



Spring 3-1-2010

Greening the Economy Sustainably

David L. Markell

Follow this and additional works at: <https://scholarlycommons.law.wlu.edu/jece>



Part of the [Environmental Law Commons](#)

Recommended Citation

David L. Markell, *Greening the Economy Sustainably*, 1 Wash. & Lee J. Energy, Climate & Env't. 49 (2010), <https://scholarlycommons.law.wlu.edu/jece/vol1/iss1/5>

This Article is brought to you for free and open access by the Journal of Energy, Climate, and the Environment at Washington and Lee University School of Law Scholarly Commons. It has been accepted for inclusion in Washington and Lee Journal of Energy, Climate, and the Environment by an authorized editor of Washington and Lee University School of Law Scholarly Commons. For more information, please contact christensena@wlu.edu.

Greening the Economy Sustainably

David L. Markell*

Table of Contents

I.	Introduction	49
II.	Defining "Greening the Economy Sustainably".....	52
III.	The Need for Foundational Work to Understand the Options for Climate Solutions and Their Implications for a Sustainable Green Economy	55
IV.	Climate Solutions and Institutional Governance.....	62
V.	Conclusion.....	69

I. Introduction

Key officials at all levels of government have characterized climate change as "the greatest challenge [we have] ever faced."¹ An enormous amount has

* Steven M. Goldstein Professor, Florida State University College of Law, Visiting Professor University of Virginia School of Law, Spring 2009 Semester. I would like to thank Jackie Roberts, Director of Sustainable Technologies at the Environmental Defense Fund, and Professors Robin Craig, John Dernbach, and J.B. Ruhl for very helpful comments on earlier drafts of this article. Thanks also to Professor Hari Osofsky of Washington and Lee University School of Law for inviting me to participate in this excellent symposium, and to the students at Washington and Lee for their work in convening the conference. Katherine Watlington, University of Virginia School of Law Class of 2011, provided terrific research assistance.

1. John M. Broder, *Title, but Unclear Power, For a New Climate Czar*, N.Y. TIMES, Dec. 12, 2008, at A28, available at <http://www.nytimes.com/2008/12/12/us/politics/12climate.html>. See also BarackObama.com, Obama Statement on Climate Change Negotiations in Bali, Dec. 10, 2007, http://www.barackobama.com/2007/12/10/obama_statement_on_climate_cha.php (last visited Nov. 20, 2009) (citing climate change as one of the greatest challenges faced); Juliet Eilperin, *Faster Climate Change Feared*, WASH. POST, Dec. 25, 2008, <http://www.washingtonpost.com/wp-dyn/content/article/2008/12/24/AR2008122402174.html> (last visited Nov. 20, 2009) (expanding on the 2007 findings of the United Nations Intergovernmental Panel on Climate Change and alluding to even more rapid changes in climate). Skeptics exist as well. For example, a March 2009 Gallop Poll reflects the "highest level of public skepticism about mainstream reporting on global warming seen in more than a decade," with 40 percent of those polled saying the media are "exaggerating the issue." Yale Forum on Climate Change & the Media, Gallup Poll Finds More Americans Say Media

already been written about climate change in the legal literature and elsewhere.²

Yet it is abundantly clear that we have not yet come up with a coherent strategy for tackling this challenge either domestically or beyond.³ My purpose in this article is to suggest the overarching importance of three fundamental features of rapidly evolving climate change initiatives.

Part I offers a conceptual frame for developing strategies for mitigating and adapting to climate change. The purpose of this Part is to articulate the goals we should pursue in addressing climate change. While it generally is sound strategy to articulate, and be clear about, goals as an essential element of policy development, doing so is particularly valuable when the goals tend toward the amorphous, such as the pursuit of "sustainable" climate solutions.⁴

Part II reviews some of the foundational information policy makers need to make sound decisions about climate solutions. This is an area in which the need for information is great but the pace of activity is frenetic and accelerating rapidly.⁵ The goal in this Part is to provide an overview of some of the types of information policy makers should develop, and consider, in formulating sustainable climate solutions.

Overstate Warming Risks, www.yaleclimatemediaforum.org/2009/03/gallup-poll-more-americans/ (last visited Nov. 20, 2009). Some skeptics also claim that scientists are being intimidated, through loss of grant support, etc., for challenging the conventional wisdom. See, e.g., *Former Astronaut Speaks Out on Global Warming*, BOSTON HERALD, Feb. 16, 2009, <http://www.bostonherald.com/news/national/general/view.bg?articleid=1152427> (last visited Nov. 20, 2009) (citing an astronaut who believes global warming is a "political tool to increase government control over American lives").

2. For example, a March 5, 2009 Westlaw search in the TP-ALL libraries identified 6,103 articles that use the term "global w/2 warming."

3. See J.B. Ruhl, *Climbing Mount Mitigation Because It's There: A Proposal for Legislative Suspension of Climate Change "Mitigation Litigation"*, 1 WASH. & LEE ENERGY, CLIMATE, & ENV'T (forthcoming 2009), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1376380; see also Michael B. Gerrard, *State Bar Task Force: 22 New York Actions to Address Climate Change*, 241 N.Y.L.J., Jan. 23, 2009 (noting that New York does not have a "comprehensive climate change strategy that has a specific, measurable and binding reduction target").

4. See, for example, NAT'L RESEARCH COUNCIL, *OUR COMMON JOURNEY: A TRANSITION TOWARD SUSTAINABILITY* 2, 3 (1999), for the proposition that goal articulation is important generally and is particularly important in the context of sustainable development. Sustainable development has been defined in numerous ways and has proved difficult to apply in the field. See Daniel C. Esty, *A Term's Limits*, FOREIGN POL'Y 74, 74-75 (2001) ("[F]or all its laudable goals and initial fanfare, sustainable development has become a buzzword largely devoid of content."); see also *infra* note 10. As I discuss in more detail below, efforts are increasing to operationalize the concept of "sustainable development." See *infra* note 21. This presumably will contribute to enhanced understanding of what sustainable development means (and should mean) at a practical level.

