CAN THE U.S. ACHIEVE A SUSTAINABLE ENERGY ECONOMY FROM THE BOTTOM-UP? AN ASSESSMENT OF STATE SUSTAINABLE ENERGY INITIATIVES

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U.S. energy policy is reminiscent of Mark Twain's quip about the weather: everyone talks about it, but no one does anything.[1]

I. INTRODUCTION

For over thirty years—a span of time inaugurated by the 1973 Arab oil embargo and punctuated by a succession of political and ideological crises—American presidents have lobbed rhetorical fireworks in support of that most elusive of goals: a secure and sustainable U.S. energy economy.[2] In 1974 President Nixon grimly declared, "We will break the back of the energy crisis; we will lay the foundation for our future capacity to meet America's energy needs from America's own resources."[3] A year later President Ford announced, "I am recommending a plan to make us invulnerable to cutoffs of foreign oil. It will require sacrifices, but it—and this is most important—it will work."[4] Taking up the baton in 1980, President Carter sagely observed, "Our excessive dependence on foreign oil is a clear and present danger to our nation's security. . . . At long last, we must have a clear, comprehensive energy policy for the United States."[5] Almost twenty years later, President Clinton proclaimed that "America

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1. Timothy Wirth, et al., *The Future of Energy Policy*, 82 FOREIGN AFFAIRS, July–Aug. 2003, at 139.

2. Admittedly, a "secure and sustainable" energy economy is somewhat redundant, as a sustainable energy economy can hardly be one that is not secure. Also, while the idea (or ideal) of a sustainable energy economy is terribly ambiguous, as a heuristic starting point we might define such an energy economy as one that provides affordable, reliable, abundant, and clean energy for both present and future generations. However reified, such an energy economy would need to satisfactorily address the many interrelated economic, environmental, social, and geopolitical issues as well as challenges presented by both domestic and global patterns of energy use. Indeed, inasmuch as the U.S. is not a closed-system and is subject to geopolitical pressures, international market dynamics, global resource constraints and so forth, it is difficult to imagine a sustainable U.S. energy economy that is not in a significant sense also a *global* sustainable energy economy.

3. President Richard Nixon, Address Before a Joint Session of the Congress Reporting on the State of the Union (Jan. 30, 1974), *in* N.Y. TIMES, Jan. 31, 1974, at A20.

4. President Gerald Ford, Address Before a Joint Session of the Congress Reporting on the State of the Union (Jan. 15, 1975), in N.Y. TIMES, Jan. 16, 1975, at A24.

5. President Jimmy Carter, Address Before a Joint Session of the Congress Reporting on the State of the Union (Jan. 23, 1980), *available at* http://www.presidency.ucsb.edu/sou.php. It deserves mention that for the vast majority of the time period from 1973 to the present, a "sustainable" U.S. energy economy was not the focus of either presidential rhetoric or actual federal laws and policies; rather, the preponderant rhetorical focus was directed at reducing our reliance on Middle Eastern oil as a means to decreasing our vulnerability to price shocks and supply embargos.

[has] led the world to reach a historic agreement committing our nation to reduce greenhouse gas emissions through market forces, new technologies, [and] energy efficiency."[6] And in 2006, President George W. Bush offered up the most recent rhetorical salvo when he surprisingly announced the rather unsurprising news that "America is addicted to oil . . . . The best way to break this addiction is through technology."[7]

Despite these lofty and noble verbal gesticulations—and more importantly, despite their coordinate policies—America has not achieved the ideal of a sustainable energy economy; and quite arguably, federal policies have not placed it on a plausible trajectory for doing so. Over the years more than a few commentators have made this argument and lamented the absence of federal leadership dedicated to building a domestic energy system that can meet increasing energy demand reliably and cheaply while also delivering the emissions reductions needed to stabilize concentrations of atmospheric greenhouse gases (GHG) "at a level that would prevent dangerous anthropogenic interference with the climate system."[8]

However, while the federal government has arguably done little to place America on a timely route to achieving a sustainable energy economy, in the past decade more states have increasingly taken the lead in enacting laws and policies designed to address climate change and support sustainable energy technologies.[9] Indeed, throughout the sub-federal domain a literal cornucopia of sustainable energy activities has sprung to life. From climate action plans, a nascent regional GHG cap-and-trade regime, state GHG targets, and a legally contentious vehicle GHG emissions regulation to renewable portfolio standards, regional systems for tracking renewable energy credits, public benefit funds, net metering rules, and so on, states have increasingly demonstrated a willingness to enact the

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6. President William J. Clinton, Address Before a Joint Session of the Congress Reporting on the State of the Union (Jan. 27, 1998), *in* THE WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Feb. 2, 1998, at 129–39.

7. President George W. Bush, Address Before a Joint Session of the Congress Reporting on the State of the Union (Jan. 31, 2006), *in* N.Y. TIMES, Feb. 1, 2006, at A18.

8. United Nations Conference on Environment and Development: Framework Convention on Climate Change, Article II, May 9, 1992, 31 I.L.M. 849, 854 (entered into force March 21, 1994).

9. *See e.g.*, Mark Bollinger et al., *States Emerge as Clean Energy Investors: A Review of State Support for Renewable Energy*, 14 ELECTRICITY J. 81, 81 (2001) ("State clean energy funds supported by system benefits charges appear to be one of the more positive developments to emerge from electricity restructuring."); Marcia Clemmitt, *Current Situation: Action in States*, 16 CQ RESEARCHER 91 (2006) (discussing state initiatives to support sustainable energy technologies); Jennifer Lee, *The Warming is Global but the Legislating, in the U.S., is All Local*, N.Y. TIMES, Oct. 29, 2003, at A20 (associating global warming legislation with states instead of the federal government); BARRY G. RABE, PEW CENTER ON GLOBAL CLIMATE CHANGE, GREENHOUSE & STATEHOUSE: THE EVOLVING STATE GOVERNMENT ROLE IN CLIMATE CHANGE 1 (2002) (discussing "[t]he current level of state activity surrounding the issue of climate change").

types of laws and policies eschewed by the federal decision-making collective.

In this Article I have two rather modest goals: first, to provide an overview of some of the "big-ticket" state and regional clean energy and climate change initiatives—focusing primarily on state climate change initiatives and renewable portfolio standards; and second, to offer an impressionistic assessment of the extent to which these initiatives can realistically hope to secure a sustainable U.S. energy economy.[10]

Part II of this Article offers a brief survey of select state and regional climate change initiatives. Part III reviews state-level policies designed to facilitate the use of renewable energy, with a particular focus on state renewable portfolio standards. Part IV assesses the potential of these initiatives—measured in terms of GHG reductions and the uptake of renewable energy technologies—to facilitate attainment of a sustainable U.S. energy economy.

II. U.S. STATE ACTION ON CLIMATE CHANGE

Much to the vocal chagrin of many members of the international community, in 2001 President George W. Bush unequivocally signaled that the U.S. would not ratify the U.N.'s Kyoto Protocol on climate change.[11] Galvanized in part by a lack of vigorous federal engagement on the issue of climate change—as well as a desire to capitalize on market opportunities, efficiency savings, and so forth—a growing number of states have instituted climate change policies designed to reduce greenhouse gas emissions.

