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***183 A SURVEY OF STATE RENEWABLE PORTFOLIO STANDARDS: SQUARE PEGS FOR ROUND CLIMATE CHANGE HOLES?**

Ivan Gold, Nidhi Thakar [FN1]

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Abstract

Thirty states now have renewable portfolios standards that require generators of electricity to increase their use of renewable energy. Originally intended to promote “energy independence” and other environmental goals, today the programs are among the few U.S. programs which respond to the threat of global warming. This article considers how they work and whether they are effective. It concludes that, in the absence of comprehensive international or federal greenhouse gas controls, renewable portfolio standards are an effective and productive means to retard global warming.

***184 Introduction**

In the past decade, U.S. electric use and electric sector-associated carbon dioxide (“CO₂”) and greenhouse gas (“GHG”) emissions increased substantially. [FN1] Electric generation produces forty-one percent of CO₂ emissions [FN2] and thirty-three percent of total GHG emissions. [FN3] The United States relies predominantly on coal, natural gas, and petroleum (“fossil fuels”) for its energy. [FN4] In 2008, fossil fuels produced more than seventy percent of U.S. electricity. [FN5]

There are other sources that produce fewer CO₂ and GHG emissions. Renewable energy produced from wind, sun, water, plant growth, and geothermic heat is naturally replenished and easily converted to electricity, with fewer emissions than fossil fuels. [FN6] Renewable energy represented eight percent of domestic electric consumption in 2008. [FN7] Large ***185** hydroelectric projects produced three percent. [FN8] “New” renewables—small hydro, modern biomass, wind, solar, geothermal, and biofuels—constituted the remaining five percent. [FN9]

Since 1978, the federal and state governments have provided various incentives such as tax credits, loan guarantees, and favorable accounting treatments to subsidize electricity produced from renewable energy. [FN10] Recently, these incentives have been augmented by statutory renewable portfolio standards or renewable energy standards (collectively, “RPS”) that require utilities to include more renewable energy in their generation portfolios. [FN11] Initially, RPS statutes were not a response to the threat of climate change. [FN12] However, state RPS programs are now one of the most effective programs available domestically to minimize CO₂ emissions and address climate change. [FN13]

Together, the thirty states with RPS programs [FN14] produce more than forty-five percent of U.S. electricity. [FN15] By contrast, the federal government has been unable to enact a national RPS, let alone comprehensive climate change legislation. [FN16] As of 2010, RPS programs have significantly reduced total U.S. GHG emissions and imminent federal preemption of existing state RPS goals seems unlikely. [FN17]

This article surveys state and regional RPS programs: how they work; their inter-relation with possible federal RPS standards and various international climate change prevention programs; and whether state RPS requirements are effective GHG emission controls. This article concludes that despite inconsistent goals and standards and the failure of some states to meet their aggressive RPS goals, state RPS programs *186 constitute a significant tool to reduce U.S. GHG emissions; and are among the most effective actions taken to date in the United States to retard climate change.

I. Background

In 1978, after the 1972 OPEC oil embargo, the United States enacted the National Energy Act. [FN18] Since then, renewable energy has been a significant component of federal and state energy policy. [FN19] Tax credits, tax deductions, price subsidies, and generous utility purchase tariffs have been used as indirect government encouragement of utilities to develop more renewable resources, reduce U.S. dependence on foreign energy resources, improve the environment, and increase energy efficiency. [FN20]

Recently, policymakers have also realized that increasing use of renewable energy to produce electricity also reduces GHG emissions and retards climate change. [FN21] State RPS statutes require electric utilities and other load-serving entities (“LSEs”) [FN22] to increase their use of renewable energy and shift electric power generation to a mix of traditional fossil fuels and renewable resources. [FN23] Federal regulators, environmental organizations, and other interest groups generally support these RPS programs as an adjunct to subsidies already provided. [FN24]

*187 Internationally, climate change [FN25] has been and remains a priority. [FN26] In 1994, members of the United Nations—including the United States—entered into the United Nations Framework Convention on Climate Change (“UNFCCC”). [FN27] Its stated intent was “to begin to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable.” [FN28] In 1997, the UNFCCC produced the Kyoto Protocol, an international agreement to reduce global GHG emissions and control climate change by imposing mandatory GHG reductions on developed nations. [FN29]

Although the United States did not ratify or otherwise bind itself to the Kyoto Protocol, [FN30] U.S. concerns about climate change and the need to control GHG emissions were increasing. [FN31] By 2006, U.S. participation in an international climate change agreement seemed likely, [FN32] and observers expected comprehensive federal legislation would soon address climate change. [FN33]

For various reasons, including the 2007-2009 global recession, international and domestic resolve to act on climate change has weakened. [FN34] In December of 2009, the UNFCCC nations met in Copenhagen to extend the Kyoto Protocol's GHG emission controls past 2012. [FN35] However, the participants failed to extend Kyoto. [FN36] Instead, the summit produced *188 only the Copenhagen Accord, [FN37] a U.S.-sponsored but non-binding recognition of international intentions to limit future global warming to less than two degrees Celsius as well as establish a \$100 billion fund to help developing countries reduce their GHG emissions. [FN38] Nevertheless, the unsuccessful Copenhagen conference confirmed that climate change and reducing GHG emis-

sions remain an international and a domestic priority. The UNFCCC stated “[t]he Copenhagen Accord is unique because, for the first time, all major economies including China and other key developing countries, have committed to reducing their greenhouse gas (GHG) emissions. However, it falls short of charting a path towards a treaty with binding commitments.” [FN39]

Domestically, Congress has repeatedly considered a federal RPS, but has failed to enact any such legislation. [FN40] Most recently, the 111th Congress tried to adopt a federal RPS as part of a larger comprehensive energy bill but failed. [FN41] The House and Senate, however, continue to consider new energy legislation to control GHG emissions and various comprehensive federal RPS programs for electric utilities. [FN42] As of the date of this writing, the international community has not agreed on how to control GHG emissions after 2012, and the U.S. federal government has not enacted comprehensive RPS or GHG control legislation. The UNFCCC will convene again in Mexico, [FN43] but is not likely to agree on post-2012 action; passage of U.S. legislation in the “lame duck” session that follows the November 2010 elections seems unlikely. [FN44]

*189 State action has been more effective. By 2002, twelve states had mandatory RPS programs. [FN45] Two years later, an additional six states followed. [FN46] By 2010, a total of thirty states had mandatory RPS programs. [FN47] Before 2002, state RPS programs generally relied on legislative findings that RPS programs were needed to subsidize renewable energy resources, reduce utility reliance on fossil fuels, diversify energy supply, promote energy independence, create jobs, protect the environment, and achieve similar goals. [FN48] Starting in 2002, control of climate change began to be cited as another express legislative purpose underlying state RPS statutes. [FN49]

As of 2010, thirty state RPS programs are in effect. [FN50] Many of these programs have compliance targets already in place or mandate compliance beginning in 2010, 2011, or 2012. [FN51] These state programs constitute the major effort to control GHG emissions and climate change in the United States.

II. Survey of State RPS Programs

A. Introduction

“Renewable energy” generally refers to energy generated from naturally replenished resources such as sunlight, [FN52] wind, rain, tides, *190 geothermal heat, and biomass. [FN53] In 2006, renewable energy sources generated about 18.4% of global electric power. [FN54] Hydroelectric power provided 15% and other renewable energy sources yielded the remaining 3.4%. [FN55] In 2008, 11% of installed U.S. electric generating capacity was renewable, approximately 9% of total electric energy production, and approximately 7% of all electric energy consumed in the United States came from renewable sources. [FN56]

Table 1. Summary of Key Facts Related to Renewable Energy in the United States

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*191 As of January 2010, the thirty states with mandatory RPS requirements, and the six states with voluntary renewable portfolio goals, [FN65] regulated energy production by electric utilities, [FN66] which made more than forty percent of all U.S. electric sales. [FN67]

Figure 1. RPS State Programs [FN68]

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*192 B. State RPS Programs and How They Work

State RPS programs vary widely in terms of their specific provisions. One review of differences in state RPS programs concluded that “[e]very state renewable portfolio standard. . . is unique because each state has its own policy objectives, political context and constituencies. As a result, RPS policies vary in many ways, including such elements as eligibility, compliance mechanisms, resource categories and program administration.” [FN69]

Although the specifics vary, most state RPS programs share a similar basic structure. Each defines which energy resources are “renewable” [FN70] and lists which utilities must comply with RPS requirements. [FN71] A utility subject to an RPS must meet its load [FN72] during a specified period (the “compliance period”) from sources (the “portfolio”) that include a certain percentage of renewably generated electric power (the “minimum percentage”). [FN73] After each compliance period, each utility must report the total amount of electric power supplied during the period and present evidence that at least the minimum percentage of that power came from RPS-eligible renewable sources.

As Table 2 indicates, all state RPS programs include photovoltaic, biomass, hydro, landfill gas, and wind energy as renewable resources. [FN74] Some of the thirty-six RPS programs include additional resources as renewable. [FN75] These sources are often related to more traditional renewable technologies recognized in all states. For example, municipal waste is a *193 subcategory of biomass, and solar thermal energy taps the same resource as photovoltaics. [FN76]

Table 2. Eligible Renewable Technologies in Thirty-Six RPS Programs [FN77]

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Each state sets its own compliance periods and minimum percentages. [FN78] Some states also require that all or part of the renewable generation come from in-state generators. [FN79] In some states, existing renewable *194 capacity may qualify to meet RPS obligations. [FN80] In other states, only new renewable generation qualifies to meet the first years of RPS obligations. [FN81] Some also include energy saved by utility efficiency programs as renewable energy. [FN82] Some permit utilities to “bank” excess renewable generation against future compliance obligations, [FN83] while others permit utilities to defer current compliance to later years with increased future obligations to compensate for the deferral. [FN84]

A utility typically has various ways to meet its obligation to add renewable generation. For example, it can: [FN85]

- Generate electric power from a renewable resource it owns or controls; [FN86]

- Purchase renewable electric power and its associated renewable energy credits (“REC”) [FN87] from another utility's renewable resource; [FN88]
- Generate electric power using a non-renewable resource, such as coal, that does not produce RECs, but purchase an equivalent number of “unbundled” RECs from another utility's renewable resources; [FN89]
- Apply excess “banked” renewable energy acquired or generated in previous compliance periods; [FN90]
- “Borrow” (defer) compliance obligations to future compliance periods; [FN91] and
- *195 · Make a monetary compliance payment to the state's RPS regulator in lieu of acquiring the minimum percentage of renewable generation. [FN92]

Most utilities meet their RPS goals. [FN93] If a utility fails to meet its RPS compliance obligations, most states provide penalties, [FN94] frequently priced as a multiple of the then-current REC market price. [FN95] However, in recent practice, penalties are often waived or deferred by regulators. [FN96] To date, state RPS enforcement actions have been unusual, and some states simply have excused failures to comply. [FN97]

RPS states also have different percentage requirements for renewable energy and impose different compliance deadlines. Tables 3 and 4 below provide a summary of all states with mandatory or voluntary RPS requirements. Five states required mandatory compliance before 2010. [FN98] Nine states will require first compliance in 2010. [FN99] The rest require initial compliance to start in 2011, 2012, or later. [FN100]

*196 Table 3. Mandatory State RPS Requirements [FN101]

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*205 Table 4. Voluntary State RPS Programs [FN102]

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Some differences in state RPS programs are noteworthy. As noted above, some states require renewable generation to be located in-state; [FN103] however, most permit compliance using out-of-state resources. [FN104] Some states require renewable energy to include some minimum percentage of specific technologies, usually wind or solar. [FN105] Some states permit utilities to meet all or part of their RPS requirements with activities that increase efficient energy usage. [FN106] Most RPS states have adapted their programs to permit regional RPS tracking systems to track and integrate their utilities' compliance. [FN107]

*206 The majority of states allow renewable generation to be purchased separate (“unbundled”) from its associated RECs. [FN108] Unbundled RECs provide utilities greater flexibility to meet requirements, [FN109] as physical delivery of energy among utilities is often difficult for reasons such as transmission congestion, or the lack of a physical interconnection between the generator and the purchasing utility. [FN110] Some utilities have fossil fuel generation sufficient to meet their total load [FN111] and cannot accept additional renewable energy in their service territory without shutting down some fossil-fueled generation. Unbundled RECs “provide buyers flexibility: [i]n procuring green power across a diverse geographical area [and] [i]n applying the renewable attributes” to electric power produced at another source. [FN112]

GHGs and climate change are global rather than local issues. Reducing GHG emissions in one region quickly benefits all regions. [FN113] Therefore, the climate change benefits of renewable energy do not depend on the energy being generated locally.

Nevertheless, some state RPS programs do apply geographic tests to determine which renewable energy will

qualify. Some of these tests favor in-state or in-region generation to enhance their local economies. [FN114] Others reflect the geographical organization of regional utility systems. [FN115] The following are some state rules regarding the source of qualified renewable generation:

***207** · Hawaii and Iowa require the renewable generation to originate in-state; [FN116]

· In some states, the renewable generation must be made within the region; for example, Michigan requires the REC to originate in the utility's service territory, [FN117] Minnesota requires it to be within MRETS, Oregon in WECC, and Pennsylvania in PJM; [FN118]

· Actual delivery of generated electricity into the state is required in Arizona, California, Montana, New Mexico, Nevada, New York, Texas, and Wisconsin; [FN119]

· Electricity must be delivered to the region in Delaware, Maine, New Jersey, and Washington; [FN120]

· Connecticut, the District of Columbia, Massachusetts, Maryland, New Hampshire, and Rhode Island require out-of-state generation to originate in a utility control area adjacent to the Independent System Operator. [FN121] The District of Columbia and Maryland allow unbundled RECs from states adjacent to the PJM ISO system; [FN122]

· In-state RECs are valued more highly than those arising out-of-state in Colorado. [FN123] North Carolina only permits twenty-five percent of RECs to originate out-of-state. [FN124]

***208** Figure 2. State RPS Targets [FN125]

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Since their enactment, almost all state RPS programs have been revised, usually to increase minimum compliance levels. For example, California [FN126] and Colorado [FN127] both increased their emissions reduction goal from twenty percent to thirty-three percent, and New Mexico extended its 2015 RPS goal to fifteen percent and its 2020 goal to twenty percent. [FN128] ***209** Nevada increased its 2025 RPS goal to twenty-five percent and requires that by 2016 at least six percent of all energy generated come from solar energy. [FN129] Missouri made its RPS requirement mandatory rather than a “good faith goal.” [FN130] Maine increased its 2017 target to forty percent, [FN131] and Vermont increased its 2025 goal to twenty-five percent. [FN132] Oregon [FN133] and New Jersey added separate photovoltaic and solar goals. [FN134] Finally, the District of Columbia adopted more stringent RPS standards, expanded the number of utilities covered, and focused on specific renewable technologies such as solar. [FN135] Table 5 summarizes these changes.

Table 5. Expanded RPS Standards [FN136]

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As a consequence of the 2007-09 recession, some states recently delayed or weakened their commitment to reduced GHG emissions. In 2009, Washington and Oregon declined to adopt multi-sector GHG controls proposed by the Western Climate Initiative (“WCI”). [FN137] California citizens proposed a legislative initiative to defer GHG mandates under ***210** AB32 until the unemployment rate declined, but the voters rejected Proposition 23 in the November 2010 elections. [FN138] In 2010, Arizona joined Oregon and Washington and announced it would not adopt WCI GHG standards. [FN139] Also in 2010, New York did not adopt a proposed Global Warming Pollution Control Act, [FN140] which would have capped state GHG emissions at 1990 levels and required a further twenty percent reduction by 2020. [FN141] However, despite the relaxation of some states' GHG programs, none of the states reduced or waived their RPS goals. [FN142] The state RPS statutes remain intact and effective.

C. State RPS Programs and Climate Change

Climate change is partly a function of GHG emissions, and GHG emissions are a function of fuels burned. [FN143] Most RPS statutes preceded current concerns over climate change and did not specifically seek to reduce GHG emissions or retard climate change. [FN144] Before 2002, the thirteen states with RPS programs in place [FN145] justified their programs for traditional environmental and economic reasons such as: encourage the development of renewable energy sources; attract new in-state “green” business development; reduce over-reliance on fossil fuel and utility exposure to price volatile fuels; reduce dependence on foreign oil and natural gas; and reduce localized air pollution from fossil fuel combustion. [FN146]

***211** In 2002, California enacted SB 1078, a major RPS program [FN147] that set the precedent for many states to follow, in 2002 and AB 32, a broad GHG-reduction bill, in 2006. [FN148] Beginning in 2002, various events intensified state legislatures' resolve to address climate change. 2005 was the worst Atlantic hurricane season on record and was capped by Hurricane Katrina and the destruction of New Orleans. [FN149] In 2006, Vice President Gore's *An Inconvenient Truth* [FN150] won an Academy Award. [FN151] In 2007, the U.N. Intergovernmental Panel on Climate Change (“UNIPCC”) released its Fourth Assessment Report, which concluded “unequivocally” that increases in global atmospheric concentrations of GHGs were caused by man, greater than ever previously experienced, and a highly probable cause of global climate change. [FN152] Finally, in 2007, the UNFCCC and Vice-President Gore shared the Nobel Peace Prize for their efforts to combat climate change. [FN153] State RPS statutes regularly began to cite climate change as a justification for adopting RPS programs, [FN154] and between 2002 and 2010, seventeen additional states enacted RPS programs. [FN155]

***212** RPS programs regulate renewable energy but do not directly regulate GHG emissions. [FN156] However, such “limitations” are relatively unimportant. [FN157] For example:

- Although RPS programs apply to only one emissions sector, electric generation, [FN158] the electric power sector in the United States produced forty percent of 2007 national CO₂ emissions (thirty-two percent of total U.S. GHG emissions). [FN159] On a global basis, the energy sector produces twenty-six percent of worldwide GHG emissions. [FN160]

- Although RPS programs apply only in some states, [FN161] RPS states currently cover forty-six percent of all U.S. electric generation. [FN162] By 2025, the thirty-six states with voluntary and mandatory RPS programs will produce more than fifty-six percent of all electric power consumed in the United States [FN163] and will emit more than sixty percent of electric power-related U.S. CO₂ (twenty percent of total U.S. CO₂ emissions). [FN164]

***213** · Although some RPS programs exempt selected utilities, or cover only a portion of a state's electric generation, [FN165] this trend is reversing, and a number of states have amended their RPS programs to include utilities previously exempted. [FN166] Today, sixteen of the thirty state RPS programs cover 90-100% of state generation [FN167] and twenty-four of the thirty mandatory programs cover more than seventy-five percent of their state utilities. [FN168]

- Although RPS programs primarily affect CO₂ emissions, rather than all GHG emissions, [FN169] CO₂ is the primary GHG released when fossil fuels make electricity. [FN170] In 2007, CO₂ represented approximately eighty-two percent of all U.S. GHG emissions. [FN171] As shown in Table 6, six GHGs are primarily responsible for climate change and are included in state, federal, and international climate change programs. In addition to CO₂, the other common GHGs are methane (CH₄) and nitrous oxide (N₂O). [FN172] Less common, but very powerful, GHGs are hydro-fluorocarbons (“HFCs”), poly-fluorocarbons (“PFCs”), and sulfur hexafluoride (SF₆). [FN173] Each GHG has its own Global Warming

Potential (“GWP”), expressed as CO₂e, its relative ability to affect climate change compared to CO₂. [FN174]

*214 Table 6. GHG Global Warming Potential (CO₂e) [FN175]

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· Although RPS programs only control GHGs indirectly, renewable electric generators generally emit far less CO₂ than coal, oil, or natural gas generators. [FN176] Generators using coal can emit as much as 2000 lbs of CO₂ for each kWh generated, and natural gas generators emit approximately one-half that amount or less. [FN177] Renewables like wind, hydro, and solar energy actually produce almost no GHGs. [FN178] Renewable biomass generators can produce 1500 lbs of CO₂e (lbs/CO₂e) per megawatt hour of energy. [FN179] The carbon content of natural gas is half that of coal, and natural gas-fired combined-cycle *215 gas turbines, the most efficient fossil fueled generators, use fewer BTUs to produce a kWh of electricity than coal plants. [FN180]

· Most RPS programs typically exclude zero-GHG resources such as nuclear power [FN181] and hydroelectric dams, [FN182] which are generally disfavored by the public. [FN183] However, from 1999 to 2008, more than ninety percent of RPS-driven projects were zero-GHG wind projects, [FN184] and the future for state RPS projects includes increasing amounts of other zero-GHG generation such as solar energy. [FN185]

· Finally, some RPS permit technologies emit GHGs, such as biomass. [FN186] However, these sources still emit significantly less GHGs than fossil-fueled generators because their fuel is recycled [FN187] and are therefore still an attractive alternative to fossil fuels.

*216 Figure 3. 2008 U.S. GHG Emissions [FN188]

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Although state RPS programs affect fewer utilities than would a federal RPS program and control fewer GHG emissions than would a multi-sector program primarily designed to reduce GHG emissions and retard climate change. [FN189] The recent recession, congressional partisan conflict, delays of mandatory international GHG reductions, and individual state objections to any “one-size-fits-all” climate change legislation have significantly delayed the development of a federal RPS or comprehensive climate change bill. [FN190] Although RPS programs may be “second-best” solutions, they are the only solutions in place.

