

GREENING THE GRID: IMPLEMENTING CLIMATE CHANGE POLICY THROUGH ENERGY EFFICIENCY, RENEWABLE PORTFOLIO STANDARDS, AND STRATEGIC TRANSMISSION SYSTEM INVESTMENTS

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ABSTRACT

Climate change policy has crossed a tipping point over the past five years: there are now widespread calls for action on the problem after decades of debate about whether climate change is happening, whether it is human-induced, and whether it is a significant problem that we need to deal with seriously. Nowhere does this have more profound ramifications than in the electric utility industry. Nationally, electricity generation accounts for 41% of carbon dioxide (CO₂) emissions from fossil-fuel combustion while the transportation sector accounts for 33%. These two sectors therefore account for three-fourths of all CO₂ emissions in the United States. Any U.S. strategy to reduce greenhouse gas (GHG) emissions therefore requires a serious reduction in GHG emission from the electricity sector. This is especially important to the extent that increased electrification of the transportation sector is pursued as a strategy for reducing either GHG or other air pollutants in that sector. This Article evaluates policy options and recommends principles to guide policy design and implementation for the transition to the Climate Change Era for electricity regulation, industry structure, and generation technology choice. It describes the primary institutional forums and tools that will affect the electricity sector's response to climate change, as well as to the obstacles that impede an economically efficient and environmentally responsible response. In particular, this Article demonstrates that an integrated regulatory approach is required to encourage significant investment in energy efficiency,

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renewable generation, and new transmission. This investment will further the climate change policy goals necessary to stabilize global temperatures. Moreover, lessons from California's extensive experience promoting significant improvements in energy efficiency and investments in renewable generation capacity show how both the states and the federal government have important roles to play in this transition. State policy innovation is a key component of future electricity sector regulation regardless of the outcome of international negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) or the passage of new climate change legislation by the U.S. Congress. This Article offers a set of implementation lessons important for greening the grid through energy efficiency, renewable portfolio standards, and strategic transmission system investments.

INTRODUCTION

Climate change policy has crossed a tipping point¹ over the past five years: there are now widespread calls for action on the problem after decades of debate about whether climate change is happening, whether it is human-induced, and whether it is a significant problem that we need to deal with seriously.² The climate change policy debate has now decisively shifted from "if" we should limit greenhouse gas (GHG) emissions³ to

1. See MALCOLM GLADWELL, *THE TIPPING POINT: HOW LITTLE THINGS CAN MAKE A BIG DIFFERENCE* (First Back Bay 2002) (2000) for a popular introduction to the idea of social epidemics and non-linearity; also see PANARCHY: *UNDERSTANDING TRANSFORMATIONS IN HUMAN AND NATURAL SYSTEMS* (Lance H. Gunderson & C. S. Holling eds., 2002) for a more sophisticated exploration of non-linear systems.

2. The maturation of the issue can indeed be measured in decades: I published my first two pieces discussing "global warming" as a serious energy and environmental policy challenge a full two decades ago in 1990, the same year that the Intergovernmental Panel on Climate Change (IPCC) published its first assessment report. See TIM DUANE & BILL KEEPIN, *INT'L FOUND. FOR THE SURVIVAL AND DEV. OF HUMANITY, ENERGY EFFICIENCY AND THE GLOBAL ENV'T* 1 (1990); TIMOTHY P. DUANE, *EMERGING ENVIRONMENTAL TRENDS: POTENTIAL IMPACTS ON PG&E IN 10-20 YEARS* iii, v (June 1990) (both documents on file with author and available as a PDF). The United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) established the IPCC in response to U.N. General Assembly Resolution 43/53 of December 6, 1988. The IPCC issued its First Assessment Report in 1990, its Second Assessment Report in 1995, its Third Assessment Report in 2001, and its Fourth Assessment Report in 2007. Intergovernmental Panel on Climate Change, History, http://www.ipcc.ch/organization/organization_history.htm (last visited Feb. 6, 2010).

3. The dominant greenhouse gases are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). Fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆) are also greenhouse gases that are extremely potent but emitted in much smaller quantities. Carbon dioxide is the most ubiquitous of these GHGs (especially in the electricity sector), but each GHG has different impacts on global warming and different durability in the atmosphere. The non-CO₂ GHGs are therefore typically converted to "CO₂-equivalents" in terms of both scientific discussions of GHG impacts on climate change and regulatory discussions of what to do about GHG emissions. Therefore, I focus here on CO₂ emissions, but additional regulatory attention focuses on non-CO₂ GHG

“when” and “how” we will limit these emissions. These calls for action remain potent despite the failure of the Copenhagen Conference in December 2009 to resolve continuing differences among the world’s nation-states on how to address climate change. Moreover, ambitious and far-reaching climate change policies have already been adopted by the European Union and its member states, dozens of other nation-states, and dozens of individual states in the United States. The collapse of Copenhagen means that those existing policies will continue to dominate climate change mitigation and adaptation policy unless and until a successor to the Kyoto Protocol is ratified. Those existing policies will also shape any international agreement and will be the primary means of implementation of any new international agreement. This will also be true in the United States if and when new federal climate change legislation is passed into law, and/or the federal Environmental Protection Agency (EPA) regulates GHG emissions under the Clean Air Act (CAA).⁴

Understanding the existing institutional framework is therefore essential both in design and implementation of climate change policies. Nowhere does this have more profound ramifications than in the electric utility industry. Nationally, electricity generation accounts for 41% of CO₂ emissions from fossil-fuel combustion, while the transportation sector accounts for 33%.⁵ These two sectors therefore account for three-fourths of all CO₂ emissions in the United States. Any U.S. strategy to reduce GHG emissions therefore requires a serious reduction in GHG emissions from the electricity sector. This is especially important to the extent that increased electrification of the transportation sector is pursued as a strategy for reducing either GHG or other air pollutants in that sector. Shifting from gasoline-fueled internal-combustion engines to electrically powered vehicles will have a different effect if the electricity is produced through coal rather than renewable power sources.⁶

emissions.

4. The shift to a call for action in the United States has happened belatedly (compared to the European Union) but with remarkable rapidity. Public concern about the problem has exploded over the past five years in response to the Hurricane Katrina disaster in New Orleans in 2005. This concern is evidenced by the release of the Academy Award-winning documentary *AN INCONVENIENT TRUTH* (Paramount Vantage 2006), the publication of the HM TREASURY, *STERN REVIEW ON THE ECONOMICS OF CLIMATE CHANGE* (2006), available at http://www.hm-treasury.gov.uk/stern_review_report.htm, in the U.K., the release of the latest round of reports from the IPCC (2007), and the award of the Nobel Peace Prize to the IPCC and Al Gore in 2007.

5. U.S. ENVTL. PROT. AGENCY, *INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2007* (Apr. 2007), tbls. ES-2, ES-5, and ES-6, http://www.epa.gov/climatechange/emissions/downloads09/GHG2007entire_report-508.pdf [hereinafter USEPA INVENTORY].

6. See Mark Z. Jacobson & Mark A. Delucchi, *A Path To Sustainable Energy By 2030*, *SCI. AM.*, Nov. 2009, at 58, for an analysis suggesting that electrification of wide sectors of the economy,

Any U.S. strategy to reduce emissions in the electricity sector requires close attention to the continued operation and future development of coal-fired generating facilities. Coal-fired electricity generation accounts for 82% of the U.S. electric industry's CO₂ emissions, so GHG emissions from coal-fired electric generation alone are equivalent to all of the GHG emissions from the entire transportation sector.⁷ Coal is also relatively plentiful and inexpensive (in strict financial terms) compared to natural gas resources (at historic prices), while renewable resources remain plentiful but relatively expensive in strict financial terms.⁸ Significant reductions in GHGs will therefore require either significantly reduced coal generation or increased coal-generation costs to ensure sequestration of coal-generated CO₂.⁹

Either way, this has important ramifications for the economics of utility operation and planning. How electricity regulators treat these additional costs will determine whether or not climate change policies are cost-effective or beneficial. How the broader system of electricity regulation is structured—in terms of its goals, degree of oversight, and criteria for evaluating the relative desirability of different generating options—will determine how those additional costs will be treated. That cost treatment, in turn, will play a critical role in directing capital investment throughout the sector.

The U.S. electric utility industry has gone through enormous changes in recent decades, moving from a structure dominated by treatment as a state-regulated “natural monopoly” from the 1920s to the 1990s, to a partially deregulated industry since the late 1990s. The Natural Monopoly Era began to erode in some states (most notably California) with the passage of the Public Utilities Regulatory Policies Act of 1978 (PURPA),¹⁰ but it took full form following the passage of the Energy Policy Act of 1992.¹¹ Aggressive implementation of the deregulation agenda by some

including transportation, is essential in order to move to a truly sustainable, renewable-resource based energy system. Expanded reliance on electricity for transportation-sector energy demands is also likely as Plug-in Hybrid Electric Vehicles (PHEV) and all-electric vehicles penetrate the market. Toyota intends to sell a plug-in version of its Prius by 2011 while Nissan, General Motors, and Tesla Motors are developing all-electric vehicles. See Bloomberg News, *Toyota plans a plug-in hybrid*, WASH. POST, Dec. 15, 2009, at A19, available at <http://www.washingtonpost.com/wp-dyn/content/article/2009/12/14/AR2009121403434.html>.

7. USEPA INVENTORY, *supra* note 5, at 3–5. Electricity generation accounts for 93% of all U.S. coal consumption. *Id.*

8. The cost curve for renewables has steadily been coming down, however, with both significant public investment (through tax benefits and other policies, discussed below) and scale-related production cost declines accounting for the reductions. Wind power is the most striking example.

9. Although carbon sequestration has received a great deal of research and policy attention, the only certain way to sequester carbon is to not release it in the first place. Carbon has already been sequestered in the earth through fossil fuels. Not using those fuels assures sequestration.

10. Public Utilities Regulatory Policies Act of 1978, 16 U.S.C. §§ 2601–2645 (1978).

11. Energy Policy Act of 1992, 42 U.S.C. §§ 13201–13556 (1997).

state regulatory commissions and the Federal Energy Regulatory Commission (FERC) followed in the mid-to-late 1990s.¹² The partial deregulation of the industry—euphemistically called “restructuring”—brought new players into debates about electricity regulation, but also led to enormous economic costs, social disruption, and a backlash against deregulation during the California energy crisis of 2000–2001.¹³ Since then, the deregulation project has paused as regulators, utilities, investors, and bankruptcy courts have tried to put Humpty Dumpty back together again. The future of the industry and the relationship between regulators and power producers therefore remains uncertain and uneven across different states.¹⁴

Regardless of one’s views on the Deregulation Era, it is clear that regulation of the electric industry must now reflect both the prominence of the electric sector as a source of GHG emissions and the important impact that these regulations (and associated trading regimes) may have on the economics and siting feasibility of different forms of electric generation and transmission. The electric utility industry is now transitioning from the Deregulation Era to the Climate Change Era. The Climate Change Era will again make regulation a central element of future electric utility planning, operation, and economics. But the form of the regulations, and the role of regulators, will be markedly different than that which dominated the industry during the Natural Monopoly Era.

This Article evaluates policy options and recommends principles to guide policy design and implementation for the transition to the Climate Change Era for electricity regulation, industry structure, and generation technology choice. It describes the primary institutional forums and tools that will affect the electricity sector’s response to climate change, the obstacles to an economically efficient and environmentally responsible response, and the routes around these obstacles. In particular, this Article demonstrates that an integrated regulatory approach is required to encourage significant investment in energy efficiency, renewable

12. See RICHARD F. HIRSH, *POWER LOSS: THE ORIGINS OF DEREGULATION AND RESTRUCTURING IN THE AMERICAN ELECTRIC UTILITY SYSTEM* 244–45 (1999) (discussing the FERC’s role in deregulation of the 1990s).

13. See generally Timothy P. Duane, *Regulation’s Rationale: Learning from the California Energy Crisis*, 19 YALE J. ON REG. 471, 471–76 (2002) (providing a detailed discussion of the California electricity crisis and its consequences).

14. Some at the FERC and many industry insiders see this pause as a problem and want further deregulation of the wholesale industry and possibly direct customer access and “choice.” Further deregulation is unlikely, however, in those states that have halted restructuring. See AM. BAR ASS’N, *CAPTURING THE POWER OF ELECTRIC RESTRUCTURING* (Joey Lee Miranda ed., 2009) for a detailed discussion of restructuring and current FERC policy. Also, see JAMES H. MCGREW, *FERC FEDERAL ENERGY REGULATORY COMMISSION* 139–215 (2d ed. 2009) in the American Bar Association’s Basic Practice Series for a discussion of the FERC’s authority.

generation, and new transmission. This investment will further the climate change policy goals necessary to stabilize global temperatures. Moreover, lessons from California's extensive experience promoting significant improvements in energy efficiency and investments in renewable generation capacity show how both the states and the federal government have important roles to play in this transition. State policy innovation is a key component of future electricity sector regulation regardless of the outcome of international negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) or the passage of new climate change legislation by the U.S. Congress.

The structure of the Article is as follows: Part I describes and summarizes the key climate change policy institutions that are already in place, highlighting the role of regional coalitions of states to develop policies in the absence of federal leadership. Part II summarizes the efforts of California, which has adopted one of the most comprehensive climate change policies in the U.S., and which will have the greatest impact on the electricity sector in western North America. Part III addresses key barriers and bridges to greening the grid, highlighting the importance of renewable portfolio standards, strategic investments in transmission system capacity, and renewable project siting and permitting to achieve climate policy goals. Part IV summarizes the key policy principles for greening the grid. In conclusion, the Article argues that neither carbon taxes nor a broad cap-and-trade regime alone are sufficient to achieve climate change policy goals in the electricity sector. Instead, institutional design details matter a great deal in promoting the improved energy efficiency and expanded renewable generation required to reduce electricity sector GHG emissions sufficiently to meet climate change goals.

I. KEY CLIMATE CHANGE POLICY INSTITUTIONS

The focus of formal, coordinated policy efforts in the United States has recently shifted to three institutional arenas. First, to the international level, under the auspices of the UNFCCC, through the Conference of the Parties (COP) 15 (COP-15) meeting in Copenhagen, Denmark in December 2009 and its successors in 2010.¹⁵ Second, to the federal legislative branch in the United States, through the U.S. House of Representatives' passage of the American Clean Energy and Security Act (ACES) of 2009 (H.R. 2454, also known as the Waxman-Markey Bill) on June 26, 2009,¹⁶ and through the U.S. Senate's

15. See Denmark, Climate & Energy, COP15, <http://en.cop15.dk/>, for an overview of COP-15 and links to related articles and documents.

16. H.R. 2454 is a 1,427-page bill, so its full scope is beyond discussion here. The legislation

consideration of a series of companion bills in 2009–2010.¹⁷ Finally, to the federal executive branch in the United States, where the U.S. EPA has made a formal endangerment finding for six GHGs under § 202(a) of the federal CAA,¹⁸ and has also granted a waiver to California under § 209 of the CAA¹⁹ so that California and other states can go forward with GHG emissions regulations of motor vehicles. In addition, judicial development of legal obligations to curb GHG emissions is proceeding with several common law actions under state law that have recently cleared critical hurdles at the federal appellate level.²⁰ Each of these efforts is summarized briefly in Part II below.

as passed calls for an overall reduction in GHG emissions of around 20% by 2020 and 83% by 2050 compared to 2005 levels. American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 702–703 (2009). However, net U.S. 2005 GHG emission levels were already significantly higher than 1990 levels, which are the basis for reduction targets under the Kyoto Protocol discussed below. Net U.S. GHG emissions totaled 6,088 Tg CO₂ Eq. in 2007, which was 15.8% greater than the 1990 net GHG emissions of 5,257 Tg CO₂ Eq. *Id.* A 17% reduction in 2005 emissions is therefore comparable to only a 2% reduction in 1990 emissions. Carbon Dioxide emissions alone increased 20% from 5,077 Tg in 1990 to 6,103 Tg in 2005, so a 17% reduction in CO₂ emissions from 2005 levels would be comparable to about 3% greater emissions than 1990 levels. USEPA INVENTORY, *supra* note 5, at tbls. ES-5 and ES-6.

17. In particular, the Senate Environment and Public Works Committee passed the Clean Energy Jobs and American Power Act, S. 1733, 111th Cong. (also known as the Kerry–Boxer Bill), in November 2009. The bill passed the committee without a single Republican vote, however, so other bills are also being considered at this time. David Welna, *Climate Change Bill Faces Delays in Senate*, NPR, Nov. 29, 2009, <http://www.npr.org/templates/story/story.php?storyId=120828193>. Senate Majority Leader Harry Reid has stated that the full Senate will consider a climate change bill sometime during spring 2010. *Id.* Following the election of Massachusetts Republican Scott Brown to the U.S. Senate, however, Senate Democrats will be unable to muster the 60 votes necessary for a cloture vote without bipartisan support. Further Senate action on a comprehensive climate change bill is therefore unlikely in this session. Instead, a sectoral policy more narrowly tailored to focus on the electricity sector is more likely to be acted on in 2010. See *Policy Options for Reducing Greenhouse Gas Emissions: Hearing Before the S. Comm. on Energy and Natural Resources*, 111th Cong. 10 (2009) (testimony of Jonathan M. Banks, Climate Policy Coordinator, Clean Air Task Force), for an excellent discussion of why a sectoral approach focusing on the electricity sector is the most important element of any national climate change mitigation policy.

18. The U.S. EPA issued its endangerment finding on December 7, 2009 in response to a conclusion by the U.S. Supreme Court in *Massachusetts v. EPA*, 549 U.S. 497 (2007), that GHGs qualify as air pollutants under the CAA. See U.S. Environmental Protection Agency, Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Clean Air Act, <http://www.epa.gov/climatechange/endangerment.html> (last visited Feb. 6, 2010) [hereinafter EPA Endangerment], for a summary of the history and links to the key documents.

19. The U.S. EPA granted the waiver on June 30, 2009 following initial denial of the waiver request under the Bush Administration on December 19, 2007 and then reconsideration of the denial under the Obama Administration. See U.S. Environmental Protection Agency, California Greenhouse Gas Waiver Request, <http://www.epa.gov/oms/climate/ca-waiver.htm> (last visited Feb. 6, 2010), for a summary of the history and links to the key documents.

20. See the outstanding Arnold & Porter LLP “Climate Case Chart” at <http://www.climatecasechart.com> (last visited Feb. 12, 2010) [hereinafter Climate Case Chart], prepared for the Center for Climate Change Law at Columbia Law School, for a summary of, and links to, these cases. The Common Law Claims are summarized at page 11 of the Climate Case Chart. The most important

The focus of this Article, however, is on state and regional efforts at the sub-national level to adopt policies to reduce GHG emissions in the electricity sector. The reason is simple: in the absence of formal preemption of the field by the U.S. Congress,²¹ states continue to have primary authority for electricity regulation due to their historic authority over both retail rates and land use. Some of this authority has been challenged by the shift to deregulated wholesale power markets under orders by the FERC²² and by new federal transmission siting authority under the Energy Policy Act of 2005 (EPAAct),²³ but the states remain the primary climate change policy venue unless and until federal legislation (with or without an international agreement in the wake of COP-15) supersedes them. Moreover, states will continue to be critical policy actors and regulatory authorities even if national legislation is signed into law. State policies are therefore the key to climate change policy implementation. Principles of federalism (together with international law) will therefore play a central role in determining the regulatory roles of state and federal climate change regulators.²⁴

appeals court decisions to date are *Connecticut v. American Electric Power Co.*, 582 F.3d 309 (2d Cir. 2009), decided by the Second Circuit on September 21, 2009 (*en banc* petition for rehearing pending) and *Comer v. Murphy Oil USA, Inc.*, 585 F.3d 855 (5th Cir. 2009), decided by the Fifth Circuit on October 16, 2009 (*en banc* petition for rehearing pending). In both cases, the Courts of Appeals reversed the trial courts' dismissal of the claims under the Political Question Doctrine. See *Am. Elec. Power Co.*, 582 F.3d at 332; *Comer*, 585 F.3d at 879. Another case with a similar procedural posture now pending before the Ninth Circuit is *Native Village of Kivalina v. ExxonMobil Corp.*, 08-CV01138, dismissed by the Northern District of California in February 2008. Climate Case Chart, *supra*, at 11. These decisions open GHG emitters to a wide range of common law claims in state courts that would apply a wide range of state common law standards to the issue, so the question is likely to go to the Supreme Court. The appeals court decisions also increase the economic interest of GHG emitters in getting a federal legislative solution from Congress, to the extent it could shield them from such state common law claims. There is considerable debate about whether federal legislation could preempt these pre-existing state common law claims. Note that the federal CAA explicitly retains causes of action under state common law.

21. Dormant Commerce Clause considerations could still preempt state action, however, even in the absence of Congressional action to occupy the field.

22. For a good overview of the FERC's efforts in this arena, see MCGREW, *supra* note 14, at 139-215. In particular, note FERC Order No. 697, 119 FERC 61,295 (codified at 18 C.F.R. pt. 35) (2007) (codifying standards for "Market-Based Rates For Wholesale Sales of Electric Energy, Capacity, and Ancillary Services By Public Utilities"); FERC Order No. 2000, (codified at 18 C.F.R. pt. 35 (1999) (amending regulations to advance the formation of Regional Transmission Organizations); FERC Order No. 889, 75 FERC 61,078 (codified at 18 C.F.R. pt. 37) (1996) (establishing "Open Access Same-Time Information System (formerly Real-Time Information Networks) and Standards of Conduct"); and FERC Order No. 888, 75 FERC 61,080 (codified at 18 C.F.R. pts. 25 and 385) (1996) (codifying the promotion of "Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities").

23. Energy Policy Act of 2005, Pub. L. 109-58, 119 Stat. 594 (codified in scattered sections of 26 U.S.C. and 42 U.S.C.). This new federal authority is discussed below in relationship to a wider set of efforts to develop new transmission capacity in the western United States.