There are a number of plausible reasons for pursuing climate change policies at the state rather than federal level. For instance, relative to the nation as a whole, the geographic scale of states can present a more manageable forum for policy development.[12] State-level climate policies are also, quite arguably, more capable of catering to the specific needs of

10. The assessment will be impressionistic—meaning that it is not based on a comprehensive empirical analysis, but rather is predicated on a patchwork of statistical information and analyses. The analytical scope of this assessment will not encompass all the many potential aspects of—or irreducible components to—a sustainable energy economy. Instead, the scope of this assessment will be focused on analyzing the potential efficacy of these initiatives in achieving significant domestic GHG reductions and facilitating the rapid diffusion of renewable energy technologies into the domestic market.

11. *See* Jeffrey Kluger et al., *A Climate of Despair*, TIME EUROPE, April 23, 2001, at 50 (discussing the administration's rejection of the Kyoto protocol); Thomas D. Peterson & Adam Z. Rose, *Reducing Conflicts Between Climate Policy and Energy Policy in the US: The Important Role of the States*, 34 ENERGY POL'Y 619, 619 (2006) (same). *See generally* Conference to the Parties to the Framework Convention on Climate Change: Kyoto Protocol, Mar. 16, 1998, 37 I.L.M. 22 (entered into force Feb. 16, 2005) (describing the objectives of the Climate Change Convention, the background to the negotiations for the Kyoto Protocol, as well as the principal features of the Protocol itself).

12. Peterson & Rose, *supra* note 11, at 619–20.

individual states, as well as exploiting opportunities peculiar to states and regions. States generally have the authority to regulate what the federal government does not; and in many instances, they also have the authority to exceed existing federal standards.[13] Frequently, states have more direct control—or influence—over entities responsible for GHG emissions. There is also a crescendo effect at work here. As more states adopt policies to address climate change, there is more opportunity for increasing the efficacy of those policies through coordination and complimentary programs at regional and even international levels. This in turn makes it more attractive for states that have yet to enact such policies to do so. Within the context of clean energy policies, the development of regional systems for tracking renewable energy credits—and the ability of such systems to facilitate the operation of state renewable portfolio standards—is one such example. With respect to climate change, the development of the still nascent Regional Greenhouse Gas Initiative, which will enable the regional trade of GHG emissions credits, is another such example.

Of course, there are at least two sides to every coin. While state-level climate policies do present certain advantages relative to federal policies, there are serious disadvantages to a climate policy regime restricted solely to the domain of states. By enacting a patchwork of policies that are similar in character but nonetheless quite often very different in detail, state-level efforts can lead to a complex, inefficient, and costly regulatory environment for those seeking to do business in multi-state jurisdictions.[14] Additionally, without a uniform national regulatory regime, there is a risk that actors will engage in a "race to the bottom" by locating in states that have not enacted stringent or any regulatory restrictions. Indeed, for states faced with economic woes, the prospect of such a race can itself be motivation for not adopting regulatory restrictions.[15]

Viewed from a global perspective, state efforts to reduce GHG emissions have the potential to strongly impact worldwide emission trends. In 2002, the U.S. share of global CO_2 emissions was approximately 23%—

13. The authority to regulate what the federal government does not—as well as to exceed federal standards—is not really a reason as to *why* climate policies should be enacted at the state rather than federal level. Rather, these factors go more to the issue of whether states *can* legitimately regulate in this domain; as opposed to the normative issue of whether they *should* do so.

14. This very drawback to state-level policies can generate pressure to preempt the regulatory patchwork with a uniform national standard. *See* Kirsten H. Engel & Scott R. Saleska, *SubGlobal Regulation of the Global Commons: The Case of Climate Change*, 32 Ecology L.Q. 183, 224 (2005) (noting that industry efforts to include motor vehicle tailpipe emission limitations in the Clean Air Act of 1965 were largely inspired by the unappetizing prospect of having to comply with fifty different state standards for the same product).

15. *See* Peterson & Rose, *supra* note 11, at 620 (discussing the risk of "capital flight" and "carbon leakage").

making it by far the number one GHG emitter.[16] If we compare CO_2 emissions from U.S. states to other national jurisdictions (and exclude the U.S. from this comparison), they would constitute 34% of the world's top 50 emitters of CO_2 (see Table 1).[17] In 2001, Texas was the world's sixth largest emitter of CO_2 and California the thirteenth.[18] If Pennsylvania, Ohio, Florida, Illinois, Indiana, and New York were considered a single country, their combined CO_2 emissions in 2001 would make them the world's third largest emitter.[19]

Thus, while the U.S. has hitherto repudiated the binding cap-and-trade approach of the Kyoto Protocol, climate mitigation efforts by many U.S. states can nonetheless have an effect equal to or even greater than that of many parties to the Kyoto Protocol. The remainder of Part II offers a brief survey of a few of the many climate change initiatives that are currently being undertaken at state and regional levels.

Table 1. Comparison of CO_2 Emissions for U.S. States vs. Nations, 2001($MMTCO_2$)[20]

United States 5,825.0			
1. China	3,467.3	26. Florida	237.1
2. Russian Federation	1,572.4	27. Netherlands	234.3
3. Japan	1,234.4	28. Illinois	225.7
4. India	1,076.5	29. Indiana	225.7
5. Germany	911.5	30. New York	209.1

16. In 2002 total U.S. CO_2 emissions equaled ~5,897 $MMTCO_2$. This amount was 55% higher than China, the number two emitter in 2002, which had CO_2 emissions of ~3,798 MMTCO2. World Resources Institute, Climate Analysis Indicators Tool, Version 3.0 (2006), *at* http://cait.wri.org [hereinafter CAIT]; Climate Analysis Indicators Tool (CAIT U.S.), Version 1.0 beta. (2006), *at* http://cait.wri.org [hereinafter CAIT U.S.]. CAIT U.S. Version 1.0 beta is currently a prerelease version. Specific permission was obtained from the World Resources Institute for the use of data from CAIT U.S. throughout this article.

17. Of the world's top fifty GHG emitters noted in Table 1, seventeen U.S. States make the list—comprising 34% of the listed jurisdictional entities. In 2001 CO_2 emissions for all fifty jurisdictional entities on the list equaled 20,064.2 MMTCO2. CO_2 emissions from the seventeen U.S. States equaled 3,809.3 $MMTCO_2$—an amount equal to 18.99% of CO_2 emissions for the entire list. CAIT U.S., *supra* note 16.