Of course, “second-best” is not “best.” A recent major study of various GHG-reduction policies and programs found that a national carbon *217 cap-and-trade program would produce the greatest cumulative GHG emissions reduction and would have the lowest present discounted value cost. [FN191] The study compared a federal RPS program that would require twenty-five percent renewable energy by 2025, with a national, multi-sector GHG cap-and-trade program that would require a reduction of GHG emissions to seventeen percent below 2005 levels by 2020 and forty percent below 2005 levels by 2040. [FN192] The study concluded that by 2030, the federal RPS program would yield only twenty-eight percent of the GHG reduction benefit that the national cap-and-trade program would provide. [FN193] Further, by 2030, the cap-and-trade program would realize 350% more cumulative CO₂ reduction than the federal RPS (i.e., 12,366 million metric tons (“MMT”) vs. 3483 MMT). [FN194] Most significantly, the study determined that for GHG reduction purposes, a national, multi-sector GHG cap-and-trade program would make state or national RPS programs redundant: the cap-and-trade program would control all sectors including the electric generation controlled by the RPS, whereas the RPS program would control only electric generation. [FN195] A federal RPS with only cap-and-trade would reduce GHG emissions 2.7% more than a federal GHG cap-and-trade program alone. [FN196]

Unfortunately, no comprehensive federal multi-sector GHG program exists. In its absence, the mandatory and voluntary state RPS programs remain the most effective solution. By 2025, if their goals are met, mandatory existing RPS programs will reduce electric power sector CO₂ emissions in their states by twenty-one percent, or 296 MMT, 4.2% of projected 2025 U.S. CO₂ emissions. [FN197] Until federal or additional state *218 programs develop, state RPS programs are the only significant control of U.S. GHG emissions. [FN198]

Table 7. State RPS GHG Emissions [FN199]

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D. Regional REC Tracking Systems and Regional GHG Accords

Regional tracking systems support individual state RPS programs. They track, record, and certify electric power produced from eligible renewable resources. [FN200] Their primary and standard medium of exchange is an REC, which represents 1000 kWh of renewably produced electric power. [FN201] In contrast, regional GHG accords are multi-state, multi-sector cap-and-trade programs that manage GHG emissions within each accord member state. [FN202] Regional accords focus on GHG emissions rather than on renewable energy, although some make special provisions to favor renewable *219 energy generation. [FN203] Their medium of exchange is a GHG allowance or offset, which represents one ton of CO₂e emissions. [FN204]

REC and GHG programs are both variants of cap-and-trade systems. An authority sets a maximum permitted level for GHG emissions or non-renewable energy during a compliance period, and this is the “cap.” [FN205] The cap is generally less than historic levels, and it reduces over time. [FN206] Each regulated entity is required to meet its assigned share of the cap; to meet its cap, a regulated entity must report its actual GHG emissions, or the nonrenewable energy it used to meet its actual load. [FN207] Typically, a GHG program requires the emitter to surrender one GHG offset for each ton of CO₂ emitted. [FN208] The RPS program requires surrender of one REC to prove use of each MWh of renewable energy. Regulated entities with less than the required evidence of compliance must acquire the necessary certificates from regulated entities with excess certificates or pay a penalty. [FN209] These exchanges and all their variations are the “trade” portion of “cap-and-trade.” [FN210]

Regional GHG programs and regional RPS tracking systems are creatures of state law, developed in the absence of federal controls on GHG and renewable generation. [FN211] These programs are not explicitly or clearly integrated. [FN212] Nor are RECs easily exchanged for tons of CO₂. [FN213] Regional *220 GHG accords and trading systems may overlap with state RPSs, but they do not replace them. [FN214] The proposed federal energy bills—“Waxman-Markey” in the U.S. House of Representatives [FN215] and “Kerry-Lieberman” in the U.S. Senate [FN216]—would have preempted the regional GHG cap-and-trade programs but would not have preempted existing state RPS programs. [FN217]

E. Regional REC Tracking Systems

RPS programs require subject utilities to show that they acquired at least the minimum percentage amount of renewable energy during each compliance period. [FN218] Regional REC tracking systems substantiate utility RPS compliance and facilitate regional RPS transactions between states. [FN219] Individual RPS tracking systems usually cover the regional interconnected transmission operating or control systems to which their member states belong. [FN220] RECs from each regional tracking system trade in the growing local, regional and nation-

al markets for renewable electricity. [FN221]

RECs are the currency of RPS programs. The EPA defines an REC as “the property rights to the environmental, social, and other nonpower qualities of renewable electricity generation.” [FN222] RECs are a medium of exchange and represent certified and reliable evidence of electric power generated from renewable sources. [FN223] With RECs, utilities can trade evidence of compliance amongst themselves, within and across state lines, and even across national regions. [FN224] RECs, and their “associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source.” [FN225]

The characteristics of RECs create interesting issues and challenges with regard to utility RPS compliance, interstate transactions between utilities, opportunities to use unbundled RECs for RPS compliance, and use of RECs in separate state or federal GHG reduction programs.

***221** RECs are a tradable currency [FN226] and, like any currency, must be authenticated and standardized to have trading value. The regional tracking agencies and the jurisdictions in which they are used have various compliance standards for RECs. [FN227] Although each REC represents 1000 kWh (1 MWh) of renewably generated electric power, [FN228] different state RPS programs have different standards, and the value of a particular REC in each state RPS program is not automatically uniform. [FN229]

The regional tracking systems resolve this variation by gathering and maintaining detailed, verifiable information on each unit of electric power as it is generated. The systems collect data for each MWh based on its generation source and its producer, production location, fuel source, air emissions rate, eligibility for various state environmental programs, and other information. [FN230] From these aggregated data, the tracking systems create and issue tradable, digital electronic certificates with unique serial numbers for each REC. [FN231] Each tracking system's database consists of all the certificates it has issued, [FN232] and certifies that each REC complies with a particular state's requirements. With this evidence of the particular environmental attributes it represents, each REC can be bought, sold, or transferred as an identifiable commodity by participants in mandatory RPS programs, voluntary green programs, and other parties, such as REC brokers and traders. [FN233] The systems track the transfer of each certificate from owner to owner, from the creation of each certificate until its final purchaser retires it, either to comply with an RPS program, to evidence voluntary compliance, or to reduce the market supply of RECs and accelerate the development of additional renewable generation. [FN234]

***222** There are five major U.S. regional REC tracking systems: (i) Western Renewable Energy Generation Information System (“WREGIS”); (ii) Midwest Renewable Energy Tracking System (“MRETS”); (iii) Electric Reliability Council of Texas (“ERCOT”); [FN235] (iv) PJM Generation Attribute Tracking System (“PJM GATS”); and (v) New England Power Pool Generation Information System (“NEPOOL GIS”). [FN236]

Figure 4. Renewable Energy Tracking Systems Operating in North America [FN237]

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***223** The following quote by the Federal Energy Regulatory Commission (“FERC”) explains how these tracking systems operate:

Five quasi-governmental regional entities were created as accounting systems to issue, track, and retire RECs, or certificates of renewable generation, within their jurisdiction in accordance with state's Renewable Portfolio Standard (RPS) rules. . . .

....

Each reported megawatt-hour (MWh) of eligible generation results in a system-issued REC with a unique identification number to prevent double-counting.

....

Each REC includes attributes such as generator location, capacity, fuel-type and source, owner, and date operational. Records are tagged by program eligibility.

Differences in intra-regional rules include whether RECs can be banked for use in future years and for how long; which renewable technologies are eligible; and whether some fuels or technologies are granted multiple credits.

Compliance entities, such as retail suppliers, can meet RPS targets by purchasing RECs in lieu of generating renewable electricity.

Where necessary, systems track conservation or energy efficiency credits in states with a combined RPS and Energy Efficiency Resource Standard (EERS).

Most systems have added attributes to support other state, provincial, or regional programs or requirements such as solar set-asides, voluntary utility green-power programs, or emissions tracking. [FN238]

WREGIS is the renewable energy tracking system for the Western states which belongs to the Western Electricity Coordinating Council ("WECC"). [FN239] WREGIS tracks renewable energy generation from generators *224 in the systems that register and provide verifiable data to certify RECs for compliance with state and provincial RPS and voluntary markets. [FN240]

PJM GATS is the centralized generation registry and emissions database for the states within the PJM interconnected transmission grid. [FN241] PJM Interconnection is the regional transmission organization ("RTO") that coordinates the movement of wholesale electric power throughout this interstate grid. [FN242] PJM Interconnection tracks and schedules all generation regionally, so power delivered into PJM's border is considered the equivalent of power delivered to any PJM-interconnected state or any utility within the PJM system. [FN243] PJM GATS tracks and manages renewable energy created in the PJM system. [FN244] PJM RECs can come from any of the PJM-interconnected states and can be traded separately ("unbundled") from electric power. [FN245] RECs coming from outside of PJM must be associated with generation that is delivered into the PJM region. [FN246]

ERCOT is the Texas independent service operator ("ISO"). [FN247] ERCOT manages the state's separate transmission grid, [FN248] the majority of the flow of electric power in Texas, [FN249] and the Texas REC trading system. [FN250]

M-RETS "tracks renewable energy generation in participating States and Provinces and assists in verifying compliance with individual *225 state/provincial or voluntary Renewable Portfolio Standards (RPS) and objectives." [FN251] It also creates and issues RECs for each renewable MWh. [FN252] M-RETS collects verifiable production data for all participating generators and keeps track of "all relevant information about renewable energy produced and delivered in the region." [FN253]

NEPOOL maintains a Generation Information System ("GIS"), which tracks all generation within the New England ISO's purview. [FN254] Generators register their renewable energy facilities with NEPOOL, and it issues certified RECs for their energy under the GIS renewable tracking system. [FN255]

F. Regional GHG Programs

Since 1997, the United States and other UNFCCC nations have focused on multi-sector GHG emissions and climate change rather than just electric utilities and renewable energy. [FN256]

In 1997, the Clinton administration supported and helped negotiate the Kyoto Protocol. [FN257] However, the Bush administration refused to submit the treaty to the Senate for ratification. [FN258] From 2000 to 2007, climate change slowly became the issue of the day in the United States, although there was little meaningful federal activity to confront it. [FN259] The Bush Administration would not support or submit to international GHG regulation. [FN260] By 2004, it was also clear that the Bush administration *226 would not propose a meaningful or comprehensive federal GHG emission regulation. [FN261]

The state governments that wanted GHG emissions reduced and regulated were frustrated. Other states feared federal regulation [FN262] because a federal "one-size-fits-all" standard for GHG reductions might not accommodate their particular interests. [FN263] Tired of waiting for Congress to act, or hoping to prevent federal regulation, some of these states organized regional accords to control both state and regional GHG emissions. [FN264]

Non-federal jurisdictions developed various compliance programs to control CO₂e emissions [FN265] from multiple sources. [FN266] These programs did *227 not replace existing or later-enacted RPS statutes. [FN267] Rather, multi-state GHG accords proposed to reduce multi-sectoral GHG emissions alongside existing state RPS programs. [FN268]

GHG accords are not interstate compacts that bind member states to reciprocal action [FN269] and require congressional approval. [FN270] Rather, they are agreements in principle between state governors that each state individually will adopt consistent legislation to limit its own GHG emissions and work cooperatively to meet the accord's regional target of reduced GHG emissions. [FN271]

Each accord developed its regional target by aggregating historic levels of GHG emissions by its member states. [FN272] From this sum of actual GHG emissions, each accord could set regional GHG reduction targets and allocate the target among each member. [FN273] Each accord also created model rules and model statutes for their members to implement so that their members would act in an integrated and cooperative manner. [FN274] After setting each state's reduction target, each accord generally allowed each member state to decide how it would allocate caps to entities within its borders. [FN275]

*228 In effect, each regional accord established and operated a functioning GHG cap-and-trade program within its borders. [FN276] Recently proposed, but not enacted, federal legislation would have preempted these regional cap-and-trade programs and effectively ended them. [FN277] The House Waxman-Markey Bill would have preempted state cap-and-trade programs from 2012 to 2017. [FN278] The Kerry-Lieberman Bill would have preempted all state cap-and-trade programs permanently. [FN279] However, regardless of which federal program(s) are ultimately adopted, provisions would likely be made to preserve portions of existing regional programs such as records of compliance activities to date and would allow the transfer of existing offsets to the new federal system. [FN280]

Unless and until a federal GHG cap-and-trade program is created, the three regional GHG organizations will manage multi-sector GHG emissions and climate change in their respective borders. The RGGI was started in 2005. [FN281] The WCI organized in 2007. [FN282] The Midwestern Greenhouse Gas Reduction Accord

("MGGRA") was also established in 2007. [FN283] RGGI exclusively controls CO₂ emissions from electric utilities. [FN284] WCI and MGGRA control GHG emissions from multiple sectors including transportation, commercial, industrial, and residential GHG emitters. [FN285]

*229 Figure 5. Regional GHG Accords [FN286]

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*230 RGGI is a regional cap-and-trade system which regulates electric generation CO₂ emissions. [FN287] RGGI compliance started in 2008 [FN288] and was the first U.S. mandatory, market-based effort to reduce GHG emissions, albeit only from the electric sector. [FN289] RGGI includes ten Northeastern and Mid-Atlantic states. [FN290] All these states have adopted "Budget Trading Programs," based on RGGI's Model Rule, [FN291] and have agreed to cap their electric sector CO₂ emissions at 2009 levels through 2014 and thereafter to reduce CO₂ emissions an additional ten percent by 2018. [FN292]

The RGGI CO₂ Allowance Tracking System ("RGGI COATS") records and tracks environmental data for each state's CO₂ trading program. [FN293] The system records CO₂ emissions and CO₂ allowance holdings. [FN294] It facilitates market participation by enabling the allocation, award, and transfer of CO₂ allowances, the certification and the registration of offset projects, and "the submittal of offset project Consistency Applications and Monitoring and Verification Reports." [FN295] The system also publishes reports of CO₂ market activity and program data. [FN296]

Each RGGI state has agreed to cap the annual CO₂ emissions of electric generators within its borders at 2009 levels through 2014, and thereafter decrease incrementally to arrive at ninety percent of 2009 levels by 2018. [FN297] Each utility within RGGI jurisdiction must install and maintain standardized CO₂ recorders on its large in-state generators, [FN298] and *231 reports its total CO₂ emissions during each compliance period. [FN299] Each state issues CO₂ allowance certificates that are equal to their annual CO₂ emissions cap. [FN300] The sum of each state's allowance equals the region's aggregate cap, less than what is required to meet its expected load. [FN301] In other words, there are not enough CO₂ allowances to permit fossil-fueled generation to meet total expected load during the compliance period. Each electric generator must acquire sufficient allowances to cover its GHG emitting generation during the compliance period, or must acquire additional electricity which doesn't emit CO₂, i.e., renewable energy. [FN302] At the close of each compliance period, each utility must present CO₂ allowance certificates equal to its actual reported CO₂ emissions. [FN303] A utility that produces too much CO₂, e.g., that fails to acquire enough renewable energy, must pay penalties calculated as a multiple of the allowance market price for allowance certificates. [FN304] A utility that reduces its CO₂ emissions below its cap may sell or trade excess allowances with utilities that need additional allowances to meet compliance levels. [FN305] RGGI maintains consistency among the member states' programs and manages the periodic auctions from which qualifying entities can buy or sell allowances. [FN306] Each utility competes to acquire the CO₂ allowances it needs and has an obvious incentive to replace its CO₂ emitting generation with low or zero CO₂ emitting generation resources or other energy conservation activities. Because each utility's customer load is greater than it could meet using available allowances, [FN307] each utility must acquire increasing amounts of power from resources that don't emit CO₂-renewable energy, increased efficiency, or RECs generated by other utilities.

*232 RGGI has been successful. Based on actual 2005 emissions data, the RGGI program will reduce emissions from its regional power plants by approximately eight percent by 2018. [FN308] To date, RGGI has held nine CO₂ emission allowance auctions. [FN309] Prices ranged from \$3.38/ton CO₂e in 1998 to \$2.06/ton CO₂e

in 2009. [FN310] In total, the auctions have raised more than \$729 million [FN311] for use by the RGGI states in implementing climate-friendly initiatives. [FN312]

WCI includes seven western U.S. states and four Canadian provinces. [FN313] WCI sets a regional emissions target and establishes a market-based cap-and-trade program that covers multiple economic sectors. [FN314] In September 2008, WCI released design recommendations to be adopted by each state for its individual cap-and-trade program. [FN315] These recommendations called for mandatory GHG reductions to start in 2012, with a goal of reducing 2020 emission levels to fifteen percent of 2005 levels by 2020. [FN316] This is approximately thirty-three percent less than predicted 2025 emission levels would be were “business-as-usual” GHG policies continued. [FN317] In contrast with RGGI's focus on electric utilities, WCI controls multi-sector emissions from utilities, transportation, resource extraction, industry, and ultimately from residential and commercial emitters. [FN318] In 2012, WCI planned to start controlling emissions from electric power and large industrial and commercial sources. [FN319] In 2015, it planned to start *233 controlling emissions from transportation, other residential and commercial sources, [FN320] and industrial fuel use. [FN321]

However, some WCI states have not adopted WCI's plans. Only California, [FN322] New Mexico, and three Canadian provinces-British Columbia, Ontario, and Quebec-have adopted WCI's recommendations. [FN323] Oregon and Washington rejected legislative proposals to do so, [FN324] and in February 2010, Arizona Governor Janice Brewer declared that her state would remain in WCI but would “not implement the GHG cap-and-trade proposal advanced by the WCI” for economic reasons. [FN325] Utah, Manitoba, and Montana have also delayed implementation. [FN326] Thus, WCI mandatory GHG cap-and-trade will begin in 2012 but only in British Columbia, Ontario, Quebec, New Mexico, and California.

MGGRA includes six states and one Canadian province. [FN327] Although MGGRA members primarily depend on coal for their electric power supply, [FN328] they have agreed in principle to establish regional greenhouse gas reduction targets of twenty percent below 2005 levels by 2020; [FN329] to develop a multi-sector cap-and-trade system, including a greenhouse gas emissions-reductions tracking system; and to implement other policies, such as low-carbon fuel standards, to aid in reducing emissions. [FN330] However, the MGGRA states have not yet adopted the MGGRA advisory group's recommendations, nor have any of the individual states adopted independent mandatory GHG regulations. [FN331]

*234 G. RPS Programs Compared to GHG Accords

RPS programs and GHG accords may differ, but their goals and methods overlap. RPS programs originate with individual state statutes, [FN332] whereas GHG accords typically flow from interstate associations that require individual state statutory approval and contain uniform and consistent terms. [FN333] GHG programs, such as the MGGRA, usually cover multiple sectors and their emissions. [FN334] RPS programs cover only electricity producers and their renewable energy generation. [FN335] RPS programs primarily affect CO₂ emissions from burning fossil fuels, [FN336] whereas GHG programs cover a broader spectrum of GHG emissions. [FN337] GHG control programs measure, record, and regulate actual GHG emissions, [FN338] whereas REC programs for the most part track low- or zero-CO₂ generation. [FN339] Finally, RPS RECs are not always uniform or transferable from state to state. [FN340] GHG offsets verified under regional tracking systems typically are fungible and freely transferable. [FN341]

RPS programs preexisted potentially conflicting GHG control programs. State RPS programs often anticipated federal RPS requirements that would likely preempt state programs but still provide credit for achievements

realized at the state level. [FN342] Most state programs were created before climate change and global warming were major issues and before most GHG reduction programs in the United States materialized. [FN343] *235 Nevertheless, to a significant degree, the RPS and GHG programs focus on related concepts and attributes. Although formal integration of these programs is not anticipated, there is a consensus that it should not be possible to use RECs in GHG programs or carbon offsets. [FN344] Such restriction in RPS programs generally appear in both RPS and GHG reduction programs. [FN345] However, the question of whether a utility may comply with an RPS program and also receive credit for reducing GHG emissions remains unclear. [FN346] Inter-utility transfers also raise questions regarding whether a sale of “unbundled” RECs disqualifies the associated electricity as evidence of GHG reduction. [FN347]

“[G]overnment regulators have yet to establish a consistent regulatory framework that clearly defines environmental attributes, substantiates and quantifies them, and assigns ownership to specific attributes where conflicting claims potentially exist.” [FN348] The state RPS programs differ as to which renewable resources qualify, compliance deadlines, how much renewable generation is required, and how RECs can be bought, sold, exported, imported, or applied for RPS compliance. [FN349] The regional GHG tracking programs also have differing model rules, regulations, and conditions that are not always consistent among their member states. [FN350]

The conflict arises because RPS programs force increased use of renewable generation while GHG programs require reduced GHG emissions. RPS programs require RECs equal to a percentage of utility load served during a compliance period. [FN351] GHG reduction programs typically *236 require CO₂e tradable offsets for each ton of GHG actually emitted during a compliance period. [FN352] GHG tradable offsets offset actual emissions. [FN353] The “environmental attributes” do not always represent reduced GHG emissions, particularly when “unbundled” from the electricity created with them. [FN354]

Integrating RECs and GHG credits is conceptually and mechanically difficult. Standards for RECs and carbon credits vary among states and regions, [FN355] which makes trading difficult. [FN356] In addition, there exists uncertainty whether a federal RPS or federal GHG standard will be enacted, and how these standards would affect state programs. [FN357]

Some RPS programs and GHG accords treat RECs and GHG offsets interchangeably. Originally, RECs were designed to comply with state RPS programs. [FN358] Today they are also used in voluntary used markets as green tags to show that a customer has utilized renewable energy for its needs. [FN359] Once RECs would be used beyond RPS programs, their environmental attributes gained greater value, [FN360] and the EPA now defines RECs as the environmental attributes of renewable energy. [FN361] When GHG reduction programs focused on carbon's environmental impact, it became clear how RECs and their environmental attributes would apply. [FN362] Today, RECs are being used to reduce a company or person's “carbon footprint” or to neutralize the environmental effects of various activities such as jet plane travel and manufacturing or chemical processes. [FN363] Various entities, *237 including the EPA's Green Power Partnership, also promote, purchase, bundle, and sell RECs as green tags to offset energy consumption and general GHG emissions. [FN364] However, if an REC produced in one jurisdiction is used in another jurisdiction's RPS to offset non-renewable generation, the utility meeting the RPS standard has not thereby reduced its emissions of CO₂. [FN365] Compliance with an RPS does not equal compliance with a GHG cap.