5. See, e.g., *infra* notes 7-11 and accompanying text.

Part III considers the myriad institutional governance questions we face in developing climate solutions. The division of responsibility in our system of government has ebbed and flowed since the country's founding.⁶ This Part identifies some of the key components of our system of government (and governance) and raises questions about whether our current set-up is a good fit for developing and implementing climate solutions. There clearly is considerable skepticism that our current structure is adequate, including at the highest levels of government—witness President Obama's very early decision to create an entirely new office in the White House focused on climate change and to task EPA's former Administrator to head that office.⁷ New governance structures of this sort raise significant questions concerning the role they will fill, their impact on the roles and responsibilities of existing institutions, and how the new entities will interact with the old, in the environmental/natural resource arena (EPA, CEQ, DOI, etc.), and beyond (e.g., the Office of National Security, the Office of Economic Policy, the Department of Labor, etc.).⁸ California's 2008 enactment of Senate Bill 375 (SB 375), which has the potential to fundamentally change state/local relations in the land use area to address climate change issues, signals that both state and local governments are likely to consider modifying their governance structures to address climate solutions. It is likely, in short, that the perceived importance of the climate change challenge will lead to significant changes in the shape of governance institutions at all levels of government in the United States and perhaps beyond.⁹ It similarly is likely that climate change-related challenges will spawn

6. This is true in terms of the distribution of power between the federal, state, and local governments. It is also true for the distribution of power between and among the branches of the federal government. See, e.g., Henry N. Butler & Jonathan R. Macy, *Externalities and the Matching Principle: The Case for Reallocating Governmental Regulatory Authority*, 14 YALE L. & POL'Y REV. 23, 23 (1996) (considering "whether environmental policy can be improved by reallocating authority for environmental regulation within our federal system"); Richard B. Stewart, *Pyramids of Sacrifice?: Problems of Federalism in Mandating State Implementation of National Environmental Policy*, 86 YALE L. J. 1196, 1222–1232, 1244–1247, 1269–1272 (1977) (discussing the difficulty of relying on state and local governments to implement federal programs and highlighting some of the constitutional questions involved); Richard B. Stewart, *The Reformation of American Administrative Law*, 88 HARV. L. REV. 1667, 1676–1688 (1975) (examining the traditional model of Administrative Law and its failure to reconcile agencies' discretionary power with legislative consent). The roles that NGOs play have shifted over time as well.

7. See Broder, *supra* note 2, at A28.

8. See, e.g., Robin Kundis Craig, "Stationarity is Dead"—*Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. (forthcoming 2010), available at <http://ssrn.com/abstract=1357766> (addressing the complications of adapting American law and policy to perpetual climate change impacts).

9. See Alastair Neil Craik & Joseph F. DiMento, *Climate Law and Policy in North*

reconsideration of the appropriate roles for citizens and other "stakeholders" in the governance efforts intended to address these challenges.¹⁰ The implications of all of these moving parts of our governance "infrastructure" for government legitimacy, accountability, transparency, and effectiveness are potentially momentous.

II. Defining "Greening the Economy Sustainably"

As the title of this article reflects, my purpose is to suggest a basic framework for looking for "sustainable" ways to green the economy. This title embodies my view that an important aspect of our challenge in the climate solutions arena is to find ways to reduce emissions and otherwise protect the environment that are sustainable in nature. Given the somewhat amorphous quality of the concept of sustainable development, I begin at the conceptual level, by elaborating on what I mean by greening the economy sustainably, or pursuing sustainable development strategies for addressing climate change.

Professor John Dernbach, the editor of *Agenda for a Sustainable America*,¹¹ points out that there are many definitions of sustainable development. However, he also identifies two key elements of the definition, at least as the term is understood internationally. First, it is important to understand the word "development," the word that "sustainable" modifies. The word development includes economic development, as might be expected. It also, however, includes two other key elements, notably: 1) peace and security, and 2) human rights. Thus, the goal of development includes the objectives that societies will succeed economically, that people will be able to live in peace and with security, and that human rights will be respected. In short, it extends beyond mere economic development to encompass other aspects of human existence that world leaders and others have pronounced to be important to strive to achieve.¹²

America: Prospects for Regionalism (CEDAN Working Paper No. 2009/1), available at <http://ssrn.com/abstract=1348580> (discussing North America-oriented bilateral and trilateral initiatives focused on reducing greenhouse gas emissions).

10. See J.B. Ruhl and James Salzman, *Massive Problems in the Administrative State: Strategies for Whittling Away*, 98 Cal. L. Rev. (forthcoming 2010), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1280896 (evaluating agencies' capacities and current ineffective approaches to solving massive problems such as climate change).

11. See JOHN DERNBACH, *AGENDA FOR A SUSTAINABLE AMERICA* 5 (Env'tl. L. Inst. 2009).

12. The literature on sustainable development is enormous. A February 22, 2009 Westlaw search of "sustainable w/2 development" in the JR, TP-All libraries, for example, identified 8,391 articles. Definitions of the concept vary considerably. There obviously are issues surrounding the parameters of each of these concepts, but I do not delve into them here.

The second key element of sustainable development involves the definition of the first word in the phrase, "sustainable." As Professor Dernbach puts it, "sustainable development adds environmental protection and restoration to the post-World War II international system's goals of economic development, peace and security, and human rights."¹³ That is, "sustainable development recognizes that the historical goals of development—the quality of human life, opportunity, and freedom—should continue to be our ultimate objectives."¹⁴ But "environmental degradation is no longer the price of progress; environmental protection and restoration is part of what progress means."¹⁵

In sum, the basic premise of this article is that, in pursuing strategies for greening the economy sustainably, it is not enough to look at environmental or public health consequences in a vacuum. Instead, policy makers need to pay attention to a range of factors that include environmental protection but also include economic development and natural security. This seems self-evident,¹⁶ but I emphasize the point because it represents a significant change of mindset compared with some contemporary domestic environmental regulatory laws and policies.¹⁷ As those familiar with the alphabet soup of domestic environmental regulatory laws are well aware, these laws take a variety of approaches to reconciling environmental and public health issues with other concerns. Some embody approaches that, at least at first glance, do not necessarily fit within the definition of sustainable development that the world seems to have embraced.¹⁸ For purposes of this article, this broad focus of

See, for example, NAT'L RESEARCH COUNCIL, *supra* note 5, at 2, for more information on the meaning of sustainable development. The NRC notes that there are "differing views about what should be developed, what should be sustained, and over what time period." *Id.*

13. JOHN DERNBACH, *supra* note 12, at 6.

14. *Id.*

15. *Id.*

16. See, e.g., RECONCILING ENVIRONMENT AND TRADE at ix (Edith B. Weiss, John H. Jackson & Nathalie Bernasconi-Osterwalder eds., 2d ed. 2008) ("Today's world faces two urgent imperatives: to protect the environment globally and to ensure continued economic growth and the eradication of poverty."); U.N. Conf. on Env't & Dev., June 3–14, 1992, *Rio Declaration on Environment and Development*, ¶ 5, U.N. Doc. A/CONF.151/26 (Aug. 12, 1992), reprinted in 31 I.L.M. 874 (1992) (declaring the eradication of poverty as a necessary requirement for sustainable development).

17. See Jonathan B. Wiener, *Radiative Forcing: Climate Policy to Break the Logjam in Environmental Law* 2, 5 (Nicholas Inst. Working Paper No. 08-04), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1307842 (discussing, for example, the need to make explicit trade-offs rather than ignore them).