18. *Id.* In 2001 CO_2 emissions from Texas and California equaled 678.8 $MMTCO_2$ and 386.0 MMTCO2, respectively. *Id.* Considered together, 2001 CO_2 emissions from California and Texas were slightly greater than CO_2 emissions from Germany just below CO_2 emissions from India. *Id.*

19. *Id.* In 2001 combined CO_2 emissions from Pennsylvania, Ohio, Florida, Illinois, Indiana, and New York equaled 1,410.4 $MMTCO_2$, ahead of Japan and just behind the Russian Federation. Total CO_2 emissions for these states equaled 7.02% of the total for all jurisdictional entities listed in Table 1. *Id.*

20. *Id.*

6. Texas	678.8	31. Turkey	203.6
7. United Kingdom	595.9	32. Thailand	200.0
8. Canada	529.6	33. Michigan	190.9
9. Korea (South)	494.8	34. Louisiana	184.6
10. Italy	466.7	35. Georgia (U.S.)	158.6
11. France	407.2	36. Kentucky	147.6
12. Mexico	399.7	37. Kazakhstan	146.3
13. California	386.0	38. Venezuela	145.8
14. South Africa	362.2	39. Belgium	145.1
15. Brazil	355.1	40. Egypt	141.4
16. Iran	353.8	41. North Carolina	141.0
17. Spain	337.8	42. Malaysia	134.7
18. Australia	336.9	43. Alabama	133.5
19. Indonesia	318.2	44. Argentina	132.3
20. Ukraine	313.1	45. Missouri	131.9
21. Saudi Arabia	306.7	46. Singapore	127.3
22. Poland	303.5	47. Czech Republic	125.2
23. Pennsylvania	262.1	48. Tennessee	124.4
24. Taiwan	253.2	49. Uzbekistan	122.4
25. Ohio	250.7	50. New Jersey	121.6

An Overview of Select U.S. State Climate Change Initiatives

1. GHG Inventories, Climate Action Plans and GHG Targets

Working in partnership with the U.S. Environmental Protection Agency (EPA), forty-one states have developed comprehensive GHG inventories.[21] In 2001, these 41 states accounted for 91.4% of total U.S. GHG emissions.[22] Inventories such as these serve as critical informational

21. U.S. EPA, State GHG Inventories (2005), *at* http://yosemite.epa.gov/OAR/globalwarming.nsf/content/EmissionsState.html.

22. *Id.* For 2001 U.S. GHG emissions equaled ~6712.5 $MMTCO_2E$. Of this amount, the forty-one

baselines, identifying the major sources of GHG emissions and presenting annual emissions statistics by sector, source, and gas.[23]

Of the 41 states that have completed GHG inventories, 28 of these states have completed climate action plans designed to identify and assess practicable measures for reducing GHG emission through public and private sector programs and policies (see Table 2). Informed by a diverse array of individual economic, resource, and political issues, state climate action plans adopt a wide range of approaches in their efforts to reduce GHG emissions.[24]

The 28 states with climate action plans produce almost half of the nation's total GHG emissions;[25] and include ten of the top seventeen state GHG emitters (see Table 1).[26] According to analysis done by the U.S. Environmental Protection Agency (EPA) in 2001 (which at that time dealt with a total of 20 state climate action plans), 14 of these plans have options that could—if fully and successfully implemented—result in annual GHG reductions of almost 100 million metric tons of carbon equivalent (MMTCE) by 2020.[27] To put this figure in perspective, according to the U.S. Energy Information Agency's most recent estimates, by 2020 total U.S. CO_2 emissions will equal 1,941 MMTCE.[28] Thus, the 100 MMTCE reduction projected by the EPA would equate to 5.1% of this amount.

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states with GHG inventories accounted for ~6,132 $MMTCO_2E$. CAIT U.S., *supra* note 16. The states that have yet to complete a GHG inventory are: Alaska, Arizona, Arkansas, Idaho, Nebraska, North Dakota, South Carolina, South Dakota, and Wyoming.

23. *See* U.S. EPA, STATES GUIDANCE DOCUMENT: POLICY PLANNING TO REDUCE GREENHOUSE GAS EMISSIONS § 1.1 (2nd ed. 1998) (noting that identifying "emission sources and sinks and compiling an inventory is a critical first step in building a comprehensive and long range state action plan"). It is worth noting that GHG inventories are also an integral part of the U.N. Framework Convention on Climate Change. Article 4(1) of the Convention requires all parties to develop, periodically update, and make available to the Conference of the Parties, national inventories of all anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies. UN Framework Convention, *supra* note 8, at art. 4(1).

24. PEW CENTER ON GLOBAL CLIMATE CHANGE, LEARNING FROM STATE ACTION ON CLIMATE CHANGE: MARCH 2006 UPDATE 9 (2006) The following are among the GHG reduction policies recommended in state climate action plans: energy efficiency audits; model energy codes; tax incentives for fuel switching and cogeneration; renewable portfolio standards; emissions trading regimes; recycling programs; afforestation programs; and methane reclamation programs.

25. In 2001, GHG emissions from these states equaled ~3344.4 MMTCO2E relative to total U.S. GHG emissions of ~6712.5 MMTCO2E (49.82% of the total). If we were to include Texas, which has not adopted a climate action plan and is the largest state GHG emitter by far, this percentage would rise to 61.1%.

26. The following seven states have not adopted a climate action plan and are also among the top seventeen U.S. state GHG emitters: Florida, Georgia, Indiana, Louisiana, Michigan, Ohio, and Texas.

27. U.S. EPA, STATE AND LOCAL CLIMATE CHANGE PROGRAM, PARTNERSHIPS AND PROGRESS: 2001 PROGRESS REPORT 15 (2001).

28. U.S. ENERGY INFORMATION AGENCY, ANNUAL ENERGY OUTLOOK 2006, Reference Case Table 18: Carbon Dioxide Emissions by Sector and Source (2006).

Table 2. State Climate Plans and GHG Targets[29]		
	Climate Action Plan (28)	GHG Target (11)
AL	X	
CA	X	X
CO	X	
CT	X	X
DE	X	
HI	X	
IA	X	
IL	X	
KY	X	
MA	X	X
ME	X	X
MD	X	
MN	X	
MO	X	
MT	X	
NC	X	
NH	X	X
NJ	X	X
NM	X	X
NY	X	X
OR	X	X
PA	X	
RI	X	X
TN	X	

29. *See* EPA, *supra* note 24; PEW, *supra* note 24, at 9 (providing information on states with climate action plans); *see infra* notes 30–35 (providing source information pertaining to GHG reduction targets).

UT	X	
VT	X	X
WA	X	
WI	X	

Out of the 28 states that have adopted climate action plans, 11 of these states have taken the significant step of committing to specific time-bounded quantitative targets for GHG emissions reductions (see tables 2 & 3).

Table 3. State GHG Emissions Targets (11)[30]	
CA	≤ 2000 levels by 2010; = to 1990 levels by 2020; 80% < 1990 levels by 2050[31]
CT	≤ 1990 levels by 2010; 10% < 1990 levels by 2020; 75-85% < 1990 levels in the long term
MA	≤ 1990 levels by 2010; 10% < 1990 levels by 2020; 75-85% < 1990 levels in the long term
ME	≤ 1990 levels by 2010; 10% < 1990 levels by 2020; 75-85% < 1990 levels in the long term
NH	≤ 1990 levels by 2010; 10% < 1990 levels by 2020; 75-85% < 1990 levels in the long term
NJ	3.5% < 1990 levels by 2005[32]
NM	Stabilize at 2000 levels by 2012; 10% ≤ 2000 levels by 2020; 75% ≤ 2000 levels by 2050[33]
NY	5% < 1990 levels by 2010; 10% < 1990 levels by 2020[34]
OR	Stabilize by 2010; 10% ≤ 1990 levels by 2020; 75% ≤ 1990 levels by 2050[35]
RI	≤ 1990 levels by 2010; 10% < 1990 levels by 2020; 75-85% < 1990 levels in the long term
VT	≤ 1990 levels by 2010; 10% < 1990 levels by 2020; 75-85% < 1990 levels in the long term

30. Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, Rhode Island, and Vermont have all adopted the GHG emissions reduction targets established by the New England Governors and Eastern Canadian Premiers (NEG/ECP) in 2001. New England Governors/Eastern Canadian Premiers, CLIMATE CHANGE ACTION PLAN 7 (2001). *See infra* notes 31–35 (providing source information pertaining to GHG reduction targets for other states).

