Minnesota Journal of Law, Science & Technology

Volume 10 | Issue 2 Article 8

2009

When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation

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FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation

Steven Ferrey*

I. THE NEW POLICY CONFLICT, BUT NO LEGAL CONTRADICTION, BETWEEN REGULATION OF CARBON REDUCTION AND RENEWABLE ENERGY PROJECTS

Control of carbon emissions to the atmosphere is the environmental issue of this decade—perhaps of this entire generation. Its importance has been equated to the survival of the planet: "The stakes, for all life on the planet, surpass those of any previous crisis."[1] It may all come down to the novel legal concept of "additionality."

All developed nations across the world, except the United States, have entered the Kyoto Protocol to reduce world carbon emissions.[2]

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1. James Hansen et al., *Target Atmospheric CO_2: Where Should Humanity Aim?*, 2 OPEN ATMOSPHERIC SCI. J. 217, 229 (2008), http://www.bentham.org/open/toascj/openaccess2.htm (follow "Click here to view the contents(2008)" hyperlink; then follow article hyperlink; then follow "DOWNLOAD" hyperlink).

2. *See* United Nations Framework Convention on Climate Change,

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Even in the United States, approximately half of the states have embarked on aggressive state-level carbon restriction laws.[3] Collectively, the objectives of these international and state carbon laws are to restrict substantially, even radically, the emissions of the primary global warming gas, carbon dioxide (CO_2), which is most abundantly emitted in energy production.[4]

Global carbon concentration in the atmosphere is now accelerating at almost four times the rate of the 1990s.[5] To make mitigation policies successful, these undertakings must address the energy sector and they must transition from the traditional primary reliance on fossil fuel combustion to greater use of renewable energy sources. Renewable energy sources either do not produce carbon or, by employing some methane or biomass resources, are potentially carbon-neutral.[6] Therefore, the success of carbon reduction initiatives is intimately tied to shifting the power generation base of both developed and developing countries to a more balanced mix of renewable energy generation.[7]

The greatest concerns about carbon trading among stakeholders

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List of Annex I Parties to the Convention, http://unfccc.int/parties_and_observers/parties/annex_i/items/2774.php (last visited Feb. 20, 2009) [hereinafter List of Annex I Parties]; Dean Scott, *Global Carbon Concentrations Accelerating at Almost Four Times Growth Rate of 1990s*, 39 ENV'T REP. 1967 (2008).

3. *See* discussion *infra* Parts III and IV.

4. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, EMISSIONS OF GREENHOUSE GASES IN THE UNITED STATES 2005: EXECUTIVE SUMMARY 2-3, (2007), http://www.eia.doe.gov/oiaf/1605/ggrpt/summary/pdf/0573(2005)es.pdf; Carbon Dioxide Info. Analysis Ctr., Frequently Asked Global Change Questions, http://cdiac.ornl.gov/faq.html (last visited Feb. 21, 2009).

5. Scott, *supra* note 2, at 1967.

6. *See* Envtl. Prot. Agency, Landfill Methane Outreach Program (LMOP): Benefits of LFG Energy, http://www.epa.gov/lmop/benefits.htm (last visited Oct. 3, 2008) ("It is estimated that . . . roughly 60-90% of the methane emitted from . . . landfill[s] [can be captured and used as fuel]."); *see also infra* tbl.1 (detailing U.S. GHG emissions). By absorbing carbon while it is growing, certain biomass only releases the stored carbon when it is burned to produce power. Angela Morrison Uhland, *Improving Regulations for Biomass-Based Electrical Generating Facilities*, 23 NAT. RES. & ENV'T, Summer 2008, at 15, 16.

7. *See generally* FERREY & CABRAAL, *supra* note * (outlining the importance of developing countries in any attempt to reduce global warming gases); Steven Ferrey, *Why Electricity Matters, Developing Nations Matter, and Asia Matters Most of All*, 15 N.Y.U. ENVTL. L.J. 113, 142 (2007).

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are the requirements of "additionality" and verification of offsets.[8] Additionality creates a major legal and regulatory disconnect in these carbon laws. Additionality is the requirement in most carbon control statutes or regulations that limits additional or non-business-as-usual carbon-reduction projects to those that legally qualify to create carbon "offsets." Offsets create tradable credits for compliance with carbon policies.[9] Such offset credits, which are embodied in all international and U.S. state carbon laws to date, can be earned and traded among regulated industries, such as power generators, for compliance with the carbon laws. They become the common currency of carbon. However, some of these carbon programs have specifically excluded all renewable energy projects from being deemed additional and thereby eligible as carbon currency.[10]

The legal rationale is that renewable power is abundantly promoted by a host of other legal incentives, from tax credits and accelerated tax depreciation to creation of Renewable Energy Credits ("RECs") or system benefit charges to promote renewable power.[11] Therefore, it is assumed that they would be constructed anyway and are not additional or justified due solely to a carbon program. To allow renewable projects to legally double-dip, as both renewable projects and carbon reduction projects, even though they truly serve dual purposes technically, is to fail additionality. The first carbon reduction program in the United States, the Regional Greenhouse Gas Initiative ("RGGI"), commencing in January 2009 in ten northeastern states, takes this position by barring renewable energy projects from being additional.[12]

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8. 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 25 (2008) [hereinafter CARBON OFFSETS], *available at* http://www.gao.gov/new.items/d081048.pdf.

9. *See* REGIONAL GREENHOUSE GAS INITIATIVE MODEL RULE § XX-10.3(d) (Final Draft with Corrections Jan. 5, 2007) [hereinafter RGGI MODEL RULE], *available at* http://www.rggi.org/docs/model_rule_corrected_1_5_07.pdf; U.S. CONG. RESEARCH SERV., RL34634, CRS REPORT FOR CONGRESS: CLIMATE CHANGE AND INTERNATIONAL DEFORESTATION: LEGISLATIVE ANALYSIS 5, Tbl.1 (Aug. 22, 2008) [hereinafter CRS REPORT ON CLIMATE CHANGE], *available at* http://ncseonline.org/NLE/CRs/abstract.cfm?NLEid=2081.

10. RGGI MODEL RULE § XX-10.3(d)(2).

11. For a discussion of RECs, see *infra* Part VI.C. For a discussion of other tax incentives, see STEVEN FERREY, THE LAW OF INDEPENDENT POWER, *supra* note *, at §§ 3:50.1–3:54.

12. RGGI MODEL RULE § XX-5.3(d).

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The conundrum of excluding renewable energy projects from being additional is that it discourages the very projects that must be created in order to shift the power-generating base to a less carbon-intense emission composition. International programs take a contrary regulatory legal position. The international Kyoto Protocol embodies the Clean Development Mechanism ("CDM") offset program and specifically allows renewable energy projects in developing countries to qualify.[13] Nonetheless, the choice made under CDM has resulted primarily in projects that do not feature renewable energy projects.[14]

This article analyzes the legal issues and policy conundrums created by the new legal meta-metric of additionality for carbon control—comparing the U.S. laws against the Kyoto Protocol. Section II examines which gases are regulated by these programs and the pivotal role of renewable energy as the alternative to mitigate prodigious creators of CO_2. It examines the various emerging U.S. state carbon laws and programs, how they choose to qualify legal offsets, and whether they require additionality. The most prominent programs are analyzed in depth. Section III explores the legal elements of the ten-state RGGI program, the first U.S. carbon regulation of the power sector. Section IV turns to the high-profile California carbon-regulation program. Section V analyzes all other U.S. mandatory and voluntary carbon-restriction programs.

Section VI examines the state legal programs that make renewable power projects ineligible for additionality. Invoking a comparison with international law, Section VII dissects the Kyoto Protocol and how it legally resolves the issues of eligibility of renewable power options, additionality, and any resultant shift in the power generation base.

Against the above analysis, Section VIII probes the legal substance of additionality in both the United States and international contexts. It probes the legal and regulatory nuances, and finds analogous precedent in recent 2008 U.S. court decisions on the legality of pollution cap-and-trade programs. It then contrasts the

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13. *See infra* Part VII.D.

14. Most CDM projects which must be sited in developing countries (Non Annex 1) are projects to reduce HFC-23, a refrigerant. All HFCs collectively constitute less than 1% of GHGs, but they have received almost half of the investment in mitigation dollars. Jeffrey Ball, *Gas Leak: Kyoto's Caps on Emissions Hit Snag in Marketplace—U.N. Mulls How to Fix Pollution-Credit System; 'Expecting Too Much'*, WALL ST. J., Dec. 3, 2007, at A1.

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legal architecture of carbon regulation in the United States and worldwide. Carbon regulation is not an unlimited technical nor legal exercise: climate scientists warn of very tight time frames, which then are applied to the legal options and regulatory construct. With the clock on global warming running and time limited, policy alternatives and options conclude this article.

II. POWER GENERATION AND CARBON

A. THE ROLE OF CARBON IN REAL TIME AND GLOBAL WARMING

Since the Industrial Revolution, emissions resulting from combusting fossil fuels used for mechanical and electrical energy have permeated the atmosphere.[15] Atmospheric CO_2 levels now are approximately 33% higher than in pre-industrial times.[16] Temperature changes move in direct relation to atmospheric greenhouse gas (GHG) concentrations.[17] GHGs include carbon dioxide (CO_2), methane (CH_4), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).[18] Notably, the most prevalent GHG is water vapor. It, alone, is the major unregulated GHG, because it is assumed to be too pervasive a phenomenon to be regulated.[19] The regulated GHGs in Table 1 are displayed in descending order of their impacts on the environment, which is a function of their

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15. *See* Pew Ctr. on Global Climate Change, Global Warming Basics, http://www.pewclimate.org/global-warming-basics (last visited Feb. 21, 2009) (using a variety of articles to discuss the basics of climate change).

16. Arnold W. Reitze Jr., *Global Warming*, 31 ENVTL. L. REP.: NEWS & ANALYSIS 10253, 10254 (2001) ("Compared with pre-industrial levels, CO_2 concentration in the atmosphere has risen from about 270 to 280 parts per million by volume (ppmv) to over 360 ppmv in 1999, N_20[, or nitrous oxide,] has risen from 270 ppmv to over 310 ppmv, and CH_4[, or methane,] concentration has increased from 700 parts per billion by volume to over 1,700 ppbv.").

17. *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2001: SYNTHESIS REPORT: SUMMARY FOR POLICY MAKERS 4-5 (2001) [hereinafter CLIMATE CHANGE 2001], http://www.ipcc.ch/pdf/climate-changes-2001/synthesis-spm/synthesis-spm-en.pdf (identifying causal link between GHGs and climate change).

18. In 2000 anthropogenic activities emitted an estimated 347 TgN of methane and 33 TgN of NOx into the atmosphere per year. WORKING GROUP I [WGI], INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2001: THE SCIENTIFIC BASIS 248-66 (2001), http://www.grida.no/publications/other/ipcc_tar/?src=/CLIMATE/IPCC_TAR/wg1/006.htm.

19. Thomas R. Karl & Kevin E. Trenberth, *Modern Global Climate Change*, 302 SCI. 1719, 1719 (2003).

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quantity released, their heat radiation properties, and their residence time in the atmosphere.

Table 1: Key Regulated Greenhouse Gases

GHG	Global Warming Relative Impact [CO_2=1]	Residency Time [years]	**Amount of U.S. Total GHG Release [%]**[20]
Carbon Dioxide (CO_2)	1	100	85
Methane (CH_4)	21	12	11
Nitrous Oxides (NOx)	310	120	2
Hydrochlorofluorocarbons (HFCs)	140-11700	Varies	< 1
Chlorofluorocarbons (CFCs)	6500	Varies	< 1
Hexafluoride (SF_6)	23,900	Varies	< 1

Despite earlier debate within the scientific community about whether climate change was natural or human-induced, the Fourth Report of the Intergovernmental Panel on Climate Change ("IPCC") in 2007 concluded that the evidence of human-made global warming is "unequivocal."[21] CO_2 is the human-caused emission of most concern. CO_2 is the main byproduct of fossil fuel combustion, and therefore results from any energy production that uses oil, coal, natural gas, or other solid waste fuels.[22] Ninety-eight percent of anthropogenic CO_2 emissions are from combustion of fossil fuels, and 84% of energy-related U.S. GHG emissions are attributed to CO_2.[23] All forecasts by

20. U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2004, at ES-3 (2006), *available at* http://yosemite.epa.gov/OAR/globalwarming.nsf/UniqueKeyLookup/RAMR6MBSC3/$File/06_Complete_Report.pdfWGI Full Report.

21. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 30 (2007), http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf.

22. For a complete discussion of global warming, see JOHN HOUGHTON, GLOBAL WARMING: THE COMPLETE BRIEFING (3d ed. 2004).

23. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, EMISSIONS OF GREENHOUSE GASES REPORT (2008) [hereinafter EMISSIONS REPORT],

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the U.S. Department of Energy, the International Energy Agency, and independent forecasters agree that GHG emissions will increase exponentially, not decrease, during the foreseeable future.[24] Global energy-related CO_2 emissions are rising at the rate of approximately 1.7% per year.[25]

Some leading climate scientists conclude that we are reaching a tipping point, where climate impacts will cause irreversible damage.[26] A recent assessment is that we need to limit the increase in the "global average surface temperature to no more than 2 to 2.5°C above its 1750 value of approximately 15°C" to avoid the most catastrophic effects of global warming.[27] This will require a sharp reduction of emissions over the next generation and annual GHG emission reduction to "near zero by 2100."[28] A zero-carbon emission economy is a radical transition. Global carbon concentrations in the atmosphere are now accelerating at four times the rate they did a decade ago, in the 1990s.[29]

This will only be possible if we can "demonstrate that a modern society can function without reliance on technologies that release carbon dioxide . . . ."[30] NASA scientist James Hansen forecast this to exceed the tipping point once the atmosphere exceeds 400 to 425

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http://www.eia.doe.gov/oiaf/1605/ggrpt/carbon.html.

24. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, INTERNATIONAL ENERGY OUTLOOK 2008 (2008) [hereinafter INTERNATIONAL OUTLOOK], http://www.eia.doe.gov/oiaf/ieo/emissions.html.

25. *Id.*

26. *See* Hansen et al., *supra* note 1, at 217 ("If humanity wishes to preserve a planet similar to that on which civilization developed . . . paleoclimate evidence and ongoing climate change suggest that CO_2 will need to be reduced from its current 385 ppm to at most 350 ppm. . . . If the present overshoot of this target CO_2 is not brief, there is a possibility of seeding irreversible catastrophic effects."); Bill McKibben, *Civilization's Last Chance: The Planet is Nearing a Tipping Point on Climate Change, and It Gets Much Worse Fast*, L.A. TIMES, May 11, 2008, *available at* http://www.latimes.com/news/opinion/la-op-mckibben11-2008may11,0,7434369.story.

27. Michael C. MacCracken, *Prospects for Future Climate Change and the Reasons for Early Action*, EM, June 2008, at 40; *see also*, TONY BLAIR, THE CLIMATE GROUP, BREAKING THE CLIMATE DEADLOCK: A GLOBAL DEAL FOR OUR LOW-CARBON FUTURE 9 (2008), http://tonyblairoffice.org/BreakingTheClimateDeadlock.pdf.

28. MacCracken, *supra* note 27, at 40.

29. *Global Carbon Concentrations Accelerating at Almost Four Times Growth Rate of 1990s*, 39 ENV'T REP. 1967 (2008).

30. MacCracken, *supra* note 27, at 40.

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parts per million ("ppm") of CO_2.[31] Since the beginning of the Industrial Revolution, CO_2 has increased by about a third to 387 ppm. At 450 ppm, Hansen says there will be no more ice left on the planet.[32]

A top official with the IPCC has indicated that developed nations will need to slash CO_2 emissions by 80 to 95%—almost entirely—by 2050 to hold GHGs to 450 ppm in the atmosphere.[33] Hansen notes that waiting even until 2018 to stop the growth of greenhouse gas emissions, virtually eliminates the chances of avoiding the catastrophic effects of warming.[34] According to Dr. John Holdren, director of the Woods Hole Laboratory, even if U.S. greenhouse emissions plateau in six years in 2015, the world already has reduced our chances by 50% to avoid climate catastrophes.[35] However, neither the more than a dozen U.S. states that are starting to regulate carbon, nor federal U.S. action, nor forecasts by international energy agencies offer any assurance of a plateau in carbon emissions by 2015.

B. THE POWER SECTOR AND CARBON GENERATION

Fossil fuel is everywhere: as a virtually exclusive transportation fuel, used for home and business heat, dominating the production of electric power. However, the focus of all regulators is on the electric power sector. This occurs for two primary reasons. First, there is a manageable number of electric power generators to regulate, while there are thousands of times more fossil-fuel-fired vehicles operated by billions of individuals. For example, in the United States there are fewer than 5000 centrally dispatched power generation machines, compared with more than 100 million automobiles. Second, regulators have always shied away from applying environmental regulations to individual voters, as opposed to larger sources. This is again evident in early carbon regulation: the emphasis is on electric power generation.

Ninety-eight percent of anthropogenic CO_2 emissions are from

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31. Dean Scott, *NASA Scientist Recalls 1988 Testimony By Seeking Phaseout of Coal-Fired Plants*, 39 ENV'T REP. 1273 (2008).

32. *Id.*

33. Rick Mitchell, *IPCC Official Says Industrialized Nations Must Cut Up to 95 Percent*, 39 ENV'T REP. 1917 (2008).

34. Robin Chase, *Get Real on Global Warming Goals*, B. GLOBE, Apr. 22, 2008, at A15.

35. *Id.*

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combustion of fossil fuels.[36] Most countries are using fossil fuels, not renewable power resources, to satisfy the exponential increase in demand. Despite the emphasis in the United States on reducing GHG emissions, electric power demand continues to increase.[37] Fossil fuel combustion results in 64% of the total atmospheric CO_2, and this amount has increased significantly since 1990.[38] Burning gaseous, liquid, and solid fossil fuels to create electric power releases copious quantities of CO_2 into the environment.[39] Success of GHG regulation in the United States, and internationally, will be linked to the level of emissions of the electric utility industry.

None of the countries with the largest coal reserves—United States, China, India, Indonesia—has a carbon policy to regulate the release of CO_2 from the deployment of such coal reserves.[40] China and India are building almost a new coal plant each week.[41] China and India harbor around one-quarter of the world's coal reserves, and are deploying them rapidly to fire electric power plants.[42] India has targeted 100,000 megawatts ("MW") in new capacity over the next ten years.[43] China is currently installing 1000 MW of coal power generation each week and predictions are that by the year "2030, coal-fired power in India and China will add 3000 million extra tons of

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36. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, EMISSION OF GREENHOUSE GASES IN THE UNITED STATES 1998 (1999) [hereinafter EIA, GASES 1998], ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggrpt/057398.pdf.

37. *See, e.g.*, INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2004 (2004), *available at* http://www.iea.org/textbase/nppdf/free/2004/weo2004.pdf.

38. ENERGY INFO. ADMIN., *supra* note 4, at 2–3 (2007), *available at* http://www.eia.doe.gov/oiaf/1605/ggrpt/summary/pdf/0573(2005)es.pdf; Frequently Asked Global Change Questions, http://cdiac.ornl.gov/faq.html (last visited Apr. 30, 2008).

39. The amount of carbon released per unit of usable energy decreased each time as human populations moved from wood to coal as the dominant CO_2-releasing fuel in the late 19th century, and again moved from coal to oil in the mid 20th century, and will move toward natural gas in the future. *See* FERREY, *supra* note *, at § 2.1.

40. *See* List of Annex I Parties, *supra* note 2.