The market value of RECs and GHG certificates is significant. The global carbon market increased from \$58 billion in 2007 to \$136 billion in 2009. [FN366] The capital cost of new renewable generation to meet RPS re-

quirements is also significant. At \$3000/installed kW [FN367] (\$3 billion/installed gigawatt ("GW")), construction of the estimated 60-77 GW of new renewable generation required to meet combined 2025 state RPS goals [FN368] would require between \$180 and \$230 billion (based on 2010 dollars). With these values at stake, it should not be a surprise that any inconsistent definition or standard for the underlying REC commodities creates opportunities to "game the system" or "double count" RECs and carbon offsets. [FN369]

The existing state RPS programs are effective and are producing significant environmental benefits and GHG reductions. [FN370] However, the conflicts and uncertainties between thirty-six state RPS programs, seven regional REC tracking systems, and three regional GHG accords likely will create significant inefficiencies. [FN371] The various programs must be uniform to meet their goals efficiently. Uniformity will only come with legislation, *238 but Congress has been unable to enact comprehensive federal legislation to address RPS programs and climate change issues. [FN372]

III. Federal Climate Change, RPS, and CO₂ Regulation

A. Introduction

Uniform federal RPS and GHG reduction programs are needed to resolve these conflicts and uncertainties for additional reasons. Industry, which must operate nationally, generally objects to non-standard patchwork regulation and generally prefers uniform federal regulation. [FN373] In the absence of federal regulation, courts sometimes apply unwieldy concepts to provide citizens redress from unregulated practices. Recent federal litigation to penalize GHG emitters, or limit their future GHG emissions under common law nuisance or other tort claims, shows—at least at the district court level—that Congress is the preferred entity to resolve these issues. [FN374] Appellate courts' willingness to allow such suits to go forward reflects the fact that climate change and RPS legislation have stalled in Congress, and litigation will be required to settle these conflicts. Congress should be the body to resolve these uncertainties; however, should Congress remain unable to fashion a solution, disputants will be left with no alternative but to turn to the courts.

There have been numerous efforts to enact a federal RPS to create a national market for renewable energy and reduce conflicts between states rich in renewable potential and states more dependent on traditional fossil fuel resources. [FN375] In both 2009 and 2010, Congress considered *239 but failed to enact comprehensive energy legislation with these goals in mind. [FN376] Adoption of a federal RPS before the November 2010 congressional elections was unlikely and did not happen. [FN377] The proposed legislation would have preempted or prohibited state GHG cap-and-trade programs but would not have precluded or preempted state RPS programs. [FN378] Because recent federal energy and climate control proposals have ignored state RPS programs, Congress seems much more interested in uniform national multi-sector GHG controls than in promoting renewable energy alone.

B. House Legislation: Waxman-Markey

On May 15, 2009, Congressional Members Henry Waxman (D-CA) and Edward Markey (D-MA) introduced the American Clean Energy and Security Act of 2009. [FN379] This comprehensive energy bill, which became known as the "Waxman-Markey bill," would have established a multi-sector federal GHG cap-and-trade system to control climate change. [FN380] In addition, the Waxman-Markey bill would have also imposed a national re-

newable energy standard for electric utilities. [FN381] “The Waxman-Markey bill would give FERC responsibility for issuing federal RECs with respect to a national RES, and to develop a tracking system compatible with existing state, tribal, and regional systems.” [FN382] Waxman-Markey would have created a federal RPS but would have accommodated stricter state programs. [FN383] The standard proposed by Waxman-Markey would have required six percent of total electric power to come from renewable sources *240 by 2012 and twenty percent by 2020. [FN384] Under certain circumstances, up to eight percent of the requirement could have been met with energy efficiency measures. [FN385]

Further, Waxman-Markey would not have restricted state RPS programs to the extent by which state programs set more rigorous minimum requirements for renewable resources. [FN386] Although Waxman-Markey would not have preempted state RPS programs with stricter standards, it would have preempted state GHG cap-and-trade programs until 2017. [FN387]

The bill was approved by the House of Representatives on June 26, 2009, by a vote of 219-212, but was never considered in the Senate. [FN388]

C. Senate Legislation: Kerry-Boxer and Kerry-Lieberman-Graham

In 2009 and 2010, the Senate also considered comprehensive energy legislation. On September 30, 2009, Senators John Kerry (D-Mass.) and Barbara Boxer (D-Cal.) introduced their own version of a comprehensive energy bill—the Clean Energy Jobs and American Power Act. [FN389] This bill became known as the “Kerry-Boxer bill,” and included a target of seventeen percent of 2005 GHG emission levels by 2050. [FN390] The bill contained many of the same provisions as the Waxman-Markey bill and would have preempted state GHG cap-and-trade programs in favor of a nationwide multi-sector cap-and-trade program. [FN391] The Kerry-Boxer bill, however, did *241 not preempt or preclude state RPS programs. [FN392] Kerry-Boxer failed to reach the floor before the end of the First Session of the 111th Congress. [FN393]

In 2010, once health care reform passed the First Session of the 111th Congress, [FN394] the President and the Senate turned their focus back to the prospect of enacting a comprehensive energy bill. In April 2010, as this article was being written, Senators Kerry (D-Mass.), Lindsay Graham (R-S.C.), and Joseph Lieberman (I-Conn.) were slated to propose new legislation setting 2012 GHG emissions caps for the U.S. electric sector and 2016 caps for the industry as a whole. [FN395] The legislation, also known as the “Kerry-Lieberman-Graham bill,” would have been similar to the Waxman-Markey bill and would have created a federal RPS with incentives for renewable energy sources. [FN396] The Kerry-Lieberman-Graham bill would have capped power-plant emissions starting in 2012, regulated trading in emission allowances, and imposed a carbon fee on petroleum-based fuels. [FN397] It would have explicitly preempted state GHG cap-and-trade programs but would not have interfered directly with state RPS programs. [FN398]

The legislation's greatest strength was its bi-partisan sponsorship. However, in April 2010, Senator Graham withdrew his sponsorship of the bill as a result of partisan disagreement with the Senate Democratic leadership over highly politicized immigration reform before the November 2010 elections. [FN399] Senator Graham was also unsupportive of the legislation because it would have expanded offshore oil-drilling activities—a topic too controversial after the Deepwater Horizon drilling explosion and oil spill. [FN400] This spelled the end of the Kerry-Lieberman-Graham bill and of *242 any hope of passing legislation that would enact a federal RPS or GHG control program during this Congress.

The Senate impasse may delay federal legislation on GHG control and a federal RPS statute until the 112th Congress convenes in January 2011. At the very least, the delay in enacting preemptive federal GHG legislation means 2010-2012 GHG compliance standards that are already mandated by state and regional GHG programs are in jeopardy of delay.

It is too early to predict what federal legislation ultimately will control utility production or GHG emissions. The EPA, the Obama administration, and most industry and trade groups have consistently preferred uniform federal legislation to address climate change over the existing inconsistent patchwork of state regulation or federal agency regulation under the Clean Air Act. [FN401] Ultimately, with regard to RPS programs:

Public opinion polls, growing support from utilities, and continually increasing state RPS legislation indicate that support for a renewable mandate is stronger than ever. However, opposition remains strong. Rightly or wrongly, the majority of Americans appear ready to take a calculated risk to find out if renewable energy can fulfill its promise. The question remains: Is Congress? [FN402]

D. EPA Action to Control Greenhouse Gases

During the Bush Administration, the EPA was reluctant to regulate CO₂ emissions. [FN403] However, in 2007, the U.S. Supreme Court declared CO₂ and other GHGs to be "pollutants" under the Clean Air Act. [FN404] This prompted the EPA to accept responsibility for the issue and begin, albeit slowly, to consider using existing Clean Air Act authority to regulate GHG pollutants emitted by new motor vehicles (and ultimately stationary emitters as well). [FN405] On December 15, 2009, the EPA issued an *243 endangerment finding with regard to CO₂ under section 202 of the Clean Air Act. [FN406] Pursuant to the Supreme Court decision, this obligated the EPA to regulate GHG emissions as pollutants. [FN407]

In May 2010, the EPA promulgated final GHG emission standards for new motor vehicles in model years 2012-2016. [FN408] The date of mandated compliance for these standards will, in turn, trigger permitting requirements and the imposition of Best Available Control Technology ("BACT") for new major stationary sources of GHGs. [FN409] The EPA is prepared to require specified new and modified stationary facilities, including new and modified electric generators, to install BACT for GHG emissions as soon as January 2, 2011. [FN410]

There have been repeated congressional attempts to prohibit the EPA from regulating GHG emissions as a pollutant under the Clean Air Act. To date they have failed. [FN411] Most recently, in June 2010, Senator Lisa Murkowski (R-Alaska) tried to pass a Senate Resolution "disapproving" EPA's finding that GHGs endanger human health and the environment. [FN412] This resolution failed by a vote of 53-47. [FN413] It is generally agreed that the Clean Air Act was not designed to regulate GHG emissions that are both non-toxic and widely dispersed. [FN414] However, in the *244 absence of comprehensive federal climate change legislation to regulate GHG emissions directly, it seems unlikely that Congress or the current administration would approve legislation that eliminates the EPA's jurisdiction and the federal government's primary weapon against climate change.

IV. International Climate Change Programs

At present there is international hesitation about continuing stringent GHG controls past 2012. A brief his-

tory follows.

A. United Nations Framework Convention on Climate Change and the Kyoto Protocol

The UNFCCC is an international environmental treaty to “stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system.” [FN415] The 1997 Kyoto Protocol to the UNFCCC seeks to retard global warming through international cooperative efforts to reduce GHG emissions from multiple sectors. [FN416]

The Kyoto Protocol required two steps to become effective. Fifty-five UNFCCC members had to sign. [FN417] This happened in 2002. [FN418] The signatories also had to represent at least fifty-five percent of GHG emissions from all developed nations; this requirement was not met until 2005. [FN419] Once effective, the Kyoto Protocol set binding GHG reduction targets for thirty-seven industrialized countries and the European community, otherwise known as the Annex I Nations. [FN420] On average, Kyoto's targets require GHG emissions to reduce to ninety-five percent of 1990 levels by *245 2012. [FN421] The Kyoto Protocol did not impose binding GHG reductions on developing (Annex II) nations such as India and China. [FN422] Although the United States is a UNFCCC member and signed the protocol, it never ratified it [FN423] and was, thus, not bound by its terms. In his campaign, President Bush promised to support GHG emission reductions. [FN424] However, in 2001, he refused to submit the Kyoto Protocol to the Senate for ratification because it did not impose binding GHG reductions on the so-called developing nations, particularly the Annex II Nations. [FN425] During the 1997 international negotiations that produced the Kyoto Protocol, and again later in 2005, the Senate passed a resolution supporting international GHG regulation only if it included binding GHG controls for developed and developing nations alike. [FN426] As of November 2009, 186 states have signed and ratified the protocol. [FN427] The United States is the only major nation that has not subscribed. [FN428] The Kyoto Protocol did not create an international RPS or mandate any requirement for renewable energy. Rather, it requires developed nation signatories to reduce their total GHG emissions. [FN429] To meet these goals, the Kyoto Protocol provided frameworks for emissions trading, offset development, and opportunities for Annex I countries to meet part of their GHG emission reductions by sponsoring projects that reduce GHG emissions in Annex II countries. [FN430]

The Protocol was generally considered an important first step toward a global program to reduce and stabilize GHG emissions and retard climate change. [FN431] However, the Kyoto Protocol's mandatory compliance *246 provisions only apply through 2012, [FN432] and as of this writing there is no agreement in place to continue them.

B. The Copenhagen Accord and Next Steps

Before the mandatory Kyoto Protocol programs were set to expire, the UNFCCC sought a continuing international agreement to require mandatory emission reductions after 2012. [FN433] The international community, including the United States, tried to extend the Kyoto Protocol at a formal UNFCCC conference in Copenhagen in December 2009. [FN434]

Unfortunately, the 2009 global economic recession restricted the availability of bank capital needed to fund GHG emissions reductions. [FN435] Although recession-related reduction in global industrial activities reduced global GHG emissions somewhat, the political and market demand for continuing reductions seemed to evaporate.

ate. [FN436] 2009 and 2010 efforts to extend Kyoto compliance past 2012 failed. [FN437]

Unable to agree on a binding extension of the Kyoto Protocol's GHG controls, the Copenhagen conference delegates could only "take note" of the "Copenhagen Accord," a non-binding recognition of their joint intentions to limit future global warming to less than two degrees Celsius [FN438] and to establish a \$100 billion fund to assist developing countries in reducing their GHG emissions. [FN439] In June 2010, the UNFCCC held inconclusive climate change talks in Bonn. [FN440] Thereafter, the G-8 and G-20 nation meetings in Toronto, Canada, gave little consideration to climate change. [FN441]

***247** As the global economy recovers, evidence of accelerating climate change may return to the headlines and may again be important to the international community. However, as of the writing of this article, international commitment to additional significant GHG reductions seemed lukewarm at best, [FN442] and future international GHG reduction obligations which might bind the United States are delayed and uncertain.

V. State RPS Performance

Any current review of state RPS performance to date is complicated by the fact that almost all RPS reporting is done in retrospect, usually months after the end of each compliance period. [FN443] Thus, as of this writing, most 2009 compliance reports have yet to become public, and there is scant information available on 2010 activities. In addition, some of the state programs do not even require first compliance until 2010 or later. [FN444] Nevertheless, some conclusions are possible.

The U.S. Energy Information Administration ("EIA") projects that there will be increased growth in renewable resources due to the American Recovery and Reinvestment Act of 2009 ("ARRA"). In particular the EIA notes:

Generation from renewable resources grows in response to the extension of key Federal tax credits and the loan guarantee program in ARRA, which greatly increases renewable generation relative to the projections in earlier outlooks. Additional growth is also supported by the many State requirements for renewable generation. The [projected] share ***248** of generation coming from renewable fuels grows from 9 percent in 2008 to 17 percent in 2035. [FN445]

As of 2008, the EIA reported a total of 1100 GW [FN446] of installed electric generation capacity in RPS and non-RPS states. [FN447] Total generation was 4,119,000 gigawatt hours ("GWh"). [FN448] Approximately nine percent of U.S. electric power came from hydroelectric and other renewable resources. [FN449]

Table 8. 2008 U.S. Electric Capacity and Energy Production [FN450]

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***249** Based on current projections, in 2025, the thirty states with mandatory RPS requirements will generate fifty-six percent of all U.S. electricity. [FN451] Their 2025 weighted RPS average goal means twenty-one percent of generation from RPS states will be renewable. [FN452] Further, the EPA estimates that, by 2035, renewables will generate seventeen percent of total U.S. electricity. [FN453] This is consistent with existing RPS goals. [FN454]

According to a November 2009 study by the Lawrence Berkeley National Laboratory, state RPS programs are indeed accelerating renewable energy development. [FN455] Since 1998, more than sixty percent of new re-

newable development occurred in RPS states, and the bias toward RPS states is increasing. [FN456] Although renewable energy is currently nine percent of total U.S. electric generation, its share is predicted to increase to seventeen percent by 2035. [FN457] In fact, from 1999 to 2025, new renewable energy will serve twenty-seven percent of the new U.S. load. [FN458] According to the same study, by 2025, state RPS programs will require 77 GW of new renewable generation. [FN459] To put this figure in perspective: a large coal plant currently can produce approximately 1000 MW (1 GW); [FN460] most wind farm projects can produce between 50-300 MW; [FN461] but few operating solar plants are larger than 5 MW. [FN462] At this rate, an additional 77 GW of solar capacity *250 would require 130,000 5-MW projects or 2000 300-MW wind projects. Obviously, the average annual number and size of renewable projects, especially solar projects, must increase significantly to meet a 77-GW requirement. Nonetheless, the record is encouraging. Since 2004, installed U.S. wind energy capacity has more than quadrupled from approximately 7 GW to 30 GW. [FN463] In fact, wind energy represented thirty percent of all new generation that came online in 2007. [FN464] Proposed new renewable energy projects dominate the schedules for new generation, which is reflected in the interconnection queues for the California ISO (more than sixty-six percent renewable), the Midwest ISO (eighty percent renewable), the New York ISO (more than sixty-two percent renewable) and the Southwest Power Pool (more than ninety percent wind). [FN465]

It is difficult to predict whether the state RPS programs will meet their goals by 2025. Some utilities have missed their initial compliance goals; [FN466] however, enforcement actions have often been limited, and compliance penalties have been waived or reduced. [FN467] Nevertheless, as of 2007, other than New York, Nevada, and Wisconsin, all utilities with 2007 compliance obligations reported that they had met at least ninety percent of their goals. [FN468] Also, Iowa, New York, and Illinois report they have not been subject to penalties as of 2010. [FN469] It is generally thought that California's utilities will miss their twenty percent target by the end of 2010 but will reach their targets by the end of 2011. [FN470]

RPS requirements generally increase dramatically in later years, but new renewable generation, to meet these requirements, will require investment of hundreds of billions of dollars in the next fifteen years. Below, Table 9 compares the current percentage of renewables-including hydroelectric, wind, biomass, and geothermal-present in the generation mix of the major U.S. ISOs. As can be seen by this table, renewables have a long way to go to meet future RPS targets.

*251 Table 9. Current Renewable Generation by ISO [FN471]

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE

*252 It is even harder to predict whether it would be easier to increase renewable generation in the United States if there were a uniform federal RPS instead of thirty mandatory state programs. Extending the existing state RPS requirements to all fifty states would raise the amount of required new renewable generation by at least eighty percent, [FN472] and, at current requirements, a fifty-state RPS would almost double the renewable energy required by 2035. [FN473] It would obviously be more difficult for the nation's transmission grid to support 107-137 GW of new renewable energy rather than the 60-77 GW currently required. But these questions are beyond the scope of this article.

Conclusions

Casey Stengel said, "making predictions is very difficult, especially about the future." [FN474] What will happen next with RPS programs and climate change control?

Scientific consensus on GHG emissions, resulting climate change, and its anthropogenic causes is overwhelming. Climate change and global warming are highly probable, according to the most recent report issued by the UNIPCC. [FN475] This hypothesis fits the historic data. [FN476] Even more important, for the past twenty years the UNIPCC has accurately and consistently predicted future climate events and trends. [FN477] Evidence indicates that the utilities and developers are prepared to site, build, and interconnect resources required by their regulators and, to date, have met most of their goals. [FN478]

However, significant obstacles exist. For example, if state regulatory agencies do not assure that utilities can recover the extra costs of renewable*253 energy from their customers, the credit markets may not finance the required projects. If siting agencies delay or do not permit the new renewable projects and transmission lines necessary to deliver new renewable energy to utilities and customers, meeting the goals will be similarly delayed. It is likely that the regulatory agencies that will be involved in these decisions, and the U.S. response to climate change generally, will reflect current politics and public opinion. However, public opinion that thinks climate change is real is declining, [FN479] as is the opinion that renewable energy is needed to curb it. [FN480] In 2008, seventy-one percent of respondents to a Pew Research Center for the People & the Press poll said that there was solid evidence of rising global temperatures. [FN481] In 2010, only fifty-seven percent held the same opinion. [FN482]

There has been a similar decline in the number of Americans who believe global temperatures are rising as a result of human activity, such as burning fossil fuels. Thirty-six percent held that belief in 2009, which is down from forty-seven percent in 2008. [FN483] A 2008 survey of polls on U.S. climate change found sixty-five percent of respondents thought climate change was an urgent threat, and fifty-two percent said climate change was “extremely” or “very” important. [FN484] However, the respondents ranked climate change twentieth in a list of twenty-one issues of concern. [FN485] In 2009, forty-eight percent of U.S. respondents to a World Bank poll were willing to pay one percent of GDP per capita to retard climate change. [FN486] Fifty-two percent thought the United States should do more than it was doing, but the respondents rated climate change only a 4.7 on an importance scale of 1-10. [FN487] Finally, a 2010 Gallup Poll of U.S. voters found that *254 only twenty-two percent of respondents thought the environment, including global warming, was “extremely important.” [FN488] Poll participants ranked environmental and global warming issues least important when compared to the economy, healthcare, unemployment, the federal deficit, terrorism, and Afghanistan. [FN489]

In the past year, there has been a sharp decline in the percentage of Americans who think there is solid evidence that global temperatures are rising. In addition, fewer see global warming as a very serious problem: thirty-five percent today, down from forty-four percent in April 2008. [FN490]

What is not predictable is the effect unchecked climate change will have on life as our biosphere has evolved. This year (2010) saw record heat and fires in the former Soviet Union, [FN491] major flooding in Pakistan, [FN492] heat waves across the United States, [FN493] and other evidence that climate change is the next Damocletian sword hanging over us. Whether political and public opinion will respond to that evidence is yet to be seen.