31. EXEC. ORDER NO. S-3-05 by the Governor of the State of California (June 1, 2005), *available at* http://www.dot.ca.gov/hq/energy/ExecOrderS-3-05.htm.

32. NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION (NJDEP), ADMINISTRATIVE ORDER 1998-09 (Mar. 17, 1998) (issued by Commissioner Robert C. Shinn, Jr.). *See also* NJDEP, SUSTAINABILITY GREENHOUSE ACTION PLAN E3 (2002) (listing GHG emission reduction of 3.5% below 1990 levels by 2005).

33. EXEC. ORDER NO. 05-033 by the Governor of the State of New Mexico (June 9, 2005).

34. *See* NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY NEW YORK STATE ENERGY PLAN § 1, at 35 (2002), *available at* http://www.nyserda.org/energy-information/ energy_ state_plan.asp.

35. GOVERNOR'S ADVISORY GROUP ON GLOBAL WARMING, OREGON STRATEGY FOR GREENHOUSE GAS REDUCTIONS 9 (2004).

2. Power Plant Regulations: Carbon Caps and Offset Requirements

At present only two states—New Hampshire and Massachusetts—impose regulatory limitations on the amount of CO_2 that existing power plants can emit.[36] In 2002, Massachusetts became the first state in the nation to regulate CO_2 emissions from existing fossil-fuel power plants.[37] Regulations promulgated by the Massachusetts Department of Environmental Protection establish CO_2 emission caps and output-based emission limitations for the state's six largest existing coal and oil-fired power plants.[38] Also in 2002, New Hampshire enacted a regulatory cap on the amount of CO_2 that can be emitted from power plants within the state.[39] New Hampshire law requires the state's three existing power plants to limit the amount of CO_2 they emit to 1990 levels.[40]

Currently, at least two states—Oregon and Washington—require new power plants to engage in projects and other mechanisms to offset a certain percentage of their CO_2 emissions.[41] In 1997 Oregon became the first state in the nation to adopt legislation regulating CO_2 emissions from new power plants.[42] The law requires new power plants to offset approximately 17% of their anticipated CO_2 emissions.[43] Similarly, Washington requires new power plants to offset 20% of their anticipated CO_2 emissions by planting trees, purchasing natural gas transit buses, or through other offset opportunities.[44] Massachusetts requires new power plants to make financial contributions to fund projects that offset 1% of the plant's anticipated CO_2 emissions over twenty years.[45]

3. The Regional Greenhouse Gas Initiative

The Regional Greenhouse Gas Initiative is the first mandatory regional program in U.S. history to cap GHG emission from power plants.[46] The

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36. PEW, *supra* note 24, at 6.
37. *See* SYNAPSE ENERGY ECONOMICS, INC., TAKING CLIMATE CHANGE INTO ACCOUNT IN UTILITY PLANNING: ZERO IS THE WRONG CARBON VALUE 10 (2005).
38. 310 MASS. CODE REGS. 7.29(5)(a) (2002).
39. SYNAPSE ENERGY ECONOMICS, INC., *supra* note 37, at 10–11.
40. N.H. R.S.A. 125-O:1–10 (2002). More specifically, the statute caps CO2 emissions from the state's three existing power plants at 5,425,866 tons annually—an amount equal to 1990 levels—until December 31, 2010. *Id.* at 125-O:3, III(d).
41. PEW, *supra* note 24, at 6.
42. SYNAPSE ENERGY ECONOMICS, INC., *supra* note 37, at 10.
43. OR. REV. STAT. ANN. § 469.503(2)(a) (2006).
44. Washington Substitute House Bill 3141 (2004) (signed by Governor Gary Locke on Mar. 31, 2004).
45. PEW CENTER ON GLOBAL CLIMATE CHANGE, STATES WITH A CARBON CAP OR OFFSET REQUIREMENT FOR POWER PLANTS (2005), http://www.pewclimate.org.
46. On February 16, 2006, the California Public Utilities Commission voted to establish a cap on GHG emissions for the state's investor owned utilities and other companies that supply electricity in the state.

program is designed to use a market-based, cap-and-trade program to reduce CO_2 emissions from participating states 10% by 2019.[47] Currently, seven northeastern states are participating in the program—with Massachusetts and Rhode Island having dropped out of the effort in 2005.[48] Under the current framework, the program will begin in 2009 and lead to the stabilization of CO_2 emissions at current levels by 2015.[49] The program will then endeavor to reduce emissions by 10% relative to current levels from 2015 to 2019.[50] The program will use a regional trading system composed of allowances for CO_2 emissions. In addition to the allowances, the program will allow power plants to use offsets to meet their compliance obligations.[51]

The program's default rule allows power plants to cover up to 3.3% of their emissions using offsets—an amount roughly equivalent to 50% of their average compliance obligation.[52] However, if the cost of carbon allowances exceeds specified thresholds, power plants are permitted to use additional offsets to meet their compliance obligations.[53] For example, if the cost of carbon allowances reaches $7 for a sustained period of time, power plants will be allowed to use offsets to cover up to 5% of their emissions; if the cost exceeds $10, offsets will be allowed for up to 20% of emissions.[54]

On March 23, 2006, the participating states released a draft model rule intended to serve as the basis for individual state rulemaking.[55]

California Public Utilities Commission, Press Release: *PUC to Set Cap on Greenhouse Gas Emissions Produced while Generating Electricity*, R.04-04-003, Feb. 16, 2006, http:// www.cpuc.ca.gov/ PUBLISHED/NEWS_RELEASE/53682.htm.

47. Anthony DePalma, *Seven States Agree on a Regional Program to Reduce Emissions From Power Plants*, N.Y. TIMES, Dec. 21, 2005, at B3.

48. The seven participating states include: Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont. Regional Greenhouse Gas Initiative, Memorandum of Understanding (2005). On April 6, 2006, Maryland Governor Robert L. Ehrlich Jr. signed into law the Healthy Air Act, which requires Maryland to become a full participant in the RGGI process June 30, 2007. Maryland Senate Bill 154 (2006) (signed by Governor Ehrlich Jr. on April 6, 2006).

49. REGIONAL GREENHOUSE GAS INITIATIVE, FREQUENTLY ASKED QUESTIONS 3 (2006), http://www.rggi.org/docs/faqs_at_draft_mr_release.pdf.