24. As discussed below, this is particularly important in the arena of transmission facility siting.

The efforts of California are particularly important. California has special importance in four respects for the transition to the Climate Change Era. First, it has already moved further and more aggressively towards beginning to regulate GHG emissions comprehensively throughout the economy than either the U.S. government or any other state. Second, it has been a historic leader and innovator in environmental regulation (especially for air quality), and therefore has special status in the U.S. regulatory scheme under the CAA—thereby leveraging its policy choices as other states and other nations are likely to adopt California's approach. Third, it is the dominant load center for electricity demand in the West,²⁵ making its policy choices important for electricity generation choices throughout the western United States, Canada, and, under the North American Free Trade Agreement (NAFTA), potentially Mexico. Finally, it has the longest history of aggressive implementation of regulatory policies to encourage extensive investment in energy efficiency, demand-side management, and renewable generation to meet its electricity needs. What happens in California is therefore likely to have a ripple effect across the United States (in terms of regulatory policy) and throughout the WECC (in terms of electricity generation investment). I will therefore elaborate on California's policy setting in more detail below in Parts II and III than the other regimes described here in Part I.²⁶

As noted above, several institutions play important roles in climate change policy and regulation as it may affect the electricity sector. This Section of the Article summarizes the key institutions in order to contextualize the more detailed discussion of California in Part II below.

A. The UNFCCC, the Kyoto Protocol, and COP-15 in Copenhagen

The Kyoto Protocol is an international agreement that was signed by 84 countries in 1997.²⁷ The United States was a signatory under the Clinton Administration, but the U.S. Senate has never ratified the treaty.²⁸ The

25. I will generally refer to the Western Electricity Coordinating Council (WECC) as the West, although the WECC boundaries include a small part of northern Baja California in Mexico and significant portions of western Canada (which play an important role in meeting U.S. demand).

26. As I note in Part III, California also has distinctive features that make it non-representative of most U.S. states and the nation as a whole—but, for reasons noted above, policy development in California has a significant impact on national policy despite those distinctive features.

27. United Nations Framework Convention on Climate Change, Status of Ratification, http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php (last visited Mar. 21, 2010).

28. The U.S. Senate passed the Byrd–Hagel Resolution on July 25, 1997 (before the Kyoto Protocol was finalized, but after it had been negotiated) by 95–0 calling for the United States not to sign any agreement that did not require binding targets and timetables for developing countries as well as industrialized countries. Byrd–Hagel Resolution, S. Res. 98, 105th Cong. (1997). The Clinton

Protocol was negotiated and adopted within the context of the UNFCCC, to which the United States remains a signatory. The Protocol went into force on February 16, 2005, following Russia's ratification.²⁹ There are now 189 parties to the Protocol.³⁰ Of these parties, 37 countries and the European Economic Community (EEC) have GHG emission reduction targets from 2008 to 2012 of an average of five percent compared to 1990 emissions.³¹ The lack of any obligations for many developing countries (in particular, China and India), together with a perception that complying with the Protocol would be too costly for the American economy, led the U.S. Senate and President Bush to reject compliance with Kyoto. Nonetheless, those nations complying with Kyoto have been gaining important preliminary experience both in making emissions reductions and in developing the emissions trading mechanisms that may be the basis for future trading regimes. The U.S. electricity industry is presently ineligible to benefit from the Kyoto mechanisms and it is unclear how GHG reductions by U.S. generators may be treated under future agreements.

Because the Protocol terminates in 2012, the COP and other signatories to the UNFCCC (e.g., the United States) have been engaged in negotiations

Administration never submitted the agreement to the Senate for ratification, and the Bush Administration then rejected participation. (As a signatory to the U.N. Framework Convention on Climate Change, though, the United States must refrain from undermining the Protocol's object and purpose unless it withdraws from the UNFCCC. The Bush Administration called for only voluntary reductions in GHG emissions. Toby Harnden et al., *'Realistic' Bush puts US above the globe*, TELEGRAPH (United Kingdom), Mar. 30, 2001, <http://www.telegraph.co.uk/news/worldnews/northamerica/usa/1328492/Realistic-Bush-puts-US-above-the-globe.html>.) The Obama Administration effected a dramatic shift in the U.S. position on the issue in 2009 at COP-15. Frank Ching, *China tried not to be the crook at COP15*, NEW STRAIGHT TIMES, Dec. 24, 2009, http://www.nst.com.my/Current_News/NST/articles/17chi/Article/art_print.

29. The Protocol required emitter countries responsible for at least 55% of the GHG emissions from the signatory countries to ratify the Protocol before it would come into force. Because both the United States and Australia rejected ratification, Russia was able to negotiate generous treatment of its historic GHG emissions inventory (in terms of future trade in emissions credits) in exchange for Russia's ratification of the Protocol. These terms make Russia a key player in implementation. ALAIN BERNARD ET AL., MIT JOINT PROGRAM ON THE SCI. AND POLICY OF GLOBAL CHANGE, *RUSSIA'S ROLE IN THE KYOTO PROTOCOL* 1-2 (2003).

30. Press Release, United Nations Framework Convention on Climate Change – Secretariat, UNFCCC: Greenhouse Gas Emissions Data from Industrialised Countries Show Increases in 2007, Underscore Need for Ambitious Copenhagen Deal (Oct. 21, 2009), available at http://unfccc.int/search/search?q=cache:laoFcZkJMwkJ:unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/20091021_pr_ghg_data.pdf+Kyoto+Protocol+Parties+move+closer&access=p&output=xml_no_dtd&site=default_collection&ie=UTF8&client=unfccc_frontend&proxystylesheet=unfccc_frontend&oe=UTF-8.

31. Kyoto Protocol to the U.N. Framework Convention on Climate Change, Dec. 10, 1997, 37 I.L.M. 22, available at http://unfccc.int/kyoto_protocol/items/2830.php.

to adopt a successor agreement. As noted above, however, the parties were unable to reach significant agreement in Copenhagen in December 2009.³² There is widespread acknowledgement by both the IPCC and most observers that much more significant reductions in GHG emissions (30–85% compared to 2000 levels) will be required over the next 40–50 years in order to stabilize the global climate.³³ Such significant reductions will be much more difficult to achieve than Kyoto's short-term targets. Future international agreements to address climate change will therefore require much broader coverage, by including the United States and major emitters like India and China, if they are to be successful. Until such agreements are reached, however, only the Kyoto Protocol has binding effect upon the parties—and it only sets targets through 2012.³⁴

B. The European Union's Emissions Trading System

Under the Kyoto Protocol, member states of the European Union (E.U.) have aggregated their Kyoto obligations in order to allow greater flexibility in achieving their respective agreements. The E.U. has therefore

32. Some observers argue that Copenhagen did result in significant agreement, in that the major industrialized nations were willing to pledge to reduce GHG emissions by 80% by the year 2050 and China was willing to pledge to reduce its emissions per capita by 40–50% by an unspecified year. Mark Lynas, *How do I know China wrecked the Copenhagen deal? I was in the room*, GUARDIAN (United Kingdom), Dec. 22, 2009, <http://www.guardian.co.uk/environment/2009/dec/22/copenhagen-climate-change-mark-lynas>. The parties did not reach agreement, however, on either specific GHG emissions reductions targets or a timeline for reaching those targets. According to some reports, China opposed an agreement where the industrialized nations would bind themselves (but not China) to an 80% GHG emissions reduction target by 2050. In the end, there was no agreement at COP-15. *Id.*

33. A 30% reduction would stabilize CO₂ equivalent concentrations in the atmosphere at 535–590 parts per million (ppm), while a 50–80% reduction in 2000 GHG emissions would be necessary to stabilize CO₂ equivalent concentrations at 445–490 ppm. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, SUMMARY FOR POLICYMAKERS, in CLIMATE CHANGE 2007: CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 15 (B. Metz et al. eds., 2007), available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-spm.pdf> (“[A]pproved at the 9th Session of Working Group III of the IPCC, Bangkok, Thailand, 30 April - 4 May 2007”). For comparison, the global mean CO₂ concentration in 2005 was only 379 ppm (plus additional CO₂-equivalent from other GHGs). INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, SUMMARY FOR POLICYMAKERS, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS, CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 2 (S. Solomon et al. eds., 2007), available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf>. Others have argued that even these targets are inadequate, and a movement has emerged calling for a stabilization target of 350 ppm based on work by James Hansen. 350.org, Understanding 350, <http://www.350.org/understanding-350#8> (last visited Feb. 6, 2010).

34. Any new agreement will still require interpretation and institutionalization of the post-Kyoto regime in order to have the system in place beginning in 2013, which is one reason that COP-15 was seen as a critical deadline for reaching an agreement. It will now be very difficult to institutionalize any new agreement to be in place in time to immediately succeed Kyoto.

initiated an emissions trading system (ETS) that allows parties to achieve lower-cost emissions reductions in one member state compared to the cost of achieving comparable reductions in a given state. Although the E.U. market has had some struggles, it has also generated valuable knowledge about how future international agreements may be structured.³⁵ In particular, the E.U. experience shows how important a reliable inventory of existing emissions is to determining the proper value of emissions credits. Early implementation of the E.U. system overestimated total GHG emissions and therefore, excessive GHG emission reduction credits were distributed. The resulting surplus led to a collapse in market prices for emission credits when more reliable inventories were produced in May 2006. (The collapse in prices also reflected an institutional design that "wall[ed] off" credits from being carried over for future use beyond December 2007.³⁶) The E.U. experience also highlighted how partially deregulated electricity generators gained a multi-billion Euro windfall profit from distribution of the credits based on historic emissions patterns.³⁷ As a result, the second phase of the E.U. market has reduced opportunities for such profit-taking without any benefit for electricity consumers.

California (see Part II below) has suggested that it may be able to engage in the E.U. trading regime as it adopts its own GHG reduction policies, but such participation raises a number of issues regarding possible conflicts with federal policies. In particular, there are clear federal constitutional limits constraining a U.S. state from entering into a treaty with another sovereign nation-state. Concerns about potential interference with the federal government's foreign policy-making are also raised by preemption concerns, although such challenges were rejected by Judge Sessions in a recent challenge to Vermont's adoption of California's GHG emissions standards for mobile sources.³⁸ California and other states may be able to be linked to the E.U. and other trading regimes through a series of innovative contractual arrangements with non-governmental entities operating in the market. In essence, the key to making U.S. GHG emission

35. The Market Advisory Committee (MAC) to the California Air Resources Board (CARB) has an excellent, succinct discussion of these lessons learned in Appendix C of its report. MKT. ADVISORY COMM. TO THE CAL. AIR RES. BD., RECOMMENDATIONS FOR DESIGNING A GREENHOUSE GAS CAP-AND-TRADE SYSTEM FOR CALIFORNIA 103-06 (June 30, 2007), available at <http://www.energy.ca.gov/2007publications/ARB-1000-2007-007/ARB-1000-2007-007.PDF> [hereinafter CAP-AND-TRADE RECOMMENDATIONS].

36. *Id.* at 104-05.

37. European firms received windfall profits with the free allowance distribution as firms then charged their customers the opportunity cost of the allowances despite the fact they were free. *Id.* at 105.

38. *Green Mountain Chrysler Plymouth Dodge Jeep v. Crombie*, 508 F. Supp. 2d 295, 397 (D. Vt. 2006).

reductions tradable with E.U. reductions is reciprocity in recognition of the property rights implied by tradable GHG emissions credits in each place. This is a ripe area for legal innovation and also an area in which there is a great deal of legal uncertainty in the absence of federal legislation explicitly prohibiting or authorizing such transactions.

It is important to note that the E.U. and its member states have not relied exclusively on the ETS under the Kyoto Protocol to encourage reduced GHG emissions through increased reliance on renewable generating technologies. Instead, the cap-and-trade regime—which is widely favored in political and economic circles when either a successor to Kyoto or federal legislation is discussed in the U.S.³⁹—has been supplemented by a complex set of policies to encourage more direct investment in renewables. Three E.U. member states stand out for these efforts: (1) Germany for photovoltaic solar development, (2) Denmark for wind power development, and (3) Spain for concentrating solar power (CSP, sometimes called Concentrating Solar Thermal (CST)). In all three cases, a combination of tax incentives, direct subsidies, and Feed-in-Tariff (FIT) policies were pursued. Moreover, all three of these European nations were attentive to the global economic development and technology development opportunities associated with nurturing renewable energy technology investment within their respective countries. Each nation therefore probably spent more per unit of renewable energy generated than alternative policies would have required—but each nation also has a vibrant, globally competitive renewable energy industry now and the green-collar jobs that go with it.⁴⁰ This attention to the broader social and economic benefits of industrial development is also a hallmark of California's approach to GHG emission reduction, where the economic benefits of such reductions are seen as greater over time than the costs.⁴¹

39. Cap-and-trade has become the favored policy option for dealing with climate change, but there are also strong advocates of and arguments for a carbon tax rather than a cap-and-trade system. For an excellent discussion of this perspective, see Janet E. Milne, *Carbon Taxes Versus Cap-and-Trade: The Relative Burdens and Risks of Market-Based Administration*, in 7 *CRITICAL ISSUES IN ENVIRONMENTAL TAXATION* 445–62 (Lin-Heng Lye et al. eds., 2009). See also ENVTL. TAX POL'Y INST. & VT. J. OF ENVTL. LAW, *THE REALITY OF CARBON TAXES IN THE 21ST CENTURY* (2008) (also published as a series of articles in 10 VT. J. ENVTL. L. 1–105 (2008)).

40. This has also become the focus of renewable technology development and deployment efforts by the People's Republic of China, which is poised to become a global leader in wind and solar development.

41. See CAL. AIR RES. BD., *CLIMATE CHANGE DRAFT SCOPING PLAN, ECONOMIC ANALYSIS SUPPLEMENT 24* (June 2008), available at http://www.arb.ca.gov/cc/scopingplan/document/economic_analysis_supplement.pdf.

C. Federal Clean Air Act and the EPA

The federal CAA allows the EPA to regulate vehicle emissions of any air pollutant, which "may reasonably be anticipated to endanger public health or welfare."⁴² The Bush Administration EPA refused to regulate GHGs under these provisions of the CAA, but the U.S. Supreme Court ruled against it on April 2, 2007, in *Massachusetts v. EPA*.⁴³ The Court found that CO₂ does qualify as an air pollutant under the CAA, giving the EPA clear statutory authority to regulate GHGs. The Court remanded the case to the EPA for a determination by the EPA Administrator on how to regulate CO₂, but the Bush Administration EPA was reticent to exercise its authority under the CAA in the absence of clear congressional direction on the scope of such regulation. The Obama Administration then changed course in 2009 and EPA Administrator Lisa Jackson issued an endangerment finding under Section 202(a) of the CAA in December 2009.⁴⁴ These findings are necessary before adopting the GHG emission regulations for motor vehicles that were jointly proposed by the EPA and the Department of Transportation's National Highway Safety Administration on September 15, 2009.⁴⁵

There are also a number of legislative bills that could compel, restrict, or expand such regulation by the EPA. Highlighting the importance of politics in determining legislative action, these bills have received much more attention since the shift in party control from the Republicans to the Democrats of both the House and Senate in January 2007. In particular, House Energy and Commerce Committee Chair Henry Waxman and Senate Environment and Public Works Committee Chair Barbara Boxer (both from California, as is Speaker of the House Nancy Pelosi) have long histories of progressive, pro-regulatory leadership on health and environmental matters. Waxman shepherded his bill (H.R. 2454) through the House and Boxer passed her bill (S. 1733) through her Senate committee in 2009. Moreover, the 2008 Presidential and Congressional elections fundamentally altered the political calculus on climate change legislation.⁴⁶ President Obama has

42. Clean Air Act, 42 U.S.C. § 7408(a)(1)(A) (2006).

43. *Massachusetts v. EPA*, 549 U.S. 497, 534–35 (2007).

44. EPA Administrator Lisa Jackson signed proposed endangerment and cause or contribute findings on April 17, 2009, and the EPA received 380,000 comments during the 60-day comment period ending June 23, 2009. EPA Endangerment, *supra* note 18. The endangerment and cause or contribute findings were then issued on December 7, 2009 and became effective on January 14, 2009. *Id.*

45. See U.S. Environmental Protection Agency, Regulations and Standards, <http://www.epa.gov/oms/climate/regulations.htm> (last visited Feb. 6, 2010).

46. Both President Obama and his Republican opponent Senator John McCain campaigned for the Presidency in part on commitments to address climate change if elected, and Senator McCain has been a leader in the Senate on the issue as co-author of the Lieberman-McCain Climate Stewardship Act, S. 139 108th Cong. (2003) (as debated in the U.S. Senate on October 30, 2003). House Democrats

placed the issue of climate change high on his legislative and regulatory agenda, naming former EPA Administrator Carol Browner to a new White House "energy/climate czar" position⁴⁷ and emphasizing the need to address climate change in his appointments,⁴⁸ speeches,⁴⁹ budget,⁵⁰ and legislative

gained 21 seats and Senate Democrats gained eight seats in the elections (including the contested Minnesota seat), giving President Obama a 257–178 lead in the House and a 59–41 lead in the Senate by party affiliation (counting two independents as caucusing with the Democrats). Kate Phillips, *New Voices in Congress Will Change the Tone of the Democratic Majority*, N.Y. TIMES, Jan. 6, 2009, <http://www.nytimes.com/2009/01/07/us/politics/07frosh.html?ref=us>. Moreover, Rep. Henry Waxman (a southern California congressman who has played a prominent role in previous efforts to strengthen environmental and health legislation and regulation) defeated incumbent chair John Dingell (a Michigan congressman who has historically sought to weaken environmental and health legislation and regulation to the extent it has burdened the automobile industry) to take leadership of the House Energy and Commerce Committee. Both Nancy Pelosi and Barbara Boxer, the Speaker of the House and chair of the Senate Environment and Public Works committee respectively, place the pro-environmental California delegation at the forefront of congressional action on climate change. Environmental legislation that has far-reaching economic consequences, however, has historically generated regional interest-based political coalitions that tend to transcend party affiliation. See GARY BRYNER, BLUE SKIES, GREEN POLITICS: THE CLEAN AIR ACT OF 1990 137–44 (1995) (illustrating regional coalitions overcoming party affiliations in Congress).

47. Carol Browner's formal title is Assistant to the President for Energy and Climate Change. Frances Romero, *Energy Czar: Carol Browner*, TIME, Dec. 15, 2008, <http://www.time.com/time/politics/article/0,8599,1866567,00.html>.

48. Obama emphasized the need to address climate change when introducing his environmental and energy appointees Lisa Jackson (EPA), Steven Chu (DOE), and Browner.

49. Obama stated in his February 24, 2009 speech to a joint session of Congress:

We know the country that harnesses the power of clean, renewable energy will lead the 21st century. And yet, it is China that has launched the largest effort in history to make their economy energy-efficient. We invented solar technology, but we've fallen behind countries like Germany and Japan in producing it. New plug-in hybrids roll off our assembly lines, but they will run on batteries made in Korea.

Well, I do not accept a future where the jobs and industries of tomorrow take root beyond our borders -- and I know you don't, either. It is time for America to lead again. (Applause.)

Thanks to our recovery plan, we will double this nation's supply of renewable energy in the next three years. We've also made the largest investment in basic research funding in American history-- an investment that will spur not only new discoveries in energy, but breakthroughs in medicine and science and technology.

We will soon lay down thousands of miles of power lines that can carry new energy to cities and towns across this country. And we will put Americans to work making our homes and buildings more efficient so that we can save billions of dollars on our energy bills.

But to truly transform our economy, to protect our security, and save our planet from the ravages of climate change, we need to ultimately make clean, renewable energy the profitable kind of energy. So I ask this Congress to send me legislation that places a market-based cap on carbon pollution and drives the production of more renewable energy in America. That's what we need. (Applause.) And to support -- to support that innovation, we will invest \$15 billion a year to develop technologies like wind power and solar power, advanced biofuels, clean coal, and more efficient cars and trucks built right here in America. (Applause.)

President Barack Obama, Speech to Joint Session of Congress (Feb. 24, 2009), in CBSNEWS,

initiatives.⁵¹ Moreover, he has continued to support these efforts despite the economic crisis gripping the nation as he took office in early 2009. The prospect of continuing executive action on climate change is therefore likely even if Congress fails to adopt new climate change legislation to modify the basis for EPA regulatory authority.⁵²

Other aspects of the existing CAA may also play an important role in climate change policy in the absence of new legislation. In particular, the EPA's enforcement of the New Source Review (NSR) provisions of the CAA could have a profound effect on the economics of continuing to operate the oldest and dirtiest coal-fired power plants in the country. Strict enforcement of NSR requirements—together with great uncertainty about future CO₂ regulation—could lead the owners and operators of these plants either to shut them down or to make major investments in upgrading them to be more efficient. The former would create significant need for new supplies that may then be met by less GHG-intensive generating sources, while the latter would commit American utilities to long-lived coal-fired generating sources that would make GHG emissions reductions more difficult. Strict enforcement of the existing NSR provisions may therefore be a key regulatory policy that could accelerate achievement of significant GHG reductions from electricity generation.⁵³

D. *Western Climate Initiative*

Seven western states (Arizona, California, New Mexico, Oregon, Utah, Montana, and Washington) have joined with four Canadian provinces (British Columbia, Manitoba, Ontario, and Québec) in the Western Climate Initiative (WCI) to pledge to cut GHG emissions regardless of whether

<http://www.cbsnews.com/stories/2009/02/24/politics/main4826494.shtml>.

50. The Obama Administration proposed auctioning carbon emission allowances in the fiscal year 2010 budget. OFFICE OF MGMT. AND BUDGET, A NEW ERA OF RESPONSIBILITY: RENEWING AMERICA'S PROMISE 21, 100 (2009), available at http://www.whitehouse.gov/omb/assets/fy2010_new_era/a_new_era_of_responsibility2.pdf.

51. The so-called stimulus bill, American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115, includes specific provisions for loan guarantees and favorable tax treatment for renewable energy projects placed into service by December 2010, as well as significant expansion of renewables research.

52. President Obama has indicated he would prefer to have new legislation rather than to rely solely on the CAA as the basis for regulatory action, but the political difficulty of shepherding health care reform through the Congress in 2009—together with the lack of any international commitments in Copenhagen by China or India to meet binding GHG emission reduction targets—will make it an uphill battle to get strong climate change legislation through the Senate in an election year.

