the outset of a cap-and-trade regime. In some cases, smaller-scale governmental bodies may be able to more quickly initiate corrective actions to subsequently disclosed impediments to an effective regime.

The potential to reduce emissions beyond the levels that produce a net gain raises an additional benefit of federal involvement. As discussed above, the IPCC projects that twenty-nine percent of building emissions can be reduced

358. U.S. Green Bldg. Council, About USGBC, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=124 (last visited Jan. 14, 2010).

359. *See* Stavins, *supra* note 59, at 314-15.

cost effectively and the Department of Energy has found even greater potential for cost-effective reductions, in the range of fifty percent for commercial buildings. But even greater efficiencies are possible with existing technology, presuming a willingness to improve efficiency beyond the level of cost-effectiveness.[360] As federal lawmakers consider various means to reduce greenhouse gas emissions, advancing technologically easy and proven building efficiencies may prove to be much safer, quicker, easier, and possibly more cost-effective than other proposals such as dramatic expansion of nuclear power, reliance on the future development of untested carbon sequestration methods, or geo-engineering. While any strategy will require multiple approaches, it is certainly worth evaluating how they compare in deciding which to prioritize.[361]

In addition to the theoretical discussion of the merits of floor versus ceiling preemption, review of existing practice suggests why any federal or state building requirements are best formulated as floors, not ceilings. First, given the tradition of local power over building codes, entirely displacing this power would likely be politically challenging. As the presence of the U.S. Conference of Mayors in congressional debates over urban renewal demonstrates,[362] local governments are, after all, interest groups in the legislative process. Indeed, the very existence of the Conference speaks to the shared interests among cities vis-à-vis states and the federal government. Second, the rapid diffusion of local green building programs demonstrates how local governments can be particularly nimble in advancing regulatory paradigms. Thirty-two of the 113 city programs identified in the Madison Energy Task Force Inventory are in California,[363] which already has some of the strictest standards for building energy efficiency in the country under its statewide Energy Efficiency Standards for Residential and Nonresidential Buildings, known as Title 24.[364] These cities attempt to achieve additional gains above and beyond Title 24 thrrough LEED or other standards. Title 24 has achieved substantial energy savings for California.[365] However, as the recent rush of activity among

360. The IPCC reports that "[a] number of advanced houses have been built in various cold-climate countries around the world that use as little as 10% of the heating energy of houses built according to the [existing] local national building code." Blok et al., *supra* note 120, at 395.

361. While the IPCC estimates that twenty-nine percent of emissions can be reduced at a cost savings, it further calculates that "at least 3% of baseline emissions can be avoided at costs up to 20 US$/tCO$_2$ and 4% more if costs up to 100 US$/tCO$_2$ are considered." *Id.* at 389.

362. *See supra* note 143 and accompanying text.

363. *See* Gruder, *supra* note 149.

364. CAL. CODE REGS. tit. 24, pt. 6 (2007).

365. *See* Cal. Energy Comm'n, California's Energy Efficiency Standards for Residential and Nonresidential Buildings, http://www.energy.ca.gov/title24/ (last visited Nov. 27, 2009) ("California's building efficiency standards (along with those for energy efficient appliances) have saved more than $56 billion in electricity and natural gas costs since 1978. It is estimated the standards will save an additional $23 billion by 2013.").

municipalities in California demonstrates, the option to exceed this floor capitalizes on nimble local governments' enthusiasm for addressing climate change. California's recent adoption of the nation's first statewide green building code preserves this option for local governments to enact more stringent standards in recognition of this benefit.[366]

Although the presumption that building regulation falls under state and local police powers, the historical background shows that the federal government plays a substantial role in propagating building codes by making urban renewal funding contingent upon their adoption. Similarly, the federal government could advance green building by offering energy efficiency funding contingent upon adoption of minimum green building standards. The rapid and widespread adoption of building codes after urban renewal funding hung in the balance suggests the effectiveness of such an approach.