18. See e.g., *Whitman v. Am. Trucking Ass'n*, 531 U.S. 457, 471 (2001) (noting that EPA may not consider implementation costs in setting NAAQS under the Clean Air Act, barring the agency from considering any harm to human health that may result from impacts on

sustainable development provides the frame for thinking about climate solutions that will be sustainable.

It is essential, in this opening Part on the conceptual frame for moving forward, to highlight the uncertainty inherent in the path toward sustainable approaches and the sense of humility we should bring to the challenge ahead. As the National Research Council (NRC) notes, while it is important to set initial goals it is also the case that goals, as well as initial plans for achieving them, are likely to, and indeed must, change as we learn more about the task at hand:

[T]he Board's view [is] that any successful quest for sustainability will be a collective, uncertain and adaptive endeavor in which society's discovering of where it wants to go is intertwined with how it might try to get there [T]he pathways of a transition to sustainability cannot be charted fully in advance. Instead, they will have to be navigated adaptively at many scales and in many places.¹⁹

So, beginning with this essential conceptual frame that our journey toward greening the economy sustainably should be infused with more than a healthy dose of humility, but should also incorporate the recognition that, ultimately, the consensus view internationally and domestically is that climate solutions should be developed mindful of their prospects for contributing to economic development, security, and human rights and dignity, in addition to protecting our environment and health, I now suggest two foundational features of sustainable approaches to climate solutions and offer some preliminary thoughts on each.²⁰

employment levels, ability to access health care, availability of health care, and the like).

19. NAT'L RESEARCH COUNCIL, *supra* note 5, at 3. A critical element of this frame-setting aspect of the task involves development of clear metrics of success so that government officials and others have the ability to monitor progress and adapt strategies as needed. See also N.Y. STATE BAR ASS'N, TAKING ACTION IN NEW YORK ON CLIMATE CHANGE 13, 34–35 (2009), *available at* http://www.nysba.org/AM/Template.cfm?Section=Task_Force_on_Global_Warming_Report, which recommends that the New York adopt an overall metric or goal of reducing emissions by eighty percent below 1990 levels by 2050, with an interim goal of achieving 1999 levels by 2020. The report also recommends adoption of "common measurements" for the various programs intended to reduce emissions so that the state can measure progress periodically and assess whether it is achieving its goals and whether it should consider adjustments in its strategies. See Michael B. Gerrard, *supra* note 4 (noting that "without a common metric it is very difficult to gauge progress and set priorities" and to also determine the most cost effective methods).

20. By highlighting in the text the uncertainties that are likely to be a central feature of society's "discovering of where it wants to go" or "how it might try to get there," as the NRC put it, I do not mean to be too pessimistic about the possibility of progress in settling in on sustainable approaches. Instead, I anticipate that achievement of rough consensus on the

III. The Need for Foundational Work to Understand the Options for Climate Solutions and Their Implications for a Sustainable Green Economy

Moving from the conceptual to the very practical, a second key step in developing climate solutions involves the foundational work of identifying and evaluating options for reducing emissions, fostering absorption capacity, and adapting to unavoidable changes in climate. This work includes assessing options in terms not only of their capacity to reduce emissions and/or to facilitate adaptation to likely changes, but also of their potential to create jobs and further economic development, foster new technology, be cost-effective, and advance national security interests—i.e., to promote development as well as environmental protection.²¹ The good news is that an enormous amount of attention is being paid to foundational issues in this realm. This part briefly reviews two examples that are illustrative of the type of work that is likely to be quite helpful in moving us forward in understanding our options for climate solutions.²²

McKinsey & Company, in its December 2007 report, *Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost*,²³ analyzed “resource costs” and “abatement potentials” for more than 250 opportunities to reduce or

appropriate parameters for sustainable approaches will be an iterative process. In addition to conceptual formulations and re-formulations of the meaning of sustainable development, this iterative process is likely to include increasingly specific conceptions of what sustainable development means. The increased specificity used in some contexts to define “sustainability” is evidence that this is already occurring. See, e.g., Exec. Order No. 13,514, 74 Fed. Reg. 52,117, 52,121 (Oct. 8, 2009) (implementing a Strategic Sustainability Performance Plan). The greater specificity will no doubt trigger fresh debate at a conceptual level as well as in the real world of policy development and implementation.

21. See John Dernbach et al., *Moving the Climate Change Debate from Models to Proposed Legislation: Lessons from State Experience*, 30 ENVTL. L. REP. 10,933, 10,934, 10,946–49 (2000).

22. There are a variety of ways of categorizing the major options. John Dernbach and Seema Kakada suggest that there are four major categories for addressing climate change: 1) emissions controls; 2) energy efficiency and conservation; 3) long-term carbon storage or carbon sequestration; and 4) adaptation. John Dernbach & Seema Kakada, *Climate Change: An Introduction*, 72 ENERGY L.J. 1, 8–9 (2008). They suggest that “the greatest efforts to date have been addressed to the first two options.” *Id.* at 9. In its recent report, the New York State Bar Association divides twenty-two proposals for reducing GHG emissions into four major categories: 1) buildings and energy; 2) land use; 3) vehicles and transportation; and 4) other. See N.Y. STATE BAR ASS’N, *supra* note 20, at 1. Other ways to organize or conceptualize the options for addressing climate change obviously exist as well. Many commentators have divided the options into two main categories: mitigation and adaptation.

23. See MCKINSEY & CO., REDUCING U.S. GREENHOUSE GAS EMISSIONS: HOW MUCH AT WHAT COST? (2007), available at http://www.mckinsey.com/client/service/ccsi/pdf/US_ghg_final_report.pdf.

prevent greenhouse gas (GHG) emissions.²⁴ These options ranged from using different types of energy generation strategies (wind power, biomass, etc.), to different options for increasing efficiency (upgrades in different types of lighting, etc.), to absorption possibilities such as afforestation.²⁵ McKinsey evaluated seven key sectors of the economy: 1) power generation, 2) transportation, 3) residential and commercial buildings (including appliances), 4) industry, 5) waste management, 6) agriculture, and 7) forestry.²⁶ It considered both emissions from these sectors and absorption of GHGs.²⁷ The team used a variety of "filtering criteria" in an effort to identify the best ("most promising and feasible") options for reducing emissions.²⁸ Filtering criteria included the elimination of options in the speculative or experimental stages, as well the elimination of options with "marginal costs greater than \$50 dollars per ton in 2030."²⁹

McKinsey projected three potential abatement outcomes for each opportunity: a low-range case involving "incremental departures from current practices;" a mid-range case involving "concerted action across the economy;" and a high-range case involving immediate "nationwide mobilization."³⁰ McKinsey then used this information to generate "abatement curves" for each of the three outcomes.³¹ The abatement curve for the mid-range outcome is displayed below.