But climate change is not the first “end of the world as we know it” hypothesis. Philosophers, scientists, and politicians have extrapolated existing conditions to predict future disaster or utopia before. In 1798, Thomas Malthus predicted that inexorable population growth would inevitably create famine, war, or disease; and that human misery and vice were inevitable. [FN494] In 1956, M. King Hubbert predicted that recoverable petroleum reserves were finite and that the world would exhaust them by 2150. [FN495] In 1972, the Club of Rome

used computers to create a novel global model that allegedly proved human growth would be seriously constrained by global resources-particularly oil-which were, by definition, *255 finite. [FN496] The computer predicted that, without additional discoveries, oil would probably be exhausted before the end of the twentieth century, and economic growth could not be sustained. [FN497] In 1992, Francis Fukuyama argued that the end of the Cold War was the end of history, and victorious liberal democracy, the endpoint of ideological evolution, would assure the world stability for the foreseeable future. [FN498]

Mindful of past errors, the status and future of RPS and GHG reduction programs seem to be:

1. International GHG reduction programs are in relative disarray since the Copenhagen and Bonn conferences failed to extend Kyoto's compliance mechanisms. [FN499] Because of the global recession, some countries such as Australia suspended commitments to reduce GHG until the economy improves and post Kyoto regulation becomes more certain. [FN500]

2. Comprehensive U.S. federal climate control legislation and national RPS standards are significantly delayed by competing economic interests, a Senate hamstrung by the filibuster, and general partisan disagreement. [FN501] The Republican victories in the November 2010 election make comprehensive climate control legislation even less likely. [FN502]

3. Federal regulatory control of GHG proceeds as the EPA (starting in 2011) expands its regulation of GHG emissions from new motor vehicles and large stationary GHG emitters, such as utility generators. [FN503] Although the Clean Air Act is a cumbersome tool for managing GHG emissions, recent Senate *256 proposals to substitute comprehensive federal GHG management for EPA regulation have not succeeded. [FN504] The November 2010 elections did not give Congress the opportunity to prohibit further EPA GHG regulation.

4. State RPS programs continue in place. Congressional climate change legislation might preempt state and regional GHG cap-and-trade systems, but congressional RPS proposals have not interfered with stricter state RPS requirements. [FN505]

5. The American public is becoming less concerned with climate change. [FN506] The decline in public concern makes it less certain that the 111th Congress will address climate change or that Congress will preempt existing state RPS programs in favor of "uniform national" regulation. [FN507]

6. In the meantime, utilities in RPS states are scrambling to meet their respective RPS obligations, and utilities in the RGGI states continue to participate in orderly, albeit low cost, [FN508] CO₂ auctions to certify compliance with RGGI CO₂ emissions caps. [FN509] WCI is going forward with GHG cap-and-trade, but California and New Mexico are the only states to have agreed to start WCI compliance in 2012. [FN510]

7. There will be substantial costs and delay as utilities move to meet their RPS targets. Economic conditions, *257 public opinion, environmental siting disputes, and capital market constraints will all contribute to RPS success or failure. However, GHG reductions and RPS compliance will continue to be a significant component of U.S. climate change policy.

RPS programs were originally designed to fill the hole created by insufficient renewable energy in utility generating portfolios. [FN511] However, they are one of the most significant U.S. responses to global warming and climate change to date. Existing state RPS programs are going forward and will continue to significantly reduce U.S. GHG emissions for the foreseeable future, regardless of federal or international action. RPS pegs may be "square," but they are effectively fitting and filling a significant portion of the climate change "round" holes.

*258 Appendix A

1998 KYOTO PROTOCOL TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE [FN512] (“Abridged”)

Article 3

1. The Parties included in Annex I shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B and in accordance with the provisions of this Article, with a view to reducing their overall emissions of such gases by at least 5 per cent below 1990 levels in the commitment period 2008 to 2012.

2. Each Party included in Annex I shall, by 2005, have made demonstrable progress in achieving its commitments under this Protocol.

3. The net changes in greenhouse gas emissions by sources and removals by sinks resulting from direct human-induced land-use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990, measured as verifiable changes in carbon stocks in each commitment period, shall be used to meet the commitments under this Article of each Party included in Annex I. The greenhouse gas emissions by sources and removals by sinks associated with those activities shall be reported in a transparent and verifiable manner and reviewed in accordance with Articles 7 and 8.

4. Prior to the first session of the Conference of the Parties serving as the meeting of the Parties to this Protocol, each Party included in Annex I shall provide, for consideration by the Subsidiary Body for Scientific and Technological Advice, data to establish its level of carbon stocks in 1990 and to enable an estimate to be made of its changes in carbon stocks in subsequent years.

7. In the first quantified emission limitation and reduction commitment period, from 2008 to 2012, the assigned amount for each Party included in Annex I shall be equal to the percentage inscribed for it in Annex B of its aggregate anthropogenic carbon dioxide equivalent emissions of the *259 greenhouse gases listed in Annex A in 1990, or the base year or period determined in accordance with paragraph 5 above, multiplied by five. Those Parties included in Annex I for whom land-use change and forestry constituted a net source of greenhouse gas emissions in 1990 shall include in their 1990 emissions base year or period the aggregate anthropogenic carbon dioxide equivalent emissions by sources minus removals by sinks in 1990 from land-use change for the purposes of calculating their assigned amount.

10. Any emission reduction units, or any part of an assigned amount, which a Party acquires from another Party in accordance with the provisions of Article 6 or of Article 17 shall be added to the assigned amount for the acquiring Party.

11. Any emission reduction units, or any part of an assigned amount, which a Party transfers to another Party in accordance with the provisions of Article 6 or of Article 17 shall be subtracted from the assigned amount for the transferring Party.

12. Any certified emission reductions which a Party acquires from another Party in accordance with the provisions of Article 12 shall be added to the assigned amount for the acquiring Party.

13. If the emissions of a Party included in Annex I in a commitment period are less than its assigned amount under this Article, this difference shall, on request of that Party, be added to the assigned amount for that Party for subsequent commitment periods.

14. Each Party included in Annex I shall strive to implement the commitments mentioned in paragraph 1 above in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. In line with relevant decisions of the Conference of the Parties on the implementation of those paragraphs, the Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first ses-

sion, consider what actions are necessary to minimize the adverse effects of Climate Change and/or the impacts of response measures on Parties referred to in those paragraphs. Among the issues to be considered shall be the establishment of funding, insurance and transfer of technology.

Article 4

1. Any Parties included in Annex I that have reached an agreement to fulfill their commitments under Article 3 jointly, shall be deemed to have met those commitments provided that their total combined aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts calculated pursuant to *260 their quantified emission limitation and reduction commitments inscribed in Annex B and in accordance with the provisions of Article 3. The respective emission level allocated to each of the Parties to the agreement shall be set out in that agreement.

....

Article 5

1. Each Party included in Annex I shall have in place, no later than one year prior to the start of the first commitment period, a national system for the estimation of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol.

Article 6

1. For the purpose of meeting its commitments under Article 3, any Party included in Annex I may transfer to, or acquire from, any other such Party emission reduction units resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy, provided that:

- (a) Any such project has the approval of the Parties involved;
- (b) Any such project provides a reduction in emissions by sources, or an enhancement of removals by sinks, that is additional to any that would otherwise occur;
- (c) It does not acquire any emission reduction units if it is not in compliance with its obligations under Articles 5 and 7; and
- (d) The acquisition of emission reduction units shall be supplemental to domestic actions for the purposes of meeting commitments under Article 3.

....

Article 8

1. The information submitted under Article 7 by each Party included in Annex I shall be reviewed by expert review teams pursuant to the relevant decisions of the Conference of the Parties and in accordance with guidelines adopted for this purpose by the Conference of the Parties serving as the meeting of the Parties to this Protocol under paragraph 4 below.

....

Article 11

1. In the implementation of Article 10, Parties shall take into account the provisions of Article 4, paragraphs 4, 5, 7, 8 and 9, of the Convention.

2. In the context of the implementation of Article 4, paragraph 1, of the Convention, in accordance with the provisions of Article 4, paragraph 3, and Article 11 of the Convention, and through the entity or entities entrusted with the operation of the financial mechanism of the Convention, the developed country Parties and other developed Parties included in Annex II to the Convention shall:

- *261 (a) Provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in advancing the implementation of existing commitments under Article 4, paragraph 1 (a), of the Convention that are covered in Article 10, subparagraph (a); and
- (b) Also provide such financial resources, including for the transfer of technology, needed by the de-

veloping country Parties to meet the agreed full incremental costs of advancing the implementation of existing commitments under Article 4, paragraph 1, of the Convention that are covered by Article 10 and that are agreed between a developing country Party and the international entity or entities referred to in Article 11 of the Convention, in accordance with that Article.

The implementation of these existing commitments shall take into account the need for adequacy and predictability in the flow of funds and the importance of appropriate burden sharing among developed country Parties. The guidance to the entity or entities entrusted with the operation of the financial mechanism of the Convention in relevant decisions of the Conference of the Parties, including those agreed before the adoption of this Protocol, shall apply mutatis mutandis to the provisions of this paragraph.

3. The developed country Parties and other developed Parties in Annex II to the Convention may also provide, and developing country Parties avail themselves of, financial resources for the implementation of Article 10, through bilateral, regional and other multilateral channels.

....

Article 17

The Conference of the Parties shall define the relevant principles, modalities, rules and guidelines, in particular for verification, reporting and accountability for emissions trading. The Parties included in Annex B may participate in emissions trading for the purposes of fulfilling their commitments under Article 3. Any such trading shall be supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments under that Article.

Article 18

The Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session, approve appropriate and effective procedures and mechanisms to determine and to address cases of non-compliance with the provisions of this Protocol, including through the development of an indicative list of consequences, taking into account the cause, type, degree and frequency of non-compliance. Any procedures and mechanisms under this Article entailing binding consequences shall be adopted by means of an amendment to this Protocol.

....

*262 Article 25

1. This Protocol shall enter into force on the ninetieth day after the date on which not less than 55 Parties to the Convention, incorporating Parties included in Annex I which accounted in total for at least 55 per cent of the total carbon dioxide emissions for 1990 of the Parties included in Annex I, have deposited their instruments of ratification, acceptance, approval or accession.

....

IN WITNESS WHEREOF the undersigned, being duly authorized to that effect, have affixed their signatures to this Protocol on the dates indicated.

*263 Annex A

Greenhouse Gases Sectors/source categories
Carbon dioxide (CO₂) Energy
Methane (CH₄) Fuel combustion
Nitrous oxide (N₂O) Energy industries
Hydrofluorocarbons (HFCs) Manufacturing industries and construction
Perfluorocarbons (PFCs) Transport
Sulphur hexafluoride (SF₆) Other sectors

Fugitive emissions from fuels Other
 Solid fuels Solvent and other product use
 Oil and natural gas Agriculture
 Other Enteric fermentation
 Industrial processes Manure management
 Mineral products Rice cultivation
 Chemical industry Agricultural soils
 Metal production Prescribed burning of savannas
 Other production Field burning of agricultural residues
 Production of halocarbons and sulphur hexafluoride Other
 Consumption of halocarbons and sulphur hexafluoride Waste
 Other Solid waste disposal on land
 Wastewater handling
 Waste incineration
 Other

***264 Annex B**

Party Quantified emission limitation or reduction commitment
(percentage of base year or period)

Australia 108
 Austria 92
 Belgium 92
 Bulgaria* 92
 Canada 94
 Croatia* 95
 Czech Republic* 92
 Denmark 92
 Estonia* 92
 European Community 92
 Finland 92
 France 92
 Germany 92
 Greece 92
 Hungary* 94
 Iceland 110
 Ireland 92
 Italy 92
 Japan 94
 Latvia* 92
 Liechtenstein 92
 Lithuania* 92
 Luxembourg 92
 Monaco 92
 Netherlands 92

New Zealand 100
Norway 101
Poland* 94
Portugal 92
Romania* 92
Russian Federation* 100
Slovakia* 92
Slovenia* 92
Spain 92
Sweden 92
Switzerland 92
Ukraine* 100
United Kingdom of Great Britain and Northern Ireland 92
United States of America 93
* Countries that are undergoing the process of transition to a market economy.

***265** Appendix B

Text of the Copenhagen Accord [\[FN513\]](#)

The Conference of the Parties,

Takes note of the Copenhagen Accord of 18 December 2009.

The Heads of State, Heads of Government, Ministers, and other heads of the following delegations present at the United Nations Climate Change Conference 2009 in Copenhagen:

...

In pursuit of the ultimate objective of the Convention as stated in its Article 2, Being guided by the principles and provisions of the Convention, Noting the results of work done by the two Ad hoc Working Groups, Endorsing decision 1/CP.15 on the Ad hoc Working Group on Long-term Cooperative Action and decision 1/CMP.5 that requests the Ad hoc Working Group on Further Commitments of Annex I Parties under the Kyoto Protocol to continue its work, Have agreed on this Copenhagen Accord which is operational immediately.

1. We underline that climate change is one of the greatest challenges of our time. We emphasise our strong political will to urgently combat climate change in accordance with the principle of common but differentiated responsibilities and respective capabilities. To achieve the ultimate objective of the Convention to stabilize greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system, we shall, recognizing the scientific view that the increase in global temperature should be below 2 degrees Celsius, on the basis of equity and in the context of sustainable development, enhance our long-term cooperative action to combat climate change. We recognize the critical impacts of climate change and the potential impacts of response measures on countries particularly vulnerable to its adverse effects and stress the need to establish a comprehensive adaptation programme including international support.

***266** 2. We agree that deep cuts in global emissions are required according to science, and as documented by the IPCC Fourth Assessment Report with a view to reduce global emissions so as to hold the increase in global temperature below 2 degrees Celsius, and take action to meet this objective consistent with science and on the basis of equity. We should cooperate in achieving the peaking of global and na-

tional emissions as soon as possible, recognizing that the time frame for peaking will be longer in developing countries and bearing in mind that social and economic development and poverty eradication are the first and overriding priorities of developing countries and that a low-emission development strategy is indispensable to sustainable development.

3. Adaptation to the adverse effects of climate change and the potential impacts of response measures is a challenge faced by all countries. Enhanced action and international cooperation on adaptation is urgently required to ensure the implementation of the Convention by enabling and supporting the implementation of adaptation actions aimed at reducing vulnerability and building resilience in developing countries, especially in those that are particularly vulnerable, especially least developed countries, small island developing States and Africa. We agree that developed countries shall provide adequate, predictable and sustainable financial resources, technology and capacity-building to support the implementation of adaptation action in developing countries.

4. Annex I Parties commit to implement individually or jointly the quantified economywide emissions targets for 2020, to be submitted in the format given in Appendix I by Annex I Parties to the secretariat by 31 January 2010 for compilation in an INF document. Annex I Parties that are Party to the Kyoto Protocol will thereby further strengthen the emissions reductions initiated by the Kyoto Protocol. Delivery of reductions and financing by developed countries will be measured, reported and verified in accordance with existing and any further guidelines adopted by the Conference of the Parties, and will ensure that accounting of such targets and finance is rigorous, robust and transparent.

5. Non-Annex I Parties to the Convention will implement mitigation actions, including those to be submitted to the secretariat by non-Annex I Parties in the format given in Appendix II by 31 January 2010, for compilation in an INF document, consistent with Article 4.1 and Article 4.7 and in the context of sustainable development. Least developed countries *267 and small island developing States may undertake actions voluntarily and on the basis of support. Mitigation actions subsequently taken and envisaged by Non-Annex I Parties, including national inventory reports, shall be communicated through national communications consistent with Article 12.1(b) every two years on the basis of guidelines to be adopted by the Conference of the Parties. Those mitigation actions in national communications or otherwise communicated to the Secretariat will be added to the list in appendix II. Mitigation actions taken by Non-Annex I Parties will be subject to their domestic measurement, reporting and verification the result of which will be reported through their national communications every two years. Non-Annex I Parties will communicate information on the implementation of their actions through National Communications, with provisions for international consultations and analysis under clearly defined guidelines that will ensure that national sovereignty is respected. Nationally appropriate mitigation actions seeking international support will be recorded in a registry along with relevant technology, finance and capacity building support. Those actions supported will be added to the list in appendix II. These supported nationally appropriate mitigation actions will be subject to international measurement, reporting and verification in accordance with guidelines adopted by the Conference of the Parties.

6. We recognize the crucial role of reducing emission from deforestation and forest degradation and the need to enhance removals of greenhouse gas emission by forests and agree on the need to provide positive incentives to such actions through the immediate establishment of a mechanism including REDD-plus, to enable the mobilization of financial resources from developed countries.

7. We decide to pursue various approaches, including opportunities to use markets, to enhance the cost-effectiveness of, and to promote mitigation actions. Developing countries, especially those with low emitting economies should be provided incentives to continue to develop on a low emission pathway.

8. Scaled up, new and additional, predictable and adequate funding as well as improved access shall

be provided to developing countries, in accordance with the relevant provisions of the Convention, to enable and support enhanced action on mitigation, including substantial finance to reduce emissions from deforestation and forest degradation (REDD-plus), adaptation, technology development and transfer and capacity-building, for *268 enhanced implementation of the Convention. The collective commitment by developed countries is to provide new and additional resources, including forestry and investments through international institutions, approaching USD 30 billion for the period 2010-2012 with balanced allocation between adaptation and mitigation. Funding for adaptation will be prioritized for the most vulnerable developing countries, such as the least developed countries, small island developing States and Africa. In the context of meaningful mitigation actions and transparency on implementation, developed countries commit to a goal of mobilizing jointly USD 100 billion dollars a year by 2020 to address the needs of developing countries. This funding will come from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources of finance. New multilateral funding for adaptation will be delivered through effective and efficient fund arrangements, with a governance structure providing for equal representation of developed and developing countries. A significant portion of such funding should flow through the Copenhagen Green Climate Fund.

9. To this end, a High Level Panel will be established under the guidance of and accountable to the Conference of the Parties to study the contribution of the potential sources of revenue, including alternative sources of finance, towards meeting this goal.

10. We decide that the Copenhagen Green Climate Fund shall be established as an operating entity of the financial mechanism of the Convention to support projects, programme, policies and other activities in developing countries related to mitigation including REDD-plus, adaptation, capacitybuilding, technology development and transfer.

11. In order to enhance action on development and transfer of technology we decide to establish a Technology Mechanism to accelerate technology development and transfer in support of action on adaptation and mitigation that will be guided by a country-driven approach and be based on national circumstances and priorities.

12. We call for an assessment of the implementation of this Accord to be completed by 2015, including in light of the Convention's ultimate objective. This would include consideration of strengthening the long-term goal referencing various matters presented by the science, including in relation to temperature rises of 1.5 degrees Celsius.

[FNa1]. Ivan Gold is senior counsel in Perkins Coie LLP's Portland, Oregon office. Nidhi Thakar is an associate in the firm's Washington, D.C. office. The authors thank Matthew Slick and Patricia MacRae of Perkins Coie's Portland office for their tireless work on innumerable drafts.

[FN1]. See Energy Info. Admin., U.S. Dep't of Energy, *Electric Power Annual 2008*, at 43 tbl.3.9 (2010), <http://www.eia.doe.gov/cneaf/electricity/epa/epa.pdf> (showing that from 1997 through 2007 electric sector CO₂ emissions increased 12.6% from 2.25 to 2.54 million metric tons); Energy Info. Admin., U.S. Dep't of Energy, *Electric Power Monthly August 2010*, at 107 tbl. 5.1 (2010), <http://www.eia.doe.gov/cneaf/electricity/epm/epm.pdf> (showing that from 1997 through 2007 U.S. electricity retail sales increased 19.5% from 3,145 to 3,760 terawatt hours).

[FN2]. U.S. Env'tl. Prot. Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005*, ES-7 to ES-8 (2005), <http://www.epa.gov/climatechange/emissions/downloads06/07ES.pdf>.

[FN3]. *Id.* at ES-14.

[FN4]. See Electric Power Annual 2008, *supra* note 1, at 2 fig.ES-1.

[FN5]. *Id.* (showing that in 2008, coal, natural gas, and oil generated 70.7% of U.S. electricity).

[FN6]. Renewable Basics: What Is Renewable Energy?, Energy Info. Admin., U.S. Dep't of Energy, http://www.eia.doe.gov/kids/energy.cfm?page=renewable_home-basics (last visited Nov. 5, 2010).

[FN7]. Energy Info. Admin., U.S. Dep't of Energy, Renewable Energy Consumption and Electricity Preliminary Statistics 2009, at 1 fig.1 (2010), http://www.eia.doe.gov/cneaf/alternate/page/renew_energy_consump/pre-trends09.pdf [hereinafter Renewable energy consumption].

[FN8]. *Id.*

[FN9]. *Id.*

[FN10]. See, e.g., Financial Incentives for Renewable Energy, DSIRE: Database of State Incentives for Renewables & Efficiency, <http://www.dsireusa.org/summarytables/finre.cfm> (last visited Nov. 19, 2010).

[FN11]. Renewable Portfolio Standards Fact Sheet, U.S. Env'tl. Prot. Agency, http://www.epa.gov/chp/state-policy/renewable_fs.html (last updated April 2009).

[FN12]. *Id.* ("There can be multiple goals for an RPS Examples of broader goals and objectives include . . . local economic development goals; hedging fossil fuel price risks; and advancing specific technologies.").

[FN13]. See *infra* Part II.

[FN14]. See *infra* Figure 2. There are twenty-nine states plus Washington, D.C. that have an RPS but for ease of reference, this article will refer to this group as thirty states.

[FN15]. Ryan Wisner & Galen Barbose, Lawrence Berkeley Nat'l Lab., Renewable Portfolio Standards in the United States 5 (2008), <http://eetd.lbl.gov/ea/ems/reports/lbnl-154e-revised.pdf> [hereinafter RPS in the U.S.].

[FN16]. See *infra* Part III.

[FN17]. See *infra* Part III.