With zoning and land use, the highly context-specific nature of the enterprise requires detailed block-by-block information to determine which tools to select and what design is even possible given existing uses. The variation of urban form renders land use inevitably local to a large degree. While some states have broad procedural requirements, zoning and land use remain largely the province of local governments. Early efforts to create some form of federal land use regime met with rapid demise and recent Supreme Court decisions create barriers to such an approach.[367] Efforts to usurp this function at either the state or federal level would likely provoke fierce political opposition, as many consider this a core local function, central to local governments' ability to maintain autonomy in a system that formally identifies them as creatures of the state.[368]

While Ewing's study, discussed above, demonstrates that cities can substantially impact VMT by zoning for compact development, municipal efforts to increase density cannot fully capture potential VMT reductions without the collaboration of higher levels of government. Because individuals travel between cities and because transit improvements are expensive,

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Researchers have noted Title 24's contribution to employment growth and prosperity in the state. *See, e.g.*, DAVID ROLAND-HOLST, CTR. FOR ENERGY, RES., & ECON. SUSTAINABILITY, UNIV. OF CAL. BERKELEY, ENERGY EFFICIENCY, INNOVATION, AND JOB CREATION IN CALIFORNIA 18-24 (2008), http://are.berkeley.edu/~dwrh/CERES_Web/Docs/UCB%20Energy%20Innovation%20and%20Job%20Creation%2010-20-08.pdf.

366. California Green Building Standards Code, CAL. CODE REGS. tit. 24, pt. 11, § 101.7 (2007). California's green building code goes beyond energy efficiency to address water usage and other sustainability issues. *See, e.g.*, CAL. CODE REGS. tit. 24, pt. 11, §§ 601-605, 701-710, 801-808 (2007).

367. *See* Solid Waste Agency of N. Cook County v. U.S. Army Corps of Eng'rs, 531 U.S. 159, 171-72 (2001) (holding that the Army Corps lacked authority to regulate intrastate development); *see also* Rapanos v. United States, 547 U.S. 715, 738 (2006); JUERGENSMEYER & ROBERTS, *supra* note 140, § 8.2.

368. *See* Briffault, *supra* note 176, at 1; *see also* Barron, *supra* note 107, at 2259-60.

comprehensive VMT reductions require statewide and regional planning, state and federal funding, and changes in the incentive structure of federal highway funding.

While there is no one-size-fits-all solution, eliminating perverse incentives in federal law that disadvantage transit projects vis-à-vis highway projects is an obvious policy change that scholars have identified to reduce automobile dependence.[369] Funding mechanisms have long favored highways over transit, both in terms of administrative hurdles and dollar amounts, perversely rewarding areas that consume the most gas, have the most freeway miles, and have the highest VMT with higher funding.[370] The federal stimulus bill[371] has also favored highway projects over VMT reducing transit.

Others scholars recognize the climate benefits of increasing both the power and direct funding of metropolitan planning organizations through which local governments cooperate to meet area needs.[372] At the same time, the state and federal government can set performance goals that reward jurisdictions for demonstrated VMT reductions. California recently enacted such a measure; 2008's Senate Bill 375 gives local governments incentives, in the form of transportation dollars, to plan for more compact, mixed-use, low-VMT development.[373] Developers who build projects that have substantial affordable housing near transit (either rail or well-established bus lines) get significant relief from California's stringent environmental review laws (and if their project is particularly green they can forego environmental review altogether).[374] Importantly, this smart growth bill is explicitly a climate change bill: the legislative findings observe that the state cannot meet the goals of its heralded climate change statute, Assembly Bill 32, unless it also "achieve[s] significant additional greenhouse gas reductions from changed land use patterns and improved transportation."[375] Harnessing a range of bidirectional efforts involving federal, state, and local governments may be especially effective in addressing transportation emissions where multilevel policies are most needed.

In proprietary activities, waste management, and provision of services,

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369. *See, e.g.*, METRO. POLICY PROGRAM, BROOKINGS INST., A BRIDGE TO SOMEWHERE: RETHINKING AMERICAN TRANSPORTATION FOR THE 21ST CENTURY 50-51 (2008), http://www.brookings.edu/~/media/Files/rc/reports/2008/06_transportation_puentes/06_transportation_puentes_report.pdf.