24. *See id.* at xi, 15.

25. *See id.* at 17.

26. *See id.* at 1, 77.

27. *See id.*

28. *See id.* at 15.

29. *See id.*

30. *See id.* at xi.

31. *See id.* at 2.

In sum, foundational work involving the relative costs and benefits of different strategies has recently been done, with more ongoing, that will help to inform policy makers and others interested in sustainable approaches.³⁷

Assessing climate solution options raises other issues beyond abatement curves. I focus on one such question here, notably the possibility that climate solutions may have positive spin-off effects on the economy.³⁸ One aspect of this is the role of "supply chains" for different low carbon options in evaluating various emission reduction possibilities. The term "supply chains" in this context is shorthand for the steps required to manufacture or put into operation different climate solutions. A significant issue for sustainable approaches to addressing climate change involves identifying strategies that will produce economic opportunity. Thus, the inquiry into supply chains raises a host of economic development-related issues. I list a handful as illustrative of the types of issues policy makers are well-advised to consider:

- 1) Does a jurisdiction have a ready infrastructure to support a supply chain for particular green solutions? For example: (a) Are there existing companies in the area that operate in one or more aspects of the supply chain? (b) Is there capacity in the existing work force to help meet the needs of the supply chain? (c) Is there existing infrastructure to support new businesses that would be attractive to employers—for example, are there "brownfields" available as possible locations? Related, is the jurisdiction's legal structure (e.g., its permitting scheme, legal regimes to facilitate reuse of brownfield sites, etc.) appropriate to support different types of activity that are part of the supply chain?

houses, motor vehicles, and so forth, the more negative-cost options we lose.").

37. Lessons from the European Union's Emissions Trading System are likely to be very helpful on issues beyond abatement costs, such as the efficacy of different monitoring strategies. *See, e.g.*, LARRY PARKER, CLIMATE CHANGE: THE EUROPEAN UNION'S EMISSIONS TRADING SYSTEM 1–3, 5–8 (EU-ETS) (Cong. Res. Serv. 2006), *available at* <http://italy.usembassy.gov/pdf/other/RL33581.pdf> (detailing the EU's climate change approach and its progress in meeting Kyoto targets). State initiatives also offer promising laboratories. *See, e.g.*, *New State Ice Co. v. Liebmann*, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting) ("There must be power in the States...to remold, through experimentation, our economic practices and institutions to meet changing social and economic needs."); AMY ROYDEN-BLOOM, STATE GREENHOUSE GAS (GHG) ACTIONS 1–19 (Nat'l Ass'n of Clean Air Agencies 2008), *available at* <http://www.4cleanair.org/documents/StateGHGActions-chart.pdf> (detailing state-wide climate change regulations).

38. There are a host of other issues too. For example, the McKinsey study points out that effective implementation of many of the negative cost options it identified will require "overcoming persistent barriers to market efficiency, such as mismatches between who pays the cost of an option and who gains the benefit (e.g. the homebuilder versus the homeowner)" MCKINSEY & CO., *supra* note 24, at xii.

2) Does a jurisdiction have other tools or strategies that are likely to attract supply chain manufacturers? For example: (a) Are there opportunities to use state procurement to attract supply chain employers? (b) Are there opportunities to work with nearby states to create markets that, again, might lure supply chain employers?

3) What is the potential upside associated with particular climate solutions and their supply chains? Is there significant potential for growth that might justify state investment? If a jurisdiction invests money to attract a company that contributes to a particular green solution, is there a good chance that the market will grow and thereby enhance the likelihood that the company will flourish? For example, a North Carolina lighting company, Cree, Inc., which holds key patents on a significant number of LED technology improvements, has nearly quadrupled its workforce since 2002.³⁹ Cree supplied over 750,000 red, blue, and green LED chips to light the stadium and aquatic center during the 2008 Beijing Olympics. Cree is also partnering with five universities to provide LED lighting for offices, parking garages, and dormitories.⁴⁰ What is the likely community reaction to and level of support for particular climate solutions and for the parts of solutions a jurisdiction would like to attract?⁴¹

In sum, in addition to reviewing foundational work of the sort McKinsey & Co. have done, described above, concerning the abatement curves of different climate change solutions, policy makers should also consider other consequences of pursuing different strategies that fit within the rubric of sustainable development, such as increased economic opportunity. For one recent articulation of this need to consider multiple goals in an integrated way, see *Green Jobs in New York: Where the (Green) Economy Meets the (Green)*

39. See GARY GEREFFI ET AL., MANUFACTURING CLIMATE SOLUTIONS: CARBON-REDUCING TECHNOLOGIES AND U.S. JOBS 19 (Ctr. on Globalization, Governance, & Competitiveness 2006), available at http://www.cggc.duke.edu/environment/climatesolutions/greeneconomy_Fullreport.pdf ("Cree holds patents on a large number of LED technology improvements, and as demand for its innovative products has increased, the company's work force has nearly quadrupled, from 893 people in 2002, to 3,168 regular full and part-time employees in 2008."). LED is the acronym for light-emitting diodes, which the Duke study defines as a "semiconductor technology whose application to general-purpose lighting is rapidly growing with significant potential for energy savings." *Id.* at 10. The report indicates that, in laboratory conditions, LED devices are up to ten times more efficient than incandescent lights. In the field, LED lighting products now are three to four times more energy efficient than incandescent bulbs. *Id.* They last up to five times longer than compact fluorescents, the longest-lasting lighting alternative. *Id.*

40. See *id.* at 13 (discussing Cree's partnerships with universities including the University of California at Santa Barbara and Tianjin Polytechnic University in China).

41. The same factors ought to be considered in formulating national policy, just at a different level of analysis.

Environment (Part 1 of 2).⁴² The authors suggest "green collar jobs" as a method for addressing economic and environmental hardships through "a re-innovation of our workforce and a re-dedication to core environmental and labor principles."⁴³

Increasingly, experts are honing in on these issues and providing important foundational information that can inform choices. Duke University's Center on Globalization, Governance, and Competitiveness provides one example in its 2008 report, *Manufacturing Climate Solutions: Carbon-Reducing Technologies and U.S. Jobs*.⁴⁴ Building on the McKinsey report, it reviews economic opportunities in the value chains of five low-carbon technologies: LED lighting, high performance windows, anti-idling technologies for heavy duty trucks, concentrated solar, and Super Soil Systems for hog waste management.⁴⁵ The five technologies were chosen to "run the spectrum from a well-established product (windows) to a new solution (Super Soil)."⁴⁶ The report provides an overview of each technology, including the main materials and component, a description of the value chain, and an analysis of the market structure including a list of representative firms and their locations.⁴⁷ It also includes case studies for several of the technologies.⁴⁸

States and others are already well along the way to investigating climate solutions. For example, in January 2009, a New York State Bar Association Task Force on Global Warming developed recommendations that the Bar Association presented to the governor and others.⁴⁹ The Task Force internalized the need to integrate environmental protection and economic development concerns, consistent with the general concept of sustainable development referenced above. The Task Force was "acutely aware" of New

42. See Delight Balducci et al., *Green Jobs in New York: Where the (Green) Economy Meets the (Green) Environment (Part 1 of 2)*, 20-2 ENVTL. L. IN N.Y. (2009), available at <http://lawyers4greenjobs.wordpress.com/green-jobs-position-paper/> (detailing various green jobs initiatives).