53. For a discussion of what qualifies as a "modification" of an existing facility that would trigger the NSR provisions of the CAA, see *Environmental Defense v. Duke Energy Corp.*, 549 U.S. 561, 578–79 (2007).

national policies in the United States or Canada emerge soon. Together, they have agreed to cut their GHG emissions to 15% below 2005 levels by 2020.⁵⁴ Such an effort is important for three reasons. First, it highlights how states and provinces have been ahead of the federal governments in developing climate change policies. Second, it includes a large fraction of the electricity generation and load in the WECC area, which is important if any individual state's efforts in the region are going to result in actual, substantive reductions in GHGs from the electric generation sector. Finally, still absent from the initiative are Alberta (Canada), Colorado, Idaho, Nevada, and Wyoming. Colorado, Nevada, Wyoming, Alaska, Kansas, and the Canadian province of Saskatchewan are WCI "observers." Montana and Wyoming are particularly important in this regard, because of their significant coal-fired generation that largely serves other states in the WECC.⁵⁵ Failing to regulate such generation would undercut the effectiveness of other WCI states' efforts, for a patchwork of state-by-state GHG regulation could result in only "paper" GHG reductions by merely shifting the contractual and ownership arrangements of existing GHG emissions in the western grid.⁵⁶

The WCI does not compel states to develop consistent regulatory policies or to cede their sovereign authority to a regional institution, so there is no promise that this agreement will lead to a regional market for emissions trading. The initial agreement sets the stage, however, for a regional cap-and-trade agreement that would reduce the risk of double-counting emissions or emissions reductions while increasing the likelihood that emissions reductions will be more economically efficient than if each state acted independently. (This will only be true, however, if the WCI states are consistent in their accounting methods and all of the relevant states in the WECC participate.) Moreover, the regional effort puts greater pressure on the federal government to adopt federal GHG emissions regulations. Each state's independent effort to meet the target could also generate innovative ideas that are incorporated into any federal or international program that might be adopted by the federal government.⁵⁷

54. For more details on the WCI effort, its history, and its programs, see Western Climate Initiative, <http://www.westernclimateinitiative.org> (last visited Feb. 9, 2010).

55. See Jolanka V. Fisher & Timothy P. Duane, *Trends in Electricity Consumption, Peak Demand, and Generating Capacity in California and the Western Grid, 1977-2000* (Univ. of Cal. Energy Inst. POWER Working Paper, Paper No. PWP-085, 2001), available at <http://www.ucei.berkeley.edu/PDF/pwp085.pdf> (stating that Wyoming and Montana are the first and second highest WECC states in terms of consumption per capacity).

56. See James Bushnell, *Implementation of California AB 32 and its Impact on Electricity Markets*, 8 CLIMATE POL'Y 277, 277-92 (2008) (illustrating this problem).

57. The concept of a "bottom up" national GHG emissions reduction policy—driven primarily

The WCI effort, like the Kyoto Protocol and the E.U. market, is not limited in scope to the electricity sector. Opportunities for inter-sectoral trading are therefore likely to decrease the total costs of achieving any given level of GHG emission reductions. Different states could adopt different strategies for achieving overall GHG emission reduction targets, which could lead to conflicting policies in the absence of a regional market for GHG emission reduction credits. One state may adopt technology standards for the electricity sector, for example, while another state may invest in new public transit infrastructure while adopting stricter land use regulations in order to encourage reduced GHG emissions in the transportation sector. It is therefore imperative that the WCI effort achieve greater cooperation in developing policy approaches that do not conflict across the WCI participants' regulatory jurisdictions. Otherwise, the paper reductions of one state's policies may be double-counted as gains by another state—without achieving the significant GHG emission reductions called for in the WCI agreement.

The Design Recommendations for the WCI Cap-and-Trade Program were released in September 2008 and they promise to move the WCI in this direction: they call for regulation for emissions of the six main greenhouse gases (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) in the following sectors of the economy:

- Electricity generation, including imported electricity
- Industrial and commercial fossil fuel combustion
- Industrial process emissions
- Gas and diesel consumption for transportation
- Residential fuel use

The first phase of the program would begin on January 1, 2012 and apply to emissions from electricity (including imports), industrial combustion at large sources, and industrial process emissions “for which adequate measurement methods exist.”⁵⁸ The second phase would begin in 2015 and expand the program to cover transportation fuels and residential, commercial, and industrial fuels not otherwise covered. Recognizing the

by state efforts like WCI—is elaborated in Kevin Doran, *Can the U.S. Achieve a Sustainable Energy Economy From the Bottom-Up? An Assessment of State Sustainable Energy Initiatives*, 7 VT. J. ENVTL. L. 95 (2006). Also, see BARRY G. RABE, STATEHOUSE AND GREENHOUSE: THE EMERGING POLITICS OF AMERICAN CLIMATE CHANGE POLICY (2004) for a more comprehensive assessment of state-led initiatives (although it predates major initiatives in California under AB 32 and all of the regional initiatives discussed herein).

58. Western Climate Initiative, The WCI Cap & Trade Program, <http://www.westernclimateinitiative.org/the-wci-cap-and-trade-program> (last visited Feb. 6, 2010).

limits of even a regional approach, however, the WCI participants say they prefer federal and/or international approaches:

The WCI Partners have designed a pioneering stand-alone regional cap-and-trade program that will immediately begin to address climate change in the absence of broader national or international standards. But the Partners also recognize that long-term compatibility is key. The WCI cap-and-trade program is designed in such a way that it can provide a model for, be integrated into, or work in conjunction with any future U.S. or Canadian emissions-reduction programs. The WCI Partners continue to advocate for national and international greenhouse gas emission reduction programs that are consistent with the WCI cap-and-trade design principles.⁵⁹

The WCI effort has conducted much of the hard work required to see how a comprehensive economy-wide GHG emissions reduction program could be implemented; it is an important source of learning for development and implementation of federal legislation as the U.S. Congress considers the pending bills in the second session of the 111th Congress. Perhaps equally important, however, the WCI effort means that implementation of any federal GHG cap-and-trade system must address the political interests of stakeholders who have already invested considerable effort to reach agreement on the WCI approach. That means the dozen senators from WCI participant states equal 20% of the 60 votes needed for a cloture vote in the U.S. Senate—so they are likely to play a significant role in determining the final shape of any U.S. legislation that has a prospect of being signed into law in 2010 or beyond.⁶⁰

It is important to note, however, that electricity generation sources in the WECC, which does not precisely map on the WCI membership, are different in important ways from the national U.S. generation mix. The WECC generally has more hydropower and less coal or nuclear generation than the rest of the U.S.⁶¹ Moreover, there are important regional differences within the WECC, which means that different states face very

59. *Id.*

60. Note that Nevada Senator Harry Reid (which is only an "observer" to the WCI) is the Senate Majority Leader, while New Mexico Senator Jeff Bingaman (which is a WCI signatory) is Chair of the Senate Energy and Natural Resources Committee. Senator Barbara Boxer, Chair of the Senate Environment and Public Works Committee, is also from a WCI signatory state. Thus, it is clear that western senators will play a major role in Senate legislation.

61. W. ELEC. COORDINATING COUNCIL, 10-YEAR COORDINATED PLAN SUMMARY 33 fig. 3 (July 2006), available at <http://www.wecc.biz/library/WECC%20Documents/Publications/10Year%20Coordinated%20Plan%20Summaries/2006-2015%2010-Year%20Coordinated%20Plan%20Summary.pdf>.

different challenges when reducing GHG emissions from the electricity sector. In particular, California has more nuclear generation, considerably more renewable generation, and less hydro generation than the entire WECC generation mix. Table 1 shows these differences:

Table 1: Differences in Generating Mix for California vs. WECC vs. United States

Generating Source by Fuel Type	United States ⁶² (% of net Generation)	Western Electricity Coordinating Council (% of installed MW) ⁶³	California (% of total Gwh) ⁶⁴
Coal	48.5%	19.8%	18.2%
Natural Gas	21.4%	39.0%	45.7%
Nuclear	19.6%	5.0%	14.4%
Hydro	6.1%	32.2%	11.0%
Renewables	3.1%	3.6%	10.6%
Notes	2007 Data; energy	2006 Data; capacity ⁶⁵	2008 Data; energy

E. Midwestern Greenhouse Gas Reduction Accord

Like the governors who have signed onto the WCI, governors in the Midwestern states have signed a broad agreement to cooperate in the development of a regional approach to GHG emission reductions: the Midwestern Greenhouse Gas Reduction Accord (MGGRA).⁶⁶ Originally

62. U.S. ENERGY INFO. ADMIN., SUMMARY OF ENERGY INFORMATION ADMINISTRATION: ELECTRIC POWER ANNUAL 2008 fig. ES-1 (Jan. 31, 2010), available at http://www.eia.doe.gov/cneaf/electricity/epa/epa_sum.html.

63. W. ELEC. COORDINATING COUNCIL, *supra* note 61, at 33 fig. 3.

64. CAL. ENERGY COMM'N, 2009 INTEGRATED ENERGY POLICY REPORT, FINAL COMMISSION REPORT 44 fig. 2 (Dec. 2009), available at <http://www.energy.ca.gov/2009publications/CEC-100-2009-003/CEC-100-2009-003-CMF.PDF>. These data include out-of-state generation providing power to California.

65. Note that the WECC data, since it is expressed as nameplate capacity of installed generation, tends to understate the role of high capital-cost generating technologies like coal and nuclear generation sources in comparison with the annual energy generation data in the Table for the United States and California. Coal and nuclear facilities will generally operate at higher capacity factors due to their relatively low fuel costs, so they will generally produce a higher percentage of annual energy generation than their proportionate share of installed generating capacity. In contrast, the other technologies will generally operate at lower capacity factors than coal or nuclear and therefore will provide a lower than their proportionate share of installed capacity in annual generation.

66. MIDWESTERN GOVERNORS ASS'N, MIDWESTERN GREENHOUSE GAS ACCORD 2007, 2-4

signed on November 15, 2007, the MGGRA includes participation by the states of Illinois, Iowa, Kansas, Michigan, Minnesota, Wisconsin, and the Canadian province of Manitoba. Indiana, Ohio, South Dakota, and the Canadian province of Ontario are "observing states".⁶⁷ The MGGRA participants explicitly recognize that their interests may differ from those of other states and regions due to both their resource generation mix and political values:

While the Midwest has intensive manufacturing and agriculture sectors, making it the most coal-dependent region in North America, it also has world-class renewable energy resources and opportunities to allow it to take a lead role in solving the effects of climate change. The geographic location and ideologically centrist beliefs of the Midwestern region provide its leaders with an ability to push the federal policy debate in a productive direction.⁶⁸

Both the WCI and the MGGRA are modeled on the earlier and more ambitious action by the Regional Greenhouse Gas Initiative (RGGI), which is discussed below. The MGGRA began its efforts later than either the WCI or RGGI, however, so it has not developed its policies as thoroughly as either of the other two regional efforts.⁶⁹ Moreover, California's direct interconnection with most of the WCI participants and its important influence as a primary electricity customer for WCI-based generators links the California efforts discussed below directly to the likely policy outcomes of the WCI effort. RGGI, which is the most advanced regional effort, is also focused exclusively on the electricity sector and therefore offers important lessons for greening the grid. I therefore do not discuss MGGRA in detail here except to note three important features of the MGGRA effort: (1) because of its heavy coal reliance, the interests of the MGGRA participants

(Nov. 15, 2007), <http://www.midwesternaccord.org/midwesterngreenhousegasreductionaccord.pdf>.

67. *Id.* at 4.

68. Midwestern Greenhouse Gas Reduction Accord, New direction, new energy, new jobs and a cleaner world, <http://www.midwesternaccord.org/index.html> (last visited Feb. 6, 2010).

69. The MGGRA released Draft Advisory Group recommendations in June 2009 and a Draft Model Rule in October 2009. DAVID THORNTON, MIDWESTERN GREENHOUSE GAS REDUCTION ACCORD, DRAFT MODEL RULE FOR ADVISORY GROUP REVIEW (2009), <http://www.midwesternaccord.org> (follow "here" hyperlink to access current draft model rule) (released on Oct. 21, 2009); MIDWESTERN GREENHOUSE GAS ACCORD, ADVISORY GROUP DRAFT FINAL RECOMMENDATIONS (2009), available at <http://midwesternaccord.org> (follow "here" hyperlink to access the recommendations) (released June 2009). In contrast, RGGI's Model Rule was released in January 2007 and the WCI Design Recommendations were released in September 2008 (a year before MGGRA). See Regional Greenhouse Gas Initiative, RGGI Benefits, <http://www.rggi.org/about/benefits> (last visited Feb. 6, 2010) [hereinafter Regional Greenhouse Gas Initiative].

are likely to play a major role in the design of any federal legislation that can successfully pass the Senate⁷⁰; (2) due to its extensive wind resources, the MGGRA participants could play a major role in greening the grid if sufficient transmission investments are made to move Midwestern wind power to areas with greater electricity demand⁷¹; and (3) due to the importance of agriculture in the region, development of offset markets that transfer payments from GHG emitting entities to land managers for carbon sequestration services is likely to play a major role in the final design of any MGGRA regulatory scheme. Once again, this feature is important politically at the national level and is therefore likely to be a key feature of any national legislation, as it became during passage of H.R. 2454 in the House in 2009.⁷²

F. Regional Greenhouse Gas Initiative

Unlike the WCI or the MRGGA, the northeastern RGGI is limited to the electricity sector and CO₂ emissions. In part because of its narrower focus, RGGI has been engaged in more detailed protocol development and is more likely to develop a truly regional GHG emissions reduction market encompassing electricity generation in ten northeastern states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont).⁷³ Together, these states represent a contiguous regional electricity system that is missing only Pennsylvania (which is a RGGI "observer," as are the Canadian Provinces of Ontario, Québec, and New Brunswick). The RGGI's goal is to stabilize CO₂

70. Such legislation is therefore likely to include incentives for Carbon Capture and Sequestration (CCS), which would allow so-called "Clean Coal" (which the coal industry defines as any technology that exceeds the regulatory requirements in place before the 1990 Clean Air Act Amendments were passed) to continue to operate with heavy subsidies and tax breaks. For a detailed discussion of CCS, see CCSREG PROJECT, DEP'T OF ENG'G & PUB. POLICY, CARNEGIE MELLON UNIV., CARBON CAPTURE AND SEQUESTRATION: FRAMING THE ISSUES FOR REGULATION (Jan. 2009), available at http://www.ccsreg.org/pdf/CCSReg_3_9.pdf.

71. For an excellent discussion of the regional flows of renewable power that could occur with and without significant transmission system upgrades, see RES. FOR THE FUTURE, SHALINI VAJJHALA ET AL., GREEN CORRIDORS: LINKING INTERREGIONAL TRANSMISSION EXPANSION AND RENEWABLE ENERGY POLICIES (Mar. 2008), available at http://www.rff.org/focus_areas/features/Documents/RFF-DP-08-06.pdf. The authors note that the Midwestern states would export significant wind power to the Southeastern United States if there is sufficient transmission capacity, but that otherwise the Southeastern United States would generate renewable power with local biomass. *Id.* at 26.

72. One of the key amendments to H.R. 2454 that ultimately greased its passage was a shift in agency authority for establishing offset standards and regulations from the EPA to the Department of Agriculture, which is seen by agricultural interests as more likely to favor a system that will provide incentive payments for agricultural practices in the Midwest.

73. Regional Greenhouse Gas Initiative, Participating States, <http://www.rggi.org/states> (last visited Feb. 26, 2010).

emissions by 2015 and to reduce CO₂ emissions by ten percent by 2018 compared to the capped level of 188 million short tons of CO₂.⁷⁴

RGGI members agreed to adopt state level legislation and/or take executive action by January 1, 2008, in order to allow the RGGI market to go “active” by January 1, 2009.⁷⁵ Unlike either the WCI or the MGGRA, the RGGI market for GHG emissions reductions is already in place as Congress and the Obama Administration consider federal approaches to legislation and/or regulation. RGGI created a Model State Rule that could be adopted by state legislatures in order to implement RGGI (although individual states may adopt different legislation in accordance with their own legislative processes and political circumstances). Development of RGGI’s Model Rule highlights how detailed negotiating and rule-making is required to achieve implementation of broad agreements on GHG emission reductions. Originally invited by New York Governor George Pataki in April 2003 to adopt a regional approach, six governors announced their basic agreement to establish RGGI in September 2003.⁷⁶ Two more years of negotiations and stakeholder input led to a Memorandum of Understanding (MOU) on December 20, 2005, but further amendments to the MOU were necessary by the time the RGGI Action Plan was released on August 8, 2006. The RGGI Model Rule was then released on January 5, 2007.⁷⁷ All ten states had adopted regulations by the end of 2008.⁷⁸ RGGI then held its first CO₂ permit auction on September 25, 2008—five years after the initial agreement.⁷⁹ Since then, RGGI had held five more auctions through December 2, 2009.⁸⁰ The six auctions allow total emissions for 163.5 million tons and have raised nearly a half billion dollars (\$494 million) in revenue.⁸¹

The revenue from the auctions, according to key RGGI program designer Richard Cowart, is much more important than the price signal sent

74. See Regional Greenhouse Gas Initiative, *supra* note 69, for more detailed information about the RGGI effort and its status. The capped level represents 95% of the CO₂ emissions associated with electric generation in RGGI. *Id.*

75. Regional Greenhouse Gas Initiative, Memorandum of Understanding 5 (Dec. 20, 2005), available at http://www.rggi.org/docs/mou_12_20_05.pdf.

76. Regional Greenhouse Gas Initiative, Frequently Asked Questions, http://rggi.org/docs/mou_faqs_12_20_05.pdf (last visited Mar. 7, 2010).

77. See generally REGIONAL GREENHOUSE GAS INITIATIVE MODEL RULE (Jan. 5, 2007), available at http://www.rggi.org/model_rule_key_documents_link (follow “Model Rule (Corrected January 5, 2007)” hyperlink) (providing model legislation for states that choose to opt into the RGGI auction program).

78. For links to each of the states’ adopted regulations, see Regional Greenhouse Gas Initiative, State Regulations, http://www.rggi.org/states/state_regulations (last visited Feb. 6, 2010).

79. Regional Greenhouse Gas Initiative, Auction Results, <http://www.rggi.org/co2-auctions/results> (last visited Feb. 6, 2010).

80. *Id.*

81. For the results of each auction, see *id.*

by the cost of the allowances—ranging from a low of \$2.05/ton in the December 2, 2009 auction to a high of \$3.51/ton in the March 18, 2009 auction. Cowart thinks of the program as “cap-and-invest” rather than simply “cap-and-trade.”⁸² The relatively low price signal is unlikely to generate significant changes in either generator or consumer behavior, but the revenues from the auction can be invested in energy efficiency programs at the state level that will yield significant reductions in both overall electricity demand and CO₂ emissions.⁸³ This distinction is a critical one for design of any federal cap-and-trade program. So-called “cap-and-dividend” programs have also been discussed, where the revenues from the allowance auctions would be returned to energy consumers and/or taxpayers to make them “revenue neutral”—but such an approach would not have the benefit of the “cap-and-invest” model that RGGI has pursued. Each of the ten RGGI states now has considerable resources to invest in energy efficiency programs: from a low of \$3.7 million for Vermont to a high of \$180.7 million for New York. Those efficiency programs will reduce total CO₂ emissions much more cost-effectively than the RGGI cap and consequent price signal.⁸⁴

Working out the details of such a comprehensive regional regulatory program—even for one that is limited to the electricity sector—also demonstrates that it is likely to take several years following adoption of broad legislation to see successful implementation. This timeframe may be shortened in the future, however, as experience with Kyoto, the E.U. market, and RGGI are incorporated into new efforts by WCI, MGGRA, and California over the next few years. Policy-makers should then be in a much better position to implement federal legislation on GHG emission reductions if the lessons of these other efforts are drawn on for guidance. Of all these efforts, the RGGI effort is the furthest along toward developing a model of how the electricity sector may reduce CO₂ emissions in the future. By focusing on the electricity sector, the RGGI effort has already developed important experience that is specific to the industry while beginning to achieve GHG reductions in one of the most important sectors of the overall economy.

82. Interview with Richard Cowart, Regulatory Assistance Project (RAP), in Montpelier, Vt. (July 2009).

83. *Id.*

84. See *supra* note 79 for a state-by-state breakdown of the cumulative auction proceeds by state. For a more detailed discussion of this “cap-and-invest” approach to capture efficiency improvements, see Richard Cowart, *Carbon Caps and Efficiency Resources: How Climate Legislation Can Mobilize Efficiency and Lower the Cost of Greenhouse Gas Emission Reductions*, 33 VT. L. REV. 201 (2008).

Limiting RGGI's scope to the electricity sector also reduces opportunities for lower-cost GHG emission investments in other sectors of the economy, which may be more attractive in some regions.⁸⁵ This limitation will likely increase RGGI's costs of compliance, compared to systems in which broader inter-sectoral trading is allowed, as utilities will be unable to reduce emissions in other sectors to offset utility GHG emissions. Emission reductions in the electricity sector, however, are likely to be more easily verified and less costly to monitor due to both the relatively small number of participants (compared to the broader economy) and the traditional role of both state (e.g., Public Utility Commissions or Public Service Commissions) and federal (e.g., the EPA under the CAA) regulators.

Most importantly though, the RGGI effort—like the E.U. effort to date—has already helped to identify challenges and pitfalls that others (e.g., Congress, EPA, WCI, MGGRA, and California) may then avoid in the design of their emissions markets and sector-specific emissions reduction strategies. A strong network of advocates, policy-makers, and regulators is developing across the United States where RGGI is likely to be able to transfer its knowledge to others.⁸⁶ The RGGI effort is therefore likely to have a significant impact on the design of any national regime for GHG emission reductions in the electricity sector. Federal and state regulators in other regions must therefore be careful to ensure that the conditions that guide RGGI's design are relevant to their own regions. Otherwise, the RGGI model could constrain important investments in GHG emission reduction strategies that could be quite promising in other parts of the country (e.g., wind power in the Midwest, biomass in the Southeast, solar power in the Southwest, and hydropower in the Northwest).

85. RGGI has limited the use of offsets to no more than ten percent of the targeted GHG emission reductions. RGGI's conservative approach to offsets is prudent in light of some of the offset abuses and the basic difficulty of assuring "additionality" in the Kyoto Protocol's Clean Development Mechanism (CDM) implementation. For critiques of the CDM, see generally Patrick McCully, *The Great Carbon Offset Swindle: How Carbon Credits are Gutting the Kyoto Protocol, and Why They Must Be Scrapped*, in *BAD DEAL FOR THE PLANET: WHY CARBON OFFSETS AREN'T WORKING...AND HOW TO CREATE A FAIR GLOBAL CLIMATE ACCORD 2* (Lori Potter ed., 2008), available at http://www.internationalrivers.org/files/DRP2English2008-521_0.pdf and Michael Wara, *Is the Global Carbon Market Working?*, 445 NATURE 595 (2007) (arguing the CDM is increasing greenhouse gas emissions under the guise of promoting sustainable development).