50. *Id.*

51. REGIONAL GREENHOUSE GAS INITIATIVE, *supra* note 49, at 4 –6.

52. *Id.*

53. *Id.*

54. *Id.*

55. REGIONAL GREENHOUSE GAS INITIATIVE, Public Review Model Rule Draft Mar. 23, 2006, http://www.rggi.org/module.htm. In certain states, such as New Hampshire, legislative approval is required prior to rulemaking. In other states, such as New York and New Jersey, the commencement of rulemaking does not require legislative approval.

4. California's Vehicle GHG Emissions Rule

On September 24, 2004, the California Air Resources Board (CARB) adopted the first regulation in the nation to target vehicle-related emissions of CO_2 and other gases linked to climate change.[56] The regulations apply to 2009 to 2026 model year passenger cars and light-duty trucks.[57] CARB estimates the emissions control equipment required under the regulation would reduce GHG emissions by about 30% or 88,000 tons a day by 2016.[58]

Under the rule, passenger cars and light-duty sport utility vehicles and trucks built for the 2009 model year and beyond will be the first that must follow the new standards. The rule requires that manufacturers comply with two fleet average emission standards; one for passenger cars, small sport utility vehicles, and trucks, and another for heavier SUVs and trucks.[59] According to the rule, credits earned for early introduction of compliant vehicles may be banked and traded between the two emission categories.[60]

In 2004 the Alliance of Automobile Manufacturers and auto dealers sued CARB, alleging the regulations are "de facto" fuel economy standards which only the National Highway Traffic Safety Administration may promulgate under federal law.[61]

Importantly, the substantive impact of California's vehicle GHG standard may well extend beyond its own borders. Under the "waiver" provision of Section 209(b) of the federal Clean Air Act (CAA) of 1970,

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56. SUSAN BROWN, CALIFORNIA ENERGY COMMISSION DRAFT STAFF PAPER: GLOBAL CLIMATE CHANGE 9 (2005).

57. The CARB rule was adopted pursuant to California A.B. 1493 (signed by Governor Davis on July 22, 2002), which required CARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light duty truck. CARB, FACT SHEET: CLIMATE CHANGE EMISSION CONTROL REGULATIONS (2004). The bill prohibited CARB from achieving this goal through any of the following measures: new fees or taxes on vehicles, fuel or miles traveled; a ban on the sale of any vehicle category; a required reduction in vehicle weight; a limitation or reduction in the speed limit; or a limitation or reduction in vehicle miles traveled. *Id.*

58. A 30% reduction as compared to GHG emissions in 2002 from the California light-duty fleet. *Id.*

59. California Environmental Protection Agency Air Resources Board, Attachment 2: Clean Air Act Section 209(b) Waiver of Preemption for California's Adopted and Amended New Motor Vehicle Regulations and Incorporated Test Procedures to Control Greenhouse Gas Emissions, Dec. 21, 2005.

60. *Id.*

61. Central Valley Chrysler-Jeep Inc. v. Witherspoon, No. CIV-F-04-6663, 2005 WL 623125 (E.D. Cal Mar. 7, 2005). The Association of International Automobile Manufacturers joined the suit in early 2005.

In response to the argument that CARB exceeded its regulatory authority, California argues that it has authority under the federal Clean Air Act to regulate the GHGs just as it does to control emissions of other air pollutants. A key question is whether or not the new rule is defined to be a state fuel economy standard—which would be prohibited under federal law. Most vehicle-related GHG emissions are CO2; and arguably, the only way to reduce those emissions without limiting the number of vehicles on the road or limiting the number of miles driven is by improving fuel economy. On October 21, 2005, a federal court denied a motion by CARB to dismiss the case and ruled the lawsuit challenging the regulation may move forward. Central Valley Chrysler-Jeep Inc. v. Witherspoon, No. CIV-F-04-6663, Slip op., 2005 WL 2709508 (E.D. Cal Oct. 20, 2005).

California has the authority—provided certain requirements are met—to implement its own regulations for motor vehicle emissions.[62] Under certain circumstances, other states are permitted to adopt these standards as their own.[63] To date, nine other states have adopted—or are in the process of adopting—California's vehicle GHG regulations.[64] If the California standard passes legal muster and takes effect in all 10 states, some estimates indicate that one-third of all U.S. auto sales will be required to meet the emission rules.[65]

III. U.S. STATE CLEAN ENERGY INITIATIVES

A. Renewable Portfolio Standards

In the past decade, state renewable portfolio standards (RPS) have arguably come to epitomize the idea of state action in the absence of strong federal support for renewable energy. They have been hailed as among the "most popular and successful measures" that states can employ to facilitate the use of renewable energy;[66] and some experts have opined that RPS policies "are the most powerful tool that a state can use to promote" such renewable resources as "wind energy."[67] However, notwithstanding the abundant plaudits directed at the RPS, the policy instrument also has its share of detractors.[68] Additionally, as a relatively nascent tool, detailed assessments of experiences with—and the impacts of—RPS policies are only beginning to emerge.[69]

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62. 42 U.S.C. § 7545(c)(4)(B) (2005).
63. 42 U.S.C. § 7507 (2006).
64. *See* Bureau of National Affairs, Daily Envt. Rep., Dec. 5, 2005, at A-4 (noting that Maine, New York, Vermont, and Washington have adopted the California standard; while Connecticut, Massachusetts, New Jersey, Oregon, and Rhode Island are in the process of doing so).
65. *Id.*
66. BARRY HOPKINS, THE COUNCIL OF STATE GOVERNMENTS, TRENDS ALERT—RENEWABLE ENERGY AND STATE ECONOMIES 29 (2003).
67. *See* Lori Bird et al., *Policies and Market Factors Driving Wind Power Development in the United States*, 33 ENERGY POL'Y 1397, 1405–06 (2005) (indicating the authors preface this claim with the caveat, "Provided they are designed and implemented effectively . . . .").
68. Wiser et al., *Evaluating Experience with Renewables Portfolio Standards in the United States*, 10 MITIGATION AND ADAPTATION STRATEGIES FOR GLOBAL CHANGE 237, 238 (2005).
69. Few states have experience dealing with RPS policies that encompass more than a handful of years. *See* Wiser et al., *supra* note 68, at 238, 240 (noting that in addition to theoretical advantages, RPS policies also present a number of potential disadvantages, including: difficulties in design and implementation; uncertainties regarding the cost impacts of RPS policies; the potential for reduced flexibility in providing specific renewable technologies with targeted support relative to policies that provide regulators with greater discretionary authority; and problems with encouraging diversity of renewable supply, as RPS policies tend to encourage "least-cost renewable supply options."). *See also* Ole Langniss & Ryan Wiser, *The Renewables Portfolio Standard in Texas: An Early Assessment*, 31 ENERGY POLICY 527, 528 (2003) ("The renewables portfolio standard—a policy instrument that

RPS policies require a specific amount or percentage of the electricity supplied by retail electricity vendors to be derived from eligible renewable sources. This ensures that a specified amount of the energy generated or sold statewide in an electric-power system comes from such renewable sources as wind, solar, biomass, geothermal, landfill gas, hydroelectric and so forth.[70] The targets established by these policies generally increase over time, with electricity suppliers required to demonstrate compliance on a regular basis.[71]

At present, twenty states and the District of Columbia have instituted a RPS policy (see Table 4).