41. Elisabeth Rosenthal, *Europe Turns Back to Coal, Raising Climate Fears*, N.Y. TIMES, Apr. 23, 2008, at A1.

42. 2007 Survey of Energy Resources, World Energy Council 2007, Coal (2007), China at 26, India at 30, *available at* http://www.worldenergy.org/documents/coal_country_notes.pdf.

43. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, INDIA COUNTRY ANALYSIS BRIEF (2007), http://www.eia.doe.gov/cabs/India/pdf.pdf.

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CO_2 to the atmosphere every year."[44] Each year China adds forty times more new coal capacity than new wind power capacity.[45]

Additional deployment of coal is still at the forefront of new electric generation. Indonesia has a program to build by 2010 a significant number of new coal-fired power plants without sequestration of carbon emissions.[46] In spring 2008, Indonesia invited banks to participate in financing five new coal-fired power plants worth more than $2 billion, representing the first part of an effort by the world's fourth most populous country to almost double its generating capacity utilizing coal-fired generation.[47] Indonesia has large amount of renewable resources, but a decade ago backed away from a program designed to feature them in future development.[48]

At current rates of world energy development, energy-related CO_2 emissions in 2050 would be 255% of their current levels in developing countries.[49] Unprecedented deployment of renewable energy generation alternatives will be required to alter this trend.[50] The technology exists to accomplish a reversal of use of fossil fuels for power generation. The amount of solar radiation striking the Earth is about 10,000 times the Earth's commercial energy use;[51] converting one to two percent of the appropriate land area of the Earth to utilize solar energy could satisfy much of the Earth's electricity requirements

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44. Ray Purdy, *The Legal Implications of Carbon Capture and Storage Under the Sea*, SUSTAINABLE DEV. L. & POL'Y, Fall 2006, at 23.

45. *Id.*

46. *Banks Invited to Bid for Financing 5 Indonesian Power Projects*, ASIA PULSE PTY. LTD., Mar. 19, 2008.

47. *Id.*

48. In the mid 1990s, the author, as a consultant for the World Bank and the government of Indonesia, helped design a program for Indonesia that would have utilized renewable energy sources for up to one-third of future power development, but was never followed. *See generally* FERREY & CABRAAL, supra note *.

49. William C. Ramsay, IEA Deputy Executive Dir., Address at the 5th IEEJ Energy Seminar: Energy Technology Perspectives: Scenarios and Strategies to 2050 (July 14, 2006), *available at* http://www.iea.org/textbase/speech/2006/ramsay/etp_ieej.pdf.

50. Neal J. Cabral, *The Role of Renewable Portfolio Standards in the Context of a National Carbon Cap-and-Trade Program*, SUSTAINABLE DEV. L. & POL'Y, Fall 2007, at 13, 14–15.

51. Interview by Martin Smith with Jeffrey Sachs, Director, The Earth Institute, Professor of Health Policy and Management, Columbia University, http://www.pbs.org/frontlineworld/stories/africa705/history/sachs.html .

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when solar radiation is available.

In fact, no nation on Earth uses more energy than the energy content contained in the sunlight that strikes its existing buildings every day.[52] The solar energy that falls on roads in the United States each year contains roughly as much energy content as all the fossil fuel consumed in the world during that same year.[53] Storing that energy efficiently is another matter.[54] Tomorrow, the earth will have exactly as much solar energy as it has today, regardless of how much solar energy is used and consumed each day.[55]

Despite the emergence of, and attention to, renewable energy sources, forecasters do not see the international mix of power generation sources changing appreciably over the next several decades.[56] The percentage of fossil fuels in the mix—and thus the potential sources of GHGs in the power sector—is forecast to remain relatively constant. The International Energy Agency in Paris predicts that by 2030, world demand for energy will grow by 59% and fossil fuel sources will still supply 82% of the total, with non-carbon renewable energy sources supplying only 6%.[57] Clearly GHGs in the twenty-first century are about power generation sources and means.[58]

What follows examines the major U.S. programs to regulate carbon emissions, their allowance of offset credits and how they interface with renewable power.

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52. STEVEN FERREY, ENVIRONMENTAL LAW: EXAMPLES & EXPLANATIONS 526 (4th ed. 2007).

53. *Id.*

54. For a discussion of electric energy storage options, see FERREY, *supra* note *, at § 2.20.

55. The sun has consumed the same amount of energy for the past 4 to 5 billion years, and will continue to do so for the next 4 to 5 billion years. FERREY, *supra* note *, at 526.

56. Clark Gelling, Electric Power Research Institute, presentation at Aegis Conference, July 25, 2007.

57. *See, e.g.*, INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2004 (2004), *available at* http://www.iea.org/textbase/nppdf/free/2004/weo2004.pdf.

58. For detailed coverage of the power industry law and regulation, see generally FERREY, *supra* note *.

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III. THE EAST COAST 10-STATE REGIONAL GREENHOUSE GAS INITIATIVE

A. THE REGULATORY SCHEME

Many states have taken their own direct regulatory action.[59] RGGI is the first such regulatory effort in the United States and includes ten U.S. states. Beginning in April 2003, Governor George Pataki of New York initiated the effort by inviting neighboring states to participate in a regional cap-and-trade emissions program.[60] On December 20, 2005, seven states—Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont—entered into an agreement to implement the RGGI.[61] Since that time, Massachusetts, Maryland, and Rhode Island have agreed to sign the RGGI Memorandum of Understanding ("MOU") (collectively all ten states, the "RGGI states").[62] The principle goal of the MOU is for RGGI states to:

> Commit to propose for legislative and/or regulatory approval a CO_2 Budget Trading Program (the "Program") aimed at stabilizing and then reducing CO_2 emissions within the Signatory States, and implementing a regional CO_2 emissions budget and allowance

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59. For example, prior to joining any formal agreement, Massachusetts enacted its own regulations to reduce CO_2 emissions from 1997–1999 by ten percent. 310 MASS. CODE REGS. § 7.29 (2007).

60. Q & A: Regional Greenhouse Gas Initiative, http://www.pewclimate.org/rggi/qanda (last visited Mar. 13, 2009).

61. Regional Greenhouse Gas Initiative Memorandum of Understanding (Dec. 20, 2005) [hereinafter RGGI Memorandum of Understanding], *available at* http://www.rggi.org/docs/mou_final_12_20_05.pdf.

62. Massachusetts and Rhode Island were originally given the status of observing states. In January 2007 both agreed to formally join RGGI as signatory states. Maryland, a predominantly coal-powered electricity generating state in contrast to the other RGGI states, also subsequently joined RGGI in 2007. Press Release, Office of the Governor of Mass., Governor Patrick Signs Regional Pact to Reduce Greenhouse Gas Emissions (Jan. 18, 2007), *available at* http://www.mass.gov/?pageID=pressreleases&agId=Agov3&prModName=gov3pressrelease&prFile=reduce_greenhouse_gases011807.xml; Press Release, Office of the Lieutenant Governor of R.I., Lt. Gov. Roberts Calls for Rhode Island to Join Regional Greenhouse Gas Initiative (Jan. 23, 2007), *available at* http://www.ri.gov/press/view.php?id=3423; Press Release, Office of the Governor of Md., Governor Martin O'Malley Signs Greenhouse Gas Agreement, Climate Change Executive Order (Apr. 20, 2007), *available at* http://www.gov.state.md.us/pressreleases/070420.html.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

> trading program that will regulate CO_2 emissions from fossil fuel-fired electricity generating units having a rated capacity equal to or greater than 25 megawatts.[63]

The market-based design of the RGGI MOU is a cap-and-trade program. "Cap-and-trade systems operate by capping the amount of CO_2 emissions allowed, distributing emissions allowances to sources, and requiring each covered source to have sufficient allowances to cover its emissions at the end of each compliance period." Allowances can be traded among emission sources.

The RGGI Staff Working Group ("SWG") finalized the Draft Model Rule ("Model Rule") in January of 2007. The Model Rule is a product of over two years of work by the SWG and it is the foundation upon which the RGGI states will base their individual regulatory rules. The Model Rule is used by each state as a starting point for obtaining regulatory or legislative approval of its cap-and-trade program, but all such authorization is accomplished at the individual state level.[64]

RGGI started in January 2009. From that time, CO_2 emissions from power plants in the region will be capped at current levels[65] and the cap will remain in place until 2015. RGGI states have begun the process of incrementally reducing emissions, with the goal of achieving a 10% reduction by 2019.[66] By 2020, the program is expected to reach an emissions reduction of approximately 35% from a business-as-usual unregulated carbon scenario.[67]

All emissions must be verified by independent entities accredited by the state.[68] Since each state will administer its own carbon allocation, allowances, and offset accounting, failure to comply with state requirements could result in the regulated entity's credits being restrained or confiscated.[69] The RGGI Model Rule indicates that when a regulated entity's emissions exceed its CO_2 allowance budget, the state can deduct from the entity's compliance account, future

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63. RGGI Memorandum of Understanding, *supra* note 61, at 2.

64. *Id.* at 1.

65. The regional base annual CO_2 emissions cap will be equal to 121 million short tons. *Id.* at 2.

66. Press Release, Regional Greenhouse Gas Initiative, States Reach Agreement on Proposed Rules for the Nation's First Cap-and-Trade Program to Address Climate Change (Aug. 15, 2006), *available at* http://www.rggi.org/docs/model_rule_release_8_15_06.pdf.

67. *Id.*

68. RGGI MODEL RULE § XX-10.5(a)(5)(iii). There are provisions that attempt to avoid conflict of interest situations between verifiers and owners of projects that might employ their services. *Id.* § XX-10.6(e)(3).

69. *Id.* § XX-6.5(b).

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

allowances (beyond the current control period) equal to three times the number of the entity's excess emissions.[70] If the regulated entity has insufficient CO_2 allowances to cover three times that amount, it must immediately thereafter transfer sufficient allowances into its compliance account.[71]

One significant aspect of the Model Rule is its requirement that each state reserve a minimum of 25% of that state's allowances for "consumer benefit or strategic energy purpose[s]."[72] This translates to auctioning these reserved allowances to whomever wants to purchase them for compliance or speculation and resale. Depending on the market for allowances, this could realize for states millions of dollars in an open-ended fund. Consumer benefits could include using the money to supplement consumer electricity bills or funding state-run energy efficiency programs, refunding amounts to consumers, or putting the money back into the state coffers.

In general, however, electricity generators have a variety of options to comply with RGGI, including reducing emissions through efficiency measures, instituting newer technologies, and changing fuel sources. Generators that implement such measures can then sell any excess allowances or purchase additional allowances from other qualifying power producers.

B. "ADDITIONALITY" AND CREATION OF OFFSETS

Because the price of implementing carbon reduction is often high, RGGI also created an offsets program to offer power producers flexibility in meeting the cap limitations through creation or trading of additionally-created external market carbon credits. "Offsets" under RGGI are emissions reductions that come from sources other than fossil fuel-fired electricity generators that are subject to the emissions cap under RGGI.[73] The offsets program awards offset allowances for approved offset projects that were realized on or after the date of the MOU.[74] Power generators can use offset allowances to comply with some of their legal compliance requirements.

No credits can be awarded for projects that are required by any

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70. *Id.* § XX-6.5(d)(1).
71. *Id.*
72. *Id.* § XX-5.3(a)-(b).
73. Offsets, Regional Greenhouse Gas Initiative, http://rggi.org/offsets (last visited May 8, 2009).
74. RGGI Memorandum of Understanding, *supra* note 61, at 4.

"local, state or federal law, regulation, or administrative or judicial order."[75] These would not be additional to pre-existing legal requirements.[76] Thus, retrofits, efficiency improvements, or emission reductions required by regulation or embodied in permits or consent decrees will not create salable offset credits.

The number of allowances available from the RGGI states declines over time. Offsets can fill this potential shortfall of allowances because each offset acquired permits an additional ton of CO_2 emission. The Independent Power Producers of New York have indicated that generators could be left short of necessary allowances when open bidding at auction as most RGGI states allow, and under pre-existing power contracts may have no means to recover their carbon-related costs.[77] New York has set aside 1.5 million credits to assist the generators operating under long-term contracts that do not consider carbon-related costs, but the generators say that this is less than half as many as needed.[78] Creation of additional offsets will play an important role to fill any shortfall of allowances below the level of CO_2 emissions.

The initial offset projects that can be approved under the Offsets Program include: (1) landfill methane capture and combustion; (2) sulfur hexafluoride (SH6) capture and recycling; (3) afforestation (transition of land from a non-forested to forested state); (4) end-use efficiency for natural gas, propane, and heating oil; (5) methane capture from farming operations; and (6) projects to reduce fugitive methane emissions from natural gas transmission and distribution.[79] As expressed in the RGGI MOU, RGGI states have agreed to continue to cooperate on the development of additional offsets projects.[80]

However, the eligible list of offset projects omits projects that involve the installation of renewable energy resources. At first blush, this would seem to be counterintuitive and at cross-purposes with other policies. About half of the fifty states award renewable energy credits for the installation of eligible[81] renewable energy electric

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75. RGGI MODEL RULE § XX-10.3(d)(1).

76. *See supra* Part I (discussing "additionality").

77. Lisa Wood, *New York Approves Rules for RGGI Carbon Trading; Independents Object*, ELECTRIC UTIL. WK., Aug. 18, 2008, at 4.

78. *Id.* at 6.

79. RGGI Memorandum of Understanding, *supra* note 61, at 4.

80. *Id.*

81. See *infra* Part V.C. There is significant variation in what is an eligible renewable energy technology in each of the states. While certain wind and solar technologies seem to qualify everywhere, the eligibility of

generation facilities.[82] In addition, sixteen states also authorize a tax on retail utility bills that creates a renewable energy trust fund used to make grants, loans, or otherwise provide incentives to renewable energy projects.[83] In addition, 76% of all states allow smaller renewable energy projects to enjoy the net metering of their electricity when sold back to the host electricity supplier, thus effectively allowing these smaller projects to sell wholesale power at much higher retail rates.[84]

However, these other renewable credits and incentives are used to justify the RGGI program to disallow credit for any project that has an electric generation component, unless the project sponsor transfers legal rights in the renewable credits to the regulatory agency.[85]

On the whole, renewable resources are not eligible to create RGGI offset allowances. The RGGI Model Rule will not issue offset allowances to any offset project that receives funding or other incentives from state renewable energy trust funds[86] or any credits or allowances that would be earned from any other mandatory or voluntary GHG programs.[87] These measures are restrictive considering that renewable energy credits in many states are expected to trade at higher prices than RGGI offsets or credits.[88] Therefore, the

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various biomass, landfill gas, hydroelectric and other facilities varies significantly. *See* Steven Ferrey, *Sustainable Energy, Environmental Policy, and States' Rights: Discerning the Energy Future Through the Eye of the Dormant Commerce Clause*, 12 N.Y.U. ENVTL. L.J. 507, 647–48 tbl.4 (2004).

82. For a detailed discussion of these state renewable energy programs, see Ferrey, *supra* note 81, at 529–32. *See also* Steven Ferrey, *Renewable Orphans: Adopting Legal Renewable Standards at the State Level*, ELECTRICITY J., Mar. 2006, at 52.

83. *See* Ferrey, *supra* note 81, at 523–29.

84. For a discussion of net metering and its legal and policy implications, *see* Steven Ferrey, *Nothing But Net: Renewable Energy and the Environment:* MidAmerican *Legal Fictions, and Supremacy Doctrine*, 14 DUKE ENVTL. L. & POL'Y F. 1 (2003); *see also* Steven Ferrey, *Net Zero: Distributed Generation and FERC's MidAmerican Decision,* ELECTRICITY J., Oct. 2004, at 33.

85. RGGI MODEL RULE § XX-10.3(d)(2).

86. *Id.* § XX-10.3(d)(3).

87. *Id.* § XX-10.3(d)(4).

88. For discussion of recent REC trading prices, see Ryan Wiser, et al., *The Experience with Renewable Portfolio Standards in the United States*, ELECTRICITY J., May 2007, at 8. There is little reliable trading data yet in the United States regarding trading of carbon offsets or allowances.

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RGGI scheme stands conspicuously apart from other carbon schemes[89] and even from the renewable energy incentive programs that the RGGI states have otherwise adopted and implemented.[90]

In sum, the RGGI scheme does not contemplate that renewable energy projects may create offsets for program compliance, with one exception: destruction of methane in a landfill gas project is eligible for RECs despite creating CO_2 while destroying methane.[91] Despite controversy over this point, it was believed by the state environmental officials administering RGGI that renewable energy projects do not themselves diminish CO_2 emissions. However, methane destruction destroys methane by converting it to CO_2, in addition to producing power. As shown in table 1 above, methane is more than twenty times more damaging in global warming than is CO_2 emitted to the atmosphere molecule for molecule, so this conversion is deemed to have independent significance.[92] By comparison, renewable energy projects create neither CO_2 nor methane, yet are not eligible to create RGGI offsets.

In addition, the RGGI Model Rule implies, albeit with some ambiguity, that energy conservation projects can qualify to generate offsets.[93]For example, fossil-fuel-burning efficiency improvements to the combustion device itself—the furnace or boiler—may qualify as an offset project. Or, albeit with less certainty, the installation of building thermal efficiency measures—which saves CO_2 emissions by making the building retain heat more efficiently, and thus requires less operation of existing fossil-fuel-burning equipment even if the equipment itself is not made more efficient—could qualify as an offset project. Finally, with two degrees of separation, a production of energy-efficient, electricity-using appliances—which would help reduce CO_2 emissions on the customer's side of the meter—may even be a valid offset project under the Model Rule.

To ensure that the majority of the emissions reductions occur within the regulated power production sector, the RGGI MOU places limits on the use of offsets and the issuance of additional offsets to moderate offset price impacts.[94] In particular, RGGI initially allows

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However, anecdotal evidence is that RGGI allowances traded even before they were available at more than $8 per ton, above projected prices.

89. *See infra* Part V (discussing other regulatory regimes).
90. *See infra* Part V.
91. RGGI MODEL RULE §§ XX-10.3(a)(1)(i), XX-10.5(a).
92. *See supra* Part II.A tbl.1.
93. RGGI MODEL RULE § XX-10.5(d).
94. RGGI Memorandum of Understanding, *supra* note 61, at 6.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

offset projects anywhere in the United States if the average price of an emission allowance remains below $7 per ton.[95] In each compliance period, each generator will be allowed to cover up to 3.3% of their emissions using offset allowances, which is roughly equal to half of that generator's emissions reduction obligation.[96]

If allowance prices rise above $10 per ton,[97] RGGI will allow sources to cover up to 10% of their emissions with offsets, and will allow offset projects outside the United States as well as allowances from the E.U. Emissions Trading Scheme ("EU-ETS") and the Kyoto Protocol's CDM.[98] This would allow the full RGGI reduction of 10% of allowance emissions by 2018 to come from purchasing offsets on the market, rather than making actual reductions at the generation facility. If allowance prices rise above $10 per ton, then the compliance period will be extended by one year, for a maximum compliance period of 4 years.[99] This mechanism will "give sources more time to reduce their emissions and may allow allowance prices to fall."[100]

The purpose of these price-denominated "circuit breaker" provisions is to effectively suspend the rules of the RGGI program during those periods when the market-based cap-and-trade system results in trading allowances at politically controversial prices. In other words, when the market works to reflect short supply of allowances, the definition of what can be counted and traded, both in geographic and percentage dimensions, is liberalized to allow regulated entities greater flexibility to document compliance. The decision to include EU-ETS and Kyoto CDM project credits as eligible currency is curious. Since EU-ETS credits are given away without charge by E.U. industries as part of the political process,[101] this effectively works as an income and welfare shift from U.S. power-generation owners to E.U. industries.