86. E.g. The Regulatory Assistance Project, United States Activities, <http://www.raponline.org> (last visited Feb. 6, 2010). In particular, the Regulatory Assistance Project (RAP) has led the RGGI effort. *Id.*

II. CALIFORNIA: THE KEY STATE POLICY FORUM

Climate change policy in California has occurred in three forums, all of which are now facing integration challenges: (1) for the economy generally through implementation by the California Air Resources Board (CARB) of AB 32 (the California Global Warming Solutions Act of 2006); (2) for the transportation sector specifically through implementation by CARB of AB 1493 (which regulates tailpipe GHG emissions from mobile sources under the waiver provisions of Section 202(a) of the federal CAA), executive orders establishing a low-carbon fuel standard for mobile sources, and SB 375 (which attempts to address vehicle miles travelled [VMT] by mobile sources through modifications to regional transportation and land use planning); and (3) through a complex array of electricity-specific regulations by CARB, the California Energy Commission (CEC), and the California Public Utilities Commission (CPUC). Each of these is summarized in turn in Part II in order to set the context for identifying barriers and bridges to greening the grid in Part III below.

A. AB 32: The California Global Warming Solutions Act of 2006

In August 2006, California became the first state to adopt legislation that will lead to a comprehensive, economy-wide, enforceable GHG emission reduction regulatory regime⁸⁷ with passage of AB 32, the California Global Warming Solutions Act of 2006 (sponsored by Assemblywoman Pavley and the Speaker of the Assembly Nunes).⁸⁸ Governor Schwarzenegger signed the bill on September 27 in a pair of signing ceremonies in Los Angeles and San Francisco; he then immediately issued several additional Executive Orders related to GHG emission reductions. The new law received national and even international attention, landing the Governor on the cover of *Newsweek* magazine⁸⁹ and catapulting him into a leadership role in establishing the Western Climate Initiative

87. RABE, *supra* note 57, at 141–44. As Rabe notes, other states were ahead of California in developing more comprehensive policies before the passage of AB 32—but AB 32 has leap-frogged California over all of the other states in the nation through its detailed, comprehensive, binding requirements. *Id.* CARB implementation of AB 32 has also been aggressive under CARB Chair Mary Nichols, whose distinguished career includes service as EPA Assistant Administrator for Air and Radiation in the Clinton Administration and Secretary for Resources of California. *Id.*

88. Since then, several states have adopted legislation calling for even greater reductions in GHG emissions. California's program is therefore the most ambitious in scope but not in reductions.

89. Karen Breslau, *The Green Giant; Carbon Czar; California's Hummer-loving governor is turning the Golden State into the greenest in the land, a place where environmentalism and hedonism can coexist. How a star turned pol's become the muscle behind saving the planet*, *NEWSWEEK*, Apr. 16, 2007, at 50.

with other western governors. Some political analysts also believe AB 32 ensured his re-election as governor in early November 2006.⁹⁰

AB 32 requires the CARB to adopt regulations to achieve a reduction in statewide GHG emissions equivalent to 1990 levels by the year 2020.⁹¹ This is comparable to reducing national emissions to 15% below 2005 levels by 2020, so it is comparable to the goals in H.R. 2454.⁹² This is an ambitious goal in a state that is both growing rapidly (averaging over 400,000 additional people per year since 1980) and is already extremely energy-efficient.⁹³ The CARB has already met a series of immediate milestones in adopting these regulations: (1) publish a list of "early action" GHG emission reduction strategies that can be implemented quickly (June 30, 2007);⁹⁴ (2) adopt regulations to require reporting and verification of GHG emissions (by January 1, 2008);⁹⁵ (3) determine what the statewide GHG emissions were in 1990, thereby establishing the regulatory target (January 1, 2008);⁹⁶ and (4) prepare and approve a Scoping Plan for achieving "the maximum technologically feasible and cost-effective reductions" in GHG emissions from a specified set of GHG emission sources (January 1, 2009).⁹⁷

The Scoping Plan, which was adopted on December 18, 2008, calls for three major initiatives to meet the AB 32 goals:

90. In fact, the politics of the gubernatorial race played a major role in Schwarzenegger's decision to sign the bill. I have spoken with two reliable sources—one who was with Assemblywoman Pavley on the day the agreement was announced, and one who spoke directly with Speaker Nunes that week as the final agreement was being hammered out—who independently told me that the Governor called Pavley and Nunes during the last few days of the legislative session to tell them that he planned to veto AB 32. These sources tell me that Pavley and Nunes replied to the Governor that they would hold a press conference that afternoon to announce his intention to veto the bill. The Governor then called them back two hours later to tell them that he would sign the bill after all—even though the final terms had not yet been worked out. Later that day, a press conference was held to announce the historic agreement, but the final wording of the bill was worked out over the next two days and then passed the Assembly and the Senate. Several other participants in those negotiations have also told me that the Senate Democrats were pushing for a strong bill in order to get the Governor to veto it because they believed that such a veto by Schwarzenegger would give his Democratic challenger, state Treasurer Phil Angelides, an opening to beat the Governor in the November election. Instead, Schwarzenegger signed the bill, received accolades as a "Green Governor," and beat Angelides by 56% to 39% in the election.

91. California Global Warming Solutions Act of 2006, CAL. HEALTH & SAFETY CODE §§ 38550–38565 (West Supp. 2009).

92. American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 702.

93. California now uses only half the electricity per capita as the national average. ADRIENNE KANDEL ET AL., CAL. ENERGY COMM'N, A COMPARISON OF PER CAPITA ELECTRICITY CONSUMPTION IN THE UNITED STATES AND CALIFORNIA 12 (2008), available at <http://www.energy.ca.gov/2009/publications/CEC-200-2009-015/CEC-200-2009-015.PDF>.

94. CAL. HEALTH & SAFETY CODE § 38560.5.

95. *Id.* § 38530.

96. *Id.* § 38550.

97. *Id.* § 38561.

- (1) Implementation of mobile sources regulations (for tailpipes under AB 1493 and for fuels under Executive Order), summarized here in Part II.B below;
- (2) Implementation of a cap-and-trade regime for stationary sources (with up to 50% of the emissions reductions required to meet the cap to be met through offsets; the details of this regime are still under development in 2010 and beyond the scope of this Article);
- (3) Implementation of new energy efficiency standards and a Renewable Electricity Standard (RES), discussed in further detail in Part III below.⁹⁸

The CARB is now moving into the regulatory phase of implementation, which is where potential conflicts between achieving the ambitious goals of AB 32 and other social and economic values will be contested as the true costs of AB 32 are distributed to specific sectors of the economy. The CARB must now: (5) adopt regulations to implement the “early action” measures identified above (January 1, 2010),⁹⁹ and (6) adopt regulations to implement the longer-term GHG reduction strategy to bring statewide GHG emission levels down to 1990 levels by 2020 (January 1, 2011).¹⁰⁰ Those final regulations are where the most difficult policy choices will be made in designing the final cap-and-trade system (and associated rules for offsets), and they must be effective by January 1, 2012.¹⁰¹ The final regulations are therefore scheduled to be adopted at the very end of Governor Schwarzenegger’s term (which expires in January 2011) but will not take effect until a new governor takes office.¹⁰²

98. These goals reflect a synthesis of the “[k]ey elements of California’s recommendations for reducing its greenhouse gas emissions to 1990 levels by 2020” CAL. AIR. RES. BD. CLIMATE CHANGE SCOPING PLAN ES-3 to ES-4 (2008), available at http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf.

99. CAL. HEALTH & SAFETY CODE § 38560.5.

100. *Id.* § 38550.

101. *Id.* § 38562.

102. The timing of the transition from regulatory development to regulatory implementation is critical. The new Governor will appoint new officials to many of the key positions at the CARB, CEC, and CPUC. At least one of the leading candidates—Meg Whitman, a Republican, who is the former CEO of eBay—has called for a delay in implementing AB 32 due to the economic crisis. See Meg Whitman for Governor, <http://www.megwhitman.com/story/561/meg-whitman-calls-for-oneyear-moratorium-on-most-ab-32-rules.html> (calling for a one-year moratorium on most AB 32 rules) (last visited Feb. 12, 2010). An Initiative measure to suspend AB 32 implementation until California’s unemployment rate drops to 5.5% or less for four consecutive quarters was cleared for circulation by the California Secretary of State on February 3, 2010 and will qualify for the November 2010 ballot if it receives 433,971 valid voter signatures by June 24, 2010 (the deadline to qualify for a 2011 special election or 2012 statewide election is July 5, 2010). Jim Sanders, *Capitol Alert: Initiative to suspend AB 32 cleared to gather signatures*, SACRAMENTO BEE, Feb. 4, 2010, available at <http://www.sacbee.com/static/>

In addition to the formal processes under way at the CARB, however, AB 32 may also have created new obligations for other state and local agencies in California that will broaden the scope of its impact on environmental and land use planning. The California Attorney General filed suit challenging the San Bernardino County General Plan in March 2007, for example, arguing that the County's failure to consider the effects of its plan on achievement of AB 32's goals was a violation of the California Environmental Quality Act (CEQA). The parties reached a settlement in August 2007 that requires the County to conduct a supplemental analysis of those issues.¹⁰³ The state legislature then passed SB 97 immediately thereafter, calling for the Governor's Office of Planning and Research (OPR) to study whether and how analysis of GHG emissions should be incorporated into CEQA analysis.¹⁰⁴ The OPR issued tentative guidelines in June 2008 and submitted its proposed changes to CEQA Guidelines for analysis of GHG emissions in April 2009.¹⁰⁵ The Attorney General also reached an important settlement with San Joaquin County in 2008 that sets a higher standard for local land use authorities when evaluating the GHG emissions impacts of their land use decisions.¹⁰⁶ The Attorney General's aggressive litigation strategy under CEQA has therefore linked AB 32 to local land use planning by California's 58 counties and 478 incorporated cities. AB 32's scope therefore already reaches far beyond the CARB's direct regulatory authority and may, in turn, affect how other entities address the impact of land use decisions on transportation-related GHG emissions.¹⁰⁷

B. AB 1493: Regulating Mobile Source Emissions

California's first aggressive move to regulate GHGs occurred four years before AB 32 with adoption of AB 1493 in 2002 (commonly called the Pavley Bill, after its author, Assemblywoman Fran Pavley). AB 1493 called for the CARB to adopt new vehicle emissions standards to reduce

weblogs/capitolalert/latest/2010/02/initiative-to-s.html. The full text of the one-page Initiative (called the "California Jobs Initiative") is available at http://ag.ca.gov/cms_attachments/initiatives/pdfs/i892_initiative_09-0094.pdf (last visited Feb. 12, 2010).

103. See Joanna Malaczynski & Timothy P. Duane, *Reducing Greenhouse Gas Emission from Vehicle Miles Traveled: Integrating the California Environmental Quality Act with the California Global Warming Solutions Act*, 36 *ECOLOGY L.Q.* 71, 104–12 (2009).

104. CAL. PUB. RES. CODE § 21083.05 (2008).

105. See The Governor's Office of Planning and Research, CEQA Guidelines and Greenhouse Gases (2009), <http://www.opr.ca.gov/index.php?a=ceqa/index.html> (noting OPR's April 13, 2009 submission of its proposed amendments to the CEQA greenhouse gas emissions guidelines to the California Secretary for National Resources).

106. Malaczynski & Duane, *supra* note 103, at 110–12.

107. *Id.*

GHG emissions from mobile sources sold in California. Adoption of these standards must occur within the structure of the federal CAA because the federal government has preempted regulation of mobile vehicle emissions. California has special authority under the CAA to adopt stricter regulations for mobile sources than the federal standards due to California's extreme air quality challenges and its advanced leadership in controlling mobile sources when the federal CAA was passed. California's standards cannot go into effect, however, unless the federal EPA issues a "waiver" to the state under §7543(b) of the CAA.¹⁰⁸ Other states then have the option of adopting either the federal or California standards (in order to avoid a patchwork of 50 different standards for vehicle manufacturers). Eleven states adopted California's vehicle emissions standards for GHG emission by 2007 (contingent upon the federal EPA issuing the waiver under the CAA).¹⁰⁹ Due to such significant market penetration, the California standards were likely to become the basis for any future federal GHG emission reduction standard for mobile sources.¹¹⁰

Following passage of AB 1493, the state CARB spent more than three years developing new GHG emissions standards for the 2009 model year. Those standards were adopted on September 15, 2005. California then filed its Request for Waiver of Preemption under CAA Section 209(b) on December 21, 2005.¹¹¹ The EPA did not hold public hearings on the matter

108. Clean Air Act, 42 U.S.C. § 7543(b)(1)-(2):

(b) Waiver

(1) The Administrator shall, after notice and opportunity for public hearing, waive application of this section to any State which has adopted standards (other than crankcase emission standards) for the control of emissions from new motor vehicles or new motor vehicle engines prior to March 30, 1966, if the State determines that the State standards will be, in the aggregate, at least as protective of public health and welfare as applicable Federal standards. No such waiver shall be granted if the Administrator finds that—

(A) the determination of the State is arbitrary and capricious,

(B) such State does not need such State standards to meet compelling and extraordinary conditions, or

(C) such State standards and accompanying enforcement procedures are not consistent with section 7521(a) of this title.

(2) If each State standard is at least as stringent as the comparable applicable Federal standard, such State standard shall be deemed to be at least as protective of health and welfare as such Federal standards for purposes of paragraph (1).

109. *Green Mountain Chrysler Plymouth Dodge Jeep v. Crombie*, 508 F. Supp. 2d 295, 302 n.5 (D.Vt. 2007).

110. New motor vehicle sales in the United States dropped to 10.4 million in 2009, the lowest level since the depths of the 1982 recession. Total sales were therefore nearly 40% below the 10-year average of 16.7 million sales before the recession began. Chris Isidore, *Auto sales: Good end to terrible year*, CNNMONEY.COM, Jan. 5, 2010, http://money.cnn.com/2010/01/05/news/companies/auto_sales/index.htm.

111. Letter from Catherine Witherspoon, Executive Officer, California Air Resources Board, to

until May 2007,¹¹² then the EPA rejected the CARB request in March 2008.¹¹³ The Bush Administration also filed amicus briefs on the side of motor vehicle manufacturers that were challenging AB 1493, so the rejection was not surprising in some respects. The motor vehicle manufacturers and the Bush Administration argued that the new CARB regulations effectively established new motor vehicle fuel efficiency standards, which was preempted by the federal government's Corporate Average Fuel Economy (CAFE) standards under the Energy Policy and Conservation Act of 1975 (EPCA).¹¹⁴

The EPA's authority to reject California's request for a waiver under the CAA was weakened by the U.S. Supreme Court's decision in *Massachusetts v. EPA*,¹¹⁵ however, where the Court determined that carbon dioxide qualifies as an air pollutant under the terms of the CAA. Based in part upon that decision—where the Court noted that the CAA and EPCA could be reconciled despite some overlapping subject matter—challenges to Vermont's adoption of the CARB's AB 1493 regulations were firmly rejected by federal District Court Judge Sessions on September 12, 2007.¹¹⁶ Nevertheless, EPA Administrator Stephen Johnson's decision in March 2008—which overruled the recommendations of career scientists and attorneys at the EPA—effectively delayed implementation of AB 1493 through the end of the Bush Administration.¹¹⁷ President Obama then explicitly requested that new EPA Administrator Lisa Jackson reconsider the waiver request, which she granted to California on June 30, 2009.¹¹⁸ The CARB then amended its earlier regulations on September 24, 2009 to “harmonize its rules with the federal rules for passenger vehicles” that were announced by President Obama on May 19, 2009.¹¹⁹ In the end, the Bush

Stephen L. Johnson, U.S. Environmental Protection Agency Administrator (Dec. 21, 2005), *available at* <http://www.arb.ca.gov/cc/docs/waiver.pdf>.

112. California State Motor Vehicle Pollution Control Standards; Request for Waiver of Federal Preemption; Opportunity for Public Hearing, 72 Fed. Reg. 21,260 (Apr. 30, 2007).

113. For a chronology with links to the key documents developed by the CARB and the U.S. EPA, see Air Resources Board, California Environmental Protection Agency, Clean Car Standards – Pavley, Assembly Bill 1493, <http://www.arb.ca.gov/cc/ccms/ccms.htm> (last visited Feb. 6, 2010).

114. Energy Policy and Conservation Act of 1975, 49 U.S.C. §§ 32901–32919 (2007).

115. *Massachusetts v. EPA*, 549 U.S. 497, 534–35 (2007).

116. See *Green Mountain Chrysler Plymouth Dodge Jeep v. Crombie*, 508 F. Supp. 2d 295, 397–99 (D.Vt. 2007).

117. California State Motor Vehicle Pollution Control Standards; Notice of Decision Denying a Waiver of Clean Air Act Preemption for California's 2009 and Subsequent Model Year Greenhouse Gas Emission Standards for New Motor Vehicles, 73 Fed. Reg. 12,156 (Mar. 6, 2008).

118. See U.S. Environmental Protection Agency, EPA Grants California GHG Waiver, <http://yosemite.epa.gov/opadmpress.nsf/0/5E448236DE5FB369852575E500568E1B> (last visited Feb. 6, 2010) for the EPA Press Release.

119. Air Resources Board, *supra* note 113.

Administration's refusal to grant the waiver caused a five-year delay in AB 1493 implementation—which translates into billions of pounds of CO₂ emissions per year.

In addition to the tailpipe emissions standards of the CARB, Governor Schwarznegger issued Executive Order (E.O. S-1-07) on January 18, 2007, that calls for a reduction of at least ten percent in the carbon intensity of California's transportation fuels by 2020.¹²⁰ In response, the CARB adopted new carbon intensity regulations for motor vehicle fuels in the state on April 23, 2009.¹²¹ These standards, in turn, could become a model for national standards if federal legislation or EPA action under the CAA calls for significant reductions in GHG emissions from mobile sources. (A similar pattern occurred during debate over the 1990 CAA Amendments for so-called "clean fuels," where California's more aggressive technology-forcing standards had already established that the refinery industry could meet standards that were then being considered for adoption at the federal level. Indeed, the then-existing CARB standards were adopted in the 1990 CAA Amendments as national standards that were then implemented more slowly across the rest of the country.)¹²²

Finally, California passed SB 375 into law in 2008 to give the CARB direct authority to establish regional GHG emission reduction targets for 2020 and 2035 that are in turn coupled to regional transportation funding decisions and some streamlining of CEQA review.¹²³ The Regional Targets Advisory Committee (RTAC) submitted its recommendations for the 18 Metropolitan Planning Organizations (MPOs) to the CARB on September 29, 2009.¹²⁴ The CARB must now determine how to link those SB 375 goals to the AB 32 implementation regime.

120. Cal. Exec. Order No. S-1-07 (Jan. 18, 2007), available at <http://gov.ca.gov/executive-order/5172/>.

121. Press Release, California Environmental Protection Agency, Air Resources Board, California Adopts Low Carbon Fuel Standard (Apr. 23, 2009), available at <http://www.arb.ca.gov/newsrel/nr042309b.htm>.

122. See BRYNER, *supra* note 46, at 132–37, 150 (describing the use of the clean fuels program and the technology-forcing idea).

123. S.B. 375, 2008 Leg., 2007–2008 Sess. (Cal. 2008) (codified as amended at Cal. Pub. Res. Code § 21159.28 (2008)). See Air Resources Board, California Environmental Protections Agency, Senate Bill 375 Implementation, <http://www.arb.ca.gov/cc/sb375/sb375.htm> (last visited Feb. 12, 2010) for a brief overview of SB 375 implementation. See also Malaczinski & Duane, *supra* note 103, at 104–12.

124. See generally Regional Targets Advisory Committee, Recommendations of the Regional Targets Advisory Committee (RTAC) Pursuant to Senate Bill 375 (2009), available at <http://www.arb.ca.gov/cc/sb375/rtac/report/092909/finalreport.pdf>.

C. Electricity Regulators: The CPUC and The CEC

The CARB is clearly the lead agency for implementing AB 32,¹²⁵ but the legislation calls for the CARB to consult with the CPUC and the CEC “on all elements of its plan that pertain to energy related matters.”¹²⁶ Both the CPUC and CEC have long had independent authority to consider the environmental impacts of those facilities and entities over which they have regulatory authority, and nothing has legally prevented either of them from considering GHG emissions as part of that mandate. For example, the CPUC announced its intention to develop GHG emission limits well ahead of AB 32 in February 2006 under its existing pre-AB 32 authority. Moreover, SB 1368 (adopted in September 2006, at the same time as AB 32) directed the CPUC and CEC to adopt GHG performance standards for all new baseload electric generating facilities (including those located out of state) that would ensure that all new facilities built to serve California’s electricity load have no more GHG emissions than those of a combined-cycle gas-fired power plant.¹²⁷ The agencies adopted an interim standard in January 2007 of 1,100 pounds of CO₂ per MWh produced. This effectively prohibits California utilities from building or contracting for power from coal-fired power plants.¹²⁸

The two regulatory agencies had therefore already begun to incorporate GHG emissions reduction policies into their respective regulatory programs before CARB has taken regulatory action under AB 32. The more comprehensive AB 32 shifts primary regulatory responsibility for GHG emissions reductions to the CARB, but it does not diminish the electricity regulators’ existing authority over electric generation, transmission, siting, and utility rates for most of California’s electricity customers and suppliers. Each of the agencies has different strengths and substantive authority over slightly different aspects of the electricity sector,¹²⁹ so it is important to coordinate their efforts to ensure the most cost-effective achievement of AB 32’s goals. The CARB, CPUC, and CEC are now working together to reconcile their

125. California Global Warming Solutions Act of 2006, CAL. HEALTH & SAFETY CODE § 38501(f).

126. California Energy Commission, Notice of Availability, AB 32 Implementation, Proposed Interim Opinion on Greenhouse Gas Regulatory Strategies, Energy Commission Docket No. 07-OIIP-1, Public Utilities Commission Rulemaking 06-04-009 (Feb. 8, 2008), available at http://www.energy.ca.gov/ghg_emissions/meetings/2008-02-15_notice_of_availability.html.

127. CAL. PUB. UTIL. CODE § 8341(d)(1) (West Supp. 2009).

128. This action raises Dormant Commerce Clause concerns, however, that could limit California’s ability to regulating (making the WCI important for policy implementation).

129. For a discussion of the CPUC and CEC’s respective historic strengths and regulatory authority, see Tim Duane, *Electricity Regulation Reform*, 6 CAL. POL’Y CHOICES 205 (1990).

complementary regulatory authority and expertise, but this will be challenging. I briefly summarize the CPUC and CEC's regulatory authority and capacity here in Part II and then discuss their efforts to overcome some key barriers and bridges to greening the grid in Part III below.