[FN18]. National Energy Act of 1978, **Pub. L. Nos. 95-617 to 95-621, 92 Stat. 3117-3411 (1978)** (codified as amended in scattered sections of 5, 12, 15, 16, 19, 23, 26, 31, 33, 40, 42, and 49 U.S.C.). The National Energy Act of 1978 included five major laws: the Public Utility Regulatory Policies Act, **Pub. L. No. 95-617, 92 Stat. 3117 (1978)** (codified as amended in scattered sections of 7, 13, 15, 16, 42, 43 U.S.C.); the Power Plant and Industrial Fuel Use Act, **Pub. L. No. 95-620, 92 Stat. 3289 (1978)** (codified as amended in scattered sections of 42 U.S.C.); the Natural Gas Policy Act, **Pub. L. No. 95-621, 92 Stat. 3350 (1978)** (codified as amended in scattered sections of 15 U.S.C.); the Energy Tax Act, **Pub. L. No. 95-618, 92 Stat. 3174 (1978)** (codified as amended at **26 U.S.C. § 4064**); and the National Energy Conservation Policy Act, **Pub. L. No. 95-619, 92 Stat. 3206** (codified as amended in scattered sections of 42 U.S.C.).

[FN19]. See, e.g., Incentives/Policies for Renewables & Efficiency, DSIRE: Database of State Incentives for Re-

newables & Efficiency, [http:// www.dsireusa.org/incentives/allsummaries.cfm](http://www.dsireusa.org/incentives/allsummaries.cfm) (last visited Nov. 19, 2010) (listing renewable energy financial incentive programs by state) [hereinafter Incentives/Policies for Renewable Energy].

[FN20]. See, e.g., *id.*; Renewable Portfolio Standards Fact Sheet, *supra* note 11.

[FN21]. See *infra* Appendix A.

[FN22]. Although LSEs may not always meet the traditional legal definition of utilities, this article refers to electric utilities and LSEs collectively as “utilities.”

[FN23]. See Renewable Portfolio Standards Fact Sheet, *supra* note 11.

[FN24]. See, e.g., The Renewable Portfolio Standard: How It Works and Why It's Needed, Am. Wind Energy Ass'n (Oct. 1997), [http:// www.awea.org/policy/rpsbrief.html](http://www.awea.org/policy/rpsbrief.html).

[FN25]. For ease of reference, this article refers to global warming, climate change, rising sea levels, increased GHG, and similar issues as “climate change.”

[FN26]. See, e.g., RPS in the U.S., *supra* note 15, at 2 n.2 (showing that mandatory RPS programs already exist in Australia, Belgium, Italy, Japan, Poland, Sweden, and the United Kingdom).

[FN27]. Essential Background, U.N. Framework Convention on Climate Change, http://unfccc.int/essential_background/items/2877.php (last visited Nov. 5, 2010). Today, the UNFCCC is comprised of 194 countries. *Id.*

[FN28]. *Id.*

[FN29]. See *infra* Appendix A.

[FN30]. Shankar Vedantam, Kyoto Treaty Takes Effect Today, Wash. Post, Feb. 16, 2005, at A4.

[FN31]. See James Russell & Janet Swain, Help Wanted: International Climate Change Mitigation Seeks Leader, World Watch Institute (Sept. 25, 2007), [http:// www.worldwatch.org/node/5369](http://www.worldwatch.org/node/5369).

[FN32]. See *id.*

[FN33]. See, e.g., Brent D. Yacobucci, Cong. Research Serv., RL32955, Climate Change Legislation in the 109th Congress 1 (2006). Twenty-one bills dealing with climate change legislation were introduced in the 109th Congress. *Id.* at app. 1.

[FN34]. See, e.g., Amy Harder, Waning Warming Debate, Nat'l J. (Aug. 11, 2008), available at http://epw.senate.gov/public/index.cfm?FuseAction=Minority.Blogs&ContentRecord_id=d6cdb39f-802a-23ad-492d-38f4101c455f&Issue_id=.

[FN35]. See Copenhagen 2009, Erantis, <http://www.erantis.com/events/denmark/copenhagen/climate-conference-2009/index.htm> (last visited Nov. 19, 2010).

[FN36]. See Emissions Action Delay, the Order of the Day, Carbon Positive (July 23, 2010), <http://www.carbonpositive.com>.

[tp://www.carbonpositive.net/viewarticle.aspx?articleID=2057](http://www.carbonpositive.net/viewarticle.aspx?articleID=2057).

[FN37]. See *infra* Appendix B.

[FN38]. See *infra* Appendix B (explaining the Accord's intentions and funding in paragraphs one and eight).

[FN39]. Selina Lee-Anderson, *Mission Impossible? Making Sense of the Copenhagen Accord*, *Blakes Bulletin: Environmental Law/CleanTech/Energy*, Jan. 2010, at 1, 1, available at http://www.blakes.com/english/legal_updates/environmental/jan_2010/Accord.pdf.

[FN40]. See RPS in the U.S., *supra* note 15, at 34.

[FN41]. See Support Renewable Energy Act of 2010, S. 3021, 111th Cong. (2010). The Bill was referred to the Senate Committee on Energy and Natural Resources. Bill Summary & Status 111th Congress (2009-2010) S.3021, Thomas, [http://thomas.loc.gov/cgi-bin/bdquery/z?d111:SN03021: X](http://thomas.loc.gov/cgi-bin/bdquery/z?d111:SN03021:X) (last visited Nov. 19, 2010).

[FN42]. See, e.g., Kate Galbraith & Matthew L. Wald, *The Energy Challenge: Energy Goals a Moving Target for States*, *N.Y. Times*, Dec. 5, 2008, at B1.

[FN43]. Calendar, UNFCCC, http://unfccc.int/meetings/unfccc_calendar/items/2655.php?year=2010 (last updated Nov. 19, 2010).

[FN44]. The federal government has taken some measures to control GHGs, but they are not yet effective. In 2009, the Environmental Protection Agency ("EPA") moved to control CO₂ and other GHGs. See *Massachusetts v. Envtl. Prot. Agency*, 549 U.S. 497, 528-29 (2006). In *Massachusetts*, the Supreme Court determined that the GHGs carbon dioxide, methane, nitrous oxide, and hydrofluorocarbons were pollutants under section 202(1) of the Clean Air Act ("CAA"), and EPA's administrator was required to regulate them as such unless the EPA found the pollutants did not endanger the public health and welfare. *Id.* In April 2009, the EPA administrator made a determination of endangerment, and in October 2009 issued a rule. *Mandatory Reporting of Greenhouse Gases*, 74 Fed. Reg. 56,260 (proposed Oct. 30, 2009) (to be codified at 40 C.F.R. pt. 86).

[FN45]. Thomas Lyon & Haitao Yin, *Why Do States Adopt Renewable Portfolio Standards? An Empirical Investigation* 36 fig.2 (2009), [http:// www.gcbpp.org/files/Academic_Papers/AP_Lyon_Why_do_states_909.pdf](http://www.gcbpp.org/files/Academic_Papers/AP_Lyon_Why_do_states_909.pdf).

[FN46]. *Id.*

[FN47]. See *infra* Figure 2.

[FN48]. See, e.g., *Tex. Util. Code Ann. § 39.904* (2009).

[FN49]. See, e.g., *New York Pub. Serv. Comm'n Case 03-E-0188, Order Regarding Retail Renewable Portfolio Standard* (Sept. 24, 2004), available at <http://documents.dps.state.ny.us/public/Common/ViewDoc.aspx?DocRefId=%7BB1830060-A43F-426D-8948-F60E6B754734%7D>.

[FN50]. See *infra* Figure 2.

[FN51]. See *infra* Figure 2. See also *infra* Table 3.

[FN52]. The sun is the ultimate driver of all these resources except geothermal. See, e.g., What Causes Wind?, WeatherQuestions.com, http://www.weatherquestions.com/What_causes_wind.htm (last visited Nov. 19, 2010) (explaining that wind occurs when sunlight has unevenly heated the earth's surface). This article, however, limits the definition of "solar energy" to direct use of radiant solar energy to make electric power ("photovoltaic"), or to heat a working fluid ("solar thermal").

[FN53]. See Renewable Energy Consumption, *supra* note 7, at 1 fig.1.

[FN54]. Paul Blystone, The Coming Energy Shift-Update, Celsias (Aug. 21, 2008), <http://www.celsias.com/article/coming-energy-shift-update/>.

[FN55]. *Id.*

[FN56]. Renewable Energy Consumption, *supra* note 7. Electric capacity, measured in watts, represents the ability to make electricity. See NEED Project, Secondary Energy Infobook 65 (2010), available at http://www.need.org/needpdf/infobook_activities/SecInfo/Elec3S.pdf. Electric energy, measured in watt hours, represents the electric power actually produced over time. See *id.* One watt of capacity can produce one watt hour of energy. See *id.* For simplicity, this article refers to electrical energy and/or electric capacity as "electrical power." See Blystone, *supra* note 54. In other words, the nation's renewable capacity did not generate as frequently as its nonrenewable generation.

[FN57]. Renewable Energy Consumption, *supra* note 7.

[FN58]. *Id.*

[FN59]. See *infra* Figure 2.

[FN60]. See *supra* notes 40-42 and accompanying text.

[FN61]. RPS in the U.S., *supra* note 15, at 5.

[FN62]. Ryan Wiser & Glen Barbose, Lawrence Berkeley Nat'l Lab., State of the States: Update on RPS Policies and Progress 9 (2009), available at http://www.cleanenergystates.org/Meetings/RPS_Summit_09/WISER_RPS_Summit2009.pdf [hereinafter State of the States].

[FN63]. See *infra* Table 3.

[FN64]. See *infra* Table 3.

[FN65]. See *infra* Figure 2.

[FN66]. See *infra* Table 3.

[FN67]. See *supra* Table 1.

[FN68]. States with Renewable Portfolio Standards, U.S. Dep't of Energy, http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm#map (last updated June 16, 2009).

[FN69]. Edward Holt, Clean Energy States Alliance, CESA State RPS Policy Report: Increasing Coordination and Uniformity Among State Renewable Portfolio Standards I (2008), available at http://www.cleanenergystates.org/Publications/CESA_Holt-RPS_Policy_Report_Dec2008.pdf.

[FN70]. See, e.g., *infra* Table 2.

[FN71]. See *infra* Table 3. Today, most programs cover all of the utilities in each RPS state. See *infra* Table 3.

[FN72]. All but Iowa, Kansas, and Texas define load as energy (kWh) rather than capacity (kW). See *Incentives/Policies for Renewable Energy*, *supra* note 19.

[FN73]. See generally *id.* (explaining the timelines and requirements for each state's RPS program).

[FN74]. See *id.*

[FN75]. See, e.g., *infra* Table 2 (indicating wave and tidal energy are incorporated into twenty-five states' RPS programs).

[FN76]. See *Incentives/Policies for Renewable Energy*, *supra* note 19.

[FN77]. See *id.*

[FN78]. See, e.g., State Programs, Regional Greenhouse Gas Initiative, <http://www.rggi.org/design/regulations> (last visited Nov. 5, 2010) ("Each Participating State's RGGI CO₂ Budget Trading Program is based upon its own statutory and/or regulatory authority."). See also *infra* Table 3 for examples of individual state statutory schemes.

[FN79]. See Holt, *supra* note 69, at 12.

[FN80]. *Id.* at 11-12.

[FN81]. *Id.* at 9-10. These states include: Colorado, Connecticut, D.C., Ohio, North Carolina, and Maine. See *infra* Table 3.

[FN82]. See *Incentives/Policies for Renewable Energy*, *supra* note 19; Spencer Reiss, Think Negawatts, Not Megawatts, *Wired* (Mar. 23, 2009), http://www.wired.com/science/discoveries/magazine/17-04/gp_efficiency.

[FN83]. See Holt, *supra* note 69, at 17.

[FN84]. *Id.*

[FN85]. Availability of the different options can vary by each state and are not necessarily available in every state's RPS program. See Holt, *supra* note 69, at i-iii.

[FN86]. *Incentives/Policies for Renewable Energy*, *supra* note 19.

[FN87]. In this article RECs include green tags, renewable energy credits, renewable electricity certificates, tradable energy certificates, and other tradable, non-tangible energy commodities in the United States that represent proof that one megawatt-hour (MWh) of electricity was generated from an eligible renewable energy re-

source. Id.

[FN88]. See id.

[FN89]. See Incentives/Policies for Renewable Energy, *supra* note 19.

[FN90]. Holt, *supra* note 69, at 17.

[FN91]. Id.

[FN92]. See id. at 18-19. States with alternative compliance payment programs include: Delaware, D.C., Massachusetts, Maryland, Maine, New Hampshire, New Jersey, Pennsylvania, and Rhode Island. Id. Where permitted, compliance payments satisfy RPS obligations although the utility does not actually acquire renewable generation or RECs. See id. at 18. Compliance payments are often priced in advance at fixed levels to provide price-out options to utilities in the REC market, preventing prices from becoming excessive. See id. In Massachusetts, for example, a utility can discharge its RPS obligation by paying an "alternative compliance payment," the price of which is set annually based on market demand. See Alternative Compliance Payment, Energy & Env'tl. Affairs, <http://www.mass.gov/> (search for "Alternative Compliance Payment Rates"; then follow "Alternative Compliance Payment Rates" hyperlink) (last visited Nov. 5, 2010).

[FN93]. See *infra* Part VI.

[FN94]. RPS in the U.S., *supra* note 15, at 24 (noting that states with financial penalties include: Arizona, California, Colorado, Connecticut, Hawaii, Minnesota, Montana, Nevada, Pennsylvania, Texas, Washington, and Wisconsin).

[FN95]. See, e.g., Nancy Rader, The Mechanics of a Renewables Portfolio Standard Applied at the Federal Level, Amer. Wind Energy Ass'n (Sept. 1997), <http://web.archive.org/web/20080313143510/http://www.awea.org/policy/rpsmechfed.html> (accessed by searching for American Wind Energy Association at the Internet Archive Index).

[FN96]. See, e.g., RPS in the U.S., *supra* note 15, at 23.

[FN97]. Id.

[FN98]. See *infra* Table 3. The states and their respective year of mandatory compliance are Arizona (2009), Colorado (2008), Illinois (2008), Montana (2008), and Pennsylvania (2007). See *infra* Table 3.

[FN99]. See *infra* Table 3 (listing the states as California, Connecticut, Delaware, D.C., Maryland, Massachusetts, Minnesota, New Jersey, and Ohio).

[FN100]. See *infra* Table 3.

[FN101]. Information in this table was principally derived from Incentives/Policies for Renewable Energy, *supra* note 19. Additionally, information in the Comment column was derived from Sindya N. Bhanoo, Arizona, in Switch, Pulls out of Regional Emissions Plan, N.Y. Times, Feb. 12, 2010, at A20; About ERCOT, Electric Reliability Council of Tex., <http://www.ercot.com/about/> (last visited Nov. 5, 2010); History of New York's Renewable Portfolio Standard, N.Y. State Energy Research & Dev. Auth., <http://www.nyserda.org/>

www.nysesda.org/rps/furtherreading.asp (last visited Nov. 5, 2010); Midwest Renewable Energy Tracking Sys., <http://mrets.net/index.asp> (last visited Nov. 5, 2010); New York's Central Procurement RPS Policy Tested as State Lags Target, IHS Emerging Energy Research (Mar. 18, 2010), <http://www.emerging-energy.com/Content/Document-Details/Renewable-Power/New-Yorks-Central-Procurement-RPS-Policy-Tested-as-State-Lags-Target/724.aspx>; Territory Map, W. Renewable Energy Generation Info. Sys., <http://www.wregis.org/territory-map.php> (last visited Nov. 5, 2010); Who We Are, PJM Interconnection, <http://www.pjm.com/about-pjm/who-we-are.aspx> (last visited Nov. 5, 2010).

[FN102]. See N.D. Cent. Code § 49-02-28 (2009); H.R. 3098, 52nd Leg., 2d Sess. (Okla. 2010); S.D. Codified Laws § 49-34A-101 (2009); Utah Code Ann. § 54-17-602 (2010); Vt. Stat. Ann. tit. 30, § 8005 (2009); Va Code Ann. § 56-585.2 (2009); W. Va. Code § 24-2F-5 (2009).

[FN103]. See Holt, *supra* note 69, at 11-12.

[FN104]. *Id.*

[FN105]. See *supra* Table 2.

[FN106]. See *supra* note 82 and accompanying text.

[FN107]. See *infra* Part II.E.

[FN108]. Edward A. Holt & Ryan H. Wisner, Lawrence Berkeley Nat'l Lab., LBNL-62574, The Treatment of Renewable Energy Certificates, Emissions Allowances, and Green Power Programs in State Renewables Portfolio Standards 5 tbl.1 (2010), available at <http://eetd.lbl.gov/ea/emp/reports/62574.pdf>. Arizona, California, Hawaii, and Iowa do not automatically permit unbundled RECs. *Id.*

[FN109]. See Holt, *supra* note 69, at 11-12.

[FN110]. RPS in the U.S., *supra* note 15, at 32.

[FN111]. See, e.g., Nat'l Wildlife Fed'n, Charting a New Path for West Virginia's Electricity Generation 1 (2007), available at http://www.nwf.org/Global-Warming/~media/PDFs/Global%20Warming/Clean%20Energy%20State%20Fact%20Sheets/WEST_VIRGINIA_10-22-8.ashx (noting that in 2007, West Virginia generated more than ninety-six percent of its electricity from coal-burning power plants).

[FN112]. Renewable Energy Certificates (RECs), Green Power P'ship, U.S. Env'tl. Prot. Agency, <http://www.epa.gov/greenpower/gpmarket/rec.htm> (last visited Nov. 5, 2010).

[FN113]. See Radiative Forcing, Stockholm Env't Inst., <http://www.co2offsetresearch.org/aviation/RF.html> (last visited Nov. 5, 2010).

[FN114]. RPS in the U.S., *supra* note 15, at 7.

[FN115]. *Id.*

[FN116]. *Id.* at 10 tbl.3.

[FN117]. See Incentives/Policies for Renewable Energy, *supra* note 19.

[FN118]. RPS in the U.S., *supra* note 15, at 10 tbl.3.

[FN119]. *Id.*

[FN120]. *Id.*

[FN121]. *Id.*

[FN122]. *Id.*

[FN123]. *Id.*

[FN124]. RPS in the U.S., *supra* note 15.

[FN125]. Renewable Portfolio Standards, DSIRE: Database of State Incentives for Renewables & Efficiency, http://www.dsireusa.org/documents/summarymaps/RPS_map.pptx (last visited Nov. 5, 2010) (The Database of State Incentives for Renewables & Efficiency (DSIRE) is a comprehensive source of information on state, local, utility, and federal incentives and policies that promote renewable energy and energy efficiency. Established in 1995 and funded by the U.S. Department of Energy, DSIRE is an ongoing project of the N.C. Solar Center and the Interstate Renewable Energy Council).

[FN126]. See Cal. Exec. Order S-21-09 (Sept. 15, 2009), available at <http://gov.ca.gov/index.php?/print-version/executive-order/13269/>.

[FN127]. See Press Release, Office of Governor Bill Ritter Jr., Gov. Ritter Signs Historic Renewable Energy Bill (Mar. 22, 2010), available at <http://www.colorado.gov/cs/Satellite/GovRitter/GOVR/1251573387639>. In March, 2010, Colorado's governor signed HB 10-1001, legislation raising the state's RPS target from twenty percent to thirty percent. *Id.*

[FN128]. S. 418, 48th Leg., Reg. Sess. (N.M. 2007).

[FN129]. See Nevada Governor Signs Bill Increasing State RPS, Pew Ctr. on Global Climate Change, <http://www.pewclimate.org/node/6583> (last visited Nov. 5, 2010). On June 8, 2009, Nevada Governor Jim Gibbons signed S.B. 395 into law. *Id.*

[FN130]. See Renewable Portfolio Standards, NACEL Energy, http://www.nacelenergy.com/news/archives_industry/RPS.pdf (last updated Dec. 4, 2008). On November 4, 2008, Missouri voters approved the Missouri Clean Energy Initiative. *Id.*

[FN131]. See Maine RPS, Pew Ctr. on Global Climate Change, <http://www.pewclimate.org/node/4669> (last visited Nov. 5, 2010). In 2007, Maine updated its 2006 goal and made it a mandatory target. *Id.*

[FN132]. Energy Efficiency and Affordability Act, *Vt. Stat. Ann. tit. 10, § 579* (2009).

[FN133]. H.R. 3039, 75th Leg. (Or. 2009) (signed July 2009).

[FN134]. A.B. 3520, 214th Leg. (N.J. 2010).

[FN135]. Clean and Affordable Energy Act of 2008, Council B. 17-492 (D.C. 2008).

[FN136]. See *supra* notes 126-35.

[FN137]. WCI Implementing Legislation Fails in Oregon, Washington, Weekly Climate Change Policy Update (Van Ness Feldman, Washington, D.C.) (Aug. 23, 2010), <http://www.vnf.com/news-policyupdates-498.html>.

[FN138]. Dan Logue, Common Sense: Suspend AB 32, Cal. Jobs Initiative, <http://suspendab32.org/resources/> (last visited Nov. 5, 2010); Rick Daysog, Voters Overwhelmingly Reject Proposition 23, The Sacramento Bee, <http://www.sacbee.com/2010/11/02/3154459/proposition-23-trailing-by-wide.html> (last modified Nov. 8, 2010).

[FN139]. Governor's Policy on Climate Change, 16 Ariz. Admin. Reg. 359 (Feb. 26, 2010), available at <http://www.azsos.gov/aar/2010/9/governor.pdf>.

[FN140]. A. 7572, 2009-10 Leg., Reg. Sess. (N.Y. 2009).