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95. *Id.* at 3 (using dollar value in 2005).
96. *Id.*
97. *Id.*
98. Pew Ctr. on Global Climate Change, Q & A: Regional Greenhouse Gas Initiative (2007), http://www.pewclimate.org/rggi/qanda.
99. *Id.*
100. *Id.*
101. Stephen Gardner, *EU Parliament, Council Making Progress on Post-2012 Emissions Trading Scheme*, 39 ENV'T REP. 1417, 1418 (2008); *Revised EU GHG-Trading Program May Shape U.S. Proposals*, CARBON CONTROL NEWS, July 14, 2008, http://www.carboncontrol news.com.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

Offsets must be real, verifiable, permanent, enforceable, and "additional." [102] Offsets credits have a lifetime of ten years, with the possibility of one renewal;[103] afforestation project credits have a twenty-year lifetime, with a possible renewal up to sixty years.[104] However, RGGI offsets do not provide any additionality relative to any net carbon-emitting power plant performance.

Unlike with allowances, there is no limit on the number of offsets that can be created.[105] The only limit is on the maximum 3.3% number of offsets that a regulated large power producer can utilize for purposes of compliance, which will rise to a maximum 20% under certain allowance cost scenarios.[106] This small percentage actually is larger in impact than it may appear. Since RGGI holds the line on CO_2 emissions until 2015, and thereafter accomplishes a progressive 10% cumulative carbon reduction by 2018, even this 3.3% annual offset compliance share is equivalent to almost 50% of reductions expected to be necessary for compliance through 2018.[107]

Ways exists for fossil-fueled power projects in RGGI states to avoid regulation of their carbon emissions. Exceptions exist for units greater than 25 MW that burn 50% or less fossil fuels.[108] States also have an option to exempt a self-generation unit on a customer's site that sells less than 10% of its output to the grid.[109] States also could choose to allocate carbon allowances to load-serving entities ("LSEs") rather than to generators of power.[110]

California is critical because it will regulate all sectors of its economy, not just large power projects, and will regulate all GHGs, not just CO_2. California is three years behind the ten RGGI states, but will have a substantial impact and is making distinct choices on offsets and "additionality." Together, these 11 states (RGGI and

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102. RGGI MODEL RULE § XX-10.1. This requirement also exists in the Kyoto Protocol.

103. RGGI MODEL RULE § XX-10.3(e)(1).

104. *Id.* § XX-10.3(e)(2).

105. Christopher Sherry, *Landfill Gas Offset Projects in the Regional Greenhouse Gas Initiative*, (Jan. 13, 2009), http://www.epa.gov/landfill/conf/12th/sherry.pdf.

106. RGGI Memorandum of Understanding, *supra* note 61, at 5–6.

107. Christopher Sherry, Chair, RGGI Staff Working Group, N.J. Dep't of Envtl. Prot., Address at the RGGI Regional Stakeholder Meeting: RGGI Offsets Update (May 2, 2006), *available at* http://www.rggi.org/docs/sherry_rggi_offsets_5_2_06_rev.ppt.

108. RGGI Memorandum of Understanding, *supra* note 61.

109. RGGI MODEL RULE § XX-1.4(b)(1).

110. *Id.* § XX-5.3.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

California) create the template for any future national carbon regulation at the national level, as is being pursued by the Obama administration. However, both are struggling with "additionality." California is discussed next.

IV. CARBON REGULATION IN CALIFORNIA

A. THE PROGRAM STRUCTURE

California is the twelfth largest GHG producer in the world.[111] Imported electricity contributes more GHG emissions than electricity produced in California, even though 78% of electricity consumed in California is produced in-state.[112] California has taken the most aggressive approach of all the states to curb emissions, as it will regulate all sectors of its economy, not just large power projects, and will regulate all GHGs, not just CO_2. Its landmark legislation establishes a comprehensive program of regulatory and market mechanisms with the goal of achieving cost-effective and quantifiable GHG emissions reductions.

Pursuant to the California Global Warming Solutions Act of 2006 (commonly referred to as Assembly Bill 32 or AB 32), the state is required to reduce its aggregate GHG emissions to 1990 levels by 2020.[113] This equates to an eventual estimated 25%-29% reduction from business-as-usual levels.[114] AB 32 charges the California Air Resources Board ("CARB") with the responsibility for developing and implementing a plan to meet this challenging emissions-reduction goal and for carrying out the regulatory development and enforcement of the statewide emissions limit and mandatory reporting requirements.[115] In addition, AB 32 charged CARB with the

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111. CAL. ENERGY COMM'N & CAL. PUB. UTILITIES COMM'N, PROPOSED FINAL OPINION SUMMARY ON GREENHOUSE GAS REGULATORY STRATEGIES 2 (2008), http://www.energy.ca.gov/2008publications/CEC-100-2008-004/CEC-100-2008-004.PDF.

112. *Id.* at 2–3 fig. 1. The percentage of imported electricity GHGs compared to in-state electricity has ranged from 39 to 57% recently. *Id.* at 3.

113. Assemb. B. 32, 2006 Leg., Reg. Sess., 2006 Cal. Legis. Serv. Ch. 488 (West) (Cal. 2006) (discussing the reduction of emissions to 1990 levels at what is codified as CAL. HEALTH & SAFETY § 38550 (West 2007)).

114. CAL. ENERGY COMM'N & CAL. PUB. UTILITIES COMM'N, *supra* note 111, at 1; M.J. Bradley & Associates, *California Legislature Passes Global Warming Solutions Act*, CLIMATE CHANGE BRIEFING, Sept. 2006, at 1.

115. Assemb. B. 32 (summarizing CARB's role in LEGISLATIVE

responsibility of establishing by January 1, 2008 a statewide GHG emissions cap, based on 1990 emissions levels, to be achieved by 2020.[116] AB 32 further required CARB to do the following:

- Adopt a plan by January 1, 2009 for achieving emissions reductions from significant GHG sources via regulations, market mechanisms, and other actions.
- Adopt rules and regulations by January 1, 2011 to achieve the maximum technologically feasible and cost-effective GHG reductions, including provisions for using both market mechanisms and alternative compliance mechanisms.
- Evaluate several factors—prior to imposing mandates or implementing market mechanisms—including but not limited to impacts on California's economy, the environment, and public health; equity between regulated entities; electricity reliability; conformance with other environmental laws; and whether the rules will disproportionately impact low-income communities.[117]

AB 32 specifically recognizes that a market-based system can be used in conjunction with regulatory and other strategies to meet California's economy-wide goal of reducing emissions.[118] To assist CARB in fulfilling its charge, the state created the Market Advisory Committee ("MAC") to advise CARB on the development of a statewide plan to reduce GHG emissions.[119] MAC is comprised of national and international experts in environmental policy, regulatory affairs, economics, and energy technologies.[120] MAC's primary objective was to design a mandatory cap-and-trade program to achieve cost-effective emissions cuts across all economic sectors.[121] MAC employed a

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COUNSEL'S DIGEST).

116. *Id.*

117. *See* CAL. AIR RES. BD., AB 32 FACT SHEET–CALIFORNIA GLOBAL WARMING SOLUTIONS ACT OF 2006, http://www.arb.ca.gov/cc/factsheets/ab32factsheet.pdf.

118. *See* Assemb. B. 32 (summarizing AB 32 regulatory means in LEGISLATIVE COUNSEL'S DIGEST).

119. MKT. ADVISORY COMM., CAL. AIR RES. BD., RECOMMENDATIONS FOR DESIGNING A GREENHOUSE GAS CAP-AND-TRADE SYSTEM FOR CALIFORNIA 4 (2007), http://www.energy.ca.gov/2007publications/ARB-1000-2007-007/ARB-1000-2007-007.PDF.

120. Press Release, Cal. Envtl. Prot. Agency, Expert Advisor Releases Final Cap-and-Trade Report: Recommendations Intended to Complement California's Ongoing Efforts to Reduce Emissions (June 29, 2007), http://www.calepa.ca.gov/PressRoom/Releases/2007/PR12-062907.pdf.

121. MKT. ADVISORY COMM., *supra* note 119, at iii.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

systems approach and examined how a cap-and-trade program might interact with other measures such as regulations, performance-based standards, price subsidies, and tax credits.[122] In its Final Report, issued in 2007, MAC concluded that a cap-and-trade program is fully compatible with other regulatory programs being introduced in the state and that such a market-based system could contribute significantly to meeting the emissions reduction target in AB 32.[123]

MAC's Final Report includes several key recommendations. The California cap-and-trade program should eventually incorporate all major GHG-emitting sectors in the state.[124] In incorporating these sectors, the greatest attention should be given to the electricity, industry, buildings, and transportation sectors as the main contributors of emissions.[125] The program's scope, however, should be expanded over time so that it covers as many sectors, sources, and gases as possible to enable the state to meet its overall emissions reduction goal.[126] To that end, MAC recommends that CARB adopt mandatory reporting requirements for all sources likely to be subject to a GHG emissions cap.[127]

The cap-and-trade program should use a combined approach with regard to the distribution of allowances. MAC recommends an initial scheme of freely allocating some share of allowances while auctioning the other share of allowances.[128] The percentage of allowances auctioned off should increase over time.[129] MAC encourages the state to retain flexibility to freely allocate some of the allowances in a manner that stabilizes the price impacts and manages competitiveness among California power producers.[130] MAC states that free allocation of allowances should be determined by environmental performance standards and the auction should be designed to promote voluntary early reductions.[131]

Because the quantity of California's imported electricity generated from coal is significant, California's cap-and-trade program

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122. *Id.*
123. *Id.*
124. *Id.* at iv.
125. *Id.*
126. *Id.* at 79.
127. *Id.*
128. *Id.* at 80.
129. Press Release, Cal. Envtl. Prot. Agency, *supra* note 120.
130. *Id.*
131. *Id.*

should take a "first-seller approach" to capping emissions associated with electricity.[132] Under this approach, the entity that first sells electricity within the state must meet the compliance obligation established under the cap-and-trade scheme.[133] For power generated in California, the owner or operator of the in-state power plant is considered the first seller and would be required to meet the emissions cap.[134] For imported power, the first seller is typically an investor-owned or municipal utility or wholesale power marketer that sells electricity to a load-serving entity or large end-user. The out-of-state entity under this approach would also be required to meet the emissions cap.[135]

This MAC recommendation represents a significant departure from the original scheme. Originally, AB 32 regulated all LSEs ("load serving entity"), or retailers of power.[136] Legally, all of these LSEs are located in-state or at least doing business in-state, and regulation is imposed at the retail level on all sellers in state of power to consumers. It is clear that state regulatory agencies have jurisdictional authority over retail power markets within their state.[137]

The California carbon scheme covers all LSEs, including municipal LSEs.[138] Electric generators are required to meet a CO_2 emissions level no greater than that achievable by a combined-cycle gas-fired generator.[139] Combined-cycle generators utilize combustion

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132. MKT. ADVISORY COMM., *supra* note 119, at iv.

133. *Id.*

134. *Id.*

135. *Id.*

136. *See* Assemb. B. 32 (discussing LSE reporting requirements at what is codified as CAL. HEALTH & SAFETY § 38530 (West 2007)).

137. *See* Ark. Elec. Coop. Corp. v. Ark. Pub. Serv. Comm'n,, 461 U.S. 375, 377 (1983) (citing *Munn v. Illinois*, 94 U.S. 113 (1977)).

138. *See* Assemb. B. 32 (discussing municipal LSEs at what is codified as CAL. HEALTH & SAFETY § 38530 (West 2007)). California is home to the largest municipal utility in the nation, the Los Angeles Department of Water and Power (LADWP), serving a multi-million person consumer base. LADWP is among the most dependent California LSEs on both power imports from out of state, and coal-fired high-GHG power. *See* Seth Hilton, *The Impact of California's Global Warming Legislation on the Electric Utility Industry,* ELECTRICITY J, Nov. 2006, at 10, 13 (Nov. 2006).

139. *See* CAL. PUB. UTIL. CODE § 8341(d)(1) (2009). This legislation targets only electric generation. Sections 8340-8341 govern all new long-term energy commitments and establish a "greenhouse gas emissions performance standard." § 8341(d)(1). This is specific to the electric power role in meeting AB 32 goals. The GHG emissions standard creates a specific level of permissible emissions and prohibits new construction,

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through two distinct combustion cycles, thus using more of the chemical energy in the fuel, and can achieve at least 50% greater efficiency than just a single cycle.[140] Natural gas is the least carbon emitting of the fossil fuels. This translates that any new contracts for a term of five years or more for the procurement of baseload generation must comply with a performance standard of emitting no more than 1100 pounds of CO_2 per MWh.[141] "Baseload generation" is "designed and intended to provide electricity at an annualized plant capacity factor of at least 60 [%]."[142]

Roughly one-half of California's electric sector GHG emissions results from electric power imported from out of state generated predominately from coal-fired power plants.[143] The impact of California's new emissions limitations will significantly restrict the attractiveness of coal-fired generation for California. While California has little in-state coal generation, various California LSEs, particularly the Los Angeles Department of Water and Power, import significant coal-fired power from various other states.[144] This

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new long-term power contracts, and any major plant investment that will not meet the performance standard. *See* § 8341. This prohibits load-serving entities from entering long-term power contracts with out-of-state producers who do not meet California's stringent new emissions standard. *See* § 8341(a). California's Public Utilities Commission ("PUC") has set the GHG emissions performance standard at the equivalent of the emissions from a combined-cycle natural gas plant. § 8341(d)(1).

140. *See generally* FERREY, *supra* note *, at chapter 2.

141. *See* § 8341; Hilton, *supra* note 138, at 14. This is a level that conventional coal-fired electric generation will not be able to meet, generating about 1,770 pounds of CO_2 per MWh. *See* Hilton, *supra* note 138, at 14.

142. CAL. PUB. UTIL. CODE § 8340(a) (2009).

143. Re Integration of Greenhouse Gas Emissions Standards into Procurement Policies Rulemaking Proceeding 06-04-009, Decision 07-09-017, 2007 WL 2579525, *2, *20 (Cal. Pub. Util. Comm'n Sept. 6, 2007). Three-quarters of California's power imports come from the Southwest, and involves much coal-fired power, as opposed to the other quarter that is imported through the Northwest. AL ALVARADO & KAREN GRIFFIN, CAL. ENERGY COMM'N., REVISED METHODOLOGY TO ESTIMATE THE GENERATION RESOURCES MIX OF CALIFORNIA ELECTRICITY IMPORTS: UPDATE TO THE MAY 2006 STAFF PAPER 1 (Apr. 12, 2007), *available at* http://www.energy.ca.gov/2007publications/CEC-700-2007-007/CEC-700-2007-007.PDF.

144. *See* Hilton, *The Impact of California's Global Warming Legislation on the Electric Utility Industry, supra* note 94, at 13. The three major investor-owned utilities import 3 to 15% of their total supply in the form of out-of-state coal-fired power. The Los Angeles DPW imports half of its power from these sources. *Id.*

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

legislation will have a significant impact on such LSEs.

Given the importation of some high-carbon power sources, offsets become critical compliance elements for some of the California LSEs. The final details of offsets, "additionality," and trading are still pending, but are in formation in California. They await implementation beginning in 2012.

B. "ADDITIONALITY" AND OFFSETS

Offsets would be permitted with unlimited banking and allowances would be allowed with no geographic limitations on their origination, and the program would bilaterally link to the Western Climate Initiative ("WCI") regional plan.[145] There would be no price trigger protections as in RGGI.[146] This set of choices of California is fundamentally and legally distinct from its predecessor RGGI states. They differ on geographic limitation on offsets from outside the region. They differ on price triggers on acquisition of offsets. They differ in point of origin of offsets.

While CARB must make the final determination, MAC has recommended starting with a limited number of allowed offset project types, such as those under RGGI, and has rejected any quantity limitations or geographic limitations on offsets.[147] This is a much more expansive use of offsets than allowed under RGGI, both in numbers and geography.[148] Therefore, total compliance in California could come through offsets, internal and external, rather than only in-state GHG emissions reductions.

MAC had other recommendations that affect offsets in the still-developing California architecture for the state's 2012 program. MAC recommended that the cap-and-trade program should recognize offsets generated by sources within and outside of California's borders.[149] Therefore, it lacks some of the geographic restrictions of the RGGI scheme.[150] California is exploring reforestation projects in Mexico to comply with the upcoming GHG cap-and-trade program.[151] California, in August 2008, executed a Memorandum of

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145. CAL. ENERGY COMM'N & CAL. PUB. UTILITIES COMM'N, *supra* note 111, at 13.

146. *Id.*

147. *See* MKT. ADVISORY COMM., *supra* note 119, at v.

148. *See supra* Part III.B.

149. *Id.* at v.

150. *See supra* Part III.B.

151. *California Officials Eye Mexico Reforestation Projects for GHG Offsets,* CARBON CONTROL NEWS, July 21, 2008.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

Understanding to advance offset projects in six Mexican states to qualify as offsets in California or under a federal program.[152] Some environmental groups believe and complain that this avoids the responsibility in AB 32 to reduce carbon emissions in the state.[153]MAC also recommended that California's cap-and-trade program should be linked to similar policy initiatives in other jurisdictions to actively promote a "global greenhouse gas market."[154] MAC recommends creating linkages to other mandatory GHG emissions reduction programs, especially those with strong compliance requirements and enforcement strategies that ensure long-lasting, positive climate-change impacts.[155]

Linkage also is at issue with regard to renewable energy programs, as well as geography of offsets. One area of contention in California is over whether renewable energy programs that satisfy REC's requirements should also satisfy GHG mandates, which is not allowed by RGGI.[156] Oddly, environmental groups which have traditionally supported renewable projects, charge this as unfair double-counting, while utilities support such credits.[157] The environmental groups argue that separating the GHG attributes from the REC would "cripple the environmental benefits of the RPS [Renewable Portfolio Standard] program" and double-count GHG reductions.[158]

Recently, the Public Utilities Commission proposed that RECs in California also include the attributes of avoided GHG emissions, thus opening up the possibility that it will later declare tradable RECs can be used for multiple compliance. [159]

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152. *Mexico, California Sign Agreement to Develop GHG-Offset Projects*, CARBON CONTROL NEWS, Aug. 25, 2008.

153. *Id.*

154. *Id.*

155. *Id.*

156. *Dispute Emerges Over GHG Benefits of Renewable Energy Credits*, CARBON CONTROL NEWS, June 23, 2008.

157. *Id.*

158. *Id.*

159. Lyn Corum, *Regulator Defines California RECs in Draft Decision, Moves Toward a Trading System*, ELECTRIC UTIL. WK., July 21, 2008, at 12.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

V. VOLUNTARY U.S. CARBON REGULATION

A. VOLUNTARY CORPORATE REPORTING

The United States has a handful of national voluntary programs. With the passage of the Energy Policy Act of 1992, Congress authorized a voluntary program to encourage the public to report achievements in reducing GHG emissions.[160] Beginning in October of 1994, the U.S. Department of Energy issued guidelines on the voluntary reporting of emissions reductions and carbon sequestration.[161] This program, though, offers only an opportunity to report annual GHG emissions and record projects that reduce emissions or increase carbon sequestration; it does not provide a mandatory mechanism or monetary incentives to reduce carbon emissions.[162]

The Chicago Climate Exchange ("CCX") was among the first to create a voluntary, legally-binding multi-sector reduction and trade program that provides true monetary incentives.[163] CCX is currently the single voluntary emissions trading system for all six GHGs and has almost 300 members from various sectors worldwide.[164] For CCX members who choose to voluntarily participate in CCX's binding commitment to meet annual GHG emission reduction goals, the program provides an opportunity to capitalize on the burgeoning carbon market.