1. California Public Utilities Commission

The CPUC was established in 1911 as a successor to the California Railroad Commission. Its authority focuses on the regulation of retail rates in the electricity, natural gas, telecommunications, water, and transportation sectors. Investor-owned utilities (IOUs) with geographically-defined franchises—based on the model that dominated the Natural Monopoly Era—are subject to CPUC jurisdiction. Publicly-owned utilities (POUs) are not subject to direct regulatory oversight by the CPUC.¹³⁰ IOUs are directly affected by CPUC regulation, however, through the CPUC's ability to approve or reject rate recovery for IOU investments in transmission or generation. Due to the dominance of the IOUs, their generation and transmission systems largely determine the market conditions for publicly-owned utility operations in the state. The California electricity crisis of 2000–2001 showed that this was true for the entire WECC, as the economics of IOU operation in California generated a ripple effect both economically and in terms of system reliability throughout the West. How the CPUC regulates California IOUs is therefore important throughout the WECC.¹³¹

The CPUC may have been established in the Natural Monopoly Era, but it played an important role in the Deregulation Era and its role has now been transformed as a result. California IOUs sold nearly all of their non-nuclear thermal generating assets from 1996 to 2000 to private generating companies, moving those facilities outside the direct jurisdictional authority of the

130. POU are often referred to as "munies" in California, since California POU are largely municipal utilities operated by California cities or joint powers agencies. See, e.g., Jesse Broehl, *Million Solar Roofs Bill Signed into Law*, RENEWABLEENERGYWORLD.COM, Aug. 23, 2006, <http://www.renewableenergyworld.com/rea/news/article/2006/08/million-solar-roofs-bill-signed-into-law-45786> (referring to publicly traded utilities as "munies"). The largest munies are the Los Angeles Department of Water and Power (LADWP), which serves about four million customers, and the Sacramento Municipal Utility District (SMUD), which serves 1.4 million customers. Los Angeles Department of Water and Power, LADWP Quick Facts and Figures (2009), <http://www.ladwp.com/ladwp/cms/ladwp000509.jsp>; Sacramento Municipal Utility District, About SMUD, <http://www.smud.org/en/about/Pages/facts-and-figures.aspx> (last visited Feb. 6, 2010). Other POU include Irrigation Districts and some state or federally operated electricity suppliers, such as the California Department of Water Resources (DWR) and the federal Western Area Power Administration (WAPA). The latter two act as wholesalers to retail distribution munies.

131. See generally Duane, *supra* note 13, for a detailed discussion of the crisis and its consequences.

CPUC.¹³² Investments in those plants—either to improve operating efficiency or to reduce GHG emissions—are no longer subject to the rate-recovery proceedings of an IOU before the CPUC. Instead, the CPUC can only exercise indirect influence on private, non-regulated, non-utility generators by approving or disapproving IOU rate recovery from its customers for the costs of Power Purchase Agreements (PPAs) from those entities.

Much of the electricity supply now meeting the IOUs' load is being provided under long-term contracts that have effectively received very little CPUC oversight.¹³³ Many of those contracts will expire in 2010–2012, so their renewal or their successor contracts are likely to be negotiated in the context of the Climate Change Era rather than the Deregulation Era. Indeed, all generating assets now serving California load—whether owned by IOUs, POUs, or Independent Power Producers (IPPs)—will be affected by the CPUC and CEC policies of the Climate Change Era. Future PPAs are therefore likely to be subject to greater CPUC scrutiny. The CPUC has broad authority to consider a wide range of factors when determining if such contracts are in the public interest, so it could influence GHG emissions in the electricity sector through its PPA review processes. Through such authority, for example, the CPUC could create strong economic incentives for IOU purchases from renewable generating sources by allowing higher rate recovery from zero or low-GHG emission generating sources and/or by disallowing rate recovery for higher-GHG emission generating sources. (The more direct influence of California's Renewable Portfolio Standard (RPS) and the CPUC's role in implementing it is discussed further in Part III below.)

The CPUC also continues to exercise direct authority over retail rates for the IOUs, which has given the CPUC a prominent role in encouraging demand-side management (DSM) and energy efficiency measures. These programs, together with CEC programs outlined below, have dampened electricity demand increases in California over the past three decades so that Californians now consume less than two-thirds of the national average electricity consumption per capita.¹³⁴ CPUC authority to allow real-time pricing for some customers and to promote utility and customer adoption of "smart grid" technology that can cycle customers' appliances on and off

132. *See id.* at 506–07 (noting that divestiture of the former utility-owned power plants also made those divested generating units exempt wholesale generators under the Energy Policy Act of 1992).

133. The state Department of Water Resources took over contracting for the IOUs during the height of the California energy crisis in 2000–2001. Thus, because the IOUs could not get credit, they could not sign long-term contracts.

134. DEVRA BACHRACH, MATT ARDEMA & ALEX LEUPP, NAT'L RES. DEF. COUNCIL & SILICON VALLEY MFG. GROUP, ENERGY EFFICIENCY LEADERSHIP IN CALIFORNIA: PREVENTING THE NEXT CRISIS 3 fig.4 (Apr. 2003), available at <http://www.nrdc.org/air/energy/eecal/eecal.pdf>.

could also play a major role in GHG emission reductions in the electricity sector.¹³⁵ The CPUC therefore continues to retain important authority to influence how the electricity sector achieves the goals of AB 32. Moreover, any implementation of AB 32 that relies on the public auctioning of GHG emission allowances for the state's cap-and-trade system—such as RGGI has used so successfully—could generate significant revenues to channel into energy efficiency programs through the cap-and-invest model developed by RGGI. The CPUC could then be the key investment vehicle to ensure that all cost-effective energy efficiency options are invested in by California's IOUs.¹³⁶

Finally, the CPUC administers the California Solar Initiative (CSI) program, which includes the "million solar roofs" program established in 2004¹³⁷ and a budget of \$2.2 million for the 2007–2016 period.¹³⁸ The program could also be funded through the cap-and-invest model developed by RGGI to expand renewable generation as well as energy efficiency programs.

2. California Energy Commission

The CEC, unlike the CPUC, has no direct authority over the economic levers of electric regulatory policy. Instead, the CEC has direct authority over the siting of major non-nuclear thermal power generating facilities in the state. The FERC has regulatory authority for the permitting of hydroelectric facilities, while the federal Nuclear Regulatory Commission (NRC) has primary authority over nuclear power plants. The CEC develops a biennial electricity resource plan, as an element of its Integrated Energy Policy Report, which includes projections of future electricity demand as

135. Despite the theoretical promise of these approaches, however, some studies have found less price elasticity in real-time pricing experiments than expected among residential electricity customers. Commercial and industrial customers are more likely to be responsive to real-time pricing and have more options for mitigating risks associated with such a rate tariff. See generally Severin Borenstein, *The Long-Run Efficiency of Real-Time Electricity Pricing* 1–24 (Ctr. for the Study of Energy Mkts. Working Paper Series, CSEM WP 133r, 2005) (discussing the "long run efficiency gains from adopting [real-time pricing] in a competitive electricity market").

136. Another mechanism would have to be developed for the POUs, which are not regulated by the CPUC but would nevertheless need to meet AB 32's targets. Assuming that POUs would also have to buy GHG emission allowances from the state, the revenues from such purchases could be distributed by the CEC for specified energy efficiency programs implemented by the POUs.

137. Press Release, Office of the Governor, Schwarzenegger Signs Legislation to Complete Million Solar Roofs Plan (Aug. 21, 2006), <http://gov.ca.gov/index.php?/press-release/3588/>.

138. The budget is summarized at Go Solar California, The California Solar Initiative – CSI, <http://www.gosolarcalifornia.org/csi/index.html> (last visited Feb. 6, 2010), but it may have been reduced in light of the state's severe budget crisis.

well as available supplies to meet that demand.¹³⁹ Permits to build new thermal generating facilities over 50 MW must meet a “demand conformance test” demonstrating that the facilities are needed under the CEC’s biennial plan.¹⁴⁰ The CEC also has authority to evaluate a wide range of environmental impacts associated with proposed generating facilities, allowing it to create strong incentives for specific types of plants.¹⁴¹ How the CEC exercises that authority could encourage generation that emphasizes low-GHG emission technologies. Historically, the CEC has even extended its regulatory reach to out-of-state power facilities by putting the utilities’ resource plans supporting such out-of-state facilities through the “demand conformance test.”

The CEC’s primary authority over generation siting cuts two ways. First, it can stop new GHG-intensive projects from being permitted. Second, its permitting processes also create a regulatory challenge for new renewable projects that require a CEC permit because they rely on thermal sources (e.g., concentrating solar power (CSP), geothermal, biomass). Other non-thermal renewable sources, such as wind, do not face this regulatory hurdle. The CEC was reviewing permit applications for 30 projects totaling 11,711.8 MW as of February 6, 2010.¹⁴² Twelve of these projects were CSP projects of some sort.¹⁴³ As discussed in Part III, the CEC also has a major role in determining whether or not adequate transmission facilities will be available to ship the power from these renewable facilities to California markets.

The combined power of the CEC’s siting authority and the CPUC’s rate recovery authority have effectively killed several IOU proposals to build large coal-fired power plants to serve California ratepayers in the intermountain west. Legislative changes in response to the California energy crisis of 2000–2001 increased coordination between the CEC and CPUC in resource planning and policy, while both AB 32 and SB 1368 ensure that out-of-state power plants will be subject to state policy for reducing GHG emissions. Nevertheless, the two agencies have been rivals

139. The 2009 Integrated Energy Policy Report was adopted by the CEC on December 16, 2009. See California Energy Commission, <http://www.energy.ca.gov/calendar/events/index.php?year=2009&month=12> (last visited Feb. 25, 2010) (showing calendar of adoption).

140. Duane, *supra* note 13, at 484.

141. IOU generating sources therefore face regulatory oversight by both the CPUC and the CEC, while POU generating sources face regulatory oversight by the CEC but not by the CPUC. Note that the CEC’s siting authority applies to all non-nuclear thermal electric generation within the state, including POU generation.

142. California Energy Commission, Status of All Projects, http://www.energy.ca.gov/sitingcases/all_projects.html#review (last visited Feb. 6, 2010).

143. *Id.*

at times in policy formation,¹⁴⁴ and the Climate Change Era presents new coordination challenges for the CEC and CPUC—with the CARB having new authority over both agencies at times.

Like the CPUC, the CEC has authority to influence electricity demand. The CEC's authority is more direct than the CPUC's rate-oriented authority because the CEC can adopt energy efficiency standards that affect demand for electricity. Such standards adopted to date have already avoided the construction of dozens of power plants by tapping "negawatts" in improved appliance and building efficiency rather than the megawatts of new generating facilities. The cost effectiveness of such standards depends on the value of the avoided generation, however, and that value will now include the cost of avoiding GHG emissions. The CEC is therefore likely to expand its regulatory programs for improved efficiency as GHG emissions are explicitly incorporated into its benefit-cost analysis framework.¹⁴⁵

3. Coordinating California's Regulators

It is clear that the CPUC and CEC have complementary, overlapping jurisdiction over electricity regulation that has the potential to be a powerful force driving electricity industry reductions in GHG emissions. The two agencies' respective missions also hold the potential for serious conflicts, however, between their individual policies. This can occur when CEC demand forecasts are different than CPUC estimates, leading to CPUC policies that create economic incentives for either new generation or efficiency programs that are not consistent with CEC policies. The IOUs may get permitting authority from the CEC for a facility that the CPUC will not let them collect rates to pay for. The CPUC may also order an IOU to enter into a contract for power from facilities that cannot get siting permits from the CEC. Concerns about such inconsistency in the late 1980s¹⁴⁶ led to the adoption of laws and policies designed to improve coordination. Reorganization of the two agencies' respective responsibilities—possibly through consolidation into a single commission and/or new state-level Department of Energy—was on the table in the early 1990s before the Deregulation Era took hold in the mid-1990s.¹⁴⁷ Since then, the two

144. See Malaczinski & Duane, *supra* note 123, at 105–06.

145. Higher costs for producing power make high-cost efficiency programs more cost effective. Thus, the CEC can justify adopting more ambitious efficiency standards by showing that the economic benefits of such standards exceed their cost by saving higher-cost power. This logic improves the cost effectiveness of demand-side management, efficiency, and renewable power.

146. Duane, *supra* note 129.

147. The Wilson Administration made this proposal to the Little Hoover Commission, and I testified in favor of it. Environmental groups opposed it while project developers generally favored it,

agencies have improved coordination under the post-energy crisis-planning framework. But AB 32 has now installed a third leg on the California utility regulatory stool: the CARB. Moreover, AB 32 makes the CARB the lead agency for adopting and implementing California state-wide policies for GHG emission reductions.¹⁴⁸ Ongoing negotiations between the CPUC, the CEC, and the CARB will therefore be critical to ensure cost effective and coherent GHG emissions reductions policies in the electricity sector.

The three agencies have already faced their first coordination challenge under AB 32. The CPUC, whose direct regulatory authority is over "load-serving entities" (LSEs) rather than generators—due to the divestiture by the IOUs of most of their generating capacity during the Deregulation Era—was developing a GHG emissions reduction strategy before the passage of AB 32.¹⁴⁹ The CPUC's original policy proposals would have required all LSEs under CPUC jurisdiction (e.g., IOUs, but not POUs) to ensure that their electricity sources—through either direct generation by the LSE or through contracts with other generators or traders—met the CPUC's standards for GHG emissions. The CPUC was pursuing this approach—rather than a source-based approach, where all generators or traders would be responsible for certifying compliance with the CPUC's standards—for both policy and legal reasons. For policy reasons, the CPUC's ability to link GHG emission strategy to other CPUC policy efforts (e.g., funding of DSM programs, real-time pricing, and other rate incentives for the IOUs) makes the LSEs a natural focus for CPUC regulatory attention. For legal reasons, the CPUC was concerned that it may not be able to mandate GHG emissions reductions on independent generators and traders that were not clearly under the CPUC's direct regulatory authority. The LSE-oriented GHG emissions policy was therefore the preferred CPUC regulatory approach.

The passage of AB 32 challenged that preference. The Secretary of the California Environmental Protection Agency (Cal-EPA) appointed a Market Advisory Committee (MAC) to produce recommendations for the CARB, which is an independent agency within the Cal-EPA, on how to design market-oriented tradeable emissions offsets to meet the AB 32 goals.¹⁵⁰ The MAC recommended against continued pursuit of the LSE-oriented strategy previously favored by the CPUC.¹⁵¹ Instead, the MAC made policy

because it would concentrate more power in the hands of the Governor.

148. CAL. HEALTH & SAFETY CODE § 38501(f).

149. See California Public Utilities Commission, Climate Strategy Activities of the CPUC, <http://www.cpuc.ca.gov/PUC/energy/Climate+Change/climate.htm> (last visited Mar. 25, 2010) (stating that "[t]he CPUC has been engaged in proactive climate strategy work since 2004").

150. See CAP-AND-TRADE RECOMMENDATIONS, *supra* note 35, at 4.

151. See *id.* at 45–52 (describing how three quarters of the allowances in 2012 would be distributed to these entities).

arguments in favor of a "first seller" system that would apply to all in-state generators and whatever entities first take imported power into California.¹⁵² Although this remains untested, the MAC argues that legal authority over such generation is much stronger now under AB 32; whereas the CPUC previously relied only on its existing pre-AB 32 authority over LSEs).¹⁵³ The CARB, CPUC, and CEC are now working to resolve conflicts between the CPUC's previous policy direction and the MAC recommendations. How those negotiations proceed will be an important test of whether or not the three agencies will be able to resolve other potential policy conflicts in the future. The resulting policies—whether load based or "first seller"—will also establish important new parameters for future electricity generation in California and throughout the WECC region.¹⁵⁴

Perhaps the greatest challenge of coordination, though, comes in the arena of meeting California's ambitious RPS and ensuring that adequate transmission is available to ship renewable power to markets. These are addressed in Part III.

III. BARRIERS AND BRIDGES TO GREENING THE GRID¹⁵⁵

Each of the institutions summarized in Parts I and II above establishes legal rights and duties that in turn have the potential to conflict with or complement each other. Each institution has also been designed for slightly different purposes, and each encompasses a different scope in terms of which GHG emissions (or mitigation measures) may be within its jurisdiction. Electricity regulators must be attentive to how interactions between these GHG regulatory regimes and the hybrid forms of partially-deregulated economic regulation of the electricity industry may produce unexpected outcomes. In particular, they must ensure that economic incentives for electricity generation are consistent with broader institutions for GHG emission reduction policies, while still addressing the unique sector-specific features of electricity regulation.

152. *Id.*

153. *Id.* at 41–43. To read more about how the CPUC policy pre-dated AB 32, see *supra* note 35.

154. Note that a third option is to have a "source-based" system, which would apply only to generating sources located within California. This would not achieve the requirements of AB 32, however, which explicitly calls for including the emissions of out-of-state power generation. A source-based system would work best in a situation like RGGI's, where all of the states within a geographic electricity market area adopt similar and reciprocal source-based GHG regulations.

155. This Part's title is inspired by *BARRIERS AND BRIDGES TO THE RENEWAL OF ECOSYSTEMS AND INSTITUTIONS* (Lance H. Gunderson, C.S. Holling & Stephen S. Light eds., 1995).

Although I focus here on the electricity sector, it is useful first to reconsider each of the institutional structures discussed above in terms of a typology of ongoing efforts by geographic scope and sectoral scope. These two features will play an important role in determining how effective, costly, and transferable lessons may be from each of these independent institutional innovations. Table 2 summarizes key features of each of the approaches:

Table 2:

Policy Scope	Single State Jurisdiction ¹⁵⁶	Multiple State Jurisdiction ¹⁵⁷
Single Sector	AB 1493 (mobile sources)	Regional Greenhouse Gas Initiative (electricity sector)
	CARB Clean Mobile Fuels CPUC/CEC policies and regulations (direct)	CPUC/CEC policies and regulations (indirect) ¹⁵⁸
Multiple Sectors	AB 32 ¹⁵⁹	Western Climate Initiative ¹⁶⁰ Midwestern Greenhouse Gas Reduction Accord ¹⁶¹ European Union Kyoto Protocol

156. California's regulations over mobile sources could be adopted by other states under § 209(b) of the CAA, which could effectively make them multiple-state regulations. Federal adoption of California's low-carbon fuels standards would also have the same effect.

157. Clean Air Act, 42 U.S.C. § 7543(b) (2006). The E.U. and Kyoto Protocol systems involve multiple nation states.

158. Examples include policies under SB 1368, which prohibits California utilities, either POUs or IOUs, from building or contracting for power emitting more than 1,100 lbs of CO₂ per MW. CAL. PUB. UTIL. CODE § 8341 (2008).

159. Note that AB 32 implementation by the CARB may rely primarily upon single-sector policies and regulations. The AB 1493 and Clean Fuels policies may be the primary means for achieving GHG emission reductions in the transportation sector, while CPUC/CEC policies and regulations may be the primary means of achieving GHG reductions in the electricity sector. CAL. HEALTH & SAFETY CODE § 38550 (2004); CAL. HEALTH & SAFETY CODE § 43018.5 (2003) (amending § 42823).

160. Both the WCI and MGGRA could involve a combination of some states pursuing single-sector strategies and other states pursuing multi-sector strategies, so individual states' policies and regulations could be located within the single-state/single-sector or the single-state/multi-sector quadrant. Together, however, the combined policies and regulations of the WCI and MGGRA participants are multi-state/multi-sector—even if many sectors may not be included across all WCI or MGGRA participants.

161. See MIDWESTERN GOVERNORS ASS'N, *supra* note 66.

California has a unique position under the structure of the federal CAA and its central importance as the greatest source of electricity demand in the WECC. This means that its policy choices are the key driver of both the technological advances that will dominate GHG emission reductions in the transportation sector nationally, and the institutional structure for addressing GHG emission reductions through energy efficiency and renewable generation investments in the WCI's electricity sector.¹⁶² The CARB regulations to implement AB 1493 have effectively become *de facto* national standards through the waiver process under the CAA. Additionally, the new carbon-content policies adopted by the CPUC and CEC under SB 1368 already cast a shadow over any proposals for new coal-fired power plants in the WECC. Climate change will also have a significant impact on electricity supply and demand in California, which will in turn affect operation of the entire WECC system: (1) by increasing demand for electricity associated with air-conditioning and irrigation pumping, (2) by decreasing availability and reliability of hydropower resources due to changing precipitation patterns and diminished Sierra Nevada snowpack, and (3) by deteriorating air quality conditions significantly with increased temperatures. Thus, making it more difficult for the existing electricity system to operate dirtier existing facilities in compliance with CAA restrictions on criteria pollutants.¹⁶³ This complex suite of impacts associated with climate change calls for significant adaptation in the West—regardless of the mitigation measures that are implemented under the programs outlined here.

Existing institutional approaches in California decouple the transportation and electricity sectors' GHG emission reduction strategies, as they neither require nor create the conditions for a cap-and-trade emissions reduction system that would directly link GHG emissions reductions between the transportation sector and the electricity sector. The implications of such a decoupled approach could be significant—especially if future technological gains in the transportation sector require significant expansion of electricity generation (e.g., for plug-in electric hybrids or electric vehicles) or natural gas (e.g., as a feedstock for fuel-cell or

162. RGGI is likely to have more influence on national policy for the electricity sector generally due to its more in-depth development of standards and an operating cap-and-invest system several years ahead of California, WCI, MGGRA, or any national legislation or regulation. Earth Observatory, *The Ozone We Breathe*, <http://earthobservatory.nasa.gov/Features/OzoneWeBreathe/> (last visited Apr. 5, 2010).