43. *Id.*

44. See generally GEREFFI ET AL., *supra* note 39 (discussing "the economic opportunity inherent in a carbon-constrained world, a world where massive investments in climate solutions and related infrastructure will be needed.").

45. See *id.* at 5.

46. *Id.* at 7.

47. See *id.* at 5 (detailing the elements of each industry analysis, as gathered from "a variety of secondary sources and direct company interviews.").

48. See *id.* at 19, 34, 45-46, 60-61 (providing case studies for LED lighting, high-efficiency windows, APUs (auxiliary power units), and CSP (concentrating solar power) technology).

49. See N.Y. STATE BAR ASS'N, *supra* note 20, at 1-2; Gerrard, *supra* note 4 (summarizing the New York State Bar Association report).

York's fiscal predicament; as a result, it focused on actions that "will either save money because of their energy cost savings or will have, at worst, a modest cost to state and local government."⁵⁰ It identified twenty-two proposals for reducing emissions and otherwise addressing climate change.⁵¹ The National Association of Clean Air Agencies has developed an inventory of state initiatives to address climate change.⁵² The continuing development of the types of foundational information summarized above will help to inform these initiatives and enhance their value for policy development and implementation.

While a great deal of rhetoric concerning the promise of "green jobs" has accompanied some of this foundational work,⁵³ cautionary notes have been sounded as well. Concerns have been raised that some policies that purportedly seek to promote green jobs may instead be more likely to "generate stagnation" and be counter-productive more generally because they "disregard . . . basic economic principles"⁵⁴ and rely on unreliable forecasts.⁵⁵ One recent article concludes by suggesting that "deep skepticism is the most appropriate response to the hyperbolic claims of the green jobs literature," and recommends "continuing the debate with the facts—not the myths."⁵⁶ Treatment of these challenges is well beyond the scope of this framework paper, but they highlight the importance of realistic foundational work in the formulation and implementation of particular policy options.

Another challenge is that many of the initiatives to pursue "climate solutions" extend well beyond traditional environmental regulatory approaches;

50. Gerrard, *supra* note 4.

51. See N.Y. STATE BAR ASS'N, *supra* note 20, at 35–56 (ranging from improving building initiatives to improving New York's floodplain mapping system).

52. See ROYDEN-BLOOM, *supra* note 37, at 1–19 (showing state climate change initiatives, including offsets of EGU emissions, regulations of motor vehicle emissions and fuels, state-wide targets, action plans, registries, and other policy actions).

53. See U.S. CONFERENCE OF MAYORS, U.S. METRO ECONOMIES: CURRENT AND POTENTIAL GREEN JOBS IN THE U.S. ECONOMY 17 (2008), available at <http://usmayors.org/pressreleases/uploads/GreenJobsReport.pdf> (maintaining that green jobs "could be the fastest growing segment of the United States economy over the next several decades," potentially generating 4.2 million jobs).

54. Andrew P. Morriss et al., *7 Myths About Green Jobs* 3, 5 (Univ. of Ill. Law & Economics Research Paper, No. LE09-007 & Case W. Reserve Univ. Research Paper Series, No. 09-14, 2009), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1357440; see Andrew P. Morriss et al., *Green Jobs Myths* 2 (Univ. of Ill. Law & Economics Research Paper, No. LE09-001 & Case W. Reserve Univ. Research Paper Series, No. 09-15, 2009) available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1358423 (expressing doubts about claims for green jobs for a variety of reasons).

55. See Morriss et al., *7 Myths About Green Jobs*, *supra* note 54, at 8–9.

56. *Id.* at 5.

instead, they require coordination of a wide range of government and non-government actors operating in or interacting with different compartments of the regulatory state. A question of fundamental importance is how government (and governance initiatives more generally) should be structured to maximize capacity to implement promising approaches. I consider this issue briefly in the following Part.

IV. Climate Solutions and Institutional Governance

Developing and implementing climate solutions poses significant challenges for our current set of laws and institutions because it is at the intersection of several areas of law and policy.⁵⁷ Ted Nordhaus and Michael Shellenberger make the point in somewhat more graphic or stark terms, as follows:

The ecological crises we face are more global, complex, and tied to the basic functioning of the economy than were the problems environmentalism was created to address forty years ago. Global warming threatens human civilization so fundamentally that it cannot be understood as a straightforward pollution problem, but instead as an existential one. Its impacts will be so enormous that it is better understood as a problem of evolution, not pollution.⁵⁸

There is, to put it mildly, likely to be substantial debate about how best to organize our institutions of governance to meet these challenges.⁵⁹ And we will need to think hard about the adequacy of current governance institutions for the task. My purpose in this section is to identify some of the challenges and offer some preliminary thoughts about them.

57. See John C. Dernbach & Seema Kakade, *Climate Change Law: An Introduction*, 29 ENERGY L. J. 1, 2, 20 (2008) (including the realms of environmental, energy, business, and international law, in addition to complex policy arenas such as federalism).

58. TED NORDHAUS & MICHAEL SHELLENBERGER, *BREAK THROUGH: FROM THE DEATH OF ENVIRONMENTALISM TO THE POLITICS OF POSSIBILITY* 8 (Houghton Mifflin Co. 2007).

59. As J.B. Ruhl and Jim Salzman point out, there is also likely to be substantial debate about the approaches and tools key actors should use to address the challenges we face. They suggest that we may need to "whittle away" at these challenges, because they may be "too big" to handle through any single approach. Ruhl & Salzman, *supra* note 11, at 7. In *Massachusetts v. EPA*, the Supreme Court acknowledged that there is likely to be no easy fix to climate change and that, in particular, EPA mobile source requirements at issue in the case would not suffice as a regulatory tool for solving the climate change challenge regardless of their content. See *Massachusetts v. EPA*, 549 U.S. 497, 532 (2007) (recognizing uncertainty surrounding various aspects of climate change).