CCX issues Carbon Financial Instrument ("CFI") contracts, each representing the equivalent of 100 metric tons of CO_2, as the tradable commodity.[165] The CFI contracts are either "Exchange Allowances" based on a member's emission baseline and an overall reduction schedule or "Exchange Offsets" generated by certain types of offset projects.[166] CCX members that reduce emissions below the target

160. U.S. DEP'T OF ENERGY, VOLUNTARY REPORTING OF GREENHOUSE GASES UNDER SECTION 1605(b) OF THE ENERGY POLICY ACT OF 1992 (1994), http://www.eia.doe.gov/oiaf/1605/1605b.html.

161. *Id.*

162. *Id.*

163. Chi. Climate Exch., History, http://www.chicagoclimatex.com/content.jsf?id=1 (last visited Feb. 18, 2009).

164. *Id.*

165. Chi. Climate Exch., Overview, http://chicagoclimatex.com/content.jsf?id=821 (last visited Mar. 12, 2009).

166. *Id.*

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

levels can sell or bank their surplus allowances.[167]

Participation in the trading system requires that members agree to collect enough CFI contracts to meet the emission reduction requirement.[168] To meet the requirement, members follow a schedule for reducing emissions that is carried out in two phases.[169] Phase I (2003-2006) requires members to commit to reduce 1% below the 1998-2001 baseline.[170] This would result in a total reduction below the target baseline of 4% by 2006.[171] Phase II (2007-2010) requires members to commit to an annual reduction schedule of an additional 2%, resulting in an overall reduction commitment of 6% below baseline.[172]

The CCX Offsets Program allows members and other entities that do not have significant GHG emissions to register offset projects.[173] CCX will issue traditional CFI contracts to Offset Providers or Offset Aggregators "for eligible projects on the basis of sequestration, destruction or reduction of GHG emissions."[174] An Offset Provider is defined as an owner of an offset project that registers and sells offsets on its own behalf.[175] An Offset Aggregator is defined as an entity that serves as the "administrative representative, on behalf of offset project owners, of multiple offset-generating projects."[176] Offset Aggregators normally register and sell offset projects involving less than 10,000 metric of CO_2 equivalent per year.[177]

CFI contracts are issued by CCX according to standardized rules for projects involving agricultural methane, landfill methane,

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167. *Id.*

168. Chi. Climate Exch., Emission Reduction Commitment, http://chicagoclimatex.com/content.jsf?id=72 (last visited Mar. 12, 2009).

169. *Id.*

170. *Id.* The Phase I baseline is the average annual emissions from 1998 to 2001.

171. *Id.*

172. *Id.* The Phase II baseline is the average annual emissions from 1998 to 2001 or the single year of 2000.

173. Chi. Climate Exch., CCX Offsets Program, http://www.chicagoclimatex.com/content.jsf?id=23 (last visited Feb. 11, 2009) [hereinafter CCE, CCX Offsets].

174. *Id.*

175. Chi. Climate Exch., Membership Categories, http://www.chicagoclimatex.com/content.jsf?id=65 (last visited Mar. 12, 2009).

176. *Id.*

177. *Id.*

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

agricultural soil carbon, forestry, renewable energy, coal mine methane, and rangeland soil carbon.[178] Other types of projects, such as energy efficiency and switching to lower carbon fossil fuel sources, are approved by CCX on a project-by-project basis.[179] Note that with CFI, in contrast to RGGI, renewable energy projects qualify. However, this is not a mandatory carbon reduction program.

B. UPCOMING REGIONAL U.S. CARBON EFFORTS

Another voluntary program is the Western Climate Initiative ("WCI"). In a regional effort to address climate change, the governors of Oregon, Washington, California, Arizona, New Mexico, and Utah, as well as the premiers of British Columbia, Manitoba, Quebec, and Ontario signed an agreement establishing the WCI. [180] In August 2007, WCI announced the establishment of its regional, economy-wide goal to reduce GHG emissions to 15% below 2005 levels by 2020.[181] To help reach this goal, WCI member states and provinces unveiled multi-sector market-based mechanisms, such as a load-based cap-and-trade program, in August of 2008.[182] The metrics for establishing this regional goal are based on (1) aggregate GHG emissions and the goals of WCI partners that had already established a 2020 goal;[183] (2) emissions inventories from states or provinces,

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178. CCE, CCX Offsets, *supra* note 173.

179. *Id.*

180. Cathy Cash, *Western Region Plan to Reduce GHG Emissions Has Energy Suppliers Waiting for Specifics*, ELECTRIC UTIL. WK., Aug. 27, 2007, at 1. The original agreement was signed in February 2007 by Governors of Arizona, California, New Mexico, Oregon, and Washington. In May 2007 the state of Utah and the Canadian provinces of British Columbia and Manitoba joined WCI. The states of Kansas, Colorado, Wyoming and Nevada, the Canadian provinces of Ontario, Quebec and Saskatchewan and one Mexican state, Sonora, will participate in WCI as observers. *See* Pew Ctr. on Global Climate Change, Regional Initiatives: Western Climate Initiative, http://www.pewclimate.org/what_s_being_done/in_the_states/regional_initiatives.cfm?preview=1 (last visited Feb. 19, 2009); *see also* WCI: Western Climate Initiative, http://www.westernclimateinitiative.org (last visited Feb. 19, 2009).

181. Press Release, W. Climate Initiative, Western Climate Initiative Statement of Regional Goal (Aug. 22, 2007), http://www.westernclimateinitiative.org/ewebeditpro/items/O104F13013.pdf; Pew Ctr. on Global Climate Change, *supra* note 180.

182. Cash, *supra* note 180, at 1; Pew Ctr. on Global Climate Change, *supra* note 180.

183. Press Release, W. Climate Initiative, *supra* note 181. An important facet of the regional, economy-wide goal is its consistency with the pre-

where available; (3) gross emissions estimates (across all sectors) for the six GHGs reported to the U.N. Framework Convention on Climate Change;[184] and (4) load-based emissions estimates for the electricity sector.[185]

To achieve the new regional GHG emissions reduction goal, WCI is committed to limiting emissions that contribute to climate change from all sources of GHGs including but not limited to stationary sources, energy supply, residential, commercial, industrial, transportation, waste management, agriculture, and forestry.[186] Eventually WCI's plan to curb emissions will focus on power plants and vehicles. Implementing the WCI plan will likely restrict the continued development of coal-fired power generation facilities because it will otherwise be difficult to meet the emission reduction goals. In developing its market approach, WCI members are engaging in discussions with leaders in the Regional Greenhouse Gas Initiative and may consider some variety of incentives, standards, and regulations similar to the approach California has taken to combat climate change.[187]

The western state WCI program will allow participating states to use CDM and Joint Implementation ("JI") Kyoto credits as offsets.[188] CDM offset credits are created exclusively in developing countries under the Kyoto Protocol.[189] Environmental groups have complained about the out-of-region geographic location of such offsets.[190] Groups in WCI states are concerned that the GHG reduction plan might "crush the market for RECs."[191] The concern is that the area will not

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existing emission goals of WCI members. *See infra* tbl.2, *infra*.

184. These six GHGs include: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

185. W. CLIMATE INITIATIVE, STATEMENT OF REGIONAL GOAL 3 (2007), http://www.westernclimateinitiative.org/ewebeditpro/items/O104F13006.pdf.

186. *Id.*

187. *Id.*

188. *Western GHG Trading Plan Draws Concern over Offsets, Auctions*, CARBON CONTROL NEWS, July 28, 2008, http://www.carboncontrolnews.com/index.php/ccn/show/western_ghg_trading_plan_draws_concerns_over_offsets_auctions/.

189. Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 12, Dec. 10, 1997, 37 I.L.M. 22 (1998).

190. *Id.*

191. *Critics Say Western GHG Plan Would Crush Renewable Trading Market*, CARBON CONTROL NEWS, Aug. 25, 2008, at 1,

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

be able to create more green power. They want the purchase of RECs to be tied into the reduction of the GHG cap that will be imposed.

The problems inherent even in the early stages of a multi-state carbon program are evident in WCI. California is the lead state in forming WCI, but now complains that it is not treated fairly in the emerging WCI legal construct.[192] California complained that the WCI will impose an inordinate burden on the California power sector starting in 2012, by excluding restriction on the transportation sector until 2015.[193] Because California utilities rely on out-of-state electricity imports, California utilities argue that they require extra allocation of any allowances if they are to be the early focus.[194]

Trading of carbon credits is already robust and growing quickly. Over 600 separate entities develop, market, or sell offsets in the United States in markets that have limited transparency.[195] The CCX uses a registry to track offset trades, which can occur across international borders through web sites.[196]

Shifting to the center of the nation, in November 2007, six participating midwestern states and Manitoba, a Canadian province, executed a regional greenhouse gas emission reduction strategy, called the Midwestern Greenhouse Reduction Accord.[197] This included Minnesota, Illinois, Indiana, Iowa, Michigan, Kansas, Ohio, South Dakota, Wisconsin, and Manitoba and Ontario.[198] Three of these nine states (Indiana, Ohio, and South Dakota) are observing rather than participating initially.[199] The group worked to develop a cap-and-trade carbon program in 2008 for implementation in

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http://www.carboncontrolnews.com/index.php/ccn/show/critics_say_western_ghg_plan_would_crush_renewable_trading_market/.

192. *California Utilities Cry Foul Over Western State Cap-And-Trade Plan*, CARBON CONTROL NEWS, Aug. 25, 2008, http://www.carboncontrolnews.com/index.php/ccn/show/california_utilities_cry_foul_over_western_state_cap_and_trade_plan/.

193. *Id.*

194. *Id.*

195. CARBON OFFSETS, *supra* note 8, at 7. Of these, 210 were original providers of offsets, including eighty-seven that were U.S. bases. *Id.* at 9.

196. *Id.* at 5. Trading prices ranged from $0.79 - $7.40 per CO_2e. *Id.* at 11.

197. Midwestern Governors Ass'n, Midwestern Greenhouse Gas Reduction Accord, Nov. 15, 2007, http://www.midwesterngovernors.org/Publications/Greenhouse%20gas%20accord_Layout%201.pdf.

198. *Id.*

199. *Id.*

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

2010.[200] This accord will not set a specific target but will attempt to cut emissions by 2020.

Recommendations would allow 10-50% of reductions to be achieved through use of offsets.[201] There is dispute as to whether allowances can come from other states.[202] The Midwestern Greenhouse Gas Reduction Accord will establish a system to enable tracking, managing, and crediting for entities that reduce GHGs.[203] This region depends heavily on coal-fired electric generation, and is therefore distinct technologically from both California and the RGGI states.

The RGGI, Western states', and Midwest states' carbon-regulation schemes collectively include about half of the U.S. states plus Canadian providences. RGGI affects only CO_2 from larger power plants, while the regional climate initiatives are looking at GHGs more broadly from various economic sectors.

C. STATE RENEWABLE PORTFOLIO STANDARD PROGRAMS

Many states are specifically encouraging renewable energy development. Some of these very encouragements are what disqualify renewable energy projects under some carbon schemes from qualifying as "additional." Half the states in the United States have adopted Renewable Portfolio Standard ("RPS") programs.[204] These programs require the covered state to procure a certain percentage of total power sales power from designated renewable energy technologies. These programs require that a designated renewable percentage be deployed each year.[205] The sole purpose is to cause the deployment of specifically identified renewable power options. This in fact also reduces GHG emissions simultaneously.

However, in the RGGI scheme, these very RPS credits, which most of the RGGI states require, would be forfeited to the state if the

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200. Midwestern Governors Ass'n, A Status Report on Midwestern Energy and Climate Accords, http://www.midwesterngovernors.org/EnergyInitiatives.htm (last visited Apr. 20, 2009).

201. *Id.*

202. *Id.*

203. Midwestern Governors Ass'n, Accord, *supra* note 197.

204. RYAN WISER & GALEN BARBOSE, RENEWABLE PORTFOLIO STANDARDS IN THE UNITED STATES 1 (2008), *available at* http://eetd.lbl.gov/ea/ems/reports/lbnl-154e.pdf.

205. *Id.*

project qualified and was claimed both as an RPS and a RGGI offset unit. Here, the state RGGI programs and the state RPS programs seem to be at cross purposes. Recognizing the full impact of renewable generation projects actually penalizes them.

1. RPS State Variations and Achievements

Mandatory RPS programs collectively cover states serving roughly 40% of total electric demand in the United States.[206] Representative northeastern state programs roughly corresponding to the RGGI area are illustrated in Table 4. By the end of 2007, more than twenty-five states and the District of Columbia had enacted RPS policies ranging from renewable energy sale requirements on an annual basis of 2% to as much as 40% of power from renewable energy achieved in successive years.[207] State adoption in twenty-four states is illustrated in Table 2.

Table 2 also illustrates which states have adopted renewable energy trust funds. The system benefits charge is a tax on utility consumption, or surcharge mechanism, for collecting funds from electric consumers, the proceeds of which then support a range of energy activities through a trust fund. Funds are collected through a non-bypassable system benefits charge to users of electric distribution services.[208] The money raised from the system benefits charge is then used to "buy down" the cost of power produced from sustainable technologies on both the supply and demand side, so that they can compete with more conventional technologies.[209]

Among the most populous states, California has a 20% (33% under legislative consideration) RPS target by 2020[210] and New York a 24% target by 2013.[211] The definition of what qualifies as renewable varies in every state. Most states allow solar, wind, biomass, and landfill gas resources to qualify; states are less consistent regarding biogas, MSW ("municipal solid waste"), geothermal, all hydro resources, fuel cells, and ocean tidal renewable resources.[212] In about

206. Wiser, et al., *supra* note 88, at 9.
207. K. S. CORY & B. G. SWEZEY, NAT'L RENEWABLE ENERGY LAB., RENEWABLE PORTFOLIO STANDARDS IN THE STATES: BALANCING GOALS AND IMPLEMENTATION STRATEGIES 1 (2007), http://www.nrel.gov/docs/fy08osti/41409.pdf.
208. FERREY, *supra* note *, § 10:95.
209. *Id.*
210. *Id.* at 22.
211. *Id.* at 1.
212. *Id.* at tbl.1.

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half of the RPS programs, solar energy installations are being encouraged in a variety of ways.[213] Nine states and the District of Columbia established specific solar set-asides in their RPS policies.[214] Several states also award rebates to customers who install solar systems.[215]

The RPS programs differ by state. Eligible projects technologies are set forth in Table 3 below. Some states allow credits to be traded, while other states do not.

Table 2: Portfolio Standards and Trust Funds in Various States

State Name	Renewable Energy Trust Fund	Portfolio Standards
Arizona	x	x
California	x	
Colorado		x
Connecticut	x	x
Delaware	x	
Hawaii		x
Illinois	x	
Iowa		x
Maine		x
Maryland		x
Massachusetts	x	x
Minnesota	x	x
Montana	x	
Nevada		x
New Jersey	x	x
New Mexico		x
New York	x	
Ohio	x	

213. *Id.* at 11.
214. *Id.*
215. *Id.* and tbl.3.

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Oregon	x		
Pennsylvania	x		x
Rhode Island	x		
Texas			x
Vermont			x
Wisconsin	x		x

Table 3: "Renewable" Resources as Defined in State Statutes

State	Hydro	Tidal	Geo-thermal	Photo-voltaic	Dedicated Crops
AZ		x		x	
CA	x		x	x	
CT	x			x	
IA				x	
IL	x			x	x
ME	x	x	x	x	
MD		x	x	x	
MA	x	x		x	x

State	Solar	Wind	Fuel Cell	Methane Landfill	Bio-mass	Trash-to-Energy
AZ	x	x			x	
CA	x	x		x	x	x
CT	x	x	x	x	x	x
IA	x	x	x		x	x
IL	x	x			x	x
ME	x	x	x		x	x
MD	x	x	x	x	x	
MA	x	x	x	x	x	x
MN		x			x	
NV	x	x	x			
NJ	x	x	x	x	x	x
NM	x	x	x	x	x	x
NY	x	x				x
OR	x	x		x		x
PA	x	x		x	x	x
RI	x	x		x	x	x
TX	x	x		x	x	x
WI	x	x	x		x	x

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MN					
NV			x	x	
NJ	x	x	x	x	
NM	x	x	x	x	
NY	x	x	x	x	
OR	x	x	x	x	x
PA	x		x	x	x
RI	x			x	
TX	x	x	x	x	
WI	x	x	x		x

Note: Photovoltaic is included within solar in some states; methane and or trash-to-energy may be included within a broad definition of "biomass."

Non-compliance penalties vary in each state.[216] The non-compliance penalty can range from around $0.05 per Kwh in California, Connecticut, Washington, and Massachusetts, to much lower amounts in other states (although New Jersey and New Hampshire have equally high penalties for non-compliance with Class I emissions).[217] In 2005, 62% of the Massachusetts RPS requirement was satisfied while 38% of the power sales were required to pay the state the penalty of $53.19 per Mwh.[218]

The currently applicable required percentage of energy delivered from renewables ranges from 2 to 40% of annual retail sales, but these numbers can be deceiving depending upon whether preexisting renewable resources are eligible and counted.[219] Because the definitions of renewable energy credits RECs created under various state programs differ, there is significant geographic limitation in cross-market REC trading and liquidity.

216. CORY & SWEZEY, supra note 207, at tbl.5.
217. *Id.*
218. *See* tbl. 3.
219. *Id.* at 1.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

Table 4: Seven Northeast State RPS Requirements

State	**Requirement**	**Technology Eligibility**
Connecticut 3 Classes	Class I technologies: 1% in 2004 +0.5%/yr; to 2% by 2006 +1.5%/yr; to 5% by 2008; +1%/yr to 7% in 2010 and thereafter Class I or II technologies: 3% in 2004 and thereafter	Class I: solar, wind, landfill gas, new (post 7/1/03) run of river hydro (<= 5 MW), fuel cells, ocean thermal, wave or tidal, low-emission renewable energy conversion tech., low NOx emitting, sustainable biomass (Biomass facilities with quarterly avg. NOx emission rate <= 0.075 lbs. per MMBTU. Existing (pre 7/1/03) biomass facilities <= 500 kW are exempt from NOx emission requirement.) Class II: MSW, existing (prior to 7/1/03) run of river hydro (<= 5 MW), other biomass (facilities must have quarterly avg. NOx emission rate <= 0.2 lbs. per MMBTU)
Maine	30% of sales in 2000 (start of competition) and thereafter as a condition of licensing.	Fuel cells, tidal power, solar, wind, geothermal, hydro, biomass, and MSW (under 100 MW) High efficiency cogen. systems of unlimited size.
Maryland	Tier 1 Renewables: 1% in 2006, increasing 1% biannually to 7% in	Tier 1: solar, wind, biomass, landfill gas, geothermal, ocean, fuel cells (renewable

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State	**Requirement**	**Technology Eligibility**
	2018, increasing to 7.5% in 2019, and thereafter Tier 1 or 2 Renewables: 2.5% 2006-2018	sources only), and small hydro (< 30 MW) Tier 2: hydro, MSW, and incineration of poultry litter
Massachu-setts	1% of sales from new renewables by 2003 +0.5%/yr. to 4% in 2009; +1 % per year thereafter until date determined by Division of Energy Resources.	Solar, wind, ocean thermal, wave, tidal, landfill gas, and low-emission advanced biomass beginning commercial operation or representing increase in capacity at existing facility after 12/31/97. Hydro and MSW qualify as existing and are not eligible.
New Jersey 3 Classes	Class I or II Technologies: 2.5% by 2004-2008. Class I technologies: 0.74% in 2004; 0.983% in 2005; 2.037% in 2006; 2.924% in 2007; and 3.84% in 2008. Solar Electric: 0.01% in 2004; 0.017% in 2005; 0.0393% in 2006; 0.0817% in 2007; and 0.16% in 2008. NJBPU sets requirements for 2009 and after, but must be at or	Class I: solar, wind, geothermal, wave, tidal energy, landfill gas, fuel cells, sustainable biomass Class II: MSW or hydro (<30 MW) that meets high environmental standards

State	**Requirement**	**Technology Eligibility**
	above 2008 levels (see comments regarding proposed RES requirements through 2020.	
New York	New renewable energy requirement: 0.8% in 2006, increasing ~0.8%/yr to 6.56% in 2013. Customer-sited tier is 2% of total annual RES targets. With existing baseline renewable energy, and generation expected from state purchase requirement, renewable energy increases from 19.45% in 2003 to 24% in 2013 (an additional 1% is expected to come from voluntary green pricing programs).	Main Tier, wind, solar, ocean, biomass, biogas, fuel cells, incremental hydro, and low-impact run-of-river hydro > 30 MW Customer Tier: solar, wind (<300kW), fuel cells, and methane digesters.
Rhode Island	3% by 2007, increasing 0.5%/yr to 4.5% in 2010, then increasing by 1 %/yr. to 8.5% in 2014, then increasing by	Solar, wind, ocean, geothermal, biomass, co-firing, hydro (< 30 MW), fuel cells using renewable resources

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

State	**Requirement**	**Technology Eligibility**
	1.5%/yr. to 16% in 2019. Requirement remains at 16% in 2020 and thereafter unless the PUC determines it is no longer necessary.	