163. The primary criteria pollutant of concern in California is tropospheric ozone, which forms as a by-product of atmospheric chemical interactions following the emission of hydrocarbons and nitrogen oxides in the presence of sunlight. Ozone is associated with serious health problems.

hydrogen-powered vehicles).¹⁶⁴ The resulting GHG emission landscape is likely to be different under such a hybrid institutional structure than what would emerge if either a multi-sectoral cap-and-trade system were established, or if a carbon tax were imposed either regionally throughout the WECC states or nationally.¹⁶⁵

Much of the political struggle over AB 32 implementation, which will certainly continue in 2010 as the final regulations are adopted, has been dominated by whether or not to pursue technology-forcing standards or a cap-and-trade system of marketable GHG emission permits. California's historic success in reducing non-GHG air pollutants over the past four decades has come primarily through a technology-forcing approach. Therefore, so many of the key stakeholders, both state officials and advocates, are strongly wedded to this approach. Governor Schwarzenegger and the business community are generally resistant to so-called "command and control" regulation by technocrats. Some academics have long argued that GHG emissions are the ideal pollutant for more indirect regulation through so-called "incentives-based regulation" of either a cap-and-trade system of tradeable GHG emission permits, or some kind of carbon tax—although a carbon tax is a non-starter politically.¹⁶⁶ The E.U.'s preliminary experience in constructing a market for tradeable permits highlights how implementation of the Kyoto Protocol in Europe is strongly oriented toward a cap-and-trade model. Such an approach is not legally required in California under AB 32, but it has emerged as a central approach as the CARB has explored various policies for implementing AB 32. The actual text of AB 32 requires the CARB to adopt regulations, but it only says that the CARB "may" achieve the targets of AB 32 through a cap-and-trade scheme.¹⁶⁷ The CARB's efforts to achieve GHG emission reductions in the transportation sector have already started the state down a technology-forcing regulatory path for at least a large chunk of California's GHG emissions. As a result, California is effectively pursuing a hybrid approach with three components: (1) sector-specific technology-forcing standards for

164. See generally Jacobson & Delucchi, *supra* note 6 (arguing that electrification of the transportation sector is key if the United States is to meet energy needs through a renewables-only sustainable energy system).

165. Current debates focus on cap-and-trade despite the possible benefits of a tax-based system, but this reflects the political infeasibility of a carbon tax being adopted in the U.S. today. See generally ENVTL. TAX POL'Y INST. & VT. J. ENVTL. LAW, *supra* note 39, for sources discussing the advantages of a carbon tax versus cap-and-trade.

166. For a general overview of market-based approaches, see Robert N. Stavins, *Market-Based Environmental Policies*, in PUBLIC POLICIES FOR ENVIRONMENTAL PROTECTION 31–76 (Paul R. Portney & Robert N. Stavins eds., 2d. ed. 2000); for a more detailed analysis of emissions trading theory and experience, see T.H. TIETENBERG, EMISSIONS TRADING: PRINCIPLES AND PRACTICE (2d ed. 2006).

167. CAL. HEALTH & SAFETY CODE § 38562(c) (West Supp. 2009).

transportation, (2) a mix of market mechanisms and technology standards in the energy sector, and (3) a broad cap-and-trade system with offsets for other sectors.

Implementing this hybrid approach requires careful attention to a complex set of detailed challenges. Within the electricity sector, greening the grid depends upon successful implementation of three independent but potentially conflicting policy initiatives that fall outside the scope of the CARB's cap-and-trade system for AB 32 implementation—and would also fall outside the cap-and-trade system envisioned under H.R. 2454, so they are equally important in determining the likely success of any national cap-and-trade system that may be adopted:

(1) RPSs, which are presently under state regulators but could be supplemented by federal authority for a national RPS as outlined in H.R. 2454;¹⁶⁸

(2) transmission system siting and pricing policies, which are influenced by both federal and state agencies with potentially conflicting mandates and authority over transmission;

(3) renewable generating facility siting and permitting, which is influenced by federal, state, and local agencies depending on the location of the facility and relevant law.

These three policy arenas address the most important barriers to greening the grid. Bridging those barriers is therefore necessary to assure the most cost-effective, yet environmentally sensitive, development of both the renewable generation capacity and the new transmission necessary to bring it to market. Fortunately, both the state and federal governments are making good progress in California toward reconciling the tensions inherent in their potentially conflicting policy goals and legal authority. Lessons from California's experience that could guide further progress throughout the U.S. are the focus of this discussion in Part III.

A. California's Renewable Success Under PURPA

California led the nation in renewable resource development in the electricity sector following PURPA's passage in 1978.¹⁶⁹ Qualifying Facilities (QFs) under the Act (which had to be powered by either (1) renewable energy sources or (2) through energy-efficient cogeneration,

168. American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. §§ 702–703.

169. Public Utility Regulatory Policies Act of 1978, 16 U.S.C. § 791.

which produces both electricity and thermal energy)¹⁷⁰ jumped to over 10,000 MW of generating capacity in California (19% of total capacity) from 1977 to 1998.¹⁷¹ These impressive gains warrant reexamination of California's experience promoting renewables and cogeneration. Upon close examination, it is clear that although a combination of economic and institutional incentives including PPA structures, planning processes, and interconnection policies created a robust QF industry in the state that completely altered the electricity industry before the Deregulation Era (which, ironically, had been born in part through PURPA's passage), these same incentives ground the industry to a halt.

The prices paid for QF power in California were generally higher than other states, but California jump-started the renewables industry by paying attention to more than just price. Issues like transmission access and PPA structure were just as important to renewable technology investors as the price they would get for their power. Price did not matter if you could not access the grid, or could only be assured of your price for five weeks or five months or five years. This is because what you needed to raise investment capital was a longer-term commitment of both transmission access and prices.¹⁷² California's utilities and regulators responded to these challenges in the early 1980s by adopting policies requiring broad transmission system access and long-term PPAs that were tied to the "long run avoided cost" (LRAC) of an "identified deferrable resource" (IDR) that the IOUs would have otherwise invested in but for the PPAs with independent generators. Those long-run PPAs kindled—admittedly, at prices that proved in hindsight to be quite favorable for the QF developers, rather than utility ratepayers, when oil and gas prices collapsed in the mid-1980s—an explosion of independent power generation in California long before the FERC created the merchant generator boom through deregulation.¹⁷³

California's major innovation in PURPA implementation was its recognition that different types of generating technologies warranted

170. *Id.* § 824a-3.

171. Fisher & Duane, *supra* note 55, at tbl. E-3.

172. This remains true today, and the challenge of raising investment capital has been exacerbated by the economic crisis since 2008. Strong cash flow demonstrated by a secure PPA is required to raise capital, but even these "PPA projects" are having difficulty getting financing. Utilities are therefore in a stronger position now for renewable technology development due to their lower costs of capital compared to private equity funders. Utilities have also been eligible since late 2008 to claim the Investment Tax Credit (ITC) for some renewable generation investments. We are therefore likely to see a shift from primarily PPA-financed projects to more utility-owned projects in the next few years, which will then require CPUC reasonableness review for utility cost recovery. Streamlining the CPUC review process will therefore be important to encourage utility investments in renewable projects.

173. For an early discussion of this phenomenon, see Lyna L. Wiggins, Timothy P. Duane & Allen L. Brown, *Diversification in Energy Production*, 4 CAL. POL'Y CHOICES 59 (1988).

different types of PPAs and that long-term capital investments required long-term price certainty just as utility investments did. Moreover, standardizing those PPAs was necessary to reduce the transaction costs and uncertainty facing QF developers. The CPUC therefore developed a Standard Offer Number 1 (SO1) for small QFs, a Standard Offer Number 2 (SO2) for cogeneration projects, and a Standard Offer Number 3 (SO3) for larger renewable generation QFs.¹⁷⁴ Each of the Standard Offer PPAs structured a payment stream that matched the generating technology: SO2 offered firm capacity payments and a variable energy payment as a function of the cogenerating project's heat rate (efficiency),¹⁷⁵ for example, while SO3 offered as-available capacity payments and a variable energy payment for technologies such as wind, solar, small hydropower, and geothermal (which did not have variable energy costs).¹⁷⁶ None of the Standard Offers provided payments sufficient to jump-start dramatic increases in renewable generation, however, because of the high fixed costs of nascent technologies, which in turn meant high financing costs due to their perceived riskiness. This meant that QF project developers could not raise sufficient capital to finance long-term projects with short-term PPAs where the utilities short-run avoided costs fluctuated seasonally and from year to year.

Pacific Gas and Electric Company (PG&E) therefore experimented with an innovative PPA design in the early 1980s for some Altamont Pass wind developers. Since fossil fuel prices were projected to increase over time, PG&E offered the wind projects a levelized payment that was higher than the current value of the power but lower than the projected value of the power. This PPA structure allowed the wind projects to get financing and to go forward. The CPUC initiated a rulemaking process to develop a similar long-run PPA as a Standard Offer Number 4 (SO4), but that process itself caused some delays in new project development, due to the anticipation of better terms under SO4. The CPUC therefore led a negotiating conference among the key utilities, consumer advocates, and PURPA developers to offer an Interim Standard Offer 4 (ISO4) that was unveiled in September 1983.¹⁷⁷ As the CPUC stated in its Decision:

174. CPUC, SUMMARY OF STANDARD OFFER CONTRACTS, http://www.cpuc.ca.gov/PUC/energy/Retail+Electric+Markets+and+Finance/Electric+Markets/QF+Issues/qf_contracts.htm (follow summary of standard offer contracts hyperlink) (last visited Mar. 6, 2010).

175. See generally *id.* (follow SO1 PDF hyperlink) (providing the terms of a standard contract for an SO1 offer).

176. See generally *id.* (follow SO3 PDF hyperlink) (providing the terms of a standard contract for an SO3 offer).

177. I began work as a Generation Planning Engineer with PG&E's Commercialization of Alternative Technologies group the week that ISO4 was adopted by the CPUC and then worked with a wide range of QF projects and utilities as well as the CPUC and CEC through 1990.

'Utilities' short-run avoided costs have proven to be more volatile than many observers would have guessed. We have seen a drastic run-up in fuel oil and gas prices, followed by a moderate decline in oil prices. The QF industry contends that the price uncertainty posed under the existing as-available and firm capacity standard offers, both based on short-run avoided costs, makes it extremely difficult to arrange financing for potential QF projects. QFs tell us that those who hold the financing purse-string, both lenders and equity investors, are reluctant to commit capital when a project's payment stream is so uncertain.'¹⁷⁸

The ISO4 was therefore intended to link the prices paid by utilities and ratepayers for long-run contractual commitments with the long-run avoided cost that the utilities would have otherwise spent. However, the CPUC recognized that meeting the QFs' needs might conflict with the interests of electricity consumers if the cost of the ISO4 proved to be too high:

'Our goal is not to ensure every possible QG [sic] project and/or technology is financeable; rather, our goal is to provide an economic environment in which solid, well-conceived projects have a reasonable opportunity to be financed through prices paid by utilities and ratepayers. It is not our task to compensate, through standard offer payment terms, for all concerns and reluctance of lenders and equity investors. Ours is a world of risks, and we have no business ensuring that some have little or virtually no risk at the expense of others (i.e., ratepayers).'¹⁷⁹

These principles remain as sound today as they were in 1983. Unfortunately, however, ratepayers ended up bearing too much risk when ISO4 was adopted: the ISO4 PPA had no "cap" on the total amount of generation that could be contracted under it and there was no real obligation to deliver the power if a QF generator signed an ISO4.¹⁸⁰ These two features led to a gold rush of ISO4 signings by QF developers (all of which the IOUs had to accept) culminating in the suspension of ISO4 by the CPUC in April 1985. By that time there were dozens of "paper projects" with ISO4 contracts—but no real ability for the IOUs or the CPUC to

178. Timothy P. Duane, *The Risk-Adjusted Cost Evaluation of Electric Resource Alternatives* 129 (June 1989) (unpublished Ph.D. dissertation, Stanford University) (on file with author) (quoting Decision (D.) 83-09-054, Application (A.) 82-04-044 et al.).

179. *Id.* at 130.

180. See generally CPUC, *supra* note 174 (follow ISO4 hyperlink) (providing the terms of a standard contract for an ISO4 offer).

ensure that the projects would be built or operate to deliver power to California consumers for the life (10–30 years) of the ISO4 contract.

The terms of the ISO4 PPAs were structured when both utility planners and regulators anticipated continuing increases in both fossil fuel prices and the cost of utility construction. Both of those assumptions may now again appear to be reasonable, but they seemed unrealistic when oil prices began to drop rapidly in the mid-1980s just as several large utility-owned power plants came on-line in California.¹⁸¹ The resulting “excess generation”—at prices that were high compared to the marginal cost of utility production, but not high compared to what the new utility-owned nuclear facilities would cost ratepayers—meant that there was diminished demand for new renewable generation at a price (and for a duration) that could entice investors.¹⁸² Moreover, the perception of renewables as too expensive and unneeded, given the new utility generation that had come on-line, tarnished the renewables industry just as the Deregulation Era began.

Thus, the renewable generation industry collapsed in California, and throughout the United States, as utilities and regulators delegated resource planning to “the market.” Ideological embrace of deregulation then shifted the policy focus to minimizing the financial costs of electricity while shifting the risk of both generating costs and externalities from utility shareholders to ratepayers. Renewable generating technologies could not compete in a market that emphasized low capital-cost technologies that neither reduced reliance on fossil fuels (which could be highly volatile in terms of ratepayers’ exposure to future electricity costs) nor addressed the environmental and security externalities associated with non-renewable generation.

The market produced only one thing in the West: natural gas-fired merchant generation. Moreover, the market reduced the financial value of diversifying the generation mix by linking the price of all power, including renewable power, to the price of producing power from the marginal generating unit. This meant that utilities and their customers paid prices for renewables that were effectively just as vulnerable to natural gas price increases as natural gas-fired generation.¹⁸³ Moreover, the market produced strong incentives for “paper projects” by those generators who controlled existing generation that could allow them to exercise market power.¹⁸⁴ Due

181. See Duane, *supra* note 129, at 216–19 (discussing the timing of the construction of these large generating facilities).

182. *Id.* (regarding the “excess generating capacity” hearings and policies emerging from them).

183. See Duane, *supra* note 13, at 506–07 (noting the factors that determined the marginal cost of production for natural gas-fired power plants); *id.* at 511–12 (describing how prices on the California wholesale spot market rose dramatically in 2000–2001).

184. *Id.* at 512–15 (discussing the ways in which “shortages” could be fabricated).

to the below-cost pricing that dominated much of the time, those generators and traders needed to take their profits during the relatively few hours when there were capacity shortages and extraordinarily high power prices.¹⁸⁵ The result was the California Energy Crisis and the transfer of tens of billions of dollars of economic rent from western electricity ratepayers to utility shareholders, generators, and traders.¹⁸⁶ Increased renewable generation was not among the benefits of the Deregulation Era. Instead, the Deregulation Era derailed much of the leadership and progress California had developed in the renewables sector over the previous quarter century.

The experience of California from the 1970s through the 1990s shows that the state faced a false choice between the Natural Monopoly Era and the Deregulation Era. Our choices were not limited to either stodgy, old-fashioned, centrally-controlled, utility-owned generation or creative, innovative, market-responsive merchant generation. Instead, there was a third path that drew on the relative strengths of both regulators (in setting policy goals) and markets (in achieving them). This third way could prove to be the best path to now make the transition to the Climate Change Era: by establishing contested renewable generation markets, the barrier of reluctant utilities could be bridged through non-utility innovation and technology deployment. That competition, in turn, has already generated utility innovation and greatly strengthened capacity to ramp up renewable generation in the future to the levels necessary in the Climate Change Era.

Unlike the Deregulation Era, however, the Climate Change Era requires regulators to set clear and explicit renewable generation policy goals with significant economic consequences for the utilities if they fail to implement them successfully. Reducing GHG emissions requires significant expansion of renewable generation—and that requires much stronger policy.

B. Renewable Portfolio Standards

A renewable portfolio standards (RPS) is a target fraction of total installed capacity or total generation that must be provided by renewable generation technologies as defined by the RPS in order to achieve a more diverse electricity generation portfolio by a specified date.¹⁸⁷ By 2006, 20

185. This strategy for maximizing revenue was modeled extensively for the PG&E Hydropower Divestiture Draft EIR in Appendix C. I supervised this analysis (which was conducted by LCG Consulting with UPLAN) while serving as a senior policy consultant to the CPUC in 2000–2001.

186. See Duane, *supra* note 13, at 522–23 (estimating the transfer of between \$40–70 billion from ratepayers).

187. United States Department of Energy, EERE State Activities & Partnerships, http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm (last visited Mar. 2, 2010).

states and the District of Columbia had adopted RPS targets,¹⁸⁸ but that number doubled to 42 states by the end of 2009.¹⁸⁹ The targets, the definition of what qualifies as meeting the RPS, and the methods of determining compliance vary from state to state. It is therefore difficult to make direct apples-to-apples comparisons of state RPS goals. Some state RPS targets are set by legislation, while others have been set by regulators through administrative processes or by Governors via executive orders.¹⁹⁰ In all cases, however, RPS targets effectively create separate markets for renewable generation and non-renewable generation technologies. In essence, renewable generation technologies must compete with each other to meet the RPS target but do not need to compete head-to-head with non-renewable generation technologies in meeting the overall needs of load-serving entities. And since most utilities need to increase renewable generation significantly more than projected demand increases in order to meet the RPS standard, the lion's share of new generation required to meet future demand will need to be renewable. The RPS approach has therefore effectively created enormous new markets for renewable generation that could theoretically ensure enough market sales and project development to nurture a strong, economically viable renewable energy industry for the next decade.¹⁹¹

California's RPS target is to meet 20% of electricity consumption from renewable generation sources by 2010 and 33% by 2020.¹⁹² Neither large

188. Doran, *supra* note 57, at 108. European governments have similar "renewable obligation commitments" (ROCs). See PAUL KOMOR, RENEWABLE ENERGY POLICY (2004).

189. The outstanding "Database of State Incentives for Renewables & Efficiency," developed and maintained by the North Carolina Solar Center for the U.S. Department of Energy, offers a series of tables and maps summarizing a wide array of state-level programs. See DSIRE, Database of State Incentives for Renewables & Efficiency, Rules, Regulations & Policies for Renewable Energy col. 2 ("RPS"), <http://www.dsireusa.org/summarytables/rpre.cfm> (last visited Feb. 6, 2010), for a list of the 44 states, the District of Columbia and Guam, with RPS targets.

190. See generally *id.* (providing brief summaries of all states' "Rules, Regulations, [and] Policies for Renewable Energy").

191. In the interest of full disclosure, I was a member of the board of directors from 2007 to 2009 for a concentrating solar power (CSP) company, SkyFuel, Inc. (<http://www.skyfuel.com>) that would clearly benefit economically as markets for renewable generation are expanded through legislative and regulatory initiatives. I have also previously consulted for wind, geothermal, landfill methane recovery, hydropower, and CSP generators in regulatory proceedings before the CPUC, CEC, Nevada Public Service Commission, and/or the FERC. My consulting clients have also included IOUs, POUs, the CPUC, the Sierra Club, and the Natural Resources Defense Council (NRDC). I have testified as an independent expert before the California Legislature and advised a wide range of stakeholder groups on renewable energy-related policy issues.

192. CAL. PUB. UTILITIES COMM'N, RENEWABLES PORTFOLIO STANDARD QUARTERLY REPORT 1 (2010), available at <http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm> (follow 1st Quarter 2010 RPS Report to the Legislature" hyperlink).

hydropower nor nuclear generation is eligible to meet the RPS targets.¹⁹³ The 20% target, which is statutory, applies only to the IOUs and allows a three-year compliance period if the IOUs fail to meet the target.¹⁹⁴ The 33% target, on the other hand, was set by Executive Order and it applies to "all retail sellers of electricity" including POUs (which have independent authority to set their own RPS goals under statute).¹⁹⁵ The 33% goal has now been explicitly incorporated into the AB 32 Scoping Plan and implementation policies by the CARB, which has moved forward to implement a new RPS of 33% under AB 32.¹⁹⁶ The CARB is therefore claiming some independent statutory authority through AB 32 that supersedes the Executive Order. The net effect of that claim is that the CARB is now the leading policy maker for RPS implementation.

Not surprisingly, the RPS approach is not without its critics. Because the RPS target is set by either political processes or regulators, some argue that it is inefficient in that the "optimum" mix of renewable generation sources will not necessarily be the RPS target. Alternative approaches that may produce more efficient levels of renewable generation include either "adders" of incentive payments for renewables (reflecting the monetized economic value of the non-price social and environmental benefits of such generation compared to alternatives) or selection of renewable technologies through multi-attribute decision-making or bidding processes that give additional "points" for renewable technologies compared to fossil-fired generation.¹⁹⁷ Both of these approaches were pursued by state regulators in the late 1980s and early 1990s, when there was widespread recognition that further development of the renewable energy industry had stalled after significant expansion under PURPA in the late 1970s and early 1980s.¹⁹⁸ The multi-attribute approach built on methods pioneered in the 1970s to improve facility siting decisions and was used by some utility planners and

193. Letter from Steven Kelly, Policy Director of Independent Energy Producers, to Gary Collord, CARB (Dec. 10, 2009), available at <http://www.arb.ca.gov/energy/res/comments/iepkelley.pdf> (expressing idea that hydropower and nuclear facilities would not be included in the RPS target).

194. The statutory goal was originally 20% by 2017 under SB 1078 (2002) and then accelerated to 2010 by SB 107 (2006). CAL. PUB. UTIL. CODE § 399.11 (2007).

195. Governor Schwarzenegger issued Executive Order E.O. S-14-08 on November 17, 2008, to increase the goal to 33% by 2020 and to extend the RPS target of 33% to "[a]ll retail sellers of electricity . . ." Cal. Exec. Order No. S-14-08 (Nov. 17, 2008), available at <http://www.gov.ca.gov/executive-order/11072>.

196. See CAL. AIR RES. BD., CLIMATE CHANGE DRAFT SCOPING PLAN 44-45 (2008), available at <http://www.arb.ca.gov/energy/res/res.htm>.

197. See generally R.L. KEENEY & H. RAIFFA, DECISIONS WITH MULTIPLE OBJECTIVES-PREFERENCES AND VALUE TRADEOFFS (1993) (describing the general framework).