The quest for effective and efficient climate solutions raises the following seven sets of governance issue, among others.⁶⁰ First, there is our current legal framework. Are current laws adequate? If not, how should we revise them to improve our capacity to address climate change effectively? An important goal, presumably, is to develop clear objectives, charge appropriate entities with fulfilling those objectives, provide them with sufficient tools and incentives, monitor their performance, and have the capacity to adapt to new learning—a form of adaptive governance.⁶¹ While there is evidence that the new Administration is likely to pursue efforts to regulate CO₂ under the Clean Air Act,⁶² consistent with the Supreme Court's decision in *Massachusetts v. EPA*,⁶³ this is only a small aspect of the "legal framework" issue. There are significant questions concerning the appropriateness of the current Clean Air Act and its NAAQS regime for addressing climate solutions.⁶⁴ We are early on in what is

60. In addition to the issues I summarize in the text, for example, another issue concerns whether President Obama's creation of various "czars," appointments that do not require confirmation, including one for energy, raises constitutional concerns and may limit Congressional oversight. See, e.g., Tom Hamburger & Christi Parsons, *Whitehouse Czar Inflation Stirs Concern*, L.A. TIMES, Mar. 5, 2009, at 1, available at <http://articles.latimes.com/2009/mar/05/nation/na-obama-czars5?pg=4> ("[S]ome lawmakers and outside experts fear that Obama is setting up a system that is not subject to congressional oversight.").

61. See William J. Wailand, *Evolving Strategies for Twenty-First Century Natural Resource Problems*, 81 N.Y.U. L. REV. 1518, 1519–20 (2006) (applying adaptive governance to paper management); J.B. Ruhl, *Climate Change and the Endangered Species Act: Building Bridges to the No-Analog Future*, 88 B.U. L. REV. 1, 49–53 (2008) (discussing adaptive management measures at the Fish and Wildlife Service); Robin Kundis Craig, *The Clean Water Act on the Cutting Edge: Climate Change and Water Quality Regulation* 3 (FSU Coll. of Law Public Law, Research Paper No. 356, 2009) available at <http://ssrn.com/abstract=1357350> (noting the problems of information generation, climate change mitigation, and climate change adaptation).

62. See Editorial, *The Next Step on Warming*, N.Y. TIMES, Jan. 31, 2009, at A24, available at <http://www.nytimes.com/2009/01/31/opinion/31sat2.html> (describing a memo by EPA Administrator Lisa Jackson vowing to address climate change under the Clean Air Act); Anthony Lacey, *Jackson Sees EPA Flexibility When Crafting GHG Rules Under Air Act*, 20 CLEAN AIR REPORT, Mar. 5, 2009 (discussing Administrator Jackson's commitment to addressing climate change through a flexible regulatory framework that does not unduly burden small business). As this article was well into its final editing, EPA issued its endangerment finding under the Clean Air Act.

63. See *Massachusetts*, 549 U.S. at 500 (finding that the regulation of tailpipe emissions of GHGs falls within EPA's mandate under the Clean Air Act to regulate any air pollutant that endangers public welfare).

64. A March 26, 2009, Clean Air Act conference at Duke University considered precisely this issue and featured a lively debate. See Nicholas Inst. for Envtl. Pol'y Solutions, *Regulating Climate: What Role for the Clean Air Act?*, <http://www.nicholas.duke.edu/institute/clean.air.2009.html> (last visited Nov. 8, 2009); *Regulating Greenhouse Gases Under the Clean Air Act: Testimony on H.R. 6666 Before the S.*

likely to be a contentious and lively debate concerning the need for legislative fixes.⁶⁵

Second, are our federal agencies (and their Congressional overseers) structured effectively? There is already evidence (indeed, proof) that at least the new Administration thinks significant institutional change is needed. President Obama has named Carol Browner, EPA's former Administrator, to a new position as White House Coordinator of energy and climate policy—to be a new "Climate Czar," as the New York Times put it.⁶⁶ In appointing Ms. Browner, President Obama said that, "Carol understands that our efforts to create jobs, achieve energy security and combat climate change demand integration among different agencies; cooperation between federal, state and local governments; and partnership with the private sector."⁶⁷ The creation of this new position raises numerous questions. To list three: 1) What will be the relationship of Ms. Browner's office with EPA and CEQ, and with other federal agencies with a natural resources focus such as DOI?; 2) What will be the "czar's" relationship with other key federal actors, such as the National Security Council, the National Economic Council, and the Department of Labor (responsible for implementation of the Federal Green Jobs Act)?;⁶⁸ and 3) What relationship will it forge with the states, with local governments, and with the private sector and non-governmental organizations (NGOs)? These issues raise questions concerning the nature of horizontal as well as vertical governance.⁶⁹

Comm. on Environment and Public Works, 110th Cong. (2008), available at http://www.uschamber.com/NR/rdonlyres/caf66mxsezcul2vb2cuvpfoooncyhpyshxpc7zzbsvgruv4uh5zc2p6csnbnom6aw7qszmg5axla43722hyxeshfe/080923_epa_Kovacs_testimony.pdf (statement of William L. Kovacs, Vice President, Environment, Technology and Regulatory Affairs, U.S. Chamber of Commerce); Joanna Franco, *Supreme Court Emissions Ruling Could Create Legacy of Regulations Grappling*, 23 OCTANE WEEK, Apr. 7, 2008.

65. My colleagues J.B. Ruhl and Robin Craig are among the scholars who have considered legislative fixes for aspects of "good governance" in this arena. See Ruhl, *supra* note 4; Craig, *supra* note 61, at 14. Michael Vandenberg and others have discussed opportunities to reduce emissions from individuals.

66. See Broder, *supra* note 2, at A28.

67. Stephen Dinan, *Obama Climate Czar Has Socialist Ties*, WASH. TIMES, Jan. 12, 2009, at 1.

68. See H.R. Res. 3221, 110th Cong. (2007) (enacted) (incorporating the Green Jobs Act of 2007, H.R. 2847, 110th Cong. (2007)); Balducci, *supra* note 42, at 35.

69. See Broder, *supra* note 2, at A28 ("How much real authority will Ms. Browner wield? Will her office have the same bureaucratic clout . . . as the National Security Council and the National Economic Council? . . . The transition team is still trying to draw the increasingly complex White House organization chart.") "Ms. Browner is informally known within the transition and in the environmental community as the 'climate czarina,' a title that conceals as much as it reveals." *Id.*

Related, it is unclear whether the Administration's apparent predisposition to embrace institutional change signals it may revisit the structure and operations of existing organizations like EPA. EPA is famous for its media-specific approach to many environmental problems, despite periodic efforts to bring more of a multimedia perspective to issues.⁷⁰ What does the new office tell us about the appropriateness of EPA's current structure, or about the prospects for a change in that structure? The last time EPA was significantly reorganized was in 1994, when Carol Browner was the Administrator.⁷¹ Parts of several media programs were moved to the enforcement office—OECA, among other changes.⁷² It remains to be seen whether the new Administration's emphasis on climate solutions will lead it to make significant changes in how EPA (among other federal entities) is structured and, if so, what that new structure will look like.