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

2. The Value of Renewable Credits and Offsets

RPS compliance raises the price of power by including the necessity of retail sellers of electricity to purchase allowances. This price impact of RPS-mandated renewable energy projects has been estimated to range between a 0.1% increase in retail rates to consumers (in Maine, Maryland, New Jersey, and New York) to up to 1.1% retail rate impact in Massachusetts.[220] In 2005 Massachusetts collected $13 million in alternative compliance payments under its RPS system, a number which is expected to expand about 25% in following years.

Significant regulatory uncertainty exists around RPS programs. Either a regulatory change in eligible projects,[221] or court interpretation of these programs,[222] can cause great volatility in RECs pricing.[223] For example, Connecticut Class I resources were originally defined to include wind, landfill methane, fuel cell, and solar voltaic resources, and REC prices ranged from $35 to $50 per REC with this definition. However, in June 2003 the Legislature amended the definitions to add certain biomass generation plants located in New England as Class I resources if they reduced NOx emissions.[224] The Connecticut Department of Public Utility Control made an advisory ruling that an existing biomass plant located in Maine "retooled" to meet a lower NOx emission standard would qualify for Class I

220. Wiser, et al., *supra* note 88, at Fig. 4. An impact of not more than approximately 1% is forecast to be the cost of this implementation. *Id.*

221. The Connecticut Regulatory Authority allowed a number of preexisting biomass plants to qualify for RECs, increasing the supply of RECs and significantly depressing the price of RECs certificates in 2005.

222. Prices of RECs in Texas fell after a legal interpretation of regulatory discretion in that state's RPS program.

223. Benjamin K. Sovacool & Christopher Cooper, *Big* Is *Beautiful: The Case for Federal Leadership on a National Renewable Portfolio Standard*, ELECTRICITY J., May 2007, at 48, 52 (quoting Ryan Wiser et al., *Evaluating Experience with Renewable Portfolio Standards in the United States*, 10 MITIGATION & ADAPTATION STRATEGIES FOR GLOBAL CHANGE 237, 243–44 (2005)). El Paso Electric took a dispute all the way to the New Mexico Supreme Court. *See* N.M. Indus. Energy Consumers v. N.M. Pub. Regulation Comm'n, 168 P.3d 105 (N.M. 2007) (outlining factual and procedural background of dispute).

224. Clean Energy States Alliance, *Progress Report: Review of State Renewable Portfolio Standard Programs in the Northeast & Mid-Atlantic Regions*, (Dec. 2008), at 39, http://www.cleanenergystates.org/Publications/CESA_Progress_Report_Porter_NE-MA_Regional_RPS_Dec2008.pdf.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

Connecticut RECs.[225] The market for Class I RECs came crashing down, dropping the forward price for 2006 RECs by approximately 90%, from near $35 per Mwh to near $2.50 per Mwh.[226] Prices later jumped back to near $30 to $50 per REC.[227]

It is estimated that roughly half of new renewable energy power capacity in the United States over the last decade has developed in states with RPS programs in place.[228] Over 90% of these capacity additions have come from wind power, with biomass and geothermal resources in second and third position.[229] Even though RPS is a powerful relative tool, the total renewable power development still is not large. The National Renewable Energy Laboratory has estimated that RPS programs may result in only 8 to 12 GW of new wind capacity (about 1% of U.S. installed total capacity) relative to a base case where no RPS programs existed.[230] Therefore, the total contribution of RPS programs appears modest in terms of total U.S. power resources, no matter what tools are used.

State RPS standards have failed to substantially increase the deployment of renewable energy technologies on a national scale.[231] Non-hydroelectric renewable energy resources continue to hover around 2% of the U.S. electricity supply.[232] Therefore, while various

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225. *See* Application for Advisory Ruling on Eligibility for Class I Renewable Status Pursuant to Connecticut's Renewable Portfolio Standards, 246 P.U.R.4th 355, Docket No. 05-03-12 (Aug. 10, 2005) (final decision).

226. *RECs Tank in Connecticut; Project May Suffer*, ELECTRIC POWER DAILY, Nov. 22, 2005, at 5.

227. CORY & SWEZEY, *supra* note 207, at fig.4, p. 18.

228. Wiser, et al., *supra* note 88 (quoting an estimate by that half of the capacity equals approximately 5,500 MW).

229. *Id.*

230. N. BLAIR ET AL., NAT'L RENEWABLE ENERGY LAB., LONG-TERM NATIONAL IMPACTS OF STATE-LEVEL POLICIES 13–14 (2006), http://www.nrel.gov/docs/fy06osti/40105.pdf.

231. *See generally* Sovacool & Cooper, *supra* note 223 (explaining why individual state RPS programs are insufficient, and national legislation is needed).

232. U.S. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, ANNUAL ENERGY OUTLOOK 2007: WITH PROJECTIONS TO 2030, at 86 (2006), http://tonto.eia.doe.gov/ftproot/forecasting/0383(2007).pdf. By the year 2030 the share of biomass resources is expected to almost double from 1% (in 2005) to 1.8% of total generation; wind is forecast to triple its percentage from the current 0.4% to approximately 0.9%, while geothermal power resources are projected to hold steady at 0.4% of generation. *Id* at 85–86. "Grid-connected solar generation increases to 0.1

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

renewable technologies are projected to double or triple their gross amount of power contribution, this is not projected to have a significant impact for two reasons. First, these renewable technologies are starting from a very small base so that even a large percentage increase translates to a relatively small absolute increase. Second, electricity demand in the United States is increasing, so the contribution of any given project is a progressively smaller percentage of the increasing generation base.

Non-hydroelectric renewable energy deployment is expected to rise from about 2% to about 4% by 2030.[233] Fossil-fired energy resources are projected to maintain a roughly 70% share of total electric generation in the United States and an 86% share of total U.S. primary energy supply (including the transportation sector) in 2030.[234] Therefore, a radical departure is not projected by the U.S. government between now and 2030 in fossil fuel use in the power sector.

The RPS program is the positive incentive for renewable power development, regardless of "additionality." It contrasts with carbon regulation which operates negatively to prohibit certain high-carbon use of fossil fuels for power generation. Carbon regulation does not necessarily result in more deployment of renewable energy for power production. Offsets and additionality requirements shape how compliance is achieved.

It is critical to contrast the U.S. treatment of offsets and additionality with what is transpiring under the Kyoto Protocol. This is important because it predates U.S. regulation, and currently imposes obligations on 38 countries. It is the model for future world GHG control.

VI. THE KYOTO PROTOCOL

The Kyoto Protocol is the existing, and by all indications the likely future continuing form of world carbon regulation. The April 2008 Bangkok Kyoto talks concluded that a post-2012 international carbon scheme should look much like the pre-2012 Kyoto regime, with trading of allowances and the creation of additional offsets.[235] All

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percent of total generation in 2030." *Id.* at 85.

233. *Id.* at 86. This, of course, could be changed significantly by a variety of tax and regulatory programs that would more robustly promote renewable power than was the case at the time that these assumptions were made for the study in 2006.

234. *Id.* at 2.

235. Eric Lyman, *"'Progress' of Bangkok Talks Shows Much Still to be*

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

industrialized countries in the world are bound by the Protocol, except for the United States. Proximate U.S. neighbor, Canada, is bound by the Protocol restrictions on carbon. Four Canadian provinces are members of the Western Climate Initiative and the Midwestern Greenhouse Reduction Accord carbon programs discussed above. How the Kyoto Protocol regulates carbon and carbon offsets becomes relevant. The United States may choose to ratify the Protocol, having signed it originally. As an international agreement, if ratified by the Congress, it would become an enforceable requirement on American industry.

A. OPERATION IN DEVELOPED COVERED NATIONS

The Kyoto Protocol is a cap-and-trade regulatory construct on carbon emissions. The Kyoto Protocol requires 35 developed ratifying nations by 2012 to reduce CO_2 emissions an average of 7% below 1990 baseline levels.[236] The other GHGs must be reduced to 5% to 7% below either their 1990 or 1995 baseline levels by 2008 to 2012.[237] Each of 35 developed nations is allocated a national emissions cap, which applies to certain large industrial emitters of carbon within the country. Assigned amount units ("AAUs"), or Kyoto allowances, may be traded among Annex 1 countries.[238]

Each of these nations decides how to impose limitations on its local industries so that it emits within its internationally allocated

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Done for 2009 Global Agreement," BNA ENVIRONMENT REPORTER, Apr. 11, 2008, at 704.

236. *See* U.N. Framework Convention on Climate Change, Kyoto Protocol, http://unfccc.int/kyoto_protocol/items/2830.php. The Kyoto Protocol received subsequent national adoption by Annex I (developed country) party signatories that accounted in total for at least 55% of the total carbon dioxide emissions from 1990 for that group, notably excluding the United States, by February 2005 and then entered into effect. While most countries have committed to achieve an eight percent reduction below 1990 levels for CO_2, there has been a reallocation among European Union countries so that some countries are allowed to emit more than these baseline levels while others are required to reduce up to 28%, with the weighted average for the European Union overall being eight percent reduction.

237. *Id.* For six GHGs that are suspected of causing global warming, principally including CO_2 and methane (CH_4), major developed countries (called the Annex I parties) have targets for reduction of these GHGs in the period 2008 to 2012. One hundred sixty-two countries ratified the Protocol.

238. *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, *supra* note 189, art. 6.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

AAUs in a given year. At the end of each compliance period of one year, each emitter must have acquired through allocation from their governments or through purchase or trade enough additional allocation credits to cover its carbon emissions during that period. In essence, each emitter must cover its emissions with regulatory credits to emit carbon.

Those covered emitters of carbon needing additional allowances can either create or purchase additional allowances through two mechanisms described below.[239] Annex 1 countries must set up national registries to issue their internationally assigned amount of AAUs.[240] Registry removal units ("RMUs") reflecting removal of GHGs due to forestry and land-use practices, also are tracked.[241] Each AAU and RMU is tracked with a unique serial number.[242] AAUs and RMUs are converted into emission reduction units ("ERUs") for international trading purposes.[243]

B. THE EUROPEAN UNION KYOTO COUNTRIES PROGRAM

The twenty-five E.U. members constitute the core of the thirty-five Annex 1 Kyoto countries.[244] As a parallel and coordinated carbon reduction system, the European Union established a separate regulatory system, different from Kyoto in that it only covers CO_2, not all GHGs. Phase II of the EU-ETS corresponds to the Kyoto 2008-2012 initial phase.[245] The EU-ETS includes any combustion source exceeding 20 Mw.[246] Households, the agricultural sector, and transportation are excluded.[247] The E.U. system caps emissions of

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239. *See infra* Section VI.C.

240. U.N. Framework Convention on Climate Change [UNFCCC], *Report of the Conference of the Parties on Its Seventh Session, held at Marrakesh from 29 October to 10 November 2001*, U.N. Doc Decision 19/CP. 7/FCCC/CP/2001/13/Add.2 (Jan. 21, 2002), at 12 [hereinafter UNFCCC, *Seventh Session*].

241. U.N. Framework on Climate Change, *Kyoto Protocol Reference Manual*, at 14–15, http://unfccc.int/resource/docs/publications/08_unfccc_kp_ref_manual.pdf.

242. *Id.* at 22.

243. *Id.* at 17.

244. *Id.* at 13.

245. A. Denny Ellerman & Barbara K. Buchner, *The European Union Emissions Trading Scheme: Origins, Allocation, and Early Results*, 1 REV. OF ENVTL. ECON. & POL'Y 66, 67 (2007).

246. *Id.* at 69.

247. *See id.* at 72, n.9 (lists categories included).

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

about 4500 companies at 11,500 installations.[248]

Under the EU-ETS scheme trading is allowed.[249] Trading in EU-ETS CO_2 allowances hit $30 billion in 2006, according to the World Bank.[250]

The EU-ETS is linked to the Kyoto Protocol;[251] the E.U. Linking Directive connects the EU-ETS system to the Kyoto Protocol JI and CDM mechanisms.[252] Differences exist: eligible CERs from land-use and forestry projects cannot be applied as EU-ETS credits,[253] and there are percentage limitations on compliance use of CERs.[254] The EU-ETS is also linked with programs in Iceland, Liechtenstein, and Norway, which are not members of the European Union.[255] Within these limits, both Certified Emission Reductions ("CERs") and ERUs are fully fungible with the E.U. AAUs and can be traded and banked until 2012 with the EU-ETS Phase II for purposes of E.U. compliance.[256] It is unclear as to whether any U.S. federal or state carbon regulations will link with the E.U. or Kyoto schemes.

The E.U. system regulates only about 40% of the carbon emitters. The result along with use of external offsets has been that rather than reducing carbon output, carbon dioxide emissions rose 1.1% in 2007.[257] It is difficult to conclude that the E.U. system

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248. *Id.* at 68. This covers larger steel, combustion facilities, oil refineries, pulp and paper mills, cement, ceramics, and glass facilities. Aviation was not included. *See id.* at 72, n.9.

249. Council Directive 2003/87/EC, 2003 O.J. (L 275) 32 (amending Council Directive 96/61/EC). The EU-ETS market trades between 5 to 15 million tons of allowances each week.

250. Ball, *supra* note 14, at A1.

251. Council Directive 2004/101/EC, 2004 O.J. (L 338) 18 ("The Linking Directive," amending Directive 2003/87/EC).

252. *See generally id.*

253. *Id.* at art. 11(a)(3).

254. *Id.*

255. TERRY BAKER ET AL., RESPONSE TO THE REVISION OF THE EU'S EMISSIONS TRADING SYSTEM BY EUROPEAN UNION SUBCOMMITTEE D 5 (Cambridge Center for Climate Change Mitigation Research) (2008), *available at* http://www.landecon.cam.ac.uk/research/eeprg/4cmr/pdf/Evidence%20to%20House%20of%20Lords%20EU%20Committee%20from%204CMR.pdf.

256. *Id.*

257. *EU Trading Experience Cited By Opponents, Backers of Lieberman-Warner*, CARBON CONTROL NEWS, May 9, 2008, http://carboncontrolnews.com/index.php/ccn/show/eu_trading_experience_cited_by_opponents_backers_of_lieberman_warner/.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

resulted in any carbon reductions that would not have occurred in the absence of the cap-and-trade system.[258] Others concede that $100 per barrel of oil may be more responsible than carbon regulation for any reduction in carbon.[259] U.S. Representative Peter DeFazio noted that E.U. carbon markets have caused speculators to profit on the E.U. cap-and-trade system.[260]

The U.S. Congress' Government Accountability Office ("GAO") in November 2008 reported to Congress on the lessons of the EU-ETS:[261]

- The high cost of producing CDM offsets as less costly options;
- The failure of up to 40% of CDM offsets to meet "additionality" requirements in fact;
- The little positive impact on sustainable development;
- The failure of undesired "leakage" of carbon, protected by free allocation of allowances rather than auction of allowances.

The EU-ETS, featuring twenty-seven (plus three non-EU European countries also participating in this trading scheme) of the thirty-eight Kyoto-regulated countries, is the core of the Kyoto Protocol implementation. The EU-ETS mirrors the Kyoto Protocol; however it began three years earlier in 2005. Both the Kyoto Protocol and the EU-ETS have established the model for offsets and "additionality" in world carbon regulation. We turn to those next.

C. "ADDITIONALITY" AND OFFSETS

Industrial emitters in each Kyoto country are able to trade emission credits or create new credits through mechanisms to gain additional credits. Kyoto has one mechanism to trade allocated allowances among countries and another to create additional offsets for export from developing nations.

1. Offsets

The Clean Development Mechanism ("CDM") allows projects that reduce greenhouses gases in developing nations to earn CERs for

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258. *Id.*
259. *Id.*
260. *Id.*
261. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-09-151, INTERNATIONAL CLIMATE CHANGE PROGRAMS: LESSONS LEARNED FROM THE EUROPEAN UNION'S EMISSIONS TRADING SCHEME AND THE KYOTO PROTOCOL'S CLEAN DEVELOPMENT MECHANISM (2008) [hereinafter INT'L CLIMATE CHANGE].

each ton of CO_2-equivalent ("CO_2e") of GHG reduced.[262] The CDM apparatus emerged as a last-minute compromise creation of the 1997 Kyoto Conference.[263] It is patterned on the U.S. SO_2 trading experience, now gone multinational.[264]

CDM projects may only be pursued by Annex 1 countries.[265] Those CERs are then traded or sold to activities in Annex I developed countries and increase that country's emission cap allocated in the Protocol.[266] CDM offsets under Kyoto Protocol must pass the requirement of "additionality," but it does not exclude renewable energy projects, and in fact encourages them, contrary to the RGGI scheme.[267]

A key issue with offsets is whether they are real, measurable, and verifiable. All emissions reduction CERs certified under the CDM are required by the Protocol to be voluntary, real, and additional to any that would occur in the absence of the CDM credit system.[268] The Kyoto Protocol process requires between 18 and 24 months to register and verify CERs.[269] The typical CDM project takes about 300 days from the comment period that starts the validation process to registration of the project.[270] It is estimated that the cost of developing a new methodology for approval of CDM projects is

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262. *See Kyoto Protocol to the United Nations Framework Convention on Climate Change*, *supra* note 189, art. 12.

263. CLIMATE CHANGE: A GUIDE TO CARBON LAW AND PRACTICE 31 (Paul Q. Watchman ed., 2008).

264. *Id.* at 132-33.

265. *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, *supra* note 189, art. 12; UNFCCC, *Seventh Session*, *supra* note 240.

266. *See Kyoto Protocol to the United Nations Framework Convention on Climate Change*, *supra* note 189, art. 6. Credits earned after 2000 can be used to achieve compliance during first commitment period which begins in 2008. Two and a half percent of ERUs and CERs may be carried over to the second phase of implementation after 2012.

267. For a discussion of RGGI, see *supra* Part III.

268. *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, *supra* note 189, art. 12, § 5.

269. Craig A. Hart, The Clean Development Mechanism: Considerations for Investors and Policy Makers, SUSTAINABLE DEV. L. & POL'Y, Spring 2007, at 41, 46.