198. RICHARD L. OTTINGER ET AL., PACE UNIV. CTR. FOR ENVTL. LEGAL STUDIES, ENVIRONMENTAL COSTS OF ELECTRICITY 574 (1990).

state regulators to make resource acquisition decisions that affected generation technology choice.¹⁹⁹ But the zeitgeist of the time, which emphasized market-oriented approaches to public policy, generally favored monetization and the payment of “adders” for so-called “green power” produced by renewable resources.²⁰⁰

The federal government has also offered an indirect “adder” payment since 1992 through the Production Tax Credit (PTC), which is worth \$0.011 or \$0.021/kwh today (depending on the technology) for qualifying renewable generation.²⁰¹ Payment of a green premium for every kilowatt hour (kwh) of power clearly helped nurture renewable technology development (especially wind), but it did not produce the vibrant, growing renewable resource-based electrical generation industry that is necessary to green the grid sufficiently in the Climate Change Era. There were two reasons for this. First, the Deregulation Era aborted state regulators’ efforts to nudge the generation sector toward a more sustainable resource mix. This occurred as the faulty promise of lower costs led regulators (especially in California with the passage of AB 1890 in 1996) to delegate the design of their future resource mix to “the market,” presuming that it would police itself if the FERC did not fulfill its duties under the Federal Power Act.²⁰²

199. *Id.*

200. *Id.* I represented a coalition of renewable generators, end-use efficiency companies, and environmental groups (Sierra Club California and the NRDC) in regulatory proceedings with the CEC (multi-attribute), CPUC (monetized adders), and the Nevada Public Service Commission (both were considered) in the late 1980s and early 1990s to develop methodologies and policies for differentiating renewable generation resources. My 1989 Ph.D. dissertation focused on this topic. I nevertheless concluded that a “set aside” of part of the market for renewable generation was necessary in order to ensure consistent market demand for renewables during an intermediate period of time (approximately 10 years or so). Richard Ottinger noted my call for such a “set aside” (what later became the much more marketable “renewable portfolio standard” or “renewable electricity standard”) in the comprehensive DOE-funded study on the topic published in 1990. *Id.*

201. Originally enacted in the Energy Policy Act of 1992, the PTC has varied in amount and been periodically interrupted due to lapsing legislation. Energy Policy Act of 1992, 26 U.S.C. § 45 (2006). It was most recently re-enacted through the American Recovery and Reinvestment Act (ARRA) of 2009, Pub. L. No. 111-5, 123 Stat. 115 §§ 1101–1102 (codified as amended in scattered sections of 26 U.S.C.). The PTC amount is \$0.015/kwh in 1993 dollars, indexed for inflation (equal to \$0.021/kwh in December 2009), for the following generating technologies: wind, closed-loop biomass, and geothermal energy. It is half that amount for the following generating technologies: open-loop biomass, landfill gas, municipal solid waste, qualified hydroelectric, and marine or hydrokinetic projects 150 kW or larger). See DSIRE, Federal Incentives/Policies for Renewables & Efficiency (July 20, 2009), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US13F. Note that solar (photovoltaic [PV] or CSP) projects are not eligible for the PTC, but instead are eligible to receive the Investment Tax Credit (ITC) (a fixed, one-time credit worth anywhere from 10% to 30% of the total capital cost of the project depending on its timing).

202. This key assumption was woefully inadequate. See Duane, *supra* note 13, at 507 (noting the erroneous assumption “that FERC would control market power through its ability to rescind market-based rate authority for any market participant who was manipulating prices”).

Second, due to the capital-intensive nature of most renewable technologies,²⁰³ the relatively low per-kwh payment was not adequate incentive alone—especially in the context of a deregulating generation market, which created enormous uncertainty about whether or not one could sell one's green power in the future marketplace—to overcome the risk factors making renewable technology investment unattractive. In short, regulators either abandoned the goals of renewable generation, ignored the lessons of what had made renewable generation such a rapidly growing part of California's resource mix throughout the 1980s, or both.

Price incentives alone, in other words, are not sufficient for steady development and deployment of new technologies—unless they are so high that they overcome all risks for technology and project developers. This appears to be the lesson of comparing the PTC in the United States with the Feed-in-Tariff (FIT) approach of Europe. The FIT approach has generated massive investment in and expansion of the generating capacity for wind throughout Europe, such as photovoltaics in Germany, and CSP in Spain.²⁰⁴ Germany in particular demonstrates how high prices can overcome even poor resource availability. Despite relatively poor solar resources, Germany has developed 10,000 MW of photovoltaic (PV) solar power.²⁰⁵ Germany achieved this through a FIT that approximated 46 euro cents/kwh (declining by five percent per year from 2004–2009).²⁰⁶ The FIT for CSP in Spain (where at least the solar resource is excellent) is approximately 27 euro cents/kwh.²⁰⁷ Ontario, Canada has also stimulated some PV development (despite a poor solar resource) with an incredibly high FIT of 44–80 cents CAD/kwh.²⁰⁸ As Paul Komor puts it, “[f]eed-in laws are best summarized

203. In general, renewables are more capital intensive than fossil-fired generation because they do not incur any fuel costs. Coal and nuclear generation are also more capital intensive than gas-fired generation, so they must operate at higher capacity factors to lower their average costs.

204. Germany actually leads Europe in wind development with 23,903 MW installed through 2008, followed by 16,754 MW in Spain, and 3,000–4,000 MW each in Italy, France, the United Kingdom, and Denmark. J. Matthew Roney, Earth Policy Institute, *China Challenging the United States for World Wind Leadership*, Dec. 10, 2009, <http://www.earth-policy.org/index.php?/indicators/C49/> (follow “Cumulative Installed Wind Power Capacity in Leading Countries and the World, 1980–2008” hyperlink). The United States had 25,369 MW of wind capacity through 2008. *Id.*

205. The Electricity Forum, German Installed PV Capacity Reaches 10,000 MW, <http://www.electricityforum.com/news/dec09/GermanyPVcapacityreaches10000MW.html> (last visited Feb. 6, 2010).

206. Solarbuzz, Fast Solar Energy Facts, <http://www.solarbuzz.com/fastfactsgermany.htm> (last visited Feb. 6, 2010).

207. CSP Today, CSP Policy: Not always the right FiT, <http://social.csptoday.com/industry-insight/csp-policy-not-always-right-fit> (last visited Feb. 6, 2010).

208. ONT. POWER AUTH., FEED-IN TARIFF PRICES FOR RENEWABLE ENERGY PROJECTS IN ONTARIO (2009), available at http://fit.powerauthority.on.ca/Storage/99/10863_FIT_Pricing_Schedule_for_website.pdf.

as 'effective but not efficient'”²⁰⁹ because they “do yield considerable new renewable capacity, but at high prices.”²¹⁰ Such high FIT prices have subsequently led the governments of Europe and Canada to reduce FIT prices dramatically as the cost of the high FIT prices has become an economic burden on electric ratepayers. The result is a boom-and-bust technology development cycle rather than the steady expansion of a renewable generation industry that is necessary to green the grid. This parallels the experience of California in the 1980s discussed above.

Despite that experience, the FIT approach made renewed inroads in the United States when Vermont became the first state to adopt a FIT in May 2009.²¹¹ The FIT legislation required the Vermont Public Service Board (VPSB) to adopt regulations and standard-offer contracts for the purchase of qualifying renewable power under the FIT (at a price to be determined by the VPSB), but limited the total quantity of purchases under the FIT to 2.2 MW per project and a total of 50 MW under the program.²¹² The VPSB issued its Order in a proceeding in September 2009,²¹³ and the response by developers was swift: according to the VPSB, “[o]n the first day that applications were accepted for the standard-offer program, the solar and biomass technology categories were oversubscribed.”²¹⁴ This reflected the relatively high prices (\$0.12–\$0.30/kwh for a 10–25 year period, depending on the generating technology)²¹⁵ that were offered under the FIT. The hearty response in Vermont—a pioneer in energy efficiency—has led renewable energy advocates to call for FIT adoption in other states, including California.

A FIT-oriented strategy, however, is not an alternative to or inconsistent with an RPS-driven strategy: a FIT could instead be a means of achieving an RPS target. A FIT without some consideration of the overall RPS policy goals nevertheless runs the risk of repeating mistakes from the 1980s, which were at least partially responsible for the bust of the 1990s.

209. KOMOR, *supra* note 188, at 19.

210. *Id.* at 20.

211. See Vermont Energy Act of 2009, 30 VT. STAT. ANN. § 8005 (Supp. 2009), available at <http://www.leg.state.vt.us/docs/2010/Acts/ACT045.pdf> (last visited Feb. 27, 2010).

212. VT. PUB. SERV. BD., DOCKET No. 7533, ORDER ESTABLISHING A STANDARD-OFFER PROGRAM FOR QUALIFYING SPEED RESOURCES 2 (Sept. 30, 2009), available at <http://psb.vermont.gov/sites/psb/files/orders/2009/7533OrderReStandardOfferProgram.pdf>.

213. *Id.* at 1.

214. Vermont Public Service Board, Implementation of Standard Offer Prices for SPEED (Docket Nos. 7523 and 7533), available at <http://psb.vermont.gov/docketsandprojects/electric/7523> (last visited Mar. 4, 2010).

215. VT. PUB. SERV. BD., DOCKET No. 7523, ORDER RE INITIAL STANDARD OFFER PRICE DETERMINATIONS FOR SPEED RESOURCES 3 (Sept. 15, 2009), available at <http://psb.vermont.gov/sites/psb/files/orders/2009/7523interimpriceorder.pdf>.

This bust followed the boom of the 1980s in California's renewable sector. Moreover, California's experience in the 1980s shows that successful renewable technology deployment policy must pay attention to much more than price alone; contract structure, interconnection issues, and a variety of other considerations are also important. Overemphasizing the high-price features of a FIT strategy therefore fails to address the need for the more nuanced institutional design for successful RPS implementation.

The existing approach to RPS implementation in California also misses the mark. By emphasizing a single target for total energy delivered, load-serving entities have strong incentives simply to buy the cheapest "green" energy that is available on the market to meet the RPS target. The result may be a mix of renewable resources that is dominated by a single technology (primarily wind), which may not be as reliable as some other technologies (e.g., solar PVs, CSP) for meeting peak demand in the system (primarily related to air conditioning demand). Moreover, the RPS fails to further the technology development that is so necessary (for a variety of competing technologies) to bring costs down while improving performance reliability. Instead, the implementation of the RPS runs the risk of actually slowing the pace of innovation and cost reductions in one technology because that technology competes only against other more immature renewable technologies, rather than fossil-fired generation. The RPS simultaneously fails to nurture higher-risk technology development that is not as well developed yet.

The result is a bit like setting a target for "organic" food in one's diet, but then measuring the fraction of the diet meeting the standard only by the caloric content of the food: one could end up with a lot of relatively low-cost, high-calorie organic carbohydrates while counter-productively reducing the nutritional content of one's overall meals by avoiding higher-cost organic proteins. Such a diet would not meet the needs of the organism, and it could easily be less healthy than the original diet—so an "organic portfolio standard," as implemented through such narrow evaluative criteria, could undermine the overall policy goals of setting the target. We run the same risk with an RPS design that measures only calories and not content.

Policymakers, in this case the CPUC, and utilities designing and implementing the program for meeting the RPS, must therefore address a variety of characteristics of renewable power such as energy delivered, standby capacity, probability of being available during peak demand periods (when higher-cost generating resources are at the margin for the rest of the utility's generating mix), and other considerations (e.g., the environmental justice implications of alternative spatial patterns of continuing emissions given dispatch needs after renewables have been

integrated into the grid).²¹⁶ Comparing all renewables to a "market price referent" (MPR) plant, as the current CPUC policy requires, does not necessarily allow such a nuanced evaluation. A multi-attribute evaluative system is therefore preferred over a price-only evaluation.²¹⁷ Moreover, the Time of Use (TOU) value of delivered energy must be explicitly considered—some green power is worth a lot more than other green power.²¹⁸

C. Siting Transmission and Renewable Generation Facilities

Meeting California's ambitious RPS goals requires moving power from where it can be generated renewably to where the load and demand require it. Unlike fossil fuels, which can be transported relatively efficiently—typically by pipeline for natural gas or by rail for coal, to geographically more desirable sites for power generation—renewable generation must be located at the site of the renewable resource. The green power must then be sent to load centers via high-voltage transmission lines. Resources for the Future (RFF) put the issue well in its study *Green Corridors*: there is a "chicken-and-egg relationship between renewables policies, specifically state or national renewable portfolio standards, and interregional transmission capability. RPS policy will affect interregional power flows, and transmission capability will in turn affect the outcomes of RPS policy."²¹⁹ This is true with either a state-by-state or a national RPS.

The RFF study has some unrealistic assumptions,²²⁰ but it offers a very useful national analysis of both the scale of transmission system investments necessary to maximize renewable generation and the importance of transmission system capability to the ultimate generation mix.²²¹ Several of its conclusions have particular relevance to California

216. The environmental justice issue is explicitly being considered under AB 32 by CARB, but it is unclear how IOUs now consider AB 32 in their contracting decisions to implement the RPS.

217. The California IOUs are currently considering some of these attributes (e.g., dispatchability), but their method of evaluation is not transparent, and the CPUC still insists on the MPR standard. Clearly, some technologies offer additional benefits that may warrant exceeding the MPR's cost.

218. The California IOUs are currently evaluating renewable technologies with a limited set of TOU periods (primarily seasonal), but the specific coincidence of wind versus solar output with peak system demand is being undervalued. This issue is increasingly important as greater renewable penetration means that the marginal value of a new renewable generating source is a function of a resource generation portfolio that is itself dominated by particular technologies.

219. VAJHALA ET AL., *supra* note 71, at 6–7.

220. Two assumptions stand out: transmission upgrades are assumed to be made whenever there is congestion in the system, without regard to economic or environmental constraints on such upgrades, and "the costs of transmission expansion are not considered." *Id.* at 13.

221. In particular, the RFF study shows that significant biomass generation in the southeastern states would be displaced by lower-cost wind generation from the Great Plains states under a national RPS if the transmission system was upgraded to handle the export of wind power to the southeast.

and the WECC: “First, the geographic distribution of generation resources in the western states and the locations of expected load center expansion in those areas will lead to a distribution of generators and customers that will exacerbate transmission congestion problems between northern California and its neighbors.”²²² Also, a “national RPS policy tends to lower prices in the West” in the RFF study,²²³ yet “no matter the scenario for transmission capacity or renewables policy, power will flow toward the coasts.”²²⁴ Perhaps most important, in terms of the fate of congressional legislation that could require a national RPS,²²⁵ “the grid configuration that would decongest the grid under state RPSs in 2020 would be quite unlike the configuration that would decongest the grid under a unified national RPS.”²²⁶

New and expanded transmission capacity is clearly necessary to improve both the economic efficiency and environmental performance of the nation’s electrical system. Yet, there is a tension in our federal system over who should have primary authority for siting, authorizing, permitting, and funding such capacity. Congress stepped in to facilitate transmission line siting and development with the Energy Policy Act of 2005, which established federal preemption over transmission line permitting within “National Interest Electric Transmission Corridors” designated by the Department of Energy (DOE).²²⁷ This centralization of authority with the FERC—and the reliance of the FERC on a narrow set of evaluation criteria when determining whether or not to issue permits for new or expanded transmission lines—has created new tensions with state and local governments. State and local governments, in short, care about a lot more than just the efficiency of the regional or national electric grid. Consequently, there has been a strong pushback from the states. There has also been litigation over the FERC’s new authority to eliminate these provisions, or at least to broaden the criteria that the FERC must use when making its permitting decisions.²²⁸

222. VAJHALA ET AL., *supra* note 71, at 16.

223. *Id.* at 17.

224. *Id.* at 18.

225. H.R. 2454 addresses the relationship between a national RPS title 1, Subtitle A, sec. 101 (“Combined Efficiency and Renewable Electricity Standard”) and state RPS policies in sec. 102 (“Clarifying State Authority to Adopt Renewable Energy Incentives”). American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. §§ 101–102 (2009). The details of H.R. 2454 are beyond the scope of this Article, but the widely varying state-level RPS approaches demonstrate that the details of any national RPS legislation could strongly favor particular renewable generation technologies and implementation approaches—including whether or not PPAs or utility ownership dominate future renewable development.

226. *Id.*

227. See Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594.

228. Similar pushback led to the Electric Consumers Protection Act in 1986, which radically

The FERC is burdened in its pursuit of improved transmission system efficiency by the legacy of the Deregulation Era. Following the establishment of Regional Transmission Organizations (RTOs),²²⁹ the FERC has advocated for locational transmission pricing to send time-sensitive marginal cost-based price signals to prospective suppliers and customers about the relative benefits of generation and new transmission. By doing so, the FERC hopes and expects new transmission to be built to alleviate congestion where it is greatest and for new generation to take advantage of surplus capacity where new transmission upgrades would be unnecessary or less costly. Locational marginal cost pricing effectively slices the California electricity market into thousands of geographically distinct sub-markets that have thousands of temporally distinct types of demand (e.g., winter overnight versus summer afternoon), which in turn compel widely varying amounts and types of electric generation. The key incentives of such a system—higher transmission prices where there is congestion on the network, with lower transmission prices where there is excess capacity—are intended to get new power plants to locate in ways that maximize transmission system efficiency while minimizing the cost of transmission system upgrades. This new system went into effect in California in 2009 under the oversight of the California Independent System Operator (Cal-ISO). But such a system does not change where the wind blows or the sun shines—renewable generation must still be located at the resource site, regardless of the locational marginal price of transmission.

As the RFF study notes, “the locational marginal pricing model put forward by the FERC has met with limited success in promoting efficient transmission investment.”²³⁰ RFF also notes that “[o]ther barriers to transmission line siting include environmental constraints, public opposition, and regulatory roadblocks.”²³¹ Existing laws such as the National Environmental Policy Act (NEPA),²³² the Endangered Species Act (ESA),²³³ the Federal Land Policy and Management Act (FLPMA),²³⁴ and

altered the FERC criteria for evaluating hydropower licenses and license renewals to include a wide set of environmental values (after state agencies unsuccessfully challenged the FERC licenses issued under the narrower criteria, congressional legislation incorporated the states' concerns). There is, however, considerable debate over the degree to which the EPCA affected the FERC's decision-making. State authority over water quality standards under the federal Clean Water Act has given states a more direct avenue for challenging the environmental impacts of hydropower licenses and relicensing decisions following *PUD No. 1 of Jefferson County v. Washington Department of Ecology*, 511 U.S. 700 (1994).

229. For a detailed history, see AM. BAR ASS'N, *supra* note 14, and MCGREW, *supra* note 14.

230. VAJHALA ET AL., *supra* note 71, at 1

231. *Id.*

232. National Environmental Policy Act of 1970, 42 U.S.C. §§ 4321–4347 (2006).

233. Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (2006).

234. Federal Land Management and Policy Act of 1976, 43 U.S.C. §§ 1701–1785 (2006).

the National Forest Management Act (NFMA)²³⁵ all present complex planning and permitting challenges. The Western Governors Association (WGA) and the U.S. Department of Energy (DOE) therefore initiated its Western Renewable Energy Zone (WREZ) project in 2008, which addresses the problem at a regional scale to develop an integrated renewables network across the WECC.²³⁶ The WREZ effort released its Phase 1A report (subtitled *Mapping concentrated, high quality resources to meet demand in the Western Interconnection's distant markets*) in June 2009.²³⁷ The report represents an important effort to strategically identify the most valuable locations for renewable energy development, which in turn should influence decisions about strategic locations for transmission system investments to serve those renewable resources. At this stage, the WREZ maps identify "resource concentrations that may be most cost-effective for regional transmission through the visual image of Hubs, or general areas of high renewable resource concentration."²³⁸ These Hubs may ultimately be the focus of transmission upgrades:

The intention of the WREZ initiative is not simply to identify Western Renewable Energy Zones in the Western Interconnection, but also to facilitate the development of high voltage transmission to those areas with abundant high-quality renewable resources and low environmental impacts. To this end, the WREZ initiative has developed a modeling tool for evaluating the relative economic attractiveness of costs of delivered renewable energy, including transmission costs, from specific renewable resource areas delivered to specific load centers.²³⁹

California is further along than the WREZ effort through its RETI. However, both the economic and environmental desirability of specific transmission system investments have been linked to identification of Competitive Renewable Energy Zones (CREZ) within and adjacent to

235. National Forest Management Act of 1976, 16 U.S.C. §§ 1600–1614 (2006).

236. The WREZ effort does not map precisely on the WECC boundaries, but it is close. The western states of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, and a small portion of Western Texas are all included. Baja California Norte, Mexico (also part of the WECC), and the Canadian Provinces of British Columbia and Alberta are also included in the WREZ mapping and modeling effort. Western Electricity Coordinating Council, About WECC, <http://www.wecc.biz/About/Pages/default.aspx> (last visited Mar. 5, 2010).

237. W. RENEWABLE ENERGY ZONES, PHASE 1 REPORT: MAPPING CONCENTRATED, HIGH QUALITY RESOURCES TO MEET DEMAND IN THE WESTERN INTERCONNECTION'S DISTANT MARKETS (June 2009), available at <http://www.westgov.org/wga/publicat/WREZ09.pdf>.

238. *Id.* at 16.

239. *Id.*

California. "[A]n important component of Phase 2 [of the WREZ effort] will include a coarse-level environmental screening to recommend preferred locations for corridors and rights-of-way,"²⁴⁰ but RETI has already completed this assessment and is therefore at the stage of recommending specific transmission system upgrades. I therefore focus on describing the process used for the RETI effort in California, rather than the less-developed WREZ effort, below.

1. Renewable Energy Transmission Initiative

The RETI approach offers a model for the FERC and others to follow in order to expedite the environmentally and economically sound strategic transmission system investments that are necessary to green the grid through RPS implementation. Both RETI and the WREZ efforts are collaborative, stakeholder-led processes that explicitly recognize the need to get a wide range of stakeholders' perspectives. These perspectives are needed to overcome the institutional complexity of renewable energy and transmission system development in the environmentally sensitive western landscape. In order to avoid delaying renewable development and transmission investment through extensive litigation over environmental concerns, widespread agreement on both where to build new transmission and where not to build new transmission is essential.

RETI began Phase 1A by identifying "renewable energy technical potential" for installed capacity (MW) and energy production (GWh/year) by technology²⁴¹ and by developing a resource valuation methodology to focus on a sub-set of potential CREZs. Phase 1B then conducted a high-level screening analysis to group potential renewable energy projects into CREZs "based on geographical proximity, development timeframe, shared transmission constraints, and additive economic benefits."²⁴² The CREZs were then "ranked according to cost effectiveness, environmental concerns, development and schedule certainty, and other factors to provide a renewable resource based case for California."²⁴³ Perhaps most importantly, "CREZ identification respected areas specified by RETI's Environmental

240. *Id.* at 19.

241. See RENEWABLE ENERGY TRANSMISSION INITIATIVE PHASE 1A FINAL REPORT 1-9 tbl. 1-2, 1-10 tbl. 1-3 (Apr. 2008), available at <http://www.energy.ca.gov/2008publications/RETI-1000-2008-002/RETI-1000-2008-002-F.PDF>.