370. *Id.*; *see also* MARILYN A. BROWN ET AL., METRO. POLICY PROGRAM, BROOKINGS INST., SHRINKING THE CARBON FOOTPRINT OF METROPOLITAN AMERICA 35 (2008), http://www.brookings.edu/~/media/Files/rc/reports/2008/05_carbon_footprint_sarzynski/carbonfootprint_report.pdf.

371. *See supra* Part II.B.4.c (discussing ARRA).

372. BROWN ET AL., *supra* note 370, at 53.

373. *See* Office of the Governor, Senate Bill 375: Redesigning Communities to Reduce Greenhouse Gases, http://gov.ca.gov/fact-sheet/10707/ (last visited Feb. 4, 2010).

374. *See id.*

375. S.B. 375 § 1(c), 2008 Leg., Reg. Sess. (Cal. 2008).

local governments are frequently hamstrung by barriers to effective action, most obviously in the form of insufficient up front capital. Eighty-two percent of respondents to a 2008 survey of Mayors Agreement signatories cited inadequate financial resources as the most significant obstacle to progress on their climate efforts.[376] Overall, local governments find state and federal assistance greatly lacking.[377] The federal stimulus bill has addressed some of this by funding the Energy Efficiency Block Grant Program, for example, but because it focuses on "shovel-ready" projects, the funding disproportionately favors projects such as road resurfacing that merely reinforce existing transportation patterns without providing support for longer term projects to support smart growth or alternative approaches to energy or building.[378] Thus, some have criticized the stimulus bill as a lost opportunity.

Sustained attention and predictable long-term funding will be necessary to fully realize the benefits from local actions. A federal regime that recognizes the benefits of bidirectional efforts that target small-scale actions and consumption would be most effective if it incorporated the very mundane and practical need for ongoing sources of predictable funding. (As discussed above, however, this funding could be made contingent on meeting transportation goals or adoption of green building standards.)

Oddly, the intersection of the quintessentially local areas of waste management and proprietary activities provides perhaps one of the best possibilities to benefit from direct federal regulation of local activities. Methane capture at landfills has been implemented by a number of local governments, but its merits have not escaped the notice of the state and federal governments, which have created some tax incentives, grants, and other voluntary mechanisms to encourage the development of methane-to-energy projects—both for private waste management companies and for public landfill proprietors.[379] However, unlike large waste companies, some local

376. MAYORS CLIMATE PROT. CTR., U.S. CONFERENCE OF MAYORS, THE IMPACT OF GAS PRICES, ECONOMIC CONDITIONS, AND RESOURCE CONSTRAINTS ON CLIMATE PROTECTION STRATEGIES IN U.S. CITIES 4 (2008), http://www.mayors.org/pressreleases/uploads/ClimateSurvey.pdf.

377. *Id.* at 5.

378. *See* Eric Sofge, *Why Shovel-Ready Infrastructure Is Wrong (Right Now)*, POPULAR MECHANICS, Feb. 5, 2009, http://www.popularmechanics.com/technology/industry/4302578.html.

379. For example, EPA's Landfill Methane Outreach Program encourages and facilitates methane capture programs in partnership with states, local governments, and private companies. U.S. Envtl. Prot. Agency, Landfill Methane Outreach Program (LMOP): Basic Information, http://www.epa.gov/lmop/basic-info/index.html (last visited Jan. 18, 2010). South Carolina established a twenty-five percent tax credit to support methane technology. U.S. Envtl. Prot. Agency, Combined Heat and Power Partnership: Funding Resources, SC Landfill Methane Tax Credit, http://www.epa.gov/chp/funding/funding/sousclandfillmethanetaxcredit.html (last visited Jan. 18, 2010). California identified landfill methane control and capture as an early action in scoping for its Global Warming Solutions Act of 2006, and is contracting with local governments on related pilot projects.

governments are poorly situated to capture the benefits of landfill energy on their own, even given these incentives. First, they are not repeat players. Usually one local government owns and manages a single landfill; hence it cannot capture the same efficiencies that large waste companies can achieve by repeatedly utilizing the same technology. Second, local governments generally have separate divisions managing waste and energy (either through power purchase or generation if the city owns its own utility). Third, local governments have limited budgets, and borrowing may be more constrained for them than it is for private companies. These factors may explain why, until climate change took center stage, there was limited local implementation despite the fact that the technology to recover landfill gas for energy has been available for over twenty years and the fuel is free once the initial investments are recovered (in an estimated eight to fifteen years depending on the technology[380]). Over the project's lifetime, this can produce very inexpensive power.[381]