270. THE CARBON RATING AGENCY, CARBON RATINGS 3 (2008), at 4, http://www.opencarbonworld.com/carbon-library/The%20Carbon%20Rating%20Agency%20-%20Performance%20of%20CDM%20and%20Offset%20Projects.pdf.

approximately $150,000.[271] Methodologies often require an average of 280 days for approval.[272]

2. Trading among developed countries

A second Kyoto mechanism for compliance is JI where developed nation signatory parties can implement projects in their own or other Annex I nations that remove GHGs or create additional carbon sinks, which are then quantified in an Emission Reduction Unit ("ERU").[273] An ERU transfers a unit of allowed carbon emissions from a selling country's cap to the purchasing country's AAU cap.[274]

Unlike a CDM CER, which creates an additional emission unit added to the world's carbon cap, a JI project transfers a credit under the existing cap from one nation to another nation, without changing the gross world cap.[275] Whereas the CDM process creates additional room in the envelope of permissible carbon emissions by developed nations, the Joint Implementation process transfers a static quantity of existing allocated credits under the cap from one developed nation to another. The former mechanism creates more room for carbon. Not surprisingly, the volume of CDM CERs was approximately 30 times that of JI ERUs in 2006.[276]

JI projects have less burdensome associated regulatory transaction costs than CDM projects as the former are approved and administered by the parties involved, rather than the U.N. Kyoto Executive Board for CERs, and are not subject to detailed periodic monitoring.[277] CERs (other than for afforestation) have a seven-year

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271. Hart, *supra* note 269, at 46.

272. *Id.*

273. *See Kyoto Protocol to the United Nations Framework Convention on Climate Change*, *supra* note 189, art. 6.

274. United Nations Framework Convention on Climate Change, Joint Implementation, http://unfccc.int/kyoto_protocol/mechanisms/joint_implementation/items/1674.php.

275. *See id.* Whereas the CDM process creates additional room in the envelope of permissible carbon emissions by developed nations, the Joint Implementation process transfers a static quantity of existing allocated credits under the cap from one developed nation to another. Thus, the emission cap of any country includes assigned Kyoto credit units plus removal units ("RMUs") from forestation projects that remove CO_2 from the atmosphere, plus JI ERUs and CDM CERs.

276. THE WORLD BANK STATE AND TRENDS OF THE CARBON MARKET 2007, at 3 (2007), http://www.ieta.org/ieta/www/pages/getfile.php?docID=2281.

277. *See* CLIMATE CHANGE: A GUIDE TO CARBON LAW AND PRACTICE, *supra*

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lifetime, with the possibility of two renewals, for a total of twenty-one years, or in the alternative one ten-year lifetime.[278] CDM offsets created between 2000 and 2007 can be used for compliance in the 2008 to 2012 Kyoto compliance period.[279]

3. "Additionality"

CDM CERs and JI ERUs are required to be legally additional to baseline project emissions.[280] This involves the establishment of an individual emissions baseline, taking account of sector reform initiatives, barriers to expansion, and sector expansion plans.[281] Early entrants in the CDM protocol established less stringent guidelines of additionality than now demanded.[282] The requirement for CDM CERs also includes the certification by the host developing nation that the project supports its goals for sustainable development.[283] This has been defined as "development that meets the needs of the present without compromising the ability of future

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note 263, at 57.

278. U. N. Framework Convention on Climate Change [UNFCCC], *Report of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol on its first session, held at Montreal from 28 November to 10 December 2005*, Decision 5/CMP.1, UN Doc FCCC/KP/CMP/2005/8/Add.1 (2006); [UNFCCC, *First Session*], http://unfccc.int/resource/docs/2005/cmp1/eng/08a01.pdf.

279. *See Kyoto Protocol to the United Nations Framework Convention on Climate Change*, *supra* note 189, arts. 3, 12.

280. U.N. Framework Convention on Climate Change, Clean Development Mechanism, http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php; U.N. Framework Convention on Climate Change, Joint Implementation, http://unfccc.int/kyoto_protocol/mechanisms/joint_implementation/items/1674.php.

281. UNFCCC, *First Session*, *supra* note 278, at 16–17.

282. CLIMATE CHANGE: A GUIDE TO CARBON LAW AND PRACTICE, *supra* note 263, at 62.

283. Under the Kyoto Protocol this is embodied in a Letter of Approval ("LoA") from the host country Designated National Authority ("DNA"). *See* United Nations Framework Convention on Climate Change, Clean Development Mechanism, http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php. After receiving the LoA and being verified by an authorized third party, the CDM project is ready to be certified as creating CERs. This is done by the CDM Executive Board, or for a JI project the JI Supervisory Committee.

generations to meet their own needs."[284] Long-term renewable energy developments clearly satisfy this definition, while many of the other CDM projects that have created CERs may be more questionable.

Thus, the emission cap of any country includes assigned Kyoto AAUs, credit units plus removal units ("RMUs") from forestation projects that remove CO_2 from the atmosphere, plus JI ERUs and CDM CERs. Under the Kyoto Protocol CDM CERs and JI ERUs can be used in future compliance to satisfy up to 2.5% of the party's annual allowed emissions. However, CERs and ERUs obtained prior to 2008 can be fully banked for use in the 2008 to 2012 compliance period.[285] The Kyoto Protocol does not place limits on the use of excess allowances other than that tradable allowances must be supplemental to significant domestic measures to reduce GHG emissions.[286]

To scale the role of offsets, the over-allocation of emission allowances in the European Union on May 26, 2007 would displace 18% of the expected CERs from the CDM projects validated as of May 2007.[287] When it was announced that verified emissions were 41 million metric tons of CO_2e, or approximately 2.5% lower than expected,[288] the EUA market of the EU-ETS plunged 67% in price.[289]

Eastern European excess emission allowances will have an impact. Most excess emission allowances are held by Russia and Ukraine.[290] These are expected to be in excess of 100 million metric tons of CO_2e per year. These excess emission allowances are approximately 33% of validated CDM emissions reductions as of May 1, 2007 and almost one-half the number of CERs expected to be issued assuming a validation estimate error of 27%.[291] By 2012 the CDM mechanism will have produced enough carbon offsets to equal

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284. THE WORLD COMM'N ON ENVTL. DEV., OUR COMMON FUTURE 8 (1987).

285. *See Kyoto Protocol to the United Nations Framework Convention on Climate Change*, *supra* note 189, art. 12.

286. UNFCCC, *Seventh Session*, *supra* note 240, at CMP 1.

287. Hart, *supra* note 269, at 44.

288. Heather Timmons, *Data Leaks Shake Up Carbon Trade*, N.Y. TIMES, May 16, 2006, at C1.

289. Hart, *supra* note 269, at 44.

290. *Id.* at 43–45.

291. *Id.* at 44–45 (utilizing UNEP data). For the first 175 CDM projects that issued CERs, the validation procedure overestimated the number of CERs produced by approximately 27% on average, with a standard deviation error of 42.5%. As of May 2007, there were more than 1800 CDM projects that had estimated their emission reductions through the validation process but not all had verified all their CERs. *Id.* at 42–45.

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the carbon emissions of the United Kingdom over three years.[292]

Of note, renewable projects, although freely allowed to create CER offsets, are not a large share of CDM projects. Developers of Kyoto CDM projects in developing nations are trapping methane and flaring it, without turning it into electricity and without additional marginal cost in the process.[293] Renewable energy projects account for 28 percent of CDM CERs. Methane capture and flaring projects producing no electricity, mostly located at large landfills, coal mines, and CAFOs, account for 19 percent of CERs.[294] Even in the U.S., methane is being flared to garner offsets, even though such flaring is not "additional," and could create power resources rather than just being flared as a waste material.[295]

These methane trapping projects offer easy solutions to reduce GHGs, but perpetuate the need for electricity for the community from other conventional fossil-fuel sources. "The CDM has, for a variety of reasons, been largely unsuccessful in encouraging real and significant changes in developing countries."[296] CDM "has been disappointingly ineffective at achieving its goal of effecting fundamental shifts toward cleaner energy production . . . .."[297] The European Union is proposing to further limit emission allowances granted to renewable energy projects.[298]

These CDM programs were originally a late minor add-on to the Kyoto Protocol.[299] The current Kyoto Protocol does not require the

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292. THE CARBON RATING AGENCY, *supra* note 272, at 3.

293. Author's observation from his extensive work around the world advising on carbon policy. *See* Kris Christen, *Environmental Impacts of Gas Flaring, Venting Add Up*, ENVTL. SCI. & TECH., Dec. 15, 2004, http://pubs.acs.org/doi/pdf/10.1021/es0406886 (explaining gas flaring); *see also* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-04-809, NATURAL GAS FLARING AND VENTING: OPPORTUNITIES TO IMPROVE DATA AND REDUCE EMISSIONS (2004), http://www.gao.gov/new.items/d04809.pdf.

294. Michael Wara, Measuring the Clean Development Mechanism's Performance and Potential, 55 U.C.L.A. L. REV. 1759, 1779 (2008).

295. *Rethinking Offsets*, CARBON CONTROL NEWS, Oct. 6, 2008, http://carboncontrolnews.com/.

296. COUNCIL ON FOREIGN RELATIONS, CONFRONTING CLIMATE CHANGE: A STRATEGY FOR U.S. FOREIGN POLICY 5 (2008), http://www.cfr.org/content/publications/attachments/Climate_ChangeTF.pdf.

297. *Id.* at 49.

298. *Revised EU GHG-Trading Program May Shape U.S. Proposals*, *supra* note 101.

299. Ball, *supra* note 14, at A-19.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

installation of renewable technologies anywhere, but rather only requires the reduction of carbon emissions, which may or may not involve the installation of renewable generation.[300] This is more accommodating than the RGGI prohibition of renewable energy projects. Nonetheless, the impact of CDM projects has not been to promote appropriate long-term technology-transfer renewable investments in developing countries, but rather has served to create additional credits for traditional emitters in Annex 1 countries.[301] CDM projects implemented by the market to date are charged with having focused on maximizing the number of CERs created for investors, rather than focusing on renewable energy projects and sustainable alternatives in developing countries.[302]

The failure to assure "additionality" of CDM CERs caused the Congressional GAO to conclude that the "evidence indicates that the CDM has had a limited effect on sustainable development."[303] GAO concluded that by encouraging the lowest-cost means for a developer to reduce carbon, the CDM scheme, it disadvantages measures that contribute to sustainable development. GAO concluded that the emphasis on reduction of HFC-23 GHGs "do little to promote efficient energy use or contribute to long-term sustainable development objectives."[304] GAO concluded that developing countries that host CDM projects dilute the stringent contribution of CDM programs to sustainable development, because of competing for these projects to be located in their countries.

Despite the variety of opportunities for carbon reduction, HFC-23 reduction projects, targeting one of the minor GHGs set forth in Table 1 that constitutes less than 1% of total GHG emissions, not only dominate CDM programs to date, "but earn more money from the offsets . . . than from selling the primary material [produced in the manufacturing process]."[305] CERs to date address high GWP ("global

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300. Renewable portfolio requirements, as employed in about half of the U.S. states, actually reward the installation of renewable electric generation technologies. *See* Ferrey, *Sustainable Energy*, *supra* note 81, at 507–08.

301. Christina Voigt, *Is the Clean Development Mechanism Sustainable? Some Critical Aspects*, 8 SUSTAINABLE DEV. L. & POL'Y 15, 17 (2008).

302. *Id.*

303. INT'L CLIMATE CHANGE, *supra* note 261, at 43–46.

304. *Id.* at 44.

305. CONG. RESEARCH SERV., THE ROLE OF OFFSETS IN A GREENHOUSE GAS EMISSIONS CAP-AND-TRADE PROGRAM: POTENTIAL BENEFITS AND CONCERNS CRS-7 (2008), http://www.ncseonline.org/nle/crsreports/08July/RL34436.pdf.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

warming potential") industrial gases such as trifluoromethane (HFC-23) and N_2O as well as CH_4 emitted by landfills and confined-animal-feeding operations ("CAFOs").[306] Two relatively obscure industries—adipic acid and chlorodifluoromethane (HCFC-22) production CDM projects dominate. Adipic acid is the feedstock for the production of nylon-66 and releases abundant N_2O as a production byproduct. HCFC-22 has two major applications. It is one of two major refrigerants that were phased in to replace the CFC's under the Montreal Protocol to Protect on Substances that Deplete the Ozone Layer. HCFC-22 is also the primary feedstock in the production of Dupont Teflon. These two relatively small industries represent nearly 55 % of the supply of issued CERs in the CDM to date. Indeed, the industrial gas emissions that account for one third of CDM reductions do not even occur in the developed world, not because of an absence of adipic acid or HCFC-22 manufacture, but because industries abated them voluntarily and destroy them.[307]

Renewable energy projects contribute more to sustainable development than these projects that have so far dominated the CDM.[308] Without regulatory changes, manufacturing process changes, rather than renewable energy and sustainable development investments, are projected to continue to dominate the Kyoto offset system.[309] How does additionality frustrate renewable power offset projects implemented as part of carbon control?

VII. THE NONADDITIVE NEW MATH OF "ADDITIONALITY": REGULATORY REQUIREMENTS INTERFACING WITH RENEWABLE POWER IMPERATIVES

The greatest concerns about carbon trading are the requirements of "additionality" and verification of offsets.[310]There is a palpable legal tension between the legal requirement of additionality for eligible offsets and the technical reality that renewable power is being left behind by carbon regulation programs internationally and within both the European Union and United States The ill-defined concept of additionality has created the gap and regulatory disconnect. Where it

306. Wara, *supra* note 294, at 1778–79.

307. *Id.* at 1780.

308. CONG. RESEARCH SERV., THE ROLE OF OFFSETS IN A GREENHOUSE GAS EMISSIONS CAP-AND-TRADE PROGRAM: POTENTIAL BENEFITS AND CONCERNS, supra note 305, at CRS-11.

309. *Id.* at CRS-11 to CRS-12.

310. CARBON OFFSETS, *supra* note 8, at 25.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

came from and how it became a legal requirement has important repercussions.

A. THE GENESIS AND OPERATION OF LEGAL "ADDITIONALITY"

A GHG offset can be defined "as the reduction, removal or avoidance of GHG emissions from a specific project that is used to compensate for emissions occurring elsewhere."[311] Offsets are the alternative compliance mechanism to direct reductions of carbon at regulated emission sources. They create an alternative venture to eliminate carbon away from the regulated sources, register such savings virtually, and trade such virtual assets to demonstrate carbon compliance. They empower another off-site activity to create a transferable carbon reduction credit. In the Kyoto Annex 1 countries, the EU-ETS, and the U.S. state programs, trading platforms exists for the trading of offsets.[312] The Congressional Research Service of the U.S. Congress called emission offsets "a critical design element."[313] Including offsets, whether additional or not, in a cap-and-trade system offers several advantages:

- It allows lower-cost reduction opportunities outside the capped region to be pursued; it also incentivizes more cost-effective methods.
- Economic sectors that are covered by the carbon emissions caps can be the source for reductions. This can include emission sources not otherwise cost-effectively addressed.
- Offsets can be credited for early reductions or for innovative technologies.
- They can promote technology transfer to developing countries.
- Offsets substantially dampen the price of compliance, by widening the array of compliance options.[314]

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311. OFFSET QUALITY INITIATIVE, ENSURING OFFSET QUALITY 1 (2008), http://www.pewclimate.org/docUploads/Executive%20Summary-OQI-Ensuring-Offset-Quality-white-paper.pdf.

312. For examples of exchanges, see generally European Energy Exchange, http://www.eex.com/de/ (last visited Mar. 1, 2009); European Climate Exchange, http://www.ecx.eu/ (last visited Mar. 1, 2009); Nord Pool, Portal, http://www.nordpool.com/en/ (last visited Mar. 1, 2009).

313. CONG.RESEARCH SERV., *supra* note 305, at Summary.

314. *See* U.S. ENVTL. PROT. AGENCY, EPA ANALYSIS OF THE CLIMATE STEWARDSHIP AND INNOVATION ACT OF 2007 (2007) [hereinafter EPA, CLIMATE STEWARDSHIP],

Traditionally, offsets have offered an incentive for lower-cost compliance options.[315] The use of unlimited offsets for compliance increases the compliance options and by increasing supply can decrease total costs of compliance by an estimated 71%.[316] Prices paid in global and U.S. markets for the sale of offsets ranged from $1.83 to $306 per ton of CO_2e, with a volume weighted average price of $6.[317] Of the projects tracked that produced offsets, only twenty-three of the 211 in the United States occurred in the ten RGGI states, which is the only place where they currently have regulatory value.[318]

Where unlimited use of offsets is allowed, compliance can occur external to the regulated power plant sources.[319] If generating facility reductions are the least expensive mode, then reductions will be made there. However, if there are not low-cost reductions at the regulated facilities themselves, then competition for the available supply of reductions will cause the clearing price of allowances at the margin to increase, at which point under the RGGI program a larger percentage of offsets may be employed due to the increase in cost.

During the next decade, a 10% use of offsets would meet the entire share of legal reductions required under the RGGI.[320] RGGI allows offsets to satisfy between 3.3 to 10% of legal compliance obligations.[321] This may seem like a minor percentage until one realizes that RGGI requires no state reduction in carbon between 2009 and 2015, and then a cumulative 10% reduction by 2018.[322] Under certain pricing contingencies, all compliance with carbon reductions could occur away from, and unrelated to, the regulated

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http://www.epa.gov/climatechange/downloads/s280fullbrief.pdf; U.S. ENVTL. PROT. AGENCY, EPA ANALYSIS OF THE LIEBERMAN-WARNER CLIMATE SECURITY ACT OF 2008 (2008) [hereinafter EPA ANALYSIS OF LIEBERMAN-WARNER], http://www.epa.gov/climatechange/downloads/s2191_EPA_Analysis.pdf; CONG.RESEARCH SERV., *supra* note 305, at CRS-12 to CRS-14; U.S. ENVTL. PROT. AGENCY, EPA ANALYSIS OF THE CLIMATE STEWARDSHIP AND INNOVATION ACT OF 2007 (2007) [hereinafter EPA, CLIMATE STEWARDSHIP].

315. *See* Stephanie L. Wilson, *Dog Days of Climate Change: Heating the Debate for Federal Cap-and-Trade*, 28 J. LAND RESOURCES & ENVTL. L. 163, 170-72 (2008) (discussing cost effective offset programs).

316. *See* CARBON OFFSETS, *supra* note 8, at 33.

317. *Id.* at 7.

318. *Id.* at 16–18.

319. *Id.* at 36.

320. RGGI Memorandum of Understanding, *supra* note 61, at 3.

321. RGGI MODEL RULE § XX-6.5(a)(3)(i)-(iii).

322. RGGI Memorandum of Understanding, *supra* note 61, at 3.

RGGI power generating facilities. The use of offsets for compliance increases the compliance options and by increasing supply can decrease total costs of compliance, by an estimated 71 %.[323] If it is cheaper to conserve energy end-use in office buildings and thereby earn offset credits, than to find a way to cut power plant CO_2 emissions, offsets will become the cost-effective compliance option.

According to one industry source, offsets are a "main avenue of compliance," because there is little that can be done at an existing fossil-fuel-fired facility to control CO_2 emissions.[324] Viewed in this context, at the margin, offsets are a significant and critical component of total compliance with regulatory carbon reduction requirements. A 10% realization in RGGI offset credits from activities other than reductions at regulated power plants can equate to 100% of required RGGI carbon reductions required by 2019. Offsets can be a mechanism for all reductions if the cost of allowance trades increases.