242. RETI COORDINATING COMM., RENEWABLE ENERGY TRANSMISSION INITIATIVE PHASE 1B FINAL REPORT ES-1 (Jan. 2009), available at <http://www.energy.ca.gov/2008publications/RETI-1000-2008-003/RETI-1000-2008-003-F.PDF>.

243. *Id.*

Working Group (EWG) as prohibiting or restricting energy development as a result of law and policies.”²⁴⁴

Eight criteria were identified by the EWG for comparing the relative environmental sensitivity of the California CREZs In general, these criteria are designed to identify those CREZs which:

- disturb the least amount of land per unit of energy output, including land needed to collect and transmit that energy to the existing transmission grid;
- minimize potential conflicts with areas of special environmental concern;
- minimize potential impacts on wildlife and significant species; and
- maximize the use of previously disturbed lands.

. . . .
The eight ranking scores for each CREZ were then summed to provide a total ranking score of relative environmental concern for each CREZ.”

. . . .
[I]ncorporating environmental factors into CREZ ranking is intended to anticipate potential concerns associated with energy development and the transmission facilities needed to access these areas, thereby facilitating approval. CREZs able to be developed at the least economic cost and least environmental concern present the strongest case for approval of new transmission facilities.”²⁴⁵

Attention to the environmental ramifications of large-scale renewable energy development is the key to overcoming public resistance to, and litigation over, such development. However, the economic cost of project development and transmission system investment to deliver power from the CREZs is also important. RETI therefore linked the environmental and economic analysis of CREZ potential in its Phase 2A Report.

Within the acknowledged limitations of the preliminary conceptual plan, this report presents two noteworthy conclusions: stakeholder consensus recommendation of two sets of major lines likely to be required not only to deliver renewable energy, but that would provide important additional benefits to the grid; and

244. *Id.* at ES-3.

245. *Id.* at ES-7 to ES-9.

development of a transparent and objective methodology for evaluating the usefulness of lines to carry renewables, in a process that supports active participation by a broad range of stakeholders.²⁴⁶

The planning and evaluation model offered by RETI is more important than the specific RETI recommendations. The key is that RETI is both transparent and incorporates participation by a wide range of stakeholders.²⁴⁷ This allowed mapping of all CREZs on a two-dimensional space to show how economic and environmental tradeoffs may affect the desirability of particular CREZs: those CREZs with high economic value and low environmental cost were clearly preferable over those with low economic value and high environmental costs.²⁴⁸ The RETI effort is time and data-intensive, however, for all stakeholders:

The methodology incorporates revised CREZ energy, economic and environmental information first assembled in Phase 1, approximately 200 potential network transmission elements including over 100 line segments, their estimated cost, electrical performance and environmental attributes.

The amount of quantitative detail considered in developing and assessing the RETI conceptual plan is unusually extensive. This conceptual plan will continue to evolve as information is updated and improved, analytical methods are refined, and the renewable energy industry grows. The RETI renewable transmission assessment methodology offers a model for other transmission planning efforts getting underway throughout the US.²⁴⁹

246. RENEWABLE ENERGY TRANSMISSION INITIATIVE, PHASE 2A FINAL REPORT 1-3 (Sept. 2009) [hereinafter RETI PHASE 2A FINAL REPORT], available at <http://www.energy.ca.gov/2009publications/RETI-1000-2009-001/RETI-1000-2009-001-F-REV2.PDF>.

247. *Id.* at 1-9. RETI itself incorrectly characterizes it as "an objective approach to conceptual planning." See *id.* at 1-10. However, it is not "objective" as much as transparent: it allows the fully subjective values of all stakeholders to be considered in an "objective" manner. The RETI process very much depends on people and their subjective values to determine what should or should not be considered or weighed in its "objective" assessment of the economic and environmental benefits and costs of CREZs.

248. RETI mapped the "footprint" of all wind projects as covering the entire area of the project (consistent with how environmental advocates have called for mapping the footprint of oil and gas development), however, while wind developers wanted to assign an environmental footprint only to the area directly affected by wind turbines (consistent with the oil and gas industries' approach to mapping). *Id.* Both approaches have arguments in their favor, but RETI decided to adopt the environmentalists' approach despite the wind developers' objections. This reflected RETI's deference to the Environmental Working Group (EWG) regarding the environmental evaluations.

249. *Id.* at 1-10 to 1-11.

Despite the limitations inherent in CREZ and transmission element data and assessment methodology, the current plan provides a stakeholder-vetted basis for detailed planning by the CAISO and POUs.²⁵⁰

Now begins the hard work of planning, designing, and permitting the specific Collector, Delivery, and Foundation transmission lines identified through RETI. Perhaps more difficult, however, is determining who should pay for the billions of dollars of new transmission investment identified as needed. RETI argues that many of those investments provide system benefits, and therefore their costs should not be borne primarily by renewable generators:

The 23 segments in the Foundation Group, including four double-circuit 500 kV facilities, were estimated to have an aggregate cost of \$5.1 billion. Because the segments in this group provide major system benefits and are likely to be needed to meet load growth regardless of generation source, it is not appropriate to attribute all of their cost to the cost of meeting renewable energy or climate change goals. For the same reason, the aggregate cost of the 13 Delivery lines, \$0.8 billion, and the cost of those Collector lines which provide interstate transfer capacity, should not be attributed solely or primarily to renewable energy development

....
The crucial point for policymakers and the public is that transmission development leverages much larger investments in new generating resources. Transmission typically accounts for only a small percentage of the cost of the generation built to deliver energy over those lines. And the value of the energy delivered can repay the cost of the transmission investment quickly. In addition, transmission lines approved for the primary purpose of delivering renewable generation to the grid will provide other benefits to consumers such as increased reliability, decreased congestion, and greater system efficiency. This report does not attempt to calculate these benefits.²⁵¹

The first major transmission project to raise this question is the Sunrise Powerlink Project, first proposed by San Diego Gas & Electric Company (SDG&E) in December 2005.²⁵² The \$1.883 billion project has been

250. *Id.* at 1-15.

251. *Id.* at 1-21 (internal citation omitted).

252. Application A.05-12-014 was subsequently amended in August 2006 with Application

marketed by SDG&E as “delivering reliable, renewable energy”²⁵³ but has faced local opposition over its specific routing and some opposition over whether or not all SDG&E ratepayers should pay for it. The project was approved by the CAISO in August 2006, by the CPUC in December 2008,²⁵⁴ and by the U.S. Bureau of Land Management in January 2009.²⁵⁵ The U.S. Forest Service (USFS) had not yet approved the project for its portions over USFS land as of the end of 2009, but a decision on the project was expected by SDG&E in early 2010. SDG&E says that construction is set to begin in March 2010 on the 25-segment, 120-mile long line and become operational in 2012. Appeals and litigation are likely to delay this timeline, however, due to the significant controversy over the environmental impacts of the project.

SDG&E successfully argued that Sunrise Powerlink would provide system benefits so that all ratepayers would both gain from and be responsible for paying for the project—a key argument in RETI’s conclusion about who should pay for the nearly \$6 billion in transmission investment identified for CREZ development. Much of the delay and controversy over the project could have been avoided, however, if the RETI process had been completed before Sunrise Powerlink was sited. The original route went through Anza-Borrego State Park (the largest state park in the nation), so the CPUC rejected that routing and instead approved a less economically beneficial route.²⁵⁶ The important policy goal of meeting California’s 33% RPS target also played a role in route selection:

Under renewable procurement at 33% RPS levels, the Final Environmentally Superior Southern Route is the second highest ranking alternative that will facilitate our renewable energy development and GHG emission reduction goals for the energy sector. The higher ranking alternative is environmentally unacceptable and therefore infeasible. We estimate that the Final Environmentally Superior Southern Route will facilitate development of 1,900 megawatts (MW) of Imperial Valley

A.06-08-010 to the CPUC. State of California Public Utilities Commission, San Diego Gas & Electric Company’s Sunrise Powerlink Project, <http://www.cpuc.ca.gov/environment/info/asp/sunrise/sunrise.htm> (last visited Mar. 2, 2010).

253. Sunrise Powerlink, <http://www.sdge.com/sunrisepowerlink/> (last visited Mar. 2, 2010).

254. PUB. UTILITIES COMM’N OF THE STATE OF CAL., DECISION D.08-12-058, DECISION GRANTING A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE SUNRISE POWERLINK TRANSMISSION PROJECT 2 (Dec. 18, 2008), available at <http://www.cpuc.ca.gov/environment/info/asp/sunrise/D08-12-058.pdf>.

255. State of California Public Utilities Commission, *supra* note 252.

256. See generally Sunrise Powerlink, Approved Route for Sunrise Powerlink, http://www.sdge.com/sunrisepowerlink/SPL_Media_MAP_021109.pdf.

renewables by 2015, and that more than half of that development will be of high capacity geothermal resources. In contrast, the higher ranked alternatives are not estimated to facilitate even half that amount of renewable development.²⁵⁷

Similar conflicts and controversy are likely to face any transmission system investment that has not been identified through a collaborative, stakeholder-led process that transparently identifies the economic benefits and environmental costs of alternative CREZ and transmission system development. The RETI process must therefore be continued and its transparent model extended through the WREZ effort to avoid unnecessary delays in approving and building the strategic transmission investments necessary for greening the grid.

2. Siting and Permitting Generation Facilities

The WREZ and RETI efforts show the importance of systematically identifying high-value, low-impact sites for renewable generation and transmission facilities. As shown by RETI, such an approach can gain broader stakeholder acceptance that could (although this has not yet been tested by either RETI or the WREZ effort) reduce social conflict, legal challenges, and permitting delays for the development of actual projects. Both RETI and WREZ are only programmatic screening-level efforts, however, so project-specific environmental review and permitting remains necessary under existing state and federal laws. There should be no special exceptions to existing environmental protections simply because a project is greening the grid. As Wyoming Governor Dave Freudenthal has stated regarding Wyoming wind development:

"Seemingly every acre . . . is up for grabs in the interest of 'green, carbon-neutral technologies,' no matter how 'brown' the effects are on the land. It's like taking a short cut to work through a playground full of school children and claiming green' as a defense because you were driving a Toyota Prius."²⁵⁸

Wind development, which has been at the leading edge of renewable generation penetration due to its remarkable cost reductions over the past

257. PUB. UTILITIES COMM'N OF THE STATE OF CAL., *supra* note 254, at 6–7.

258. Jonathan Thompson, *Wind Resistance: Will the petrocracy—and greens—keep Wyoming from realizing its windy potential*, HIGH COUNTRY NEWS 10, 20 n.22 (Dec. 21, 2009) (quoting a letter from Wyoming Governor Dave Freudenthal to the state Senate), available at <http://www.hcn.org/issues/41.22/wind-resistance>.

three decades, has faced significant controversies in a number of institutional settings: local efforts to zone against wind development in Wyoming,²⁵⁹ the protracted and bitter conflict over the Cape Wind offshore wind development in Nantucket Sound,²⁶⁰ and debates over the aesthetics of ridgeline wind projects in Vermont under either VPSB mandates or Act 250.²⁶¹ Three impacts dominate the debate: (1) aesthetics, (2) noise, and, most important from a regulatory perspective, (3) impacts on birds and bats listed as threatened or endangered under the federal ESA. Renewable technologies like CSP face additional challenges due to water supply in the desert southwest, which has led some CSP developers to propose costlier dry-cooling in order to avoid conflicts and delays associated with water impacts. ESA issues associated with the Desert Tortoise also confront CSP developers, while potential listing of the Sage Grouse under the ESA hangs over wind development.²⁶²

The details of the specific permitting procedures and issues confronting individual renewable generation facilities are beyond the scope of this Article,²⁶³ but important lessons can be drawn from the WREZ and RETI efforts (and the failure to conduct such efforts before the Sunrise Powerlink transmission line was first proposed). First, programmatic assessment is necessary to reduce the likelihood of conflict over project-specific proposals.²⁶⁴ Second, such programmatic assessment must be transparent

259. *Id.*

260. See Cape Cod Times, Wind Farms, <http://www.capecodonline.com/apps/pbcs.dll/section?category=SPECIAL01> (last visited Mar. 2, 2010) for links to a series of articles on the issue.

261. All electric generation and transmission facilities must receive a "certificate of public good" from the VPSB, 30 VT. STAT. ANN. § 248(a)(2)(b), and satisfy ten criteria (including the environmental criteria in Act 250, the state's comprehensive land use planning and regulatory scheme adopted in 1969). 30 VT. STAT. ANN. § 248(b)(1)–(10) (Supp. 2009). See 10 VT. STAT. ANN. §§ 6001–6093 (2006). One of the key considerations under Act 250 is aesthetics, which are governed by *In re Quechee Lakes Corp.* See *In re Quechee Lakes Corp.*, No. 3W0411-EB (Vt. Env'tl. Bd. Nov. 4, 1985). The *Quechee* tests have been adopted by the VPSB for application in its Section 248 evaluation of whether or not to issue a certificate of public good. See VT. PUB. SERV. BD., DOCKET NO. 6911, ORDER RE PETITION OF EMDC 48 (July 17, 2006), available at <http://www.state.vt.us/psb/orders/2006/files/6911fnl.pdf>. Application of the *Quechee* tests in its Section 248 review has led to approval of some wind projects and rejection of other wind projects in Vermont.

262. See Thompson, *supra* note 258, at 10 (discussing possible listing of sage grouse under Endangered Species Act and potential effects listing could have on wind-farm development).

263. In California, the CEC has primary authority over siting decisions for projects on private land, but federal land management agencies have primary authority over federal lands. The BLM is particularly important to the solar industry in the desert southwest region.

264. The joint BLM–DOE Solar Energy Development Programmatic EIS is a model of such an effort, although BLM's efforts hit some difficult bumps along the road when it originally sought to evaluate solar energy projects under its jurisdiction on a project-by-project, first-come-first-serve basis. The PEIS is expected to be completed by the spring of 2010. See Transcript of Solar Energy Development Programmatic EIS Scoping Meeting held in Barstow, CA, June, 17, 2008, at 32–37, http://solareis.anl.gov/documents/docs/transcripts/scoping/ScopingTranscript_Barstow_CA.pdf.

and include participation by all of the relevant stakeholders. Third, coordination among, and consistency across, relevant state and federal permitting authorities²⁶⁵—together with the decision-makers with authority over economic recovery by load-serving entities for either PPAs or transmission investments—is necessary if more than just a patchwork quilt of isolated renewable projects is going to be developed.

The bottom line, though, is that driving a hybrid car does not justify driving that car through a schoolyard. Renewable generation projects need to meet the same environmental standards and regulations that nuclear, hydro, or fossil-fired generating facilities need to meet.

IV. POLICY PRINCIPLES AND IMPLEMENTATION LESSONS FOR GREENING THE GRID

The Climate Change Era presents profound challenges for the electricity industry, which must be at the forefront if the ambitious goals necessary to stabilize atmospheric greenhouse gases are to be achieved in a timely way. We simply cannot meet climate change policy goals without a radical restructuring of the electric generation mix, moving it away from coal by making massive investments in energy efficiency and renewable generation sources. Moreover, we need to make strategic investments in transmission capacity to bring green power to market. The entire market and regulatory structure of the electricity industry is therefore likely to be affected by the transition from the Deregulation Era to the Climate Change Era.

The choice before us is not between regulation and markets; we need both technology-forcing regulatory tools and market-oriented cap-and-trade incentives at our disposal. We need to use a portfolio of tools—each suited to specific tasks, reflecting the technological and institutional histories and characteristics of different sectors of the economy—to achieve the radical reductions in GHG emissions necessary to stabilize the climate.

In some cases, such as the transportation sector or for end-use efficiency in buildings and appliances, the transaction costs associated with a tradeable GHG emission offset system may make less sense than a technology-forcing regulatory approach. We should therefore continue to

265. At the state level, Governor Schwarzenegger signed Executive Order #S-14-08. The California Energy Commission, State-Federal MOUs On Renewable Energy Projects, <http://www.energy.ca.gov/siting/mous.html> (last visited Feb. 8, 2010). As a result of the Cal Exec. Order, the California Department of Fish and Game (DFG) and the CEC signed a Memorandum of Understanding creating the Renewable Energy Action Team (REAT), which coordinates their efforts in renewable generation, transmission siting, and permitting. *Id.* The CEC and DFG also signed an MOU with the U.S. Fish and Wildlife Service (FWS) and BLM in November 2008 with the same basic purposes. *Id.* These two MOUs followed another one between CEC and BLM in August 2007. *Id.*

rely on sectoral policies that force technological change, or simply adopt existing technology, through regulation. These include building, lighting, and appliance standards like those that have been adopted by the California Energy Commission for the past 35 years.²⁶⁶ Moreover, we can fund investments in end-use energy efficiency by auctioning GHG emission offsets and then channeling those funds through programs administered by state Public Utility Commissions or Public Service Boards as the RGGI has demonstrated. This “cap-and-invest” approach picks the lowest-hanging GHG emission reduction fruit that might otherwise not be harvested due to the wide range of institutional impediments that have prevented cost-effective efficiency investments throughout all sectors.

Experience suggests that cap-and-trade systems will only work if they are comprehensive in both geographic (i.e. jurisdictional) and sectoral scope. Such coverage is unlikely in the absence of a comprehensive national regulatory system. In the meantime, the efforts of the RGGI in the Northeast, California (through AB 1493 and AB 32), and the WCI have laid the groundwork for workable regional or sectoral GHG emission reduction markets, while beginning the long, difficult road toward making serious inroads on GHG emission reductions. But these efforts must be consistent with each other to achieve their full potential. Even stabilizing emissions at 1990 levels, the stated goals of both RGGI and AB 32, will not be easy with existing technology and economic arrangements. Achieving the long-term GHG reductions that most scientists say are necessary to stabilize global climate (50–85% reductions from 2000 levels by 2050) will require major expansion of renewable resources in both the transportation and electricity sectors. State regulators in these sectors must create strong incentives now for technological innovation. Technological innovation and market penetration by renewable generation is unlikely to be adequate through adoption of a cap-and-trade system alone. The need to regulate and to drive innovation through other policies therefore remains.

The most cost-effective and proven way to create those incentives is to create “contested markets” for electricity generation that are still overseen by regulators who are considering the full range of social and environmental factors necessary in the Climate Change Era. Regulators need to establish utility reliability standards, oversee demand forecasts to ensure that new generation and/or transmission facilities are needed, and

266. See California Energy Commission, An Overview of the California Energy Commission, <http://www.energy.ca.gov/commission/overview.html> (last visited Mar. 5, 2010) (discussing the history and responsibilities of the CEC); California Energy Commission, Energy Efficiency Programs, <http://www.energy.ca.gov/efficiency/> (last visited Mar. 5, 2010) (providing information on California's building, lighting, and appliance efficiency standards).

then create markets to provide the generating and transmission capacity that society needs to achieve its public policy goals. Those goals, as we have seen through the debacle of the Deregulation Era, include more than economic efficiency. They also include: (1) GHG emission reductions in accordance with the need to stabilize global climate; (2) achievement of other air quality goals consistent with public health and visibility concerns (especially in the WECC, where the Prevention of Significant Deterioration (PSD) rules under the federal CAA play a prominent role in protecting National Parks, National Monuments, and Wilderness Areas); (3) avoidance of emission “hot spots” that disproportionately burden some communities with greater environmental harm due to class, race, or ethnicity; (4) technological development, to accelerate a transition to a renewables-based electricity sector; and (5) protection of local community integrity, as well as scenic, ecological, or other important resources when siting both power plants and transmission facilities.

To achieve this, we need regionally consistent regulatory approaches by both the states and the FERC. The WCI effort must therefore ultimately move toward RGGI’s model of consistent state approaches—perhaps based on California’s efforts, but other states are also innovating and California could benefit from their insights. The integrated Biennial Resource Plan Update (BRPU) process used by the CEC and CPUC in the late 1980s and early 1990s could serve as a model for resource planning,²⁶⁷ but regulators must segment contestable markets by generation type (e.g., renewable versus non-renewable) and power service provided (e.g., dispatchable on-peak capacity versus non-dispatchable intermittent energy).²⁶⁸ That is what legislators and regulators do best: articulate public policies that ensure that the public’s best interests will be served. That is not the function of the market; it is the function of public policy when the market would not otherwise ensure it. There has never been better empirical evidence that the market will not ensure a diversified portfolio of electric generation sources that simultaneously address the need to reduce GHG emissions while meeting a broad set of other public policy goals: the Deregulation Era abandoned these goals and the market did not meet them. So regulators must reassert the primacy of these public policy goals—and the role of public regulatory institutions in meeting them—in the Climate Change Era.

267. See generally Duane, *supra* note 129, for a discussion of how the CEC and CPUC conducted the BRPU process in order to ensure that new generation would be consistent with both agencies’ policies.

268. Moreover, the value of ancillary services must be modified to reflect the resource portfolio—so dispatchability from resources like CSP increase in value as non-dispatchable resources like wind are added to the system (therefore also decreasing the relative value of wind generation).

But regulators are not very good at either picking winners in the technological innovation sweepstakes or building power plants to meet customer demand. We must leave those tasks to markets, for competitive bidding to meet regulators' stated goals will produce least-cost generating facilities without sacrificing achievement of the broader public policy goals. Initially, integrated resource planning efforts to identify cost-effective renewable portfolio standards should establish long-term purchasing commitments that allow renewable resource developers to finance projects for a solid decade. These portfolio standards should be tailored to the resource availability and opportunities of individual load-serving entities, rather than as a one-size-fits-all target that may be too low in some cases and too high in others. This was the key to California's successful development of more than 10,000 MW of renewable generation and efficient cogeneration in the 1980s: the PPA structure matched the technology-specific capital structure and financing needs necessary to move technologies from the laboratory to the field through project financing.

Transmission planning, siting, and utility (or RTO) investment should also be focused on increasing access for the renewable resource projects that win competitive bids to meet customer demand. California's RETI demonstrates how CREZs can be identified that are both economically competitive and environmentally sound. Strategic transmission system investments must be made in those CREZs and their costs allocated to all ratepayers in order to facilitate their development. We will simply not have significant renewable energy development if we do not make strategic transmission system investments as a society.

Together, these implementation policies will move us much closer toward greening the grid—reducing GHG emissions to the degree necessary in the Climate Change Era. These policies will be necessary even if an international climate change treaty is signed or if congressional legislation establishes a national cap-and-trade system to reduce GHG emissions. In the absence of either of these changes—each of which appears less and less likely as 2010 progresses—the state and regional efforts described herein are our only hope of greening the grid.

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