[FN141]. New York League of Conservation Voters, Memorandum in Support: A.7572-A/ S. 4315-A-Global Warming Pollution Control Act (2009), available at <http://www.nylcv.org/sites/nylcv.civicactions.net/files/MIS%20-%20Global%20Warming%20Pollution%20Control%20Act.pdf>.

[FN142]. See *supra* notes 126-35 and accompanying text.

[FN143]. See, e.g., Tines Pulles & Jeroen Meijer, Estimating Uncertainties in GHG Emissions from Fuel Combustion 146 (2010), available at http://www.ipcc-nggip.iges.or.jp/public/gp/bgp/2_8_Uncertainties_Fuel_Combustion.pdf.

[FN144]. See *supra* note 12 and accompanying text.

[FN145]. RPS in the U.S., *supra* note 15, at 4 fig.2. Early state RPS programs and the year of adoption are: Iowa (1983), Minnesota (1994), Arizona (1996), Massachusetts (1997), Maine (1997), Nevada (1997), Connecticut (1998), Pennsylvania (1998), Wisconsin (1998), New Jersey (1999), Texas (1999), and New Mexico (2000). *Id.*

[FN146]. See, e.g., Renewable Portfolio Standards Fact Sheet, *supra* note 11.

[FN147]. S. 1078, 2001-02 Leg., Reg. Sess. (Cal. 2002).

[FN148]. A.B. 32, 2005-06 Leg., Reg. Sess. (Cal. 2006).

[FN149]. Manav Tanneeru, It's Official: 2005 Hurricanes Blew Records Away, CNN (Nov. 30, 2005), <http://www.cnn.com/2005/WEATHER/11/29/hurricane.season.ender/index.html>.

[FN150]. Premiering at the 2006 Sundance Film Festival, the documentary was a critical and box-office success, winning Academy Awards for Best Documentary Feature and for Best Original Song. See William Booth, Al Gore, Sundance's Leading Man, Wash. Post (Jan. 26, 2006), <http://www.washingtonpost.com/wp-dyn/content/article/2006/01/25/AR2006012502230.html>; Documentary: 1982-Present, Box Office Mojo, <http://boxofficemojo.com/genres/chart/?id=documentary.htm> (last visited Nov. 5, 2010) (listing film rankings by lifetime gross); "Inconvenient Truth" a Double Winner at Green Academy Awards, Env't News Service (Feb. 26, 2007), <http://www.ens-newswire.com/ens/feb2007/2007-02-26-01.html>.

[FN151]. "Inconvenient Truth" a Double Winner at Green Academy Awards, *supra* note 150.

[FN152]. Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report* 25, 37 (2007), available at http://www.preventionweb.net/files/2335_ar4syr.pdf [hereinafter *Synthesis Report*]. Language in this report pinning climate change on human activities was the most unequivocal of any IPCC report. See *id.* at 37. The UNIPCC wrote that "[g]lobal atmospheric concentrations of CO₂, CH₄, and N₂O have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years." *Id.*

[FN153]. The Nobel Prize in Peace 2007, Nobelprize.org, http://nobelprize.org/nobel_prizes/peace/laureates/2007/ (last visited Nov. 5, 2010).

[FN154]. See *Global Status Report: Policy Landscape/Power Generation Promotion Policies*, REN21, <http://www.ren21.net/globalstatusreport/gsr4b.asp> (last visited on Nov. 5, 2010); *Renewable Portfolio Standards*, Am. Coal Council, <http://www.americancoalcouncil.org/displaycommon.cfm?an=1&subarticlenbr=159> (last visited on Nov. 5, 2010).

[FN155]. See *Incentives/Policies for Renewable Energy*, *supra* note 19.

[FN156]. See Ted Gayer & John Horowitz, *Market-Based Approaches to Environmental Regulation* 1 *Found. & Trends in Microeconomics* 201, 280-81 (2005), available at http://www.aei.org/docLib/20060720_publishedarticleMIC0104.pdf (addressing the limitations of the RPS system).

[FN157]. See Brad Kopetsky, Comment, *Deutschland ber Alles: Why German Regulations Need to Conquer the Divided U.S. Renewable-Energy Framework to Save Clean Tech (and the World)*, 2008 *Wis. L. Rev.* 941, 959 (2008); *Renewable Portfolio Standards*, Creative Energies, <http://www.creativeenergies.biz/go.php?id=26> (last visited on Nov. 5, 2010).

[FN158]. See *Renewable Portfolio Standards FactSheet*, *supra* note 11; *The Renewable Portfolio Standard: How It Works and Why It's Needed*, Am. Wind Energy Assoc. (Oct. 1997), <http://www.awea.org/policy/rpsbrief.html>.

[FN159]. Energy Info Admin., U.S. Dep't of Energy, DOE/EIA-0573(2008), *Emissions of Greenhouse Gases in the United States 2008*, at 16 (2009), available at [http://www.eia.doe.gov/oiaf/1605/ggrpt/pdf/0573\(2008\).pdf](http://www.eia.doe.gov/oiaf/1605/ggrpt/pdf/0573(2008).pdf) [hereinafter *Emissions of Greenhouse Gases*].

[FN160]. *Synthesis Report*, *supra* note 152, at 36 fig.2.1.

[FN161]. See *supra* Figure 2.

[FN162]. *RPS in the U.S.*, *supra* note 15, at 1.

[FN163]. *State of the States*, *supra* note 62, at 9.

[FN164]. This estimate is a rough approximation. In 2008, the fifty states emitted approximately 5802 MMT of CO₂ to make electric power. Energy Info. Admin., U.S. Dep't of Energy, *U.S. Carbon Dioxide Emissions from Energy Sources for 2008 Flash Estimate* 3, 6 (2009), <http://www.eia.doe.gov/oiaf/1605/flash/pdf/flash.pdf>.

[FN165]. See *supra* Table 3.

[FN166]. See, e.g., Union of Concerned Scientists, Pa. Alternative Energy Portfolio Standard Summary 5 (2008), available at http://www.ucsusa.org/assets/documents/clean_energy/pennsylvania.pdf (noting that Pennsylvania is phasing out exemptions for certain utilities by the end of year 2010).

[FN167]. See *supra* Table 3.

[FN168]. See *supra* Table 3.

[FN169]. See Incentives/Policies for Renewable Energy, *supra* note 19.

[FN170]. See *infra* Figure 3.

[FN171]. Energy Info. Admin., U.S. Dep't of Energy, Greenhouse Gases, Climate Change, and Energy (2004), available at <http://www.eia.doe.gov/oiaf/1605/ggccebro/chapter1.html>.

[FN172]. See *infra* Table 6.

[FN173]. See *infra* Table 6.

[FN174]. See Synthesis Report, *supra* note 152, at 36.

[FN175]. Emissions of Greenhouse Gases, *supra* note 159, at 13 tbl.4.

[FN176]. See Energy Info. Admin., U.S. Dep't of Energy, Carbon Dioxide Emissions from the Generation of Electric Power in the United States 6 (2000), available at <http://www.eia.doe.gov/cneaf/electricity/page/co2report/co2emiss.pdf>; Energy Info Admin., U.S. Dep't of Energy, U.S. Carbon Dioxide Emissions in 2009: a Retrospective Review (2010), available at http://www.eia.doe.gov/oiaf/environment/emissions/carbon/pdf/2009_co2_analysis.pdf [hereinafter Carbon Dioxide Retrospective Review].

[FN177]. See Carbon Dioxide Retrospective Review, *supra* note 176.

[FN178]. See *id.*; Alternative Energy, <http://www.altenergy.org/> (last visited Nov. 5, 2010); see also Alan. W. Hodges & Mohammad Rahmani, Food & Res. Econ. Dep't, Univ. of Fla., Fuel Sources and Carbon Dioxide Emissions by Electric Power Plants in the United States, available at <http://edis.ifas.ufl.edu/FE796>.

[FN179]. A Tool for Companies and Office Activities, Manicore (May 2004), http://www.manicore.com/anglais/missions_a/carbon_inventory.html. Biomass fuel CO₂ emissions are usually replaced as trees are replanted, and avoided as biomass refuse is directed from landfills in which it emits methane as it decomposes anaerobically. *Id.*

[FN180]. *Id.* See also Alternative Energy, *supra* note 178.

[FN181]. See Incentives/Policies for Renewable Energy, *supra* note 19. A vast majority of states do not list nuclear as an eligible renewable resource. See *id.*

[FN182]. See Renewable Portfolio Standard (RPS), Hydropower Reform Coalition, <http://www.hydroreform.org/policy/rps> (last visited Nov. 5, 2010).

[FN183]. See, e.g., Maryann Spoto, Nuclear License Renewal Sparks Protest, *Star-Ledger* (Newark, N.J.) (June 2, 2009), <http://www.nj.com/news/ledger/jersey/index.ssf?base/news-14/1243915641194930.xml&coll=1> (discussing various citizen groups that fought against the local nuclear power plant because of safety concerns); Mark Freeman, Public Opinion Favors Gold Ray Dam Removal, *Mail Tribune* (Medford, Or.) (Mar. 26, 2010), <http://www.mailtribune.com/apps/pbcs.dll/article?AID=/20100326/NEWS/3260325> (explaining that the public favored tearing down an existing dam by an almost twenty-to-one margin).

[FN184]. See RPS in the U.S., *supra* note 15, at 1. Some contend that RPS programs are not efficient GHG controls because some renewable technologies emit GHGs. See Air Emissions, U.S. Env'tl Prot. Agency, <http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html> (last visited Nov. 5, 2010). Nevertheless, to date, state RPS programs have primarily supported zero-GHG wind power. See RPS in the U.S., *supra* note 15, at 1. From 1998-2008 wind projects represented ninety-four percent of all RPS-motivated capacity additions. *Id.*

[FN185]. See RPS in the U.S., *supra* note 15, at 16.

[FN186]. See Air Emissions, *supra* note 184. Biomass projects, which are currently included as renewables, may be challenged in Massachusetts if they apply for state tax incentives because they emit GHGs. Tom Zeller, New Rules May Cloud the Outlook for Biomass, *N.Y. Times*, July 10, 2010, at B1. It also remains unknown whether the federal government might also limit biomass projects because they emit GHGs. *Id.*

[FN187]. See Air Emissions, *supra* note 184.

[FN188]. See Emissions of Greenhouse Gases, *supra* note 159, at 3.

[FN189]. See *supra* Table 3 and accompanying notes (showing that not all utilities are covered by state RPSs and not all states have an RPS).

[FN190]. See, e.g., Carl Hulse & David M. Herszenhorn, Democrats Call Off Climate Bill Effort, *N.Y. Times*, July 23, 2010, at A15, available at <http://www.nytimes.com/2010/07/23/us/politics/23cong.html> (noting bipartisan disputes and the focus on unemployment prevented climate change legislation from passing in the Senate); Lucie, Dirtier Air Bill: SB 265, *Buckeye State Blog* (Mar. 24, 2006, 10:40 PM), <http://www.buckeyestateblog.com/node/426> (displaying Ohioans' displeasure with one-size-fits-all federal climate change legislation).

[FN191]. See Resources for the Future & Nat'l Energy Policy Inst., *Toward a New Energy Policy: Assessing the Options 14* (2010), available at http://www.rff.org/Documents/RFF_NEPI_Exec_Summary.pdf [hereinafter Resources for the Future].

[FN192]. *Id.* at 10.

[FN193]. *Id.* at 33-34 tbl.3b.

[FN194]. *Id.* Electric generation GHG emissions are only forty-one percent of total U.S. GHG emissions. See Emissions of Greenhouse Gases, *supra* note 159, at 2 fig.3.

[FN195]. Resources for the Future, *supra* note 191, at 18.

[FN196]. *Id.* at 33-34 tbl.3b.

[FN197]. This is a rough and probably optimistic approximation. For a list of electric power sector CO₂ emissions by state, see State Rankings, Energy Info. Admin., U.S. Dep't of Energy, http://tonto.eia.doe.gov/state/state_energy_rankings.cfm?keyid=86&orderid=1 (last updated Nov. 5, 2010). The total reduction was calculated by multiplying 2008 values for each state's CO₂ production from electric power by that state's RPS percentage final reduction target, as shown in Table 3, supra, and dividing the sum of those calculations by the total 2008 electric power CO₂ emissions of all RPS states. This estimate assumes all RPS additions are zero-GHG and all state goals are achieved. A December 2009 report from the Environment America Research and Policy Center quotes the Union of Concerned Scientists as predicting 2025 reduced CO₂ emission of 183 MMT. Env't Am. Research & Policy Ctr., *America on the Move: State Leadership in the Fight Against Global Warming, and What It Means for the World* 23 (2009), available at <https://www.environmentamerica.org/uploads/50/82/5082749472c3c18623a0a4d23725bb55/America-on-the-Move.pdf>. The same report independently calculates 2020 reduced CO₂ emissions at 119 MMT. Id.

[FN198]. See Timothy P. Duane, *Greening the Grid: Implementing Climate Change Policy Through Energy Efficiency, Renewable Portfolio Standards, and Strategic Transmission System Investments*, 34 *Vt. L. Rev.* 711, 718 (2009).

[FN199]. See supra Figure 3 for total GHG emissions, energy related CO₂ emissions, and power sector CO₂ emissions. The remaining numbers have been calculated according to the method described in supra note 197.

[FN200]. See REC Tracking, Green Power P'ship, U.S. Env'tl Prot. Agency, <http://www.epa.gov/greenpower/gpmarket/tracking.htm> (last updated Aug. 4, 2010).

[FN201]. Id.

[FN202]. See, e.g., Regional Initiatives, Pew Ctr. on Global Climate Change, http://www.pewclimate.org/what_s_being_done/in_the_states/regional_initiatives.cfm (last updated Sept. 24, 2010) (explaining the scope of the Midwest Greenhouse Gas Reduction Accord). A regional accord is an organization of states united for a specific purpose, in this case to control GHG emissions. Id.

[FN203]. See, e.g., Duane, supra note 198, at 745.

[FN204]. The Regional Greenhouse Gas Initiative ("RGGI") measures CO₂ in short tons. See The RGGI CO₂ Cap, Reg'l Greenhouse Gas Initiative, <http://www.rggi.org/design/overview/cap> (last visited Nov. 5, 2010). MGGA and WCI measure metric tons. See *Midwestern Greenhouse Gas Reduction Accord, Final Model Rule 6* (2010), available at http://www.midwesternaccord.org/Final_Model_Rule.pdf; A Comprehensive Initiative, W. Climate Initiative, <http://www.westernclimateinitiative.org/designing-the-program> (last visited Nov. 5, 2010). There are 2000 pounds in a short ton and 2200 pounds in a metric ton. See *Electric Conversions*, Energy Info. Admin., U.S. Dep't of Energy, <http://www.eia.doe.gov/electricity/page/prim2/charts.html> (last visited Nov. 5, 2010).

[FN205]. See *Cap and Trade Basics*, U.S. Env'tl. Prot. Agency, <http://www.epa.gov/air/clearskies/captrade.html> (last updated Jan. 14, 2009).

[FN206]. Id.; see also supra Table 3.

[FN207]. See *Cap and Trade Basics*, supra note 205.

[FN208]. See *id.*

[FN209]. See Cap and Trade Basics, *supra* note 205.

[FN210]. See *id.*

[FN211]. Duane, *supra* note 198, at 718.

[FN212]. See *infra* Part II.G.

[FN213]. See Offset Quality Initiative, Maintaining Carbon Market Integrity: Why Renewable Energy Certificates Are Not Offsets 3-5 (2009), available at http://www.pewclimate.org/docUploads/OQI-REC-Brief-Web_0.pdf (explaining the inherent problems regarding trying to exchange RECs and CO₂).

[FN214]. Compare *infra* Figure 4, with *infra* Figure 5 (showing overlap in state programs).

[FN215]. American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. (2009).

[FN216]. Clean Energy Jobs and American Power Act, S. 1733, 111th Cong. (2009).

[FN217]. See H.R. 2454; S. 1733.

[FN218]. See Learn About Tracking Systems, Envt'l Tracking Network of N. Am., <http://www.etna.org/learn.html#tracking> (last visited Nov. 5, 2010).

[FN219]. See *id.*

[FN220]. See *id.*

[FN221]. See *id.*

[FN222]. Renewable Energy Certificates, *supra* note 361.

[FN223]. *Id.*

[FN224]. *Id.*

[FN225]. *Id.*

[FN226]. *Id.*

[FN227]. See U.S. Dep't of Energy et al., Guide to Purchasing Green Power 19 (2010), available at http://www.epa.gov/greenpower/documents/purchasing_guide_for_web.pdf; Meredith Wingate & Matthew Lehman, Ctr. for Resource Solutions, The Current Status of Renewable Energy Certificate Tracking Systems in North America 4 (2003), available at http://www.cec.org/Storage/54/4660_Summary-Tracking-Systems_en.pdf.

[FN228]. REC Tracking, *supra* note 200.

[FN229]. See Wingate & Lehman, *supra* note 227, at 4.

[FN230]. See Learn About Tracking Systems, *supra* note 218.

[FN231]. See Wingate & Lehman, *supra* note 227, at 4.

[FN232]. See, e.g., Learn About Tracking Systems, *supra* note 218.

[FN233]. See Wingate & Lehman, *supra* note 227, at 2.

[FN234]. See, e.g., *id.* at 6-11 (explaining how RECs are used in Texas, New England, and Wisconsin). Utilities comply with RPS requirements by surrendering RECs which represent required units of renewable generation. See *id.* If a third party acquires and retires RECs there are fewer available for utility compliance, and more must be created, i.e., more renewable energy must be produced to provide the utilities the RECs they need for compliance. See *id.*

[FN235]. See *infra* Figure 4. Not quite regional, ERCOT operates only within the borders of Texas. See *infra* Figure 4.

[FN236]. See *infra* Figure 4.

[FN237]. Renewable Energy Tracking Systems Operating in North America, Fed. Energy Regulatory Comm'n, <http://www.ferc.gov/market-oversight/othr-mkts/renew/othr-rnw-rec-trk.pdf> (last updated Sept. 7, 2010).

[FN238]. *Id.*

[FN239]. W. Renewable Energy Generation Info. Sys., <http://www.wregis.org/> (last visited Nov. 6, 2010). WREGIS also covers two Canadian Provinces. Territory Map, W. Renewable Energy Generation Info. Sys., <http://www.wregis.org/territory-map.php> (last visited Nov. 6, 2010).

[FN240]. W. Renewable Energy Generation Info. Sys., *supra* note 239.

[FN241]. News Release, PJM Envtl. Info. Services, First 5 Years of GATS' Data Show Renewables More than Doubled in PJM (Apr. 22, 2010), available at <http://www.pjm-eis.com/reports-and-news/~media/D996B7CB51A24C3EA162544199746733.ashx>. Delaware and Illinois also belong to the PJM interconnected system. *Id.*

[FN242]. How We Operate, PJM, <http://www.pjm.com/about-pjm/how-we-operate.aspx> (last visited Nov. 6, 2010).

[FN243]. Energy Market, PJM, <http://www.pjm.com/markets-and-operations/energy.aspx> (last visited Nov. 6, 2010).

[FN244]. Renewable FAQs, PJM, <http://www.pjm.com/faqs/renewables.aspx#FAQ12> (last visited Nov. 6, 2010).

[FN245]. See About GATs, PJM Envtl. Info. Servs., <http://www.pjm-eis.com/getting-started/about-GATS.aspx> (last visited Nov. 6, 2010).

[FN246]. See PJM Envtl. Info. Servs., GATS Operating Rules 59 (rev. 6, 2008), available at <http://www.pjm-eis.com/~media/59FB4081EE75444E95F01C52461E8633.ashx>.

[FN247]. About ERCOT, Elec. Reliability Council of Tex., [http:// www.ercot.com/about/](http://www.ercot.com/about/) (last visited Nov. 6, 2010).

[FN248]. Historically, the main Texas electrical system has not been interconnected with any out-of-state system. Brendan I. Koerner, Why Texas Has Its Own Power Grid, *Slate* (Aug. 19, 2003), <http://www.slate.com/id/2087133>.

[FN249]. About ERCOT, *supra* note 247.

[FN250]. Renewable Energy Credit, Elec. Reliability Council of Tex., <http://www.ercot.com/services/programs/rec/> (last visited Nov. 6, 2010).

[FN251]. Midwest Renewable Energy Tracking Sys., <http://www.m-rets.net/> (last visited Nov. 6, 2010).

[FN252]. About M-RETS, Midwest Renewable Energy Tracking Sys., <http://www.m-rets.net/about/AboutMRETS.asp> (last visited Nov. 6, 2010).

[FN253]. Frequently Asked Questions, Midwest Renewable Energy Tracking Sys., <http://www.m-rets.net/about/FAQ.asp> (last visited Nov. 6, 2010).

[FN254]. New England Power Pool Generation Info. Sys., Operating Rules app. 1.1 (2010), available at [http://www.nepoolgis.com/GeneralDoc/GIS%20Operating%20Rules%207.01.10%. DOC](http://www.nepoolgis.com/GeneralDoc/GIS%20Operating%20Rules%207.01.10%.DOC).

[FN255]. See *id.* at 3-5.

[FN256]. William K. Stevens, Global Warming Experts Call Human Role Likely, *N.Y. Times*, Sept. 10, 1995, at 1.

[FN257]. Editorial, The Coming Battle over Kyoto, *N.Y. Times*, Dec. 12, 1997, at A34 (explaining how the Clinton administration brokered a compromise during negotiations).