B. "ADDITIONALITY," LEGAL PRECEDENT

The *quid pro quo* for offsets has been the requirement for additionality: additionality has become a legal requirement for qualifying for a carbon emission offset under both the international Kyoto Protocol, the EU-ETS, and the first ten U.S. states to regulate carbon under RGGI. Additionality even trumps any requirement to have an offset substitute renewable energy generation for high-carbon-emitting conventional power generation. Under the only results available to date, the CDM Kyoto offsets are principally avoiding renewable energy projects in favor of higher-return abatement of HFCs and burning of methane without using it to generate power.[325]

So from where did the legal definition of additionality emanate and how does it influence or contort U.S. and world carbon policy? There are at least eight different tests of additionality, none of which is commonly accepted as credible.[326] Retailers of offsets provide little information or claim that their offsets are additional, but the U.S. GAO found that some sellers cannot explain how they define

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323. CARBON OFFSETS, *supra* note 8, at 33.

324. *RGGI Officials Facing Unresolved Questions Over Offset-Project Policy,* CARBON CONTROL NEWS, Aug. 12, 2008, http://carboncontrolnews.com/index.php/ccn/show/rggi_officials_facing_unresolved_questions_over_offset_project_policy/.

325. *See supra* Part VII.A.

326. CARBON OFFSETS, *supra* note 8, at 26–27.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

additionality and provide little verifiable information to buyers.[327] This made offsets less credible and could compromise the integrity of a carbon reduction system.[328]

Additionality is a legal rather than technical or engineering concept. Additionality has no technical analogue, as every ton of carbon reduction has technical value in reducing atmospheric concentrations, regardless of whether additional or how or why obtained. Therefore, additionality is a legal rationing mechanism rather than an embodiment of any technical reality. Stakeholders surveyed by the U.S. GAO believed that additionality is not a critical factor and barriers to entry of carbon reduction strategies must be lowered, especially since there is no accepted definition of it.[329]

Legal additionality in the case of carbon control is a regulatory concept to ration the creation and use of certain intangible regulatory assets representing the reduction of carbon. The actual impact of additionality is to reduce the net quantity of available traded allowances in a regulatory system. The additionality requirement does nothing to reduce total GHG emissions, but it does reduce the availability of eligible GHG reduction offset credits. This reduction in supply will tend to increase the market-clearing price in trading of eligible GHG reduction offsets. The purpose of additionality is to prevent subsidizing or double-counting business-as-usual investments in certain projects. Therefore, additionality prevents cross-subsidy through the carbon regulatory system at the microeconomic level of certain investments, but actually decreases the supply and thus increases the cost of remaining eligible offset projects.

Additionality as a legal concept originally was added to the four requirements for U.S. Clean Air Act Emission Reduction Credits ("ERC") for NOx, and later was adapted by the states for carbon offsets.[330] There have been five prior cap-and-trade emission markets established in the United States: Acid rain (SO_2),[331] NOx summer ozone budget program (12 state NOs),[332] EPA's Clean Air Interstate

327. *Id.* at 30.
328. *Id.* at 31.
329. *Id.* at 25–26.
330. *See* FERREY, *supra* note *, at § 6:86.
331. Clean Air Act, 42 U.S.C. §§ 7651–7651o (2008). This cut approximately in half electric power SO_2 emissions from coal-fired plants.
332. This covers the electric utility industry from the ozone season of

Rule ("CAIR") scheduled to start in 2009 (NOx and SO_2), [333] the Mercury Rule scheduled to commence in 2010 (mercury from power plants), [334] and RECLAIM[335] in southern California (NOx and SO_2). All but RECLAIM, a program under SCAQMD,[336] have been administered by the U.S. EPA. All allowances under each of these five prior programs, also including Kyoto and EU-ETS allowances, were not auctioned but were allocated free to traditional emitters of the pollutant based on average unit heat input (e.g. acid rain program) or depending on state-specific programs (e.g. summer ozone).[337]

But all has not gone smoothly with these prior cap-and-trade emission programs. The two most recent of these cap-and-trade programs, the CAIR NOx and SO_2 trading rules and the mercury trading rules, were ruled legally impermissible and stricken in 2008 by the Court of Appeals for the District of Columbia Circuit.[338] Most recently, in mid-2008, the D.C. Circuit vacated EPA's CAIR which required twenty-eight states and the District of Columbia to reduce of regional NOx emissions and regional SO_2 emissions below 2003 levels by 2015 starting in 2009, and eliminate "significant" contributions to downwind states' air pollution.[339] The court declared that it found

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May through September of each year. Targeted reductions of NOx from electric power facilities have escalated from about 60% reduction to about 75% reduction during phase II.

333. Rule to Reduce Interstate Transport of Fine Particulate Matter, 70 Fed. Reg. 25,162 (May 12, 2005) (codified at 40 C.F.R. pts. 51 and 72).

334. Standards of Performance for New and Existing Stationary Sources, 70 Fed. Reg. 28,606 (May 18, 2005) (codified at 40 C.F.R. pts. 60, 72, and 75).

335. REgional CLean Air Incentives Market. This was targeted to limit emissions in Southern California from a heterogeneous group of industries. Although there is no formal banking, because of two overlapping reporting periods each year, allowances can be carried beyond their nominal expiration for six months.

336. South Coast Air Quality Management District, RECLAIM, www.aqmd.gov/RECLAIM/index.htm (last visited May 5, 2009).

337. Statement of Peter Orszag, Director, Congressional Budget Office, "Containing the Cost of a Cap-and-Trade Program for Carbon Dioxide Emissions," before U.S. Senate Committee on Energy and Natural Resources, May 20, 2008, at 9; EU-ETS Council Directive, Art. 10, 2003 O.J. (L 275)(EC), *available at* http://eur-lex.europa.eu/LexUriServ.do?uri=CELEX:320030087:EN:HTML; Roman Kramarchuk, *All-Out Auctions?*, ENVTL. FIN., Mar. 2007, at 45, *available at* http://www.environmentalmarkets.org/galleries/default-file/Kramarchuk%20ef3marketview_p45.pdf.

338. *See*, New Jersey v. E.P.A., 517 F.3d 574 (D.C. Cir. 2008) (striking mercury rule).

339. North Carolina v. E.P.A., 531 F.3d 896 (D.C. Cir. 2008). The court

"more than several fatal flaws in the rule" and remanded to EPA to promulgate a new rule consistent with the opinion.[340] This has raised questions as to whether the EPA can use a cap-and-trade system to address National Ambient Air Quality Standards ("NAAQS") attainment in downwind states under the Clean Air Act for fine particulate matter, SO_2, NOx and ozone.[341]

Aside from their legality, how have these programs achieved success? The SO_2 cap-and-trade program is largely viewed as the classic success in reducing a third of power plant emissions through a tradable cap-and-trade system.[342] However, even this reduction, which was achieved over approximately the prior decade during which compliance requirements were phased in, does not serve well as a template for GHG carbon reductions. SO_2 reductions affected only 111 discrete power facilities principally in the Midwest, among the approximately 4800 grid-connected power generation facilities in the United States—approximately 2% of power facilities.[343] It was also limited in terms of both geography and emissions sources.[344] It was not economy-wide, albeit no national experience exists with a cap-and-trade system affecting all industrial activities beyond power generation.[345]

The benefits and achievements of this SO_2 program were not largely from trading of allowances. Instead, the availability of more low-sulfur coal at less expensive prices caused the shift to lower sulfur fuel and the resulting lower SO_2 emissions.[346] Most of the SO_2 allowance trades that did occur were between power plants owned by the same company, rather than between companies.[347] The SO_2

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questioned the EPA's ability to define "significant" contribution of air pollution from one state crossing into another state. The EPA previously had defended this ability in prior challenges to the NOx SIP Call. *Id.* at 907–08.

340. *Id.* at 901.

341. Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone, 70 Fed. Reg. 25,165 (May 12, 2005) (codified at 40 C.F.R. pts. 51, 72–74, 77, 78, and 96).

342. U.S. ENVTL. PROT. AGENCY, ACID RAIN PROGRAM 2005 PROGRESS REPORT 2–10 (2006), http://www.epa.gov/airmarket/progress/docs/2005report.pdf.

343. *See* Clean Air Act, 42 U.S.C. §§ 7651–7651o (2008).

344. *Id.*

345. *See id.*

346. Curtis A. Moore, *The 1990 Clean Air Act Amendments: Failing the Acid Test*, 34 ENVTL. L. REP. 10366, 10379 (2004).

347. *See* A. DENNY ELLERMAN ET AL., EMISSIONS TRADING IN THE U.S.:

program resulted in little technology innovation, no switch to renewable power sources, and primarily fuel switching of the coal source to lower SO_2 emissions.

These prior EPA emission trading programs focused on refineries and the utility industry as primary sources, overlooking other families of GHG pollutants and numerous sources of all sizes.[348] While about one-third of carbon originates from power generation facilities and another one-quarter from transportation through hundreds of millions of individual vehicle operations, billions of additional, smaller industrial, commercial, and residential sources contribute CO_2 from fossil-fuel combustion.[349] Note that RGGI, for example, only addresses larger power plants and not other sectors of the economy and not smaller or cogenerating power plants.[350]

Carbon regulation can occur at different points of the economy. If regulation of carbon occurs upstream, it is simpler in that carbon emissions and fuels are addressed at the point they first enter the economy. For fossil fuels, this dramatically reduces the number of entities to be regulated. However, when CO_2 regulation occurs at the state levels, as it does in the United States, this raises legal issues as states may try, at least indirectly, to regulate external upstream sources producing power in interstate commerce.[351] Regulating CO_2 at the state level invokes a classic "race to the bottom" paradigm: because there is no direct local impact from CO_2 emissions since greenhouse gases released anywhere on Earth warm the entire planet's atmosphere rather than exert local pollutant impacts, there may be a temptation for some states to not effectively restrict state CO_2 emissions within their states, relying on other states to bear the burden.[352]

If regulation instead occurs downstream at the point that fossil fuel is consumed or burned, the number of regulated entities expands exponentially. Individual residential consumers are responsible for at

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EXPERIENCE, LESSONS, AND CONSIDERATIONS FOR GREENHOUSE GASES 50 n.15 (2003), http://www.pewclimate.org/docUploads/emissions_trading.pdf.

348. U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2006 2–4 (2008), www.epa.gov/climatechange/emissions/usinventoryreport.html.

349. *Id.* at 2–9.

350. RGGI MODEL RULE § XX-1.4(a) (mentioning power plants with capacity equal to or greater than 25MWe).

351. *See* Ferrey, *supra* note 117.

352. Erica Herrero-Martinez, *"States Sudy Carbon Trading*," WALL STREET J., Aug. 1, 2007, at B5A.

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least one-third of all carbon emissions and as a group constitute the largest single share.[353] Yet no one is now advocating grasping this "third rail" of regulating residential downstream sources who also vote. Coverage of sufficient downstream sources becomes much more complex. The current ability to trade allowances created for leaded gas, SO_2 and NOx all adopted downstream regulation. However, each was dealing with a finite number of refineries or power plants, not with tens of millions of emitters of carbon.

C. MONITORING AND VERIFICATION OF CARBON CONTROLS

Concern exists about the integrity of offsets.[354] "The vast majority of offsets are, at some level, just rip-offsets," according to a former Clinton administration official.[355] Additionality has become the regulatory test for integrity, although without any certain or accepted tool to verify. The GAO concluded that the verification of "additionality" was burdensome and overly bureaucratic,[356] extremely subjective and often manipulated, and frustrated stakeholders.

Regulatory additionality is made more complex because it requires a baseline against which to measure reductions. Reductions are only additional when above a project-specific or standardized baseline. The baseline requires accurate measurement, correct counting for attribution, and permanence of the reduction.[357] Double-counting can occur, for example, where one region or nation installs a renewable power generation project, another region or nation purchases the power from the project, and yet another nation or state purchases the virtual renewable energy credits associated with the project. Which can claim the carbon reduction attributes?

This becomes even more challenging where one region regulates carbon and another does not. Accessing possible "leakage" into the system of regulated carbon emissions from other unregulated sources poses an additional problem. Because power moves almost at the speed of light and is not precisely traceable as to source and offset credits, as a virtual regulatory creation, move subject to different legal rules, there can be conflicts and challenges. However, additionality is

353. Michael P. Vandenbergh & Anne C. Steinmann, *The Carbon-Neutral Individual*, 82 N.Y.U. L. REV. 1673, 1691–94 (2007).
354. CONG. RESEARCH SERV., *supra* note 305, at CRS-18.
355. CARBON CONTROL NEWS, *supra* note 295.
356. INT'L CLIMATE CHANGE, *supra* note 261, at 46–48.
357. CONG. RESEARCH SERV., supra 305, at CRS-18 to CRS-21.

the most significant challenge.[358]

The measures of additionality for purposes of environmental emission credits trading are extremely imprecise. First, developing a baseline "business as usual" scenario against which to measure what is additional, is subject to significant assumptions. Against this "business as usual" scenario, actual carbon savings are calculated and assumed to be an emission reduction.[359] Many additional NOx ERC-creating projects traditionally earn credits by shutting down for economic or political reasons, rather than actually implementing emission-saving measures associated with continued operation or output.[360] Similar reductions or shut-downs may or may not also be eligible for creating carbon offsets.[361] This topic is currently controversial in the European Union and also in California as it designs its regulation.[362]

Second, looking at international precedent, calculation of Kyoto Protocol CDM project-based offsets are generally linear extrapolations of models, which may not be representative of what actually occurs on the ground, as shown by the significant overestimation of CDM credits. For the first 175 CDM projects that issued CERs, the validation procedure overestimated the number of CERs produced by approximately 27% on average, with a standard deviation error of 42.5%.[363] Verification can be an inside game: three firms have been collectively involved in verifying more than 80% of the first 740 CDM projects that were registered under the Kyoto Protocol.[364] In the United States, a California legislative committee moved forward on legislation that would require sellers of offsets to hire independent third-party verification to ensure that offsets are legitimate and meet state protocols and requirements.[365]

Third, issuing credits on a project-by-project basis increases

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358. *Id.* at CRS-24.

359. Regional Clean Air Incentives Market, (Feb 14, 2008), http://www.aqmd.gov/RECLAIM/reclaim.html.

360. *See Activists Split Over Support of GHG Offsets for Plant Closures*, INSIDE THE EPA, Sept. 5, 2008, *available at* 2008 WLNR 16718143 (detailing controversies across United States regarding plant closures).

361. *Id.*

362. *See supra* Part IV.B.

363. Hart, *supra* note 269, at 42.

364. *Id.*

365. *California Lawmakers Advance Bill Requiring GHG Offset Verification,* CARBON CONTROL NEWS, Apr. 15, 2008, http://www.carboncontrolnews.com/index.php/ccn/show/california_lawmakers_advance_bill_requiring_ghg_offset_verification.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

inaccuracy because any pattern of deviation from actuality is then multiplied over a large number of small transactions. The fact that national "compliance" was shown so easily in 2006 in the European Union carbon trading scheme, after early predictions of shortfall,[366] indicates that political flexibility to demonstrate compliance on paper often masks the true reduction. Despite this apparent compliance with goals to significantly cut annual GHG emissions, rather than declining in either 2006 or 2007, world GHGs actually climbed 2.9% from 2006 to 2007.[367]

The process of certification of more or less offsets can result in significant swings in offset and allowance trading prices.[368] There are several regulatory mechanisms to reduce price volatility in the cost of CO_2 emission allowances or offsets. The first is to create banking across various periods of time so that excess credits from one period are transferable to the next period, increasing the longevity of long-term offset supply and depressing trading prices. For example, the EU-ETS system allows annual banking of allowances (although not from Phase I ending in 2007 to Phase II beginning in 2008),[369] which works to dampen any short-term price swings in allowance or offset availability and trade pricing.

The second mechanism to reduce price volatility is to allow borrowing against future credits not yet created. The E.U. program allows borrowing of next-year allowances to satisfy current-year allowance requirements.[370] The third mechanism is to create a safety valve that caps the cost of emission allowances at a set price, has the government release into the market surplus allowances at a set price, or creates additional, wider types of eligible credits and offsets to increase supply under certain pricing conditions. The RGGI model adopts the third mechanism through use of pricing triggers at which a

366. *See supra* Part VI.B.

367. Juliet Eilperin, *Greenhouse Gases Continue to Build Despite Agreements*, B.GLOBE, Sept. 26, 2008, at A13.

368. *See supra* notes 316–319.

369. 2003 O.J. (L 275) at art. 14. *See generally* A. DANNY ELLERMAN & PAUL L. JOSKOW, PEW CTR. ON GLOBAL CLIMATE CHANGE, THE EUROPEAN UNION'S EMISSIONS TRADING SYSTEM IN PERSPECTIVE (2008), http://www.pewclimate.org/docUploads/EU-ETS-In-Perspective-Report.pdf (analyzing development, structure, and performance of EU-ETS).

370. Council Directive 2003/87/EC, 2003 O.J. (L 275) 32 (amending Council Directive 96/61/EC); Commission Regulation 916/2007, art. 51, 2007 O.J. (L 200) 12 (EC).

larger percentage amount and a wider variety of credits from more geographic regions can satisfy an increasing percentage over time of compliance responsibilities.[371]

In a market with tradable credits, additionality does not reward the obvious or cost-effective or best investments precisely because such investments are economically feasible anyway, and therefore not additional. In other words, to satisfy additionality, energy investors would forsake the best investment and invest in something that is marginal to qualify it as additional to normal investments. Additionality requirements for offsets increase transaction costs for certifying credits.[372]

What is not a requirement, but looms as an extremely profound issue, especially where most nations or U.S. states are not currently regulating carbon, is the potential "leakage" of emissions from other regions that substitute cheaper, higher-carbon power. The CDM CERs and other green credits share some characteristics with other commodity-based asset classes. They are non self-liquidating assets: forward delivery contracts are delivered for the CERs and the receivable is dependent on the performance of the project generating the CERs. Unlike commodity-based asset classes, there may not be any commodity that is created backstopping the CO_2e reductions accomplished, unless it is a renewable energy project which does create the energy commodity or service.[373]

However, environmental groups have questioned the additionality of renewable energy projects if their construction cannot prove to be valuable because of the offset sale.[374] Renewable power investments are not recognized as carbon offsets because "the emission reduction doesn't occur at the site of the renewable generator," but in backing out other carbon-intensive generation.[375] Under the current construct, the coal, power, and railroad industries have threatened some states with suit over the RGGI program.[376]

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371. *See infra* Part VIII.B.

372. CONG. RESEARCH SERV., *supra* note 305, at CRS-17.

373. For a discussion of whether electricity production is a good or a service, see Steven Ferrey, *Inverting Choice of Law in the Wired Universe,* 14 WM. & MARY L. REV. 1839 (2004).

374. *Activists Split Over Support of GHG Offsets for Plant Closures*, *supra* note 360.

375. *Id.*

376. *First RGGI Allowance Auction May Trigger Coal Industry Lawsuits*, CARBON CONTROL NEWS, July 21, 2008, http://www.carboncontrolnews.com/index.php/ccn/show/first_rggi_allowance_auction_may_trigger_coal_industry_lawsuits.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

D. WORLD CARBON REGULATION COMPARED ON RENEWABLE POWER: E.U., KYOTO, AND RGGI

1. Indulgences and Actions

Offsets have been likened to "environmental indulgences," where any person, no matter how profligate in emissions, can utilize the purchase of virtual verified reductions created elsewhere, to neutralize one's net carbon emissions in gross.[377] Creating offsets is an alternative, lower-cost path to reduce the private cost of compliance with CO_2 requirements at a carbon-emitting facility.[378] Additionality is the legal gatekeeper as to what qualifies as either an international Kyoto, E.U., or U.S. RGGI state offset. Additionality is a qualitative legal gatekeeper that eschews rational energy decision making in certain markets. Additionality is failing to motivate a dramatic shift to a renewable generating base in either developed or developing countries.