While the movement among local governments to address climate change seems to have motivated a number of local entities to overcome these barriers and implement successful efforts to capture landfill gas, an explicit multilevel effort that works jointly across local, state, and federal policies could multiply these benefits and expand them to many new areas across the country. Federal regulation of large landfills under section 111 of the Clean Air Act (CAA), which currently mandates collection and flaring of methane,[382] could be amended to target a range of sizes and mandate energy recovery or other productive use instead of flaring. Some flexibility could be maintained by allowing local governments to choose both from a range of technologies and end uses—from sale to powering local buildings.

B. *Working in Both Directions*

A number of local governments have been able to design and implement mitigation plans more quickly than the federal government and most states. They are largely targeting the farthest downstream actors, consumers, and multiple small-scale activities. In this sense, their efforts are not only bidirectional because this smallest governmental level is regulating from the bottom up, but also because their focus on reducing emissions by targeting small-scale downstream actions trickles up by reducing demand.

In arguing against federal preemption of state environmental laws, Engel contends that jurisdictional overlap can create a regulatory "safety net" that may be particularly critical in the environmental arena where "the costs of

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CAL. AIR RES. BD., CLIMATE CHANGE SCOPING PLAN 26-27, 62 (2008), http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf .

380. *See* Simon, Singleton & Carter, *supra* note 268, at 38 tbl.1.

381. *Id.* at 38.

382. 40 C.F.R. §§ 60.30c-36c (2009).

underregulation are high . . . . in that it often concerns nonrenewable and irreplaceable resources."[383] In the climate change context, the safety net concept can be extended beyond Engel's model of alternative levels of government regulating the same areas (that is, the same types of regulation, but on different scales) to include addressing the same harms through simultaneous top-down regulation of large supply targets and bottom-up regulation of multiple small-scale demand targets. Attacking climate change through multiple levels of government, aiming to affect the stream of greenhouse gas creation and demand bidirectionally, can provide important regulatory overlap because it is unlikely that the necessary reductions will be achieved perfectly on either end.

Presuming a cap-and-trade system can get through Congress (something that cannot be assumed as of this writing), it will not be created in an ideal type rational policymaking machine; despite the importance of the issue, the push and pull among interest groups will undoubtedly influence policies.[384] Scientific, demographic, and other uncertainties will compound these problems. Federal regulation targeting upstream sources through standards faces similar problems of interest group pressures and scientific uncertainties. Because of this, it is unlikely that even well designed federal legislation will get it right the first time. Indeed, regulation of upstream targets alone may simply be insufficient to reduce emissions to necessary levels. Nonetheless, even were federal measures sufficient comprehensive, effective, and well-designed, the concern that local programs could impede national or international comprehensive programs misunderstands the nature of these local efforts.

Rather than impeding future caps or providing only trivial benefits, earlier adoption of local programs provides several substantial benefits for the development of a comprehensive national regime. Perhaps most critically, local efforts have begun to shift rules governing the built environment in ways that will not only reduce greenhouse gas emissions now but also ease adaptation to a carbon-constrained economy in the future. These efforts directly influence emissions levels in domains like building energy efficiency and transportation that studies show to be critical.

As they implement and revise climate change plans, local governments also develop institutional and bureaucratic competence. Even if state and federal laws shape their future plans more directly, the presence of planners knowledgeable about smart growth and building permitting staff and inspectors familiar with green building standards will facilitate implementation. Had many local governments not yet developed these institutions, top-down directives mandating emissions reductions would likely come online much more slowly. By going first, local programs raise awareness, educate consumers, generate

383. Engel, *supra* note 89, at 179.

384. *See, e.g.*, DeShazo & Freeman, *supra* note 39, at 1548-50 (describing the role of political struggles between potential targets in shaping federal climate change policy).