[FN258]. Douglas Jehl, U.S. Going Empty-Handed to Meeting on Global Warming, *N.Y. Times*, Mar. 29, 2001, at A22 (“The Bush administration reconfirmed today that it opposed the Kyoto Protocol, the international treaty to fight global warming, and would not submit it for Senate ratification.”).

[FN259]. See *supra* Part I.

[FN260]. See *infra* Part IV.

[FN261]. See, e.g., Andrew C. Revkin, NASA Expert Criticizes Bush on Global Warming Policy, *N.Y. Times*, Oct. 26, 2004, at A22 (“[T]he Bush administration has ignored growing evidence that sea levels could rise significantly unless prompt action is taken to reduce heat-trapping emissions from smokestacks and tailpipes.”).

[FN262]. See, e.g., Midwest Greenhouse Gas Reduction Accord, Advisory Group Final Recommendations 3 (2010), available at [http:// www.midwesternaccord.org/Accord_Final_Recommendations.pdf](http://www.midwesternaccord.org/Accord_Final_Recommendations.pdf) [hereinafter MG- GRA Final Recommendations].

[FN263]. See *id.* (“Any future federal program must recognize the particular resources and special economic circumstances of the Midwest region.”); Peter Henderson, States Fear Devil in Details of U.S. Climate Bill, *Reu-*

ters, Apr. 21, 2010, available at <http://www.reuters.com/article/idUSTRE63K5HT20100421>.

[FN264]. See, e.g., Memorandum of Understanding from the Governors of Conn., Del., Me., N.H., N.J., N.Y., Vt., Mass., & R.I. to the Reg'l Greenhouse Gas Initiative 1-2 (Dec. 20, 2005), available at http://www.rggi.org/docs/mou_final_12_20_05.pdf; Press Release, W. Climate Initiative, Five Western Governors Announce Regional Greenhouse Gas Reduction Agreement (Feb. 26, 2007), available at <http://www.westernclimateinitiative.org/component/remository/general/WCI-National-Press-Release/>.

[FN265]. Glossary of Statistical Terms: Carbon Dioxide Equivalent, OECD (last updated July 4, 2005), <http://stats.oecd.org/glossary/detail.asp?ID=285>. "Carbon dioxide equivalent is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential. For example . . . emissions of one million metric tons of methane is equivalent to emissions of 21 million metric tons of carbon dioxide." Id. The UNFCCC and Kyoto Protocol adopted CO₂e for multi-sectional GHG control. U.N. Framework Convention on Climate Change, Fact Sheet: The Kyoto Protocol (2009), available at http://unfccc.int/files/press/backgrounders/application/pdf/fact_sheet_the_kyoto_protocol.pdf. The CO₂e nomenclature applies across multiple sectors and is a more powerful concept than the RECs used in RPS programs. See, e.g., Emissions Trading, U.N. Framework Convention on Climate Change, http://unfccc.int/kyoto_protocol/mechanisms/emissions_trading/items/2731.php (last visited Nov. 6, 2010) (listing equivalents to emissions reduction, such as reforestation).

[FN266]. See, e.g., California Air Resources Board, Climate Change Scoping Plan ES3-4 (2008), http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf (outlining California's plan to reduce GHG emissions, including "energy efficiency programs," "a California cap-and-trade program," "targets for transportation-related greenhouse gas emissions," and other measures).

[FN267]. See, e.g., W. Climate Initiative, Design Summary 16 (2010), available at <http://westernclimateinitiative.org/component/remository/general/program-design/Design-Summary/>; New York, Reg'l Greenhouse Gas Initiative, http://www.rggi.org/rggi_benefits/program_investments/New_York (last visited Nov. 6, 2010) (explaining how RGGI supplements New York's existing RPS program).

[FN268]. See *supra* Part II.D.

[FN269]. See, e.g., Midwestern Governors' Ass'n, Midwestern Greenhouse Gas Accord 3 (2007), <http://www.midwesternaccord.org/midwesterngreenhousegasreductionaccord.p> [hereinafter MGGGA].

[FN270]. U.S. Const. art. I, § 10 ("No State shall, without the Consent of Congress . . . enter into any Agreement or Compact with another State.").

[FN271]. See, e.g., MGGGA, *supra* note 269, at 3.

[FN272]. See, e.g., The RGGI CO₂ Cap, Reg'l Greenhouse Gas Initiative, <http://www.rggi.org/design/overview/cap/> (last visited Oct. 17, 2010).

[FN273]. See, e.g., *id.*; W. Climate Initiative, Guidance for Developing WCI Partner Jurisdiction Allowance Budgets 3-7 (2010), available at <http://www.westernclimateinitiative.org/component/remository/func-startdown/273/>.

[FN274]. See, e.g., Midwestern Greenhouse Gas Reduction Accord, Final Model Rule (2010), available at ht-

[tp://www.midwesternaccord.org/Final_Model_Rule.pdf](http://www.midwesternaccord.org/Final_Model_Rule.pdf) [hereinafter MGGRA Model Rule]; Reg'l Greenhouse Gas Initiative, Model Rule (2007), available at http://www.rggi.org/docs/model_rule_corrected_1_5_07.pdf [hereinafter RGGI Model Rule].

[FN275]. See, e.g., W. Climate Initiative, Design Summary, *supra* note 267, at 5; State Regulations, Reg'l Greenhouse Gas Initiative, <http://www.rggi.org/design/regulations/> (last visited Nov. 6, 2010).

[FN276]. See W. Climate Initiative, Design Summary, *supra* note 267, at 5; Reg'l Greenhouse Gas Initiative, Fact Sheet (2010), http://www.rggi.org/docs/RGGI_Fact_Sheet.pdf [hereinafter RGGI Fact Sheet]; MGGRA Model Rule, *supra* note 274, at 3.

[FN277]. See, e.g., Hannah Chang, Ctr. for Climate Change Law, The Preemptive Effects of the Revised American Power Act, Climate Law Blog (July 16, 2010), <http://blogs.law.columbia.edu/climatechange/2010/07/16/the-preemptive-effects-of-the-revised-american-power-act/>.

[FN278]. American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 335 (2009) (“[N]o State or political subdivision thereof shall implement or enforce a cap and trade program that covers any capped emissions emitted during the years 2012 through 2017.”).

[FN279]. Clean Energy Jobs and American Power Act, S. 1733, 111th Cong. (2009) (“Effective January 1 of the first calendar year for which the Administrator allocates allowances pursuant to section 781, no State or political subdivision of a State may implement or enforce a cap-and-trade program.”).

[FN280]. See, e.g., H.R. 2454 § 321 (allowing holders of State or Regional emissions credits to exchange them for Federal Credits); S. 1733 § 786 (containing almost identical language to H.R. 2454).

[FN281]. Program Design Archive, Reg'l Greenhouse Gas Initiative, <http://www.rggi.org/design/history> (last visited Nov. 6, 2010).

[FN282]. History, W. Climate Initiative, <http://www.westernclimateinitiative.org/history> (last visited Nov. 6, 2010).

[FN283]. Midwestern Greenhouse Gas Reduction Accord, <http://www.midwesternaccord.org> (last visited Nov. 6, 2010).

[FN284]. Regulated Sources, Reg'l Greenhouse Gas Initiative, http://www.rggi.org/design/overview/regulated_sources (last visited Nov. 6, 2010).

[FN285]. Frequently Asked Questions, W. Climate Initiative, <http://www.westernclimateinitiative.org/the-wci-cap-and-trade-program/faq> (last visited Nov. 6, 2010); MGGRA Model Rule, *supra* note 274, at 9-11.

[FN286]. Regional Initiatives, Pew Ctr. on Global Climate Change, http://www.pewclimate.org/what_s_being_done/in_the_states/regional_initiatives.cfm (last updated Sept. 24, 2010).

[FN287]. See Reg'l Greenhouse Gas Initiative, <http://www.rggi.org/home> (last visited Nov. 6, 2010).

[FN288]. Marc S. Reisch, Limited Cap-And-Trade Program, Chem. & Eng'g News, Feb. 2010, at 23, 23, available at <http://pubs.acs.org/cen/environment/88/8805bus2.html>.

[FN289]. RGGI Fact Sheet, *supra* note 276.

[FN290]. Reg'l Greenhouse Gas Initiative, *supra* note 287. The RGGI states include: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. *Id.*

[FN291]. RGGI Model Rule, *supra* note 274.

[FN292]. Reg'l Greenhouse Gas Initiative, Overview of RGGI CO₂ Budget Trading Program 1-2 (2007), available at http://www.rggi.org/docs/program_summary_10_07.pdf.

[FN293]. CO₂ Emissions & Allowance Tracking, Reg'l Greenhouse Gas Initiative, <http://www.rggi.org/market/tracking> (last visited Nov. 6, 2010).

[FN294]. *Id.*

[FN295]. *Id.*

[FN296]. *Id.*

[FN297]. See, The RGGI CO₂ Cap, *supra* note 272.

[FN298]. See Overview of RGGICO₂ Budget Trading Program, *supra* note 292, at 2, 8. Generators smaller than 25 MW are not measured. U.S. Envtl. Prot. Agency, Environmental Revenue Streams for Combined Heat and Power 2 (2008), available at http://www.epa.gov/chp/documents/ers_program_details.pdf. However, ninety-five percent of RGGI's historic CO₂ emissions have come from generators larger than 25 MW. See How the Carbon Dioxide Budget Trading Program Works, N.Y. Dep't of Envtl. Conservation, <http://www.dec.ny.gov/energy/39276.html> (last visited Nov. 6, 2010).

[FN299]. See Overview of RGGI CO₂ Budget Trading Program, *supra* note 292, at 2, 8.

[FN300]. See The RGGI CO₂ Cap, *supra* note 272.

[FN301]. *Id.*

[FN302]. See, e.g., How the Carbon Dioxide Budget Trading Program Works, *supra* note 298.

[FN303]. Reg'l Greenhouse Gas Initiative, Fact Sheet: RGGI CO₂ Allowance Tracking System, available at http://www.rggi.org/docs/RGGI_COATS_in_Brief.pdf (last visited Nov. 6, 2010).

[FN304]. See, e.g., *id.*

[FN305]. See How the Carbon Dioxide Budget Trading Program Works, *supra* note 298.

[FN306]. See RGGI, Inc., Reg'l Greenhouse Gas Initiative, <http://www.rggi.org/rggi> (last visited Nov. 6, 2010).

[FN307]. See *supra* note 301 and accompanying text.

[FN308]. See Env't Am. Research & Pol'y Ctr., *supra* note 197, 22-23.

[FN309]. Auction Results, Reg'l Greenhouse Gas Initiative, [http:// www.rggi.org/market/co2_auctions/results](http://www.rggi.org/market/co2_auctions/results) (last visited Nov. 6, 2010) (the latest auction was held on September 10, 2010).

[FN310]. *Id.*

[FN311]. *Id.* (indicating a cumulative total of \$729,281,959.72 raised to date).

[FN312]. See RGGI Fact Sheet, *supra* note 276.

[FN313]. See WCI Provincial and State Partners Contacts, W. Climate Initiative, <http://www.westernclimateinitiative.org/wci-partners> (last visited Nov. 6, 2010). The WCI is comprised of the following U.S. states and Canadian provinces: Arizona, British Columbia, California, Manitoba, Montana, New Mexico, Ontario, Oregon, Quebec, Utah, and Washington. *Id.*

[FN314]. See WCI Partners Release Their Comprehensive Strategy to Address Climate Change and Spur a Clean Economy, W. Climate Initiative, <http://www.westernclimateinitiative.org/news-and-updates/121-wci-partners-release-their-comprehensive-strategy-to-address-climate-change-and-spur-a-clean-energy-economy> (last visited Nov. 6, 2010).

[FN315]. W. Climate Initiative, Design Recommendations for the WCI Regional Cap-and-Trade Program (2008), available at [http:// www.westernclimateinitiative.org/component/remository/func-startdown/14/](http://www.westernclimateinitiative.org/component/remository/func-startdown/14/).

[FN316]. *Id.* at 53.

[FN317]. See Regional Initiatives, *supra* note 202.

[FN318]. See Frequently Asked Questions, *supra* note 285.

[FN319]. *Id.*

[FN320]. *Id.*

[FN321]. See Milestones, W. Climate Initiative, [http:// www.westernclimateinitiative.org/milestones](http://www.westernclimateinitiative.org/milestones) (last visited Nov. 6, 2010).

[FN322]. In California, a proposed ballot initiative would have delayed the GHG limits until the current economic conditions improved, but the voters did not adopt it in the November 2010 election. See Daniel B. Wood, Texas Oil Firms Behind California Greenhouse Gas Initiative, *Christian Sci. Monitor* (Jun. 23, 2010), <http://www.csmonitor.com/USA/2010/0623/Texas-oil-firms-behind-California-greenhouse-gas-initiative>.

[FN323]. See WCI Implementing Legislation Fails in Oregon, Washington, *supra* note 137.

[FN324]. See *id.*

[FN325]. Governor's Policy on Climate Change, *supra* note 139, at 360.

[FN326]. See WCI Implementing Legislation Fails in Oregon, Washington, *supra* note 137 (showing that Utah,

Manitoba, and Montana are not among the states and provinces that have agreed to the proposal).

[FN327]. See *Midwestern Greenhouse Gas Reduction Accord*, *supra* note 283. The U.S. states include: Iowa, Illinois, Kansas, Michigan, Minnesota, and Wisconsin. Manitoba is the participating Canadian province. *Id.*

[FN328]. See *id.*

[FN329]. *MGGRA Final Recommendations*, *supra* note 262, at 5.

[FN330]. *MGGA*, *supra* note 269, at 3.

[FN331]. See *Midwestern Greenhouse Gas Reduction Accord*, *supra* note 283.

[FN332]. See, e.g., *State Regulations*, *supra* note 275 (“Each Participating State's RGGI CO₂ Budget Trading Program is based upon its own statutory and/or regulatory authority.”).

[FN333]. *MGGRA Final Recommendations*, *supra* note 262, at 3 (describing the formation of the MGGRA advisory group, which formulated one policy to be followed by all accord participants).

[FN334]. *Id.* at 5-6. The scope of the MGGRA includes transportation, industrial combination and process, as well as electricity sectors. *Id.*

[FN335]. See *Renewable Portfolio Standards Fact Sheet*, *supra* note 11.

[FN336]. See *Renewable & Alternate Energy Portfolio Standards*, Pew Ctr. on Global Climate Change, http://www.pewclimate.org/what_s_being_done/in_the_states/rps.cfm (last visited Oct. 20, 2010) (noting that an RPS requires a percentage of electricity otherwise generated from burning fossil fuels to come from renewable or alternate energy sources). By reducing fossil fuel consumption, RPSs reduce CO₂ emissions from burning fossil fuel. *Id.*

[FN337]. See *MGGRA Final Recommendations*, *supra* note 262, at 5-6.

[FN338]. See *Env't Am. Research & Policy Ctr.*, *supra* note 197, at 22 tbl.1.

[FN339]. See *Offset Quality Initiative*, *supra* note 213, at 2.

[FN340]. See *Incentives/Policies for Renewable Energy*, *supra* note 19.

[FN341]. See *Offset Quality Initiative*, *supra* note 213, at 1-2.

[FN342]. See *supra* notes 277-81 and accompanying text.

[FN343]. Compare *The Political Climate*, PBS, <http://www.pbs.org/now/science/climatechange.html> (last visited Nov. 6, 2010) (cataloging significant political events related to global warming), with *supra* Table 3 (recognizing when state RPS programs were enacted).

[FN344]. See Jonathan L. Ramseur, Cong. Research Serv., RL34241, *Voluntary Carbon Offsets: Overview and Assessment 3-4* (2009), available at www.fas.org/sgp/crs/misc/RL34241.pdf.

[FN345]. See Ryan Wiser et al., Ernest Orlando Lawrence Berkeley Nat'l Lab., LBNL-62569, *Renewables Port-*

folio Standards: A Factual Introduction to Experience from the United States 19 (2007), available at <http://eetd.lbl.gov/ea/ems/reports/62569.pdf>; Ramseur, *supra* note 344, at 3-4.

[FN346]. See, e.g., Offset Quality Initiative, *supra* note 213, at 4 (discussing the problem many companies have in conceptually separating RECs from GHGs).

[FN347]. See *id.* at 4-5.

[FN348]. *Id.* at 3.

[FN349]. See *supra* Table 3 (showing the various guidelines for the mandatory state RPS programs).

[FN350]. Compare MGGRA Model Rule, *supra* note 274, RGGI Model Rule, *supra* note 274, and W. Climate Initiative, Design for WCI Regional Program DD-40 to - 43 (2010), available at <http://westernclimateinitiative.org/component/remository/func-startdown/282/> (describing the offset program design proposed by WCI), with *supra* Table 3 (discussing varying state RPS programs).

[FN351]. REC Trading 101, Evolution Markets, http://new.evomarkets.com/index.php?page=Renewable_Energy-REC_Trading_101 (last visited Nov. 6, 2010). "As an example, if the RPS is set at 3%, and a retail supplier had annual sales of 2,000,000 MWh, the supplier would need to purchase 60,000 MWh from renewable sources." *Id.*

[FN352]. See Offset Quality Initiative, *supra* note 213, at 1-2.

[FN353]. See *id.*

[FN354]. See Ed Holt & Lori Bird, Nat'l Renewable Energy Lab., U.S. Dep't of Energy, Emerging Markets for Renewable Energy Certificates: Opportunities and Challenges 59 (2005), available at <http://www.epa.gov/greenpower/gpmarket/rec.htm> (follow "Emerging Markets for Renewable Energy Certificates: Opportunities and Challenges" hyperlink) (noting that California and New York do not allow separation).

[FN355]. Offset Quality Initiative, *supra* note 213, at 1-3.

[FN356]. *Id.* at 3, 6.

[FN357]. See *infra* Part III for a discussion of potential federal legislation on state programs.

[FN358]. Offset Quality Initiative, *supra* note 213, at 2.

[FN359]. See *id.*

[FN360]. See *id.*

[FN361]. Green Power P'ship, U.S. Env'tl. Prot. Agency, Renewable Energy Certificates 1 (2008), available at http://www.epa.gov/grnpower/documents/gpp_basics-recs.pdf [hereinafter Renewable Energy Certificates].

[FN362]. See Offset Quality Initiative, *supra* note 213, at 2.

[FN363]. See *id.* at 1-3 (noting that these functions used to be reserved for offsets and expressing concern that

RECs do not serve as a functional equivalent).

[FN364]. See, e.g., Renewable Energy Certificates, *supra* note 361, at 1.

[FN365]. See Offset Quality Initiative, *supra* note 213, at 3-4 (discussing the potential for double-counting and additionality). To truly comply with both on-site GHG reductions, and off-site RPS programs, no part of the REC can count for both. *Id.*

[FN366]. Global Carbon Trading Volumes Grew 68 percent in 2009, *Env'tl. Leader* (Jan. 8, 2010), <http://www.environmentalleader.com/2010/01/08/global-carbon-trading-volumes-grew-68-in-2009/>.

[FN367]. See, e.g., Wind Energy Manual: Wind Energy Economics, Iowa Energy Ctr., http://www.energy.iastate.edu/renewable/wind/wem/economic_issues.htm (last visited Nov. 6, 2010).

[FN368]. See *supra* Table 3.

[FN369]. U.S. Gov't Accountability Office, GAO-08-1048, Carbon Offsets: The U.S. Voluntary Market is Growing, but Quality Assurance Poses Challenges for Market Participants 28, 35 (2008), available at <http://www.gao.gov/new.items/d081048.pdf>.

[FN370]. See RPS Renewable Energy, State Env'tl. Res. Ctr., <http://www.serconline.org/RPS/fact.html> (last visited Nov. 6, 2010).

[FN371]. See *supra* Part II for a survey of state programs. See also Offset Quality Initiative, *supra* note 213, at 3 (noting that the contradictory and overlapping programs lead to confusion).

[FN372]. See *infra* Part III.

[FN373]. See Joshua P. Fershee, *Changing Resources, Changing Market: The Impact of a National Renewable Portfolio Standard on the U.S. Energy Industry*, 29 *Energy L.J.* 49, 55-56, 58-59 (2007) (explaining the economic benefits of a national RPS program).

[FN374]. See, e.g., *Comer v. Murphy Oil*, 585 F.3d 855, 860 (5th Cir. 2009) (stating that the district court felt ill-equipped to handle what it felt was a "'debate' about global warming"); *Conn. v. Am. Elec. Power*, 582 F.3d 309, 314 (2d Cir. 2009) ("Plaintiffs' claims presented a non-justiciable political question . . ."); *Kivilina v. Exxon Mobil*, 663 F. Supp. 2d 863, 874-77 (N.D. Cal. 2009) ("[T]he allocation of fault-and cost-of global warming is a matter appropriately left for determination by the executive or legislative branch . . .").

[FN375]. Fershee, *supra* note 373, at 50-56. The various state and federal legislative proposals and statutes typically contain very ambitious goals for GHG reduction in the more distant future. Reduction goals of ten percent below 1990 levels by 2020 are common. See, e.g., Michael Szabo, U.S. State-Level Greenhouse Gas Reduction Targets, *Reuters*, Jan. 23, 2009, available at <http://www.reuters.com/article/idUSTRE50M54b20090123>. In the authors' opinion, these goals are irrelevant. Such future goals are easy to set and laudable but lack concrete methods to achieve them, and are completely subject to the vagaries of future legislative action and external conditions.

[FN376]. See, e.g., Clean Energy Jobs and American Power Act, S. 1733, 111th Cong. (2009); American Clean Energy Leadership Act of 2009, S. 1462, 111th Cong. (2009); American Clean Energy and Security Act of 2009,

H.R. 2454, 111th Cong. (2009); Discussion Draft, American Power Act (2010), available at <http://kerry.senate.gov/imo/media/doc/APAbill3.pdf>.