Table 4. State Renewable Portfolio Standards[72]

States with Standards (21)	RPS Requirements
Arizona	15% of generation by 2025
California[73]	33% of purchases by retail sellers by 2020
Colorado	10% of sales by 2015
Connecticut	10% of generation b 2010
Delaware	10% of retail sales by 2019
District of Columbia	11% of sales by 2022
Hawaii	20% of sales by 2020
Illinois (goal)	8% of sales by 2013
Iowa	105 MW of generation
Maine	30% of sales
Maryland	7.5% of sales by 2019
Massachusetts	4% of generation by 2009; 1% increases thereafter
Minnesota (Xcel)	1,125 MW wind by 2010
Montana	15% of sales by 2015
Nevada	20% of sales by 2015
New Jersey	22.5% of generation by 2021
New Mexico	10% of generation by 2011
New York	25% of generation by 2015
Pennsylvania	18% of sales by 2020
Rhode Island	16% of sales by 2019
Texas	5,880 MW by 2015

ensures that a minimum amount of renewable energy is included in the portfolio of electricity resources—has become increasingly popular in energy policy and research circles worldwide.").

70. Wiser et al., *supra* note 68, at 239.

71. *Id.*

72. Information for Table 4 was obtained from the Database of State Incentives for Renewable Energy (DSIRE), http://www.dsire.org (last visited May 17, 2006).

73. The California RPS policy is currently being reviewed by the California Public Utilities Commission (CPUC), the California Energy Commission (CEC), and the California State Legislature. CEC, 2005 INTEGRATED ENERGY POLICY REPORT, CEC-100-2005-007-CMF, 11–2 (2005).

Vermont (goal)	All growth (up to 10% of total sales) by 2012
Wisconsin	10% of generation by 2015

States have crafted their RPS policies to meet their respective and often idiosyncratic policy objectives, renewable resource capabilities, and electricity market characteristics.[74] For instance, endowed with a relative abundance of bituminous and anthracite coal, Pennsylvania has become the first state to adopt a RPS that includes waste coal, coal gasification, and coal mine methane among its eligible technologies. The specific contours of these state RPS policies—expressed in terms of minimum renewable energy requirements, implementation timing, eligible resources, and technologies, and other design details—thus vary widely from state to state (see Table 5).

Table 5. Eligible Technologies Under State RPS Policies[75]

Tech no	AZ	CA	CO	CT	DE	DC	HI	IA	IL	MA	MD	ME	MN	MT	NJ	NM	NV	NY	PA	RI	TX	VT	WI
Anaer		X	X		X		X				X			X	X	X	X	X	X			X	
Biod							X										X			X			
Biog																		X					
Bio	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CH				X			X		X			X						X	X				
Coal																			X				
Coal																			X				
Ener							X										X		X				
Etha							X																
Fuel				X								X						X	X				

74. Environmental Protection Agency, Prepublication Version—Clean Energy-Environment Guide to Action: Policies, Best Practices, and Action Steps for States § 5.3 (2006).

75. Much of the information contained in Table 5 was obtained from the Database of State Incentives for Renewable Energy (DSIRE). DSIRE, *supra* note 72. As demonstrated by Table 4, RPS policies vary widely in their definitions of what constitutes a renewable resource for the purpose of meeting their respective requirements. Vermont's RPS goal—which if not met by 2012 is statutorily required to become a mandate—is perhaps the most ambiguous in its definition of eligible renewable resources. The statute defines such resources as, *inter alia*, "energy produced using a technology that relies on a resource that is being consumed at a harvest rate at or below its natural regeneration rate." VT. STAT. ANN. tit. 30, § 8002 (2) (2005).

76. Information in this row refers only to those states that permit fuel cells using non-renewable energy sources to produce hydrogen. All state RPS policies permit fuel cells if the fuel is produced from an

Geot		X	X		X	X	X				X	X		X	X	X	X		X	X	X		X
Hydr		X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Hydr							X						X										
Land	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X	X	X	X	X	X
Liqu																		X					
Meth							X																
Mun		X		X		X	X	X			X	X	X		X		X		X				
Ocea		X		X	X	X	X			X	X							X		X	X		
Phot	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Solar	X	X		X	X	X	X		X	X	X	X	X	X		X	X		X		X	X	X
Solar	X						X		X								X		X		X		
Tidal		X		X	X	X				X	X	X			X			X		X	X		X
Wast																			X				
Wav		X		X	X	X	X			X	X				X			X		X	X		X
Wind	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

* These categories are noted here only because they are specified by New York's RPS. They are thus treated as discrete categories, though there are other categories that might logically fit into these two categories.

B. Other U.S. State Clean Energy Policies and Financial Incentives

In addition to RPS policies, states have instituted a dizzying array of regulations and financial incentive mechanisms designed to facilitate the use of renewable energy (see Table 6). The table below provides a quick snapshot of the type and number of state-level policies in place.

eligible renewable resource.

Table 6. State Polices & Financial Incentives for Renewable Energy, 2006[77]

Type of Regulation or Policy	All State Levels	Statewide
System Benefits Charge	16	16
Generation Disclosure Rules	26	26
Renewable Portfolio Standards	28	24
Net Metering Rules	54	36
Interconnection Standards	41	37
Construction & Design Policies	31	11
Green Power Purchasing	27	8
Mandatory Green Power Option	5	5
Personal Tax Incentives	23	23
Corporate Tax Incentives	19	19
Sales Tax Incentives	19	19
Property Tax Incentives	35	35
Rebate Programs	75	22
Grant Programs	46	28
Loan Programs	52	30
Industry Recruitment Incentives	12	12
Leasing Programs	3	0
Production Incentives	27	6

IV. ASSESSING THE IMPACT OF SELECT STATE CLIMATE AND CLEAN ENERGY INITIATIVES

Given the growing plethora of sub-federal policies designed to address the perils of climate change and support the growth of clean energy resources, we might legitimately ask whether these multitudinous efforts are all that is needed to build a sustainable U.S. energy economy. In other words, are sub-federal efforts equal to the task of securing cheap, abundant, reliable, and emissions-free energy on a long-term basis?

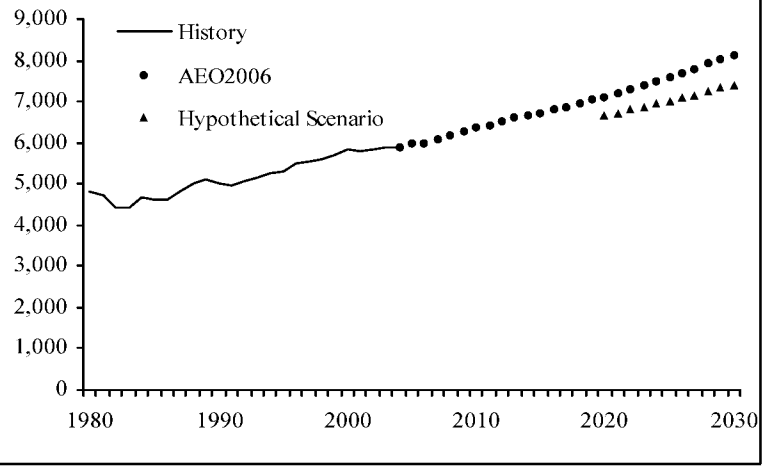
The following two sections are intended to offer a very brief and partial answer to this question. These sections provide an assessment of the extent to which two categories of state-level initiatives—GHG targets and renewable portfolio standards—are capable of achieving significant reductions in national GHG emissions and facilitating the rapid uptake of renewable energy technologies in the domestic market.