Third, climate change may also trigger new looks at regional governance in some contexts. A small number of regional climate change programs have already been implemented. Most notably, the northeastern states have formed the Regional Greenhouse Gas Initiative (RGGI) to develop a cap-and-trade system for electric utilities.⁷³ Other states have begun to follow suit. It remains to be seen whether new regional or other structures will emerge and how such organizations will fare over time.

Fourth, effectively developing and implementing climate solutions is likely to require rethinking of the organizational structure of our states. Are states organized to engage in integrated sustainable development through their environmental, economic development, labor, and other departments? Will states decide to follow the lead of the early Obama Administration decision to create an overarching position of "Climate Czar," in order to facilitate coordination among, and to provide direction to, the different components of government? Or will the smaller scale of state government (at least in some cases) make it unnecessary to undertake this potentially dramatic reconfiguration of the shape of government? Several states have already begun to superimpose special institutions on existing governmental structures in order

70. See U.S. EPA, FINAL FY 96/97 OECA MEMORANDUM OF AGREEMENT GUIDANCE 1, 28 (1997), available at <http://www.epa.gov/oecaerth/resources/policies/data/planning/96-97moa.pdf>.

71. See Michael M. Stahl, *Enforcement in Transition*, ENVTL. F. 19, 21 (1995).

72. See *id.*

73. See Alice Kaswan, *A Cooperative Federalism Proposal for Climate Change Legislation: The Value of State Autonomy in a Federal System*, 85 DENV. U. L. REV. 791, 816 (2008).

to address climate change-related issues.⁷⁴ It is clear that expertise from a wide range of disciplines will be needed to develop and implement climate solutions; there are a wide variety of options for structural arrangements to bring these capacities and expertise to the table and it remains to be seen how different states will reconfigure their governance structures to meet these challenges.

A fifth essential governance structure question involves the appropriate relationship between states and local governments. In addition to having their own responsibilities as regulated parties, local governments exercise much of the land use regulatory authority in the United States.⁷⁵ Climate solutions inevitably will need to include close attention to land use regulation. For example, LEED and Energy Star standards can be integrated into local building codes.⁷⁶ Land use regulation can also be used to encourage communities to create more appealing pedestrian areas, reducing automobile usage. In addition, regulations set the tone in determining how welcome alternative energy sources such as solar and wind power will be in a community.⁷⁷

California has recently taken legislative action to integrate land use planning into the State's efforts to address concerns about climate change. Senate Bill 375, adopted in 2008, is intended to link land use planning and greenhouse gas emissions reduction in California.⁷⁸ According to various commentators, SB 375 has the potential to "change dramatically both

74. See Balducci, *supra* note 42, at 35 (summarizing new institutional arrangements in states such as Washington, Massachusetts, and California); N.Y. STATE BAR ASS'N, TAKING ACTION IN NEW YORK ON CLIMATE CHANGE 18–27, 54 (2009) (summarizing the significant number of government agencies and others involved in climate change). The New York DEC created an Office of Climate Change in 2007 within the Department to develop programs for climate change; the Department of State is responsible for issuing rules to update the State's Energy Conservation and Construction Code; the Governor's Office of Regulatory Reform is involved in such rule development as well; the Public Service Commission, NYSERDA, and the New York Power Authority have significant roles; and a host of new entities have been created to address climate change, including a legislatively-created Sea Level Risk Task Force (2007), a State Renewable Energy Task Force (June 2007), a Smart Growth Cabinet (via a 2007 Executive Order), and an Interagency Committee on Sustainability and Green Procurement (via a 2008 Executive Order). *Id.*

75. See Patricia E. Salkin, *Smart Growth and the Greening of Comprehensive Plans and Land Use Regulation*, A.L.I.-A.B.A. COURSE OF STUDY LAND USE INST. 437, 438–39 (2008).

76. See, e.g., Mark J. Bennett et al., *Sustainability Due Diligence: LEED as the Evolving National Standard*, 39 ENV'T REP. (BNA) 1783, 1783 (Sept. 5, 2008) (providing an overview of LEED and suggesting the increasing importance of LEED certification).

77. See Salkin, *supra* note 75, at 448.

78. See Mary D. Nichols, *California's Climate Change Program: Lessons for the Nation*, 27 UCLA J. ENVTL. L. & POL'Y 185, 207–08 (2009).

California's land use planning system and growth patterns." ⁷⁹ And it is expected to have a significant effect on reductions in emissions.

The locus of authority to make land use decisions has received enormous attention in recent years.⁸⁰ Debate concerning whether climate change requires a different (and greater) state role is inevitably going to increase substantially in the near future. Other states will need to confront the same issues that California seeks to address in SB 375. Though answers may vary, concerns about climate change are likely to engender efforts by state government to use land use planning and regulatory tools as part of their tool boxes to reduce emissions. States will need to consider whether they need to reallocate power to use these tools to maximize their promise.

A sixth issue regarding the implications of climate change concerns for the structure of governance is whether our primary model for environmental regulation in the United States, notably that of cooperative federalism, requires tweaking or a more fundamental revamping. As most readers are well aware, the major U.S. environmental regulatory statutes, notably the Clean Air Act (CAA),⁸¹ Clean Water Act (CWA),⁸² and the Resource Conservation and Recovery Act (RCRA),⁸³ are structured in the same basic way: Congress has established various normative goals (eliminating water pollution from point sources by 1983, for example);⁸⁴ it has charged the U.S. EPA with responsibility for achieving these goals and created permitting and other mechanisms for the Agency to use in doing so;⁸⁵ and Congress has authorized, or in some cases directed, EPA to delegate to qualified and interested states the power to play the lead role in implementing their own versions of the federal laws.⁸⁶ Under this system, which is how most of our environmental regulatory statutes are structured, including the CAA and CWA, authority tends to be split between the federal government and the states for much of the work.

79. Paul Shigley, SB 375 Continues to Dominate Planning Discussion, Jan. 26, 2009, <http://www.cp-dr.com/node/2239> (last visited Nov. 20, 2009).

80. See DAVID L. CALLIES, ROBERT H. FREILICH & THOMAS E. ROBERTS, *CASES AND MATERIALS ON LAND USE* 767 (5th ed. 2008).

81. See 42 U.S.C. § 7401 (2006).

82. See 33 U.S.C. § 1251 (2006).

83. See 42 U.S.C. § 6901 (2006).

84. See 33 U.S.C. § 1251 (2006).

85. See, e.g., 33 U.S.C. § 1342 (2006).

86. See, e.g., ROBERT L. GLICKSMAN ET AL., *ENVIRONMENTAL PROTECTION: LAW AND POLICY* 988 (5th ed. 2007); 33 U.S.C. § 1251 (2006). Some environmental statutes follow different approaches, such as the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Toxic Substances Control Act (TSCA). See 42 U.S.C. §§ 9601–9676 (2006); 15 U.S.C. §§ 2601–2629 (2006).