behavioral patterns, develop institutions, stimulate broader social movements that influence local political will, and increase availability of professionals necessary to ease implementation of future top-down constraints on greenhouse gases. Current local efforts to improve energy efficiency in their proprietary domains also improves the resilience of local budgets to the increased fuel costs that economists warn will follow from national standards or cap-and-trade. It also gives local governments time to develop and revise regulatory models so that their incorporation into a national mitigation strategy can follow more smoothly. To the extent they have used this time preceding national legislation to iterate their own climate change plans, local governments have not only provided laboratories for state and national programs, but they have also created models of local regulation for matters that cannot be more effectively centralized. Thus, rather than serving as an impediment, local government climate change plans may provide the perfect prelude for a comprehensive national regime.

Finally, even assuming that a comprehensive cap-and-trade regime that will effectively limit economy-wide emissions can be adopted, continued efforts by local governments to reduce demand will help reduce and stabilize allowance costs. Lower and more stable prices will help maintain political will for continued cap reductions, avoid triggering cost containment mechanisms that could undermine the overall cap, and facilitate early retirement of allowances by nonprofits.

IV. AREAS FOR ADDITIONAL RESEARCH AND CONCLUSION

Consideration of why a number of local governments have been more proactive than the federal government and many states on climate change mitigation warrants further exploration. The empirical realities of local action show the need to broaden conceptual frameworks that guide environmental law to include more political and social theories that can explain these local movements and provide analytic foundations for multilevel and bidirectional climate change regulation. Public choice models seem unlikely to provide complete answers; local mandates as well as climate change education and outreach programs seem to be aimed at shaping constituents' preferences and behaviors, and not merely responding to them. Similarly, the noticeably collaborative approach to climate change policy that local governments have taken seems to belie theoretical models that envision inter-jurisdictional competition to drive local law and policy.

At the same time that local governments' position as vanguards on climate change policy warrants study, to the extent that their policies actually pay for themselves, investigation of barriers to cost-effective environmentally beneficial actions (both public and private) and the catalysts to overcoming them could facilitate a beneficial marriage of environmental and cost savings. More broadly, further study could contribute to literature on behavioral

economics as well as political and social theories regarding regulatory evolution.

Local governments have a critical, though clearly non-exclusive, role to play in efforts to reduce greenhouse gas emissions in the United States. The collective potential and the ease of implementation of local policies warrant their serious inclusion in a comprehensive national program. Because local governments have been largely targeting consumption, their efforts highlight the bidirectional potential to reduce greenhouse gas emissions by simultaneously constraining the supply of fossil fuels from the top (indirectly targeting consumption) and reducing demand from the bottom (indirectly targeting supply).

This model that combines top-down and bottom-up approaches can create redundancy to compensate for regulatory failures at each end. Nonetheless, this bidirectional approach cannot promise the clarity that could theoretically be achieved by an exclusive top-down constraint on greenhouse gases. Although I argue that the concerns raised about subnational actions are overstated, and that the theoretical clarity is never reflected in actual policymaking and implementation reality, a multilevel and bidirectional approach undoubtedly threatens some degree of leakage, inefficiency, and regulatory inconsistency. However, because this approach much more closely tracks the existing legal and regulatory environment it is much more likely to in fact be what happens on the ground. In that case, recognizing its benefits (along with its drawbacks) will be more likely to enable us to capture the advantages of a system of environmental law that involves multiple levels of government, reducing greenhouse gases by targeting both supply and consumption. As recognized by Freeman and Farber, the complexity (and messiness) of environmental law on the ground means that "[t]here is rarely a single tool, or a lone agency at either the federal or state level, that is capable of producing the desired environmental benefit by itself . . . ."[385]

Because of the myriad of sources and activities that interact to produce greenhouse gases, a multilevel and bidirectional approach likely will be essential to accomplish the depth of emissions cuts necessary. The broad range of economic, political, and social activities that must be altered to sufficiently reduce greenhouse gas production will require the complementary and overlapping skills, competencies, and unique regulatory approaches that each level of government can provide. Thus, to accomplish our climate change goals we will need "all hands on deck."

385. Freeman & Farber, *supra* note 91, at 797.