77. DSIRE, *supra* note 72.

A. U.S. State GHG Targets

According to the U.S. Energy Information Agency (EIA), in 2030 total U.S. energy-related CO_2 emissions will equal approximately 8,115 million metric tons of carbon (see Figure 1).[78] This equates to a 62% increase from 1990, with an average increase rate of 1.2% per year.

Figure 1. U.S. Energy-Related CO_2 Emissions: 1980 - 2030 ($MMTCO_2E$)



As previously discussed, eleven states have committed to achieving time-bounded, quantitative reduction targets for GHG emissions (see Table 3). According to one estimate, these eleven states accounted for a respectable 17.29% of total U.S. GHG emissions in 2001.[79] However, this is largely due to the presence of California, New Jersey, and New York in this grouping. Emissions from these three states comprised 72.5% of the 17.29% figure. Put differently, if California, New Jersey, and New York had not committed to their respective GHG targets, states with GHG targets would have accounted for a rather unimpressive 4.74% of total U.S. GHG

78. Sources for Figure 1 include: U.S. EIA, ANNUAL ENERGY OUTLOOK 2006 (2006) [hereinafter AEO2006]; ANNUAL ENERGY REVIEW 2004 (2004); U.S. EPA, *Draft,* State Greenhouse Gas Projection Tool (2005); CAIT U.S., *supra* note 16.

The AEO2006 line in Figure 1 represents EIA projections for CO2 emissions made in the 2006 Annual Energy Outlook report.

79. In 2001 GHG emissions from these eleven states equaled ~1,160.7 MMTCO2E relative to total U.S. GHG emissions of ~6,712.5 MMTCO2E. CAIT U.S., *supra* note 16.

emissions in 2001.[80]

The Hypothetical Scenario (HS) line depicted in Figure 1 is a preliminary attempt to answer the following question: Using the EIA's most recent projections as the baseline, if all eleven of these states were to achieve and maintain a reduction in CO_2 emissions equal to 10% below 1990 levels by 2020, what impact would this have on total U.S. CO_2 emissions through 2030?[81]

The impact delineated by the HS line above should be understood merely as a starting point for discussing what the actual impact of such a scenario would be. However, viewed strictly as a heuristic device, there are three obvious conclusions. First, the reductions achieved under this scenario are considerable. Attainment of the HS target by all 11 states in 2020 would result in a reduction of ~6.36% or 453.08 $MMTCO_2E$ below the EIA AEO2006 baseline for total U.S. CO_2 emissions in 2020. Second, despite this significant reduction, the overall trend of the HS is still upward. Initially, stabilization at 10% below 1990 levels for all eleven states would slow the total average annual growth rate from 1.2% under the EIA baseline scenario to approximately 1.05%. However, assuming the average annual growth rate for the other 39 states remains at 1.2%, by 2030 the HS annual growth rate reaches 1.06%, pulled higher by the net increase in CO_2 emissions from the other 39 states. Third and finally, the CO_2 reductions that would be achieved under the HS are nowhere near the magnitude of reductions needed to bring the U.S. into compliance with the Kyoto Protocol's call for reductions of 5% below 1990 levels from 2008 to 2012—much less the reductions needed to avert "dangerous anthropogenic interference with the climate system."[82]

B. U.S. State Renewable Portfolio Standards

Notwithstanding their many substantive differences, state RPS policies are a species of means designed to achieve a single end—that of an increased role for sources of energy that are, when compared to their traditional fossil fuels, relatively free of emissions and other deleterious

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80. *Id.* California, New Jersey, and New York had GHG emissions of ~842.5 MMTCO2E in 2001. GHG emissions from the remaining eight states committed to GHG targets were collectively equal to ~318.2 MMTCO2E in 2001. *Id.*

81. The hypothetical scenario of 10% below 1990 levels is greater than the aggregate reductions called for by the emission targets for these eleven states.

82. U.N. Framework Convention on Climate Change, *supra* note 8, at art. II. *See also* Martin I. Hoffert et al., *Advanced Technology Paths to Global Climate Stability: Energy for a Greenhouse Planet*, 298 Science 981, 981 (2002) (noting that emission reductions far greater than those called for by the Kyoto Protocol will be needed to meet the goals of the Framework Convention).

environmental effects.[83]

Just how effective have these policies been in achieving this goal? In 2004 and 2005 almost 60% of all added renewable energy capacity occurred in states with RPS policies. However, notwithstanding this general correlation, it is exceedingly difficult to ascertain the causal impact of these policies on the renewable energy growth rate.[84] With this caveat in mind, the EIA offers the following general and qualitative assessment regarding the potential impact of state RPS policies:

> State-level requirements probably have led to somewhat more biomass, geothermal, [landfill gas], and solar capacity than would otherwise have been built, although the additional amounts are small. Hydroelectric capacity does not appear to have been advanced by State-level renewables requirements. Expansion of wind power capacity appears to be strongly affected by the combination of State requirements and the Federal [Production Tax Credit], as evidenced by the substantial construction of new wind capacity in 2005, particularly in States with RPS programs.[85]

The key point here is that while RPS policies have indeed impacted the growth rate of renewable energy capacity, that impact has primarily been limited to the least-cost, non-hydroelectric renewable alternative of wind power. Additionally, policy drivers at both the state and federal levels influenced the strong growth rate of wind capacity. In this context, it is useful to note that Oklahoma and Washington, neither of which have a RPS policy, each installed between 250 and 300 megawatts of new renewable capacity in 2004 and 2005.[86] Of the states with RPS policies, only California and Texas installed more renewable capacity during this time period.[87]

What impact will state RPS policies have on reduction of GHGs and the growth rate of renewable energy in the years to come? According to a

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83. From a full lifecycle perspective, renewable energy is not *entirely* free of CO2 and other GHG emissions, as the production and transportation of the technologies involved in harnessing renewable energy involve the combustion of fossil fuels. These lifecycle emissions are, of course, exceedingly minor when compared to the GHG emissions that result from the direct combustion of fossil fuels for electricity production.

84. AEO2006, *supra* note 80, at 26–27.

85. *Id.* While AEO2006 does offer a more quantitative assessment of this impact in Table 7, it also notes "it is difficult to quantify the specific impacts of State renewable programs." *Id.* at 26.