Particularly as changes emerge in how the federal and state governments restructure themselves internally to address climate change,⁸⁷ these changes, in addition to changes in underlying goals and programs, will require attention to the structure of state/federal relations.⁸⁸

A final "governance structure" question that is likely to be influenced by the challenge of climate change relates to changes in relationships between and among government organizations, regulated parties, non-governmental organizations, and "ordinary" citizens. For example, the pressures that climate change is likely to place on governance may influence the shape and function of "governance networks" that participate in shaping and implementing environmental law and policy.⁸⁹ This effect on governance is different from the influence of climate change on the structure of particular government institutions or the ways in which such government entities interact. The shape of governance is evolving to respond to current challenges and will continue to do so; climate change pressures are likely to influence the pace and nature of this evolution.⁹⁰

Jonathan Wiener has used the phrase "radiative forcing" to suggest that climate policy may "break the logjam in environmental law."⁹¹ This Part identifies some of the key possible drivers of potentially transformative changes in our structures of governance that policy makers and others may decide are needed to address the concerns that Professor Wiener and others have raised about our current structure, such as fragmentation, insensitivity to trade-offs, and mismatched scale.⁹² There is a burgeoning literature concerning

87. See *supra* pp. 16–17 and note 74.

88. For different views on these issues, see, for example, Jonathan B. Wiener, *Think Globally, Act Globally: The Limits of Local Climate Policies*, 155 U. PA. L. REV. 101, 101 (2007); Kirsten H. Engel, *Mitigating Global Climate Change in the United States: A Regional Approach*, 14 N.Y.U. ENVTL. L.J. 54, 54 (2005); Robert L. Glicksman & Richard E. Levy, *A Collective Action Perspective on Ceiling Preemption by Federal Environmental Regulation: The Case of Global Climate Change*, 102 NW. U. L. REV. 579, 579 (2007); Thomas D. Peterson et al., *Developing a Comprehensive Approach to Climate Change Policy in the United States that Fully Integrates Levels of Government and Economic Sectors*, 27 VA. ENVTL. L.J. 227, 227 (2008).

89. See, e.g., Jody Freeman, *Collaborative Governance in the Administrative State*, 45 UCLA L. REV. 1, 1 (1997); Eric Orts & Cary Coglianese, *Collaborative Environmental Law: Pro and Con*, 156 U. PA. L. REV. 289, 289 (2007).

90. See Ruhl & Salzman, *supra* note 11; Alex Camacho, *Adapting Governance to Climate Change: Learning to Manage Uncertainty*, 59 EMORY L.J. 1, 4 (2009).

91. Wiener, *supra* note 18, at 2–3. The NYU Environmental Law Journal recently devoted a volume to consideration of this "breaking the logjam" challenge. See generally *Symposium: Breaking the Logjam: Environmental Reform for the New Congress and Administration*, 17 N.Y.U. ENVTL. L.J. 1 (2008).

92. See Wiener, *supra* note 18, at 2–3 ("A serious policy to combat climate change can—

governance for sustainability,⁹³ as existing governance structures prove ineffectual, or are so perceived, we will need to design, often by improvisation, new governance structures. President Obama's initial salvo signals his belief that such new structures are essential. Recent developments of the sort I describe above in each of these seven areas may well foreshadow more substantial and permanent changes.⁹⁴

V. Conclusion

At least for the next several years, climate change is likely to be viewed as a central governance challenge, assuming that other, more immediate challenges (war, economic collapse, etc.) do not materialize that take up the

and should—radiate a powerful influence, driving important improvements in environmental law [W]ell designed climate policy will both address the climate problem and help 'break the logjam' by propelling significant reforms in the structure of U.S. environmental governance."); David L. Markell, *States as Innovators: It's Time For a New Look To Our "Laboratories of Democracy" in the Effort to Improve Our Approach to Environmental Regulation*, 58 ALB. L. REV. 347, 390 (1994). Scholarship in areas such as "Dynamic Federalism," "New Governance," and "Transgovernmental Networks" may inform the debate about relationships within, between, and among different levels of government and other key actors. J.B. Ruhl and James Salzman have reviewed scholarship in each of these areas. See, e.g., Ruhl & Salzman, *supra* note 11. Beyond these governance issues at the national and sub-national levels, climate change obviously raises fundamental issues of governance at the regional level and beyond. The new U.S. administration has expressed its intent to "re-engage" with the United Nations process. BarackObama.com, New Energy for America, <http://www.barackobama.com/issues/newenergy/index.php> (last visited Nov. 20, 2009) (indicating that President Obama and Vice President Biden plan to "re-engage with the U.N. Framework Convention on Climate Change (UNFCCC)—the main international forum dedicated to addressing the climate problem"). They will also invigorate the Major Economies (MEM) effort and bring all the major emitting nations together to develop effective emissions reduction efforts." *Id.* In addition to the possibility that attempts at regional and/or global governance will shift power from national and sub-national governments to other institutions, such attempts also have implications for distribution of power domestically.

93. See, e.g., John C. Dernbach, *Navigating the U.S. Transition to Sustainability: Matching National Governance Challenges with Appropriate Legal Tools*, 44 TULSA L.J. 93, 93 (2008) (containing a helpful overview of some of this literature); John C. Dernbach, *National Governance: Still Stumbling Toward Sustainability*, in AGENDA FOR A SUSTAINABLE AMERICA 10,321, 10,321 (John C. Dernbach ed., Env'tl. L. Inst. 2009).

94. Lessons from our efforts to address climate change may well shape approaches intended to move toward sustainable development more generally. We have a considerable amount to learn in moving in that direction. As John Dernbach has noted, "the systematic integration of environment with development raises problem-solving issues with which we have relatively little experience." See Dernbach, *supra* note 93, at 98. Professor Dernbach suggests that the legal foundation for sustainable development "has received less attention than it deserves." See Dernbach, *supra* note 93, at 94.

"air" of ongoing policy deliberations and actions of government.⁹⁵ We are very much finding our way at all stages of the effort needed to develop an effective strategy (or set of strategies) for addressing this challenge. This article identifies at least three of the factors policy makers and others need to keep in mind as they seek to move forward productively. Much remains to be done to "drill down" into each of these sets of issues to understand the options and the implications of different choices. Hopefully this article will be a modest contribution to the effort to do just that.

95. Threats from terrorist attacks generally and from countries like Iran in particular loom and we are only another attack on domestic soil along the lines of 9/11 away from having these concerns move well up on the public agenda. The enormous financial challenges that the country and the world face, similarly, have the potential to influence or shape the agenda on climate change in fundamental ways.