[FN377]. See Hulse & Herszenhorn, *supra* note 190.

[FN378]. See *infra* Part III.B.

[FN379]. H.R. 2454.

[FN380]. *Id.* at tits. III, V. See also Pew Ctr. on Global Climate Change, At a Glance: American Clean Energy Securities Act of 2009, at 1-2 (2009), available at <http://www.pewclimate.org/docUploads/Waxman-Markey-short-summary-revised-June26.pdf>.

[FN381]. H.R. 2454, §§ 101-103.

[FN382]. Fed. Energy Regulatory Comm'n, Renewable Power & Energy Efficiency 6 (2010), available at <http://ferc.gov/market-oversight/other-mkts/renew/2010/03-2010-other-rnw-archive.pdf>.

[FN383]. See *id.* at 4.

[FN384]. H.R. 2454, § 610(d)(2).

[FN385]. *Id.* at § 610(b)(4)(A). Waxman-Markey defined “renewable” sources as wind, solar, geothermal, renewable biomass, biogas derived exclusively from renewable biomass, qualified hydropower, and marine and hydrokinetic sources. *Id.* at § 610(a)(17).

[FN386]. U.S. House Passes Comprehensive Climate Legislation; Senate Consideration Expected to Follow, Ctr. for Climate Strategies, <http://archive.constantcontact.com/fs048/1102405988721/archive/1102625740838.html> (last visited Nov. 6, 2010).

[FN387]. See Georgetown Climate Ctr., Overview of State-Related Provisions, Am. Clean Energy and Security (ACES) Act of 2009, at 1 (2009), [http://www.georgetownclimate.org/federal/files/GCCHR2454state-fedsummary07-17-09%20\(1\).pdf](http://www.georgetownclimate.org/federal/files/GCCHR2454state-fedsummary07-17-09%20(1).pdf).

[FN388]. H.R. 2454 (placed on Senate calendar), 155 Cong. Rec. H7469, 7469-70 (daily ed. June 26, 2010) (roll call vote 447).

[FN389]. Clean Energy Jobs and American Power Act, S. 1733, 111th Cong. (2009).

[FN390]. *Id.* at § 103.

[FN391]. See Pew Ctr. on Global Climate Change, Summary of the Clean Energy Jobs and American Power Act (S. 1733) Chairman's Mark (2009), available at <http://www.pewclimate.org/docUploads/chairmans-mark-kerry-boxer-10-29-09.pdf>.

[FN392]. See S. 1733 § 103(b)(2) (“[N]othing in this Act . . . is intended to interfere with or prevent the continued operation and growth of the voluntary renewable energy market.”).

[FN393]. See Derek Willis, Stephan Weitberg, Shan Carter & Matthew Bloch, S.1733: Clean Energy Jobs and

American Power Act, N.Y. Times (Sept. 26, 2010), <http://politics.nytimes.com/congress/bills/111/s1733> (showing that the Bill was still in Committee when the first session ended).

[FN394]. Patient Protection and Affordable Care Act, Pub. L. No. 111-148, amended by Pub. L. No. 111-152.

[FN395]. Brad Johnson, Outline of Kerry-Graham-Lieberman Appears to Hew to Obama's Clean Energy Principles, Grist (Mar. 19, 2010, 6:00 AM), <http://www.grist.org/article/2010-03-18-outline-kerry-graham-lieberman-bill-hew-to-obamas-clean-energy>.

[FN396]. See id.

[FN397]. Id.

[FN398]. Discussion Draft, *supra* note 376, at § 806(c).

[FN399]. Darren Samuelsohn, Graham Says He Could Vote for Energy Bill, but Oil Spill Requires a 'Time-Out,' Env't & Energy Daily (May 7, 2010), <http://www.eenews.net/public/EEDaily/2010/05/07/1>.

[FN400]. Id.

[FN401]. See Fershee, *supra* note 373, at 50 n.2 (citing Brad Knickerbocker, US Energy Proposal Pushes Toward Center, Christian Sci. Monitor, Dec. 4, 2004, at 2).

[FN402]. Id. at 77.

[FN403]. See Jehl, *supra* note 258.

[FN404]. *Massachusetts v. Env'tl. Prot. Agency*, 549 U.S. 497, 532 (2007). The Court specifically found that greenhouse gases were pollutants under Section 7602(g) of the Clean Air Act. Id. ("Because greenhouse gases fit well within the Clean Air Act's capacious definition of 'air pollutant,' we hold that EPA has the statutory authority to regulate the emission of such gases from new motor vehicles.").

[FN405]. Endangerment and Cause or Contribute Findings for the Greenhouse Gases Under Section 202(a) of the Clean Air Act, U.S. Env'tl. Prot. Agency, <http://www.epa.gov/climatechange/endangerment.html> (last updated Oct. 26, 2010).

[FN406]. Endangerment and Cause or Contribution Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act, 74 Fed. Reg. § 66,496 (Dec. 15, 2009) (to be codified at 40 C.F.R. pt. 1).

[FN407]. *Massachusetts*, 549 U.S. at 533.

[FN408]. Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 75 Fed. Reg. § 25,324 (Env'tl. Prot. Agency & Nat'l Highway Traffic Safety Admin. May 7, 2010) (to be codified at 49 C.F.R. pts. 531, 536, 537 & 538).

[FN409]. Press Release, U.S. Env'tl. Prot. Agency, EPA Sets Threshold for Greenhouse Gas Permitting Requirements/Small Businesses and Farms Will be Shielded (May 13, 2010), available at <http://yosemite.epa.gov/opa/admpress.nsf/0/EA1BF25579E541B1852577220055C20C>.

[FN410]. U.S. Env'tl. Prot. Agency, Final Rule: Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule: Fact Sheet 2 (2010), available at <http://www.epa.gov/nsr/documents/20100413fs.pdf>.

[FN411]. See Robin Bravender & Noelle Straub, GOP Senator Considering Rider to Limit EPA Authority on Greenhouse Gases, N.Y. Times (Sept. 18, 2009), <http://www.nytimes.com/cwire/2009/09/18/18climatewire-gop-senator-considering-rider-to-limit-epa-a-46507.html>.

[FN412]. Erika Bolstad, Senate Defeats Bid to Limit EPA Authority to Regulate Emissions, McClatchy (June 10, 2010), <http://www.mcclatchydc.com/2010/06/10/95709/senate-defeats-bid-to-limit-epa.html>.

[FN413]. Id.

[FN414]. See, e.g., John Broder, E.P.A. Expected to Regulate Carbon Dioxide, N.Y. Times, Feb. 19, 2009, at A15 (“[T]he Clean Air Act, now more than 40 years old, was not designed to regulate ubiquitous substances like carbon dioxide.”).

[FN415]. Press Release, Framework Convention on Climate Change, Greenhouse Gas Emissions Data from Industrialized Countries Show Increases in 2007, Underscore Need for Ambitious Copenhagen Deal, U.N. Press Release (Oct. 21, 2009), available at http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/20091021_pr_ghg_data.pdf.

[FN416]. See *infra* Appendix A, at art. 2.

[FN417]. See *infra* Appendix A, at art. 25(1).

[FN418]. Status of Ratification of the Kyoto Protocol, U.N. Framework Convention on Climate Change, http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php (last visited Nov. 6, 2010).

[FN419]. Id.

[FN420]. See *infra* Appendix A, at art. 3.

[FN421]. See *infra* Appendix A, at art. 3.

[FN422]. See Vedantam, *supra* note 30.

[FN423]. Id.

[FN424]. U.S. Env'tl. Prot. Agency, President Bush Announces Clear Skies & Global Climate Change Initiatives 1 (2002), available at http://www.epa.gov/air/clearskies/clear_skies_factsheet.pdf.

[FN425]. See Vedantam, *supra* note 30.

[FN426]. See Byrd-Hagel Resolution, S. Res. 98, 105th Cong. (1997); Lugar-Biden Resolution, S. Res. 312, 109th Cong. (2006). In 2006 the Senate Foreign Relations Committee passed the Lugar-Biden resolution, which called on the United States to participate only in international climate change agreements that imposed binding commitments on all countries. Id.

[FN427]. See Kyoto Protocol: Status of Ratification, U.N. Framework Convention on Climate Change (Jan. 14, 2009), http://unfccc.int/files/kyoto_protocol/status_of_ratification/application/pdf/kp_ratification.pdf.

[FN428]. See Vedantam, *supra* note 30. Australia also declined to sign. *Id.*

[FN429]. See *infra* Appendix A, at art. 3.

[FN430]. See *infra* Appendix A, at art. 6, 17.

[FN431]. See Kyoto Protocol, U.N. Framework Convention on Climate Change, http://unfccc.int/kyoto_protocol/items/2830.php (last visited Nov. 6, 2010).

[FN432]. See *infra* Appendix A, at art. 3.

[FN433]. Elizabeth Rosenthal, Climate Change Treaty, to Go Beyond the Kyoto Protocol, Is Expected by the Year's End, *N.Y. Times*, June 13, 2009, at A5.

[FN434]. *Id.* (noting U.S. involvement).

[FN435]. Although the overall value of the global carbon market grew at a six percent compound rate during 2009, international investments in carbon offset projects using UNFCCC Clean Development Mechanisms fell from \$6.5 billion to \$2.7 billion. See Alexandre Kossoy & Philippe Ambrosi, World Bank, World Bank Report on State and Trends of the Carbon Market 1, 39 (2010), http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/State_and_Trends_of_the_Carbon_Market_2010_low_res.pdf.

[FN436]. See *id.* at 12.

[FN437]. See Emissions Action Delay, the Order of the Day, *supra* note 36.

[FN438]. See *infra* Appendix B, at para. 1.

[FN439]. See *infra* Appendix B, at para. 8.

[FN440]. See Bonn Climate Change Talks Make Limited Progress, Climate-L.org, <http://climate-l.org/2010/06/14/bonn-climate-change-talks-make-limited-progress> (last visited Nov. 6, 2010).

[FN441]. See Lisa Friedman, Economic Summit Agendas Seem Cooler to Climate Issues, *Climate Wire* (June 22, 2010), <http://www.eenews.net/cw/2010/06/22>.

[FN442]. At the end of April 2010, Australia's prime minister stopped proposals for a national GHG reduction law and announced that the program would not be considered before 2012. See Carbon Pollution Reduction Scheme, Australian Gov't Dep't of Climate Change & Energy Efficiency (May 5, 2010), <http://www.climatechange.gov.au/en/media/whats-new/cprs-delayed.aspx>. In addition, Japan's 2010 elections further threatened that country's determination to continue GHG control. See Election in Japan Threatens National Climate Bill with CO₂ Target, *Climatewire* (June 22, 2010), <http://www.eenews.net/climatewire/print/2010/07/13/1>.

[FN443]. See, e.g., *N.C. Gen. Stat. § 62-133.8* (2009); *Or. Rev. Stat. § 469A.052* (2009); *Wash. Rev. Code §*

19.285.070 (2009).

[FN444]. North Carolina's first compliance period began in 2010. *N.C. Gen. Stat. § 62-133.8* (2009). Kansas and Oregon begin in 2011. *Kan. Stat. Ann. § 66-1258* (2009); *Or. Rev. Stat. § 469A.052* (2009). Washington and Michigan begin in 2012. *Wash. Rev. Code § 19.285.040* (2007); *Mich. Comp. Laws § 460.1027* (2009).

[FN445]. Energy Info. Admin., U.S. Dep't of Energy, DOE/EIA-0383, Annual Energy Outlook 2010: Early Release Overview 11 (2010), available at <http://www.eia.doe.gov/oiaf/aeo/pdf/overview.pdf> [hereinafter Annual Energy Outlook 2010]. The nine percent in 2008 includes hydro-electricity, but EPA's estimate of the 2035 seventeen percent value assumes no additional hydro development occurs from 2008 to 2035. *Id.* at 11-12.

[FN446]. 1 GW = 1 million kilowatts of capacity. See Energy Measurements and Conversions, Iowa State U., U. Extension, <http://www.extension.iastate.edu/agdm/wholefarm/pdf/c6-86.pdf> (last visited Nov. 6, 2010). This equals the generation capacity of a large utility generating station. See What is a Megawatt?, Depleted Cranium, <http://depletedcranium.com/what-is-a-megawatt/> (last visited Nov. 6, 2010).

[FN447]. See Electric Power Annual 2008, *supra* note 1, at 18 tbl.1.2.

[FN448]. *Id.* at 1. A GWh is one gigawatt of capacity produced for a period of one hour. A one GW generator running night and day for one year (8760 hours) would produce 8760 (24 X 365) GWh of energy. See Glossary, Sierra Energy Prods., <http://sierraenergyproducts.com/glossary.html> (last visited Nov. 6, 2010).

[FN449]. See *infra* Table 8.

[FN450]. Electric Power Annual 2008, *supra* note 1, at 19 tbl.1.2, 40 tbl.2.1 (numbers are rounded for ease of use). Sources for other renewables include: wood and wood waste, black liquor, biogenetic municipal solid waste, landfill gas, sludge waste, agricultural byproducts, other biomass, geothermal, solar thermal, photovoltaic energy, and wind. *Id.* at 19 nn.6-7. Pumped Storage uses electric power to store energy which can be recovered and used when needed. It registers a negative producer of electric capacity. See Glossary, Energy Info. Admin., U.S. Dep't of Energy, <http://www.eia.doe.gov/glossary/index.cfm?id=P> (last visited Nov. 6, 2010).

[FN451]. State of the States, *supra* note 62, at 9.

[FN452]. See *supra* Table 3.

[FN453]. Annual Energy Outlook 2010, *supra* note 445, at 11.

[FN454]. See State of the States, *supra* note 62, at 6.

[FN455]. See *id.* at 21.

[FN456]. See *id.*

[FN457]. See *supra* note 453 and accompanying text.

[FN458]. State of the States, *supra* note 62, at 22.

[FN459]. *Id.*

[FN460]. Cf. What is a Megawatt?, supra note 446 (explaining that a large utility plant typically generates about 1000 MW).

[FN461]. U.S. Wind Energy Projects, Am. Wind Energy Ass'n, [http:// www.awea.org/projects/](http://www.awea.org/projects/) (last visited Oct. 22, 2010) (follow each state's hyperlink for an exhaustive list of wind farm projects and the power produced at each).

[FN462]. Large-Scale Photovoltaic Power Plants: Ranking 251-300, PVResources.com, <http://www.pvresources.com/en/top300pv.php> (last visited Nov. 6, 2010). Only 250 powerplants in the world currently produce over 5 MW. Id.

[FN463]. Env't Am. Research & Policy Ctr., supra note 197, at 36.

[FN464]. Warren Belmar, Capital Counsel Group, Advancing the Availability of Transmission for Renewable Energy Projects 6 (2009), available at www.abanet.org/publicserv/environmental/webinar/warren.belmar.ppt.

[FN465]. Id.

[FN466]. See State of the States, supra note 62, at 31.

[FN467]. See id. at 34 (financial penalties have only been levied in Texas and Connecticut, totaling \$32,000 and \$5.6 million respectively).

[FN468]. Id. at 31.

[FN469]. See id. at 34 (showing that no enforcement action is required in these three states).

[FN470]. Colin Sullivan, California Won't Meet RPS Goal in 2010, on Track for 2011-Report, Greenwire (June 23, 2010), [http:// www.eenews.net/Greenwire/2010/06/23/11/](http://www.eenews.net/Greenwire/2010/06/23/11/).

[FN471]. Belmar, supra note 464, at 4.

[FN472]. In 2025, existing RPS programs will govern fifty-six percent of U.S. generation. State of the States, supra note 62, at 9. The eighty percent figure is based on an aggregation of this number. See id.

[FN473]. See Belmar, supra note 464 (a little more than half of the states currently have RPSs in place, bringing the remaining states online would presumably almost double the demand).

[FN474]. Peter H. Gleik, *The World's Water 2000-2001*, at 39 (2000).

[FN475]. See Intergovernmental Panel on Climate Change, Summary for Policymakers 3-5 (2007), available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf>.

[FN476]. See FAQ 8.1: How Reliable Are the Models Used to Make Projections of Future Climate Change?, Intergovernmental Panel on Climate Change, [http:// www.ipcc.ch/publications_and_data/ar4/wg1/en/faq-8-1.html](http://www.ipcc.ch/publications_and_data/ar4/wg1/en/faq-8-1.html) (last visited Nov. 6, 2010).

[FN477]. Id.

[FN478]. See *supra* Part II.A-B.

[FN479]. See Press Release, Pew Research Ctr., Modest Support for Cap and Trade Policy: Fewer Americans See Solid Evidence of Global Warming (Oct. 22, 2009), available at <http://people-press.org/reports/pdf/556.pdf>.

[FN480]. See, e.g., Peter Schwartz & Spencer Reiss, Nuclear Now!, *Wired* (Feb. 2005), <http://www.wired.com/wired/archive/13.02/nuclear.html>.

[FN481]. Pew Research Ctr., *supra* note 479.

[FN482]. *Id.*

[FN483]. *Id.*

[FN484]. Monterey Bay Aquarium, Review of Public Opinion Surveys on Climate Change 5 (2008), <http://it-conf.mbayaq.org/climatechangesummit/ReviewofClimateChangesurveysfor2010FINAL>.

[FN485]. *Id.* at 4.

[FN486]. World Bank, World Development Report 2010: Public Attitudes Toward Climate Change: Findings From a Multi-Country Poll 19 (2010), available at <http://siteresources.worldbank.org/INTWDR2010/Resources/Background-report.pdf>.

[FN487]. Publics Want More Government Action on Climate Change: Global Poll, World Public Opinion (July 29, 2009), <http://www.worldpublicopinion.org/pipa/articles/btenvironmentra/631.php>.

[FN488]. Jeffrey M. Jones, Voters Rate Economy as Top Issue for 2010, *Gallup* (Apr. 8, 2010), <http://www.gallup.com/poll/127247/voters-rate-economy-top-issue-2010.aspx>.

[FN489]. *Id.*

[FN490]. Pew Research Ctr., *supra* note 479.

[FN491]. Update, Rain Refreshes Moscow, but Wildfires Still Burning, *KyivPost* (Aug. 13, 2010), <http://www.kyivpost.com/news/russia/detail/78307/>.

[FN492]. Pakistan Floods: Two 'Major Peaks' Due on Indus River, *BBC News* (Aug. 13, 2010), <http://www.bbc.co.uk/news/world-south-asia-10961640>.

[FN493]. John Collins Rudolf, The Heat Wave and the Climate Divide, *N.Y. Times Green: Blog About Env't* (July 9, 2010 8:25 A.M.), <http://green.blogs.nytimes.com/2010/07/09/the-heat-wave-and-the-climate-divide/>.

[FN494]. T. Malthus, *An Essay on the Principle of Population*, ch.5 (Geoffrey Gilbert ed., Oxford World's Classics 1993) (1798). In the authors' opinion, the jury is still out.

[FN495]. M. King Hubbert, Chief Consultant, Presentation at the Spring Meeting of the Southern District, American Petroleum Institute: Nuclear Energy and the Fossil Fuels (March 7-9, 1956), available at <http://www.hubbertpeak.com/hubbert/1956/1956.pdf>.

[FN496]. D. Meadows, et al., *The Limits to Growth*, a Report for the Club of Rome's Project on the Predicament of Mankind 20-24, 54-55, 66-69 (5th ed., 1972).

[FN497]. See *id.* at 54-56.

[FN498]. F. Fukuyama, *The End of History and the Last Man* 87-99, 276-84 (1992). The authors suggest the jury has rejected this argument.

[FN499]. See *supra* Part IV.

[FN500]. See *supra* notes 435-43 and accompanying text.

[FN501]. See *supra* Part III.

[FN502]. See, e.g., Pew Research Ctr., *supra* note 479, at 3-4 (explaining that Republicans are more likely to not believe climate change exists and less likely to believe anything should be done about it).

[FN503]. See *supra* Part III.D.

[FN504]. See *supra* Part III.C-D.

[FN505]. See *supra* Part III.B-C.

[FN506]. See *supra* notes 479-90 and accompanying text.

[FN507]. But see Jon A. Krosnick, *The Climate Majority*, *N.Y. Times*, June 9, 2010, at A25. Krosnick contends the recent polls asked the wrong questions and drew the wrong conclusions. “[H]uge majorities of Americans still believe the earth has been gradually warming as the result of human activity and want the government to institute regulations to stop it.” *Id.*

[FN508]. A short ton of CO₂ generally brings less than \$3.00 at RGGI auctions. See Press Release, Reg'l Greenhouse Gas Initiative, *RGGI CO₂ Auctions Yield Millions for Investment in Clean Energy, Job Creation* (March 12, 2010), available at http://www.rggi.org/docs/Auction_7_Release_MM_Report_2010_03_12.pdf. This compares to an average price of 15-20 (\$20-26) for a metric ton of CO₂ equivalent on the European Union Emissions Trading System. See European Climate Exchange, *ECX Monthly Report July 2010* (2010).

[FN509]. See *supra* Part II.D-F.

[FN510]. See *supra* notes 322-27 and accompanying text.

[FN511]. See *supra* Part II.A.

[FN512]. *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, opened for signature Mar. 16, 1998, 2303 U.N.T.S. 148 (entered into force Feb. 16, 2005).

[FN513]. *Conference of the Parties, Fifteenth Session, Copenhagen, Denmark, Dec. 7-19, 2009, 4-7, Part Two: Action Taken by the Conference of the Parties at its Fifteenth Session*, U.N. Doc. FCCC/CP/2009/Add.1 (Mar. 30, 2010), available at <http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf>.

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