86. AEO2006, *supra* note 80, at 27.

87. The EIA notes that most new capacity in states without RPS policies is wind power, "suggesting that good resources and the Federal PTC may be the primary factors leading to new wind power installations" in these states. *Id.*

somewhat Panglossian estimate by the Union of Concerned Scientists (UCS), if every annual target established by state RPS policies—including goals—was fully achieved, these policies would result in approximately 36.7 gigawatts (GW) of new renewable capacity by 2017.[88] At a less optimistic point on the spectrum, the EIA projects that current state programs—including RPS policies—will *partially* stimulate the installation of about 12.5 GW of new renewable capacity by 2030.[89] Based in part on this estimate, the EIA anticipates that non-hydroelectric renewable energy will grow from the 2004 level of 2.2% of U.S. electricity generation to 4.3% in 2030—an impressive gain of 95%, but nonetheless still a very small fraction of the whole.[90]

For the sake of discussion, though, let us accept the UCS estimate as valid and assume that all targets instituted by state RPS policies are fully achieved. The UCS projects this full-compliance scenario would result in CO_2 emission reductions of 75 $MMTCO_2E$—the "equivalent of taking 11.1 million cars off the road or planting 17.9 million acres of trees."[91] If we use the EIA 2006 reference case projection for total U.S. energy-related CO_2 emissions as a baseline, in 2017 U.S. CO_2 emissions will equal approximately 6,869 $MMTCO_2E$ (see Figure 1). Thus, CO_2 emission reductions achieved under the UCS full-compliance scenario would roughly equate to 1.09% of this 2017 benchmark.[92]

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88. Union of Concerned Scientists, Renewable Energy Expected from State Standards and Funds (2005) (PowerPoint slide *available at* http://www.ucsusa.org/clean_energy/clean_energy_policies/state-clean-energy-maps-and-graphs.html). This estimate does not include the Vermont goal.

89. AEO2006, *supra* note 80, at 79. From 2004 to 2030, AEO2006 estimates that a total of 26.4 GW of renewable generating capacity will be added (21.9 GW in the electric power sector; 4.5 GW in residential, commercial, industrial, and transportation end-use sectors). Of this 26.4 GW, AEO2006 estimates that almost one-half of the total (11.7 GW in the electric power sector and 0.75 GW in the end-use sectors noted above, equaling 12.45 GW) will be "at least partially stimulated by State programs, with the remainder resulting from commercial projects." *Id.*

There is a very simple reason for the vast difference between the UCS and the EIA projections for renewable energy growth attributable to state policies. While the UCS projection assumes that the targets and timetables established in state RPS policies will be fully complied with, the EIA projection rejects this assumption. Instead, the EIA projection is based on information gleaned from interviews with state officials to determine the level of renewable construction these officials and EIA felt "very confident" would result from their respective programs. Email correspondence from Christopher Namovicz, Operations Research Analyst, U.S. Energy Information Agency, to Kevin Doran (Mar. 3, 2006) (on file with author). Unlike the UCS, the EIA projection assumes some of the covered entities will meet their obligations under state RPS policies using alternative compliance payments and other forms of non-generation compliance. *Id.*

90. AEO2006, *supra* note 80, at 81.

91. Union of Concerned Scientists, *supra* note 90.

92. Taking into account the fact that the EIA projection *already* factors in estimates regarding the impact of state renewable energy policies (albeit estimates that are considerably lower than those of the UCS), this 1.09% figure should arguably be even lower.

V. CONCLUSION

As the foregoing discussion has indicated, state GHG targets and renewable portfolio standards are not, as currently formulated, equal to the task of achieving the GHG reductions needed to avert dangerous human interference with the global climate system or making non-hydroelectric renewables more than a niche player in the U.S. energy economy. While these tools constitute a significant and valuable step toward a sustainable U.S. energy economy, they are only one step in what presently appears to be a very long journey.

However, it is important to note that the impact of policies is not necessarily limited to what is directly achieved through the implementation of their terms. Policies enacted at one level of government have the potential—albeit one that is essentially impossible to measure—to influence and facilitate the creation of similar policies at other levels of government. To borrow from the oft quoted dictum of Justice Louis Brandeis, states can serve as laboratories of democracy—fertile incubators for novel regulatory frameworks and policy mechanisms.[93] Within the proving ground of an individual state, policies that would not see the light of day on the national stage can be refined and given time to develop track records of success.[94]

There is a flip side to this, of course. While proliferation of state policies such as GHG targets and renewable portfolio standards has the potential to facilitate the adoption of similar efforts at the national level, this proliferation can also serve as a rationale for why similar national responses are not needed.[95]

No discussion of the potential efficacy of state-level policies in

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93. In his famous dissenting opinion in *New State Ice Co. v. Liebmann*, Justice Brandeis wrote: "It is one of the happy accidents of the federal system that a single courageous state may, if its citizens choose, serve as a laboratory, and try novel social and economic experiments without risk to the rest of the country." New State Ice Co. v. Liebmann, 285 U.S. 262, 311 (1932). *See also* Robert B. McKinstry, *Laboratories for Local Solutions for Global Problems: State, Local and Private Leadership in Developing Strategies to Mitigate the Causes and Effects of Climate Change,* 12 PENN ST. ENVTL. L. REV. 15, 15–16 (2004) (noting that in the context of environmental regulatory regimes, state "laboratories" have frequently "generated the models for federal legislation. . . ."). The following are among the causal linkages that he traces between state and federal policies: California state air regulations and the federal Clean Air Act; water quality regulations by the Delaware River Basin Commission and the federal Clean Water Act; Pennsylvania's surface mining regulations and the federal Surface Mining Control and Reclamation Act; and New Jersey's remediation program for hazardous and toxic sites and the federal Comprehensive Environmental Response Compensation and Liability Act. *Id.*

94. *See* Barry G. Rabe, *North American Federalism and Climate Change Policy: American State and Canadian Provincial Policy Development,* 14 WIDENER L.J. 121, 152 (2004) (noting there are "decades of precedent for basing federal policy on previous state innovations . . . [which] reflects a basic dynamic of a federated system of government").

95. *See* Andrew C. Revkin & Jennifer Lee, *White House Attacked for Letting States Lead on Climate Policy*, N.Y. TIMES, Dec. 11, 2003, at A32 (indicating that the states are taking action to address global warming and climate change because the federal government is not).

achieving a national sustainable energy economy would be complete without reference to the global context in which such policies take place. Even if current state-level policies were able elevate renewable energy to the role of a major player in the U.S. energy economy and achieve the singular feat of stabilizing U.S. GHG emissions at the level called for by Kyoto, this alone would not secure a sustainable U.S. energy economy. We are living in a global atmospheric commons, and emissions from any part of the world affect all parts of the world. According to estimates by the EIA, CO_2 emissions from developing countries will likely exceed those of industrialized countries sometime between 2015 and 2020.[96] The goal of securing a sustainable U.S. energy economy is thus inextricably tied to the goal of securing a global sustainable energy economy.

Finding and deploying the solutions needed to meet galloping global energy demand within the context of sustainable development is perhaps the greatest environmental challenge of the Twenty-First Century. There is no guarantee that we will prove equal to this extraordinary challenge. However, if we are to do so, we will need technology solutions and policy frameworks at all geographic levels working in concert.

96. U.S. EIA, INTERNATIONAL ENERGY OUTLOOK 137 (2004), http://www.usembassy.it/pdf/other/ieo2004.pdf.