Where international offsets are eligible as options to create compliance, one expects the potentially lower cost of implementing carbon offsets in developing countries to dominate the early years of offset creation.[379] International-only, as opposed to domestic, offsets are part of both the EU-ETS and Kyoto Protocol.[380]

Despite the emergence of, and attention to, renewable energy sources, forecasters do not see the international technology mix of power generation sources changing appreciably over the next several decades.[381] The percentage of fossil fuels in the mix—and thus the

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377. Joshua S. Gans, *Do Voluntary Carbon Offsets Work?*, THE ECONOMISTS' VOICE , Oct. 2007, http://www.bepress.com/ev/vol4/iss4/art7. The author provides the illustration that former Vice President Al Gore had electricity usage more than twenty times the average usage, but countered that he "offset" those emissions through carbon offsets and green power consumption. In essence, Gans argues that the profligate carbon users can purchase indulgences. *Id.*

378. Billy Tizer, Resources for the Future, Presentation at June Harvard Electricity Policy Forum (June 2007) (notes on file with author).

379. EPA, CLIMATE STEWARDSHIP, *supra* note 314, at CRS-25.

380. *See Kyoto Protocol to the United Nations Framework Convention on Climate Change*, *supra* note 189, art. 12; LARRY PARKER, U.S. CONG. RES. SERV., CLIMATE CHANGE AND THE EU EMISSIONS TRADING SCHEME (ETS): KYOTO AND BEYOND (2008), http://www.fas.org/sgp/crs/misc/RL34150.pdf.

381. Clark Gelling, Elec. Power Research Inst., Presentation at Aegis Conference (July 25, 2007).

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

potential sources of GHGs in the electric power sector—is forecast to remain relatively constant. The International Energy Agency in Paris predicts that by 2030 world demand for energy will grow by 59% and fossil fuel sources will still supply 82% of the total, with non-carbon renewable energy sources supplying only 14%.[382]

The importance of the electric sector in global warming abatement is reflected in its changing role. In 1949, only 11% of global warming gases in the United States came from the electric sector; today it is more than 40%.[383] The Energy Information Administration in 2008 concluded that the electric power sector offered the more cost-effective opportunities to reduce CO_2 emissions, when compared to the transportation sector.[384] The power sector will therefore be the carbon reduction focus, and the place where additionality has its primary application. The types of technologies in the power generation capital stock largely determine the long-term concentrations of atmospheric carbon.

One would assume that renewable-energy policy and carbon policy, each aiming to provide the generating base with lower-carbon power resources, would be closely aligned to meet policy objectives. More than half the states have RPS programs to promote renewable generation.[385] The RGGI, and the Western and Midwestern states' carbon regulation schemes collectively include about half of the U.S. states plus four Canadian provinces. Those states that are participating in the RGGI scheme, along with California, alone are significant in scale. Their emissions approach the total emissions of the nation of Japan, one of the two largest carbon-emitting participants in the Kyoto Protocol. The offset and additionality policies of these various carbon programs, however, seem not similarly or consistently aligned.

2. The RGGI Angle

First, distinguish the offsets and allowances concerning

382. INT'L ENERGY AGENCY, *supra* note 37, at 58.

383. *See generally* Table 2.1f Electric Power Sector Energy Consumption, 1949-2007, http://www.eia.doe.gov/aer/txt/ptb0201f.html (last visited May 7, 2009).

384. *Energy Estimates Show Rise in CO_2 Emissions, Offer Mitigation Options*, CARBON CONTROL NEWS, Jun 26, 2008, http://www.carboncontrolnews.com/index.php/ccn/show/energy_estimates_show_rise_in_co2_emissions_offer_mitigation_options.

385. There are twenty-five states in the United States that have announced that they will regulate carbon in the four U.S. state regulatory schemes announced. See *supra* Parts III, IV, V.

FERREY S. When 1 + 1 No Longer Equals 2: The New Math of Legal "Additionality" Controlling World and U.S. Global Warming Regulation. MINN. J.L. SCI. & TECH. 2009;10(2): 591-670.

additionality requirements. While RGGI includes the *offset* requirement of additionality, there is no concept of additionality in either the RGGI original allocation of carbon *allowances* among the ten individual RGGI states or in the secondary allocation through those states to those who acquire such allowances by either auction or allocation.

a. Allowances

There is a proposal to make additionality an additional requirement in early-reduction RGGI allowances achieved at fossil-fuel projects.[386] This would transform such allowances, which typically do not require additionality, to the have the equivalent requirement of offsets, which do require additionality. Early compliance was also incorporated in another U.S. credit trading program for SO_2.[387] It did not require additionality be demonstrated for early compliance. To make things even more disconsonant, by definition, offsets cannot be created at fossil-fuel-fired power projects,[388] although early-reduction allowances will be created at existing fossil-fuel fired projects.

If the requirement of RGGI is to hold CO_2 emissions at their historic levels and then permanently reduce CO_2 emissions after 2014,[389] allowing 2006 to 2008 early reductions to be shifted in time so that they are used as if they were 2009 reductions does not directly contribute to this requirement to limit current carbon emissions. However, if continued long-term, there may be value in allowing credit for early reductions. Since CO_2 emissions become a carbon concentration in the atmosphere lasting for a century, any reduction accomplished in the past century is of value globally and might be of creditable value in a regulatory system.[390]

Some states have gone even further with earlier allowances not requiring additionality. For example, Massachusetts, which prior to joining RGGI regulated GHG emissions from six large fossil-fueled power generation facilities,[391] also will allow some of these terminated

386. RGGI MODEL RULE § XX-5.3(c).
387. EPA Bidding Rules, 40 C.F.R. §73.71(a)-(f).
388. *See* RGGI MODEL RULE § XX-10.3(d)(2).
389. *See* RGGI Memorandum of Understanding, *supra* note 61, at 3 (delineating emission reduction timeline).
390. *See* Steven Ferrey, *Corporate Responsibility and Carbon-Based Life Form*, 35 B.C. ENVTL. AFF. L. REV. 419 (2008).
391. Emission Standards for Power Plants, 310 C.M.R. § 7.29(6)–(7).

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prior program elements to create transferred RGGI offsets. This will apply to RGGI- ineligible offset projects because these projects are required by other law and would involve state set asides from Massachusetts' RGGI allowance portfolio.[392] In essence, it allows prior expenditures on carbon projects required by law in Massachusetts under a different regulation to create RGGI allowances from early efforts, which by definition are not additional to what is required by law and therefore normally ineligible.

b. Offsets

Additionality is required in all RGGI offsets. Renewability or renewable power is not required in any offsets. In fact, renewable energy projects are not allowed to create RGGI offsets.[393] Offsets are a substitute mode reducing carbon emissions from other than fossil-fired power plants, while the RGGI program only regulates CO_2 emissions from fossil-fueled power plants. Even in the United States, methane is being flared to garner offsets, even though such flaring is not additional, and could create power rather than just being flared as a waste material.[394] Notwithstanding this, RGGI early compliance allowances—but not offsets—recognize CO_2 reductions at the same covered power projects.

RGGI offsets must be projects commenced on or after December 20, 2005,[395] while early-compliance RGGI allowances can be commenced prior to, on, or after January 1, 2009.[396] These early reduction allowances under RGGI are created by shifting the timing of compliance in an opposite direction from that applying for offsets, utilizing a timing ceiling rather than a timing floor. One is not allowed to register under the RGGI program and other carbon programs simultaneously.[397] Offsets also cannot be awarded for voluntary participation in programs or for elements required by law.[398]

If a project is located outside of a participating RGGI state, the

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392. Nicholas Bianco, GHG Stakeholder Meeting—Rule Review: Transitioning from 7.29 to RGGI, Apr. 5 & 10, 2007, *available at* http://www.mass.gov/dep/air/climate/rggi3p1.pdf.

393. RGGI MODEL RULE § XX-10.3(d)(2).

394. *Rethinking Offsets*, CARBON CONTROL NEWS, Oct. 6, 2008, http://www.carboncontrolnews.com/index.php/ccn/show/rethinking_offsets.

395. RGGI MODEL RULE § XX-10.3(f).

396. *Id.* § XX-10.4(b)(1).

397. *Id.* § XX-10.3(d)(4).

398. *Id.* § XX-10.3(d)(1), (4).

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sponsor of the offset project can pick any RGGI state in which to file its credits.[399] There could be some arbitrage here, as any offset project would have to be registered in just one RGGI state, and then could, if an MOU is in place, could be traded into another RGGI state. The flexibility, however, of different RGGI states in terms of registering offset projects under local state rules can vary.

RGGI contains circuit-breaker triggers that change the use and location of eligible offsets.[400] Once RGGI offsets are trading in the market at greater than $7 per ton over a one-year period, credits created from anywhere in North America can provide up to 5% of compliance, as opposed to 3.3% normally.[401] Once the market price of offsets increases above $10 per ton twice in two consecutive years, offsets can be obtained from anywhere in the world without any discount.[402] The purpose of this is to increase the number of available offsets if prices for them rise because of a lack of adequate supply.

The RGGI system is inverted. While RGGI, like Kyoto, requires offset additionality but does not require renewability, RGGI goes even further to specify that renewable power projects expressly do not qualify to create any offsets. The media have questioned the credibility of carbon offsets[403] and the efficacy of such offsets.[404] The uncertainty about carbon regulation and the differential impact on various sources of generation have caused U.S. industry to postpone needed investments in new generation sources.[405] With increasing demand for power and the aging generation fleet of existing power service units, this state of affairs cannot proceed indefinitely.

California is considering allowing RECs to also count for carbon

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399. Steven Ferrey, *Power Paradox: The Algorithm of Carbon and International Development*, 19 STAN. L. & POL'Y REV. 510 (2008).

400. See *supra* note 95 and accompanying text.

401. RGGI Memorandum of Understanding, *supra* note 61, at 5.

402. *Id.* at 3, 5–6.

403. *See* Andrew Revkin, *Carbon Neutral Is Hip, but Is It Green?* N.Y. TIMES, Apr. 29, 2007, http://www.nytimes.com/2007/04/29/weekinreview/29revkin.html.

404. *See id.*; *see also* Ben Elgin, *Little Green Lies,* BUSINESS WEEK, Oct. 29, 2007, 45 (arguing that the ability to make a company green while making it profitable may not always be attainable).

405. Timothy P. Gardner & James C. Hendrickson, *Carbon War Games: U.S. Utilities Gain Strategic Insights by Playing Out a Carbon-Constraint Scenario*, PUB. UTIL. FORT., Dec. 2007, at 46.

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reduction.[406] Some activists are trying to limit out-of-state offset credit for out-of-California renewable energy project offsets.[407] Southern California utilities are urging no restrictions on out-of-state renewable energy credits.[408]

The California carbon program has not yet made its final decisions for additionality and renewability of offset projects, prior to its commencement in 2012. The carbon programs of the Western and Midwestern states also have not made their final decisions.[409] Therefore, the RGGI scheme is the U.S. model for legal additionality and its effect on renewable power in carbon programs.[410]

3. Kyoto Conundrum

Additionality is in the text of the Kyoto Protocol: emission credits/offsets must be "supplemental to domestic actions for the purpose of meeting quantified emission limitations and reduction commitments . . . ."[411] With Kyoto, verifying additionality is enough, but there is no requirement for more renewable resource deployment. Kyoto has additionality without renewability.

The effect of CDM projects has not been to promote appropriate renewable investments in developing countries, but rather to create transferable additional credits for Annex 1 countries.[412] There is no mandatory environmental or sustainability assessment in Kyoto projects or public input, which was rejected by the Kyoto developing countries as an infringement on host country sovereignty.[413] There are almost a thousand CDM projects, with twice that many in the project development pipeline. The existing projects have generated

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406. *"Utility Argues renewable Credit Trading Key to California GHG Cuts*," CARBON CONTROL NEWS, Sept. 29, 2008, at 3; *Montana Inaction on GHGs Signals Trouble for Regional Trading Plan*, CARBON CONTROL NEWS, Sept. 26, 2008, http://www.carboncontrolnews.com/index.php/ccn/show/montana_inaction_on_ghgs_may_signal_collapse_of_regional_trading_plan.

407. *Utility Argues Renewable Credit Trading Key to California GHG Cuts*, CARBON CONTROL NEWS, Sept. 29, 2008.

408. *Id.*

409. Steven Ferrey, *Converting Brownfield Environmental Negatives into Energy Positives*, 34 B.C. ENVTL. AFF. L. REV. 417 (2007).

410. Gerald B. Silverman, *Regional Initiative Holds First Auction in Nation of Carbon Emissions Allowances*, 39 ENV'T REP. 1913 (2008).

411. *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, *supra* note 189, art. 17.

412. Voigt, *supra* note 301, at 18.

413. *Id.* at 17.

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117 million issued CERs, with an estimated 2.6 billion CERs to be generated by 2012.[414] This would represent almost 10% of monitored emissions.

The early experience from the E.U. trading scheme paralleling the Kyoto Protocol illustrates, similarly, that many industries are buying offset credits created under CDM in developing countries, rather than making significant energy or carbon reductions at their European regulated industrial facilities.[415] Rather than cut fossil fuel use in developed countries, the response has been to create CER offsets in developing countries. To date, these typically do not use renewable resources, which when transferred then increase the entire cap emission quantity of available emissions in developed countries.[416] This creates an incentive for host CDM countries[417] and CDM investors at lowest cost to increase the number of CERs created.[418] CDM projects to date have focused on increasing the number of CERs created for investors, instead of focusing on renewable energy projects and sustainable energy alternatives in fast-electrifying developing countries, such as China.[419]

Emission allowance and offset trading are allowed under the EU-ETS and the Kyoto Protocol.[420] Therefore, any party, even if for purposes of speculation, can purchase E.U. or RGGI offset credits, even if they do not themselves require them for compliance. While offsets are equivalent to allowances in both environmental and economic terms, they are not interchangeable without limitations.[421] The lesser price at which CERs have traded compared to EUAs creates arbitrage opportunities. The actual allowances can have

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414. *Id.* at 15.

415. Jeffrey Ball, *supra* note 14.

416. Jeffrey Ball, *supra* note 14.

417. Under the Kyoto scheme, the host country for the CDM project gets to determine whether the project satisfies its sustainable development goals. U.N. Framework Convention on Climate Change [UNFCCC], *Report of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol on its second session, held at Nairobi from 6 to 17 November 2006*, UN Doc FCCC/KP/CMP/2006/10/Add.1 (March 2, 2007) [*hereinafter* UNFCCC, *Second Session*], http://unfccc.int/resource/docs/2006/cmp2/eng/10a01.pdf.

418. Voigt, *supra* note 301, at 15.

419. *Id.* at 17–18, n. 41–42.

420. *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, *supra* note 189, art. 20; UNFCCC, *Seventh Session*, *supra* note 240, at 18/CP.7.

421. PARKER, *supra* note 380, at 32.

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greater value than external offsets created under CDM and imported back to an Annex I nation. Contracts for differences can be employed to hedge future carbon requirements.[422]

As of the end of 2006, the World Bank reports that CDM offset projects under the Kyoto Protocol were located 61% in China, 12% in India, 7% in other Asian countries, 10% in Latin America (most significantly Brazil), and 3% in Africa.[423] Therefore one developing country, China, dominated the other 170 developing countries collectively, as the locus of CDM projects. Since Kyoto CDM CER offsets must be created in developing countries, sovereign and commercial interests are subject to the risks associated with these intangible regulatory assets.[424]

This risk is mitigated by the oversight of U.N. designated authorities in each such nation that hosts a CDM project.[425] Questions have been raised, however, concerning whether the Kyoto Executive Board and panels will correctly monitor the incentive to inflate CERs.[426] In August 2008, the United Nations administrators of the Kyoto Protocol announced that they would try to tighten the ability of speculators to earn CDM credits for improving already existing and profitable projects.[427] This would originally apply to biomass projects.[428]

A report by the World Wildlife Fund found that many CDM programs fail to support sustainable development in host CDM countries.[429] The same study found that 20% of the CDM projects

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422. A contract for differences typically involves a financial institution acting as the intermediary to agree to supply a certain quantity of carbon credits in the future at a fixed price and then covering this with a second contract with a different entity to supply the same quantity of credits at that future date at the then market price. The difference between the two prices becomes a settlement amount between the two parties.

423. Lauren Etter, *In China, A Plan to Turn Rice into Carbon Credits*, WALL ST. J., Oct. 9, 2007, at A1.

424. For treatment of sovereign risk and commercial risk in developing countries, see FERREY, *supra* note * at § 3:10. Commercial risk is mitigated by pooling CERs from different technologies and from different countries in financial instruments for trading.

425. For specification of DNAs, see List of Annex I Parties, *supra* note 4.

426. Voigt, *supra* note 301, at 16.

427. *Cracking Down on Offset Projects*, CARBON CONTROL NEWS, Aug. 6, 2008.

428. *Id.*

429. Voigt, *supra* note 301, at n.9 (quoting Lambert Schneider, Öko-Institute, Energy & Climate Prot. Div., Practical Experiences with the Environmental Integrity of the CDM (June 15, 2007)), *available at*

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would have occurred notwithstanding CDM qualification and therefore were not "additional, while another study found that one-third of projects in India failed to demonstrate their additionality from what would have otherwise been implemented.[430] The report argued that this will result in the production of a large quantity of cheap carbon credits, which would allow businesses and developed countries to avoid a fast shift to renewable resources and to keep polluting.[431] According to one recent witness before the European Union, "Additionality is often subjective," and there should be "more independent and transparent" evidence of additionality under the CDM offset system.[432]

E. THE ROLE OF FOREST "ADDITIONALITY"

Forests are the missing piece in the carbon equation. Forests are renewable. But their potential role as a harvested renewable biomass power generation fuel does not make them eligible to create offsets. Instead, their role as living forests in naturally absorbing and converting carbon molecules makes them eligible for offset creation and credit. Forests use carbon dioxide as building blocks for organic molecules and store it in woody tissues, but that process is not indefinite. Forests store about 45% of terrestrial carbon, and remove from the atmosphere about 33% of the anthropogenic carbon emitted annually.[433] Tropical forests are responsible for about one-quarter of this absorption, yet deforestation is fastest in tropical forests in South America and Africa.[434] Forests represent a better opportunity to sequester CO_2 currently in the atmosphere, in contrast to the proposed controversial sequestration experiments conducted underground in mines or in the ocean.

Annually in the world, about 32 million acres (13 million hectares) of forest are destroyed and not replanted.[435] The

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http://ec.europa.eu/environment/climat/emission/pdf/4thmeeting/8a_lambert.pdf.

430. *Id.* at 15.

431. *Id.* at 39.

432. Stephen Gardner, *EU Parliament, Council Making Progress on Post-2012 Emissions Trading Scheme*, 39 ENVTL. REP. 1417, 1419 (2008).

433. Gordan Bonan, *Forests and Climate Change: Forcings, Feedbacks, and the Climate Benefits of Forests*, 320 SCI. 1444 (2008); CRS REPORT ON CLIMATE CHANGE, *supra* note 9, at CRS-1.

434. Bonan, *supra* note 433, at 1445.

435. Arthur Max, *Deal Struck on Forest in Climate Talks*, ASSOCIATED PRESS, Dec. 9, 2008.

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agricultural sector offers a significant potential for sequestration of carbon through preservation of biologic resources.[436] The carbon stored in the existing forests of the contiguous 48 U.S. states equals about 20 years of industrial U.S. carbon emissions.[437] Legally, however, there has emerged a difference between preserving existing forest and afforesting new land. For forestation projects, the integrity, additionality, and credibility of offsets credited are controversial issues.[438]

Leading carbon scientists have submitted that an important way to reduce carbon concentrations to even 90% of current levels is to adopt "forestry practices that sequester carbon."[439] If carbon concentrations stay above this 90% threshold for even a short amount of time there may be "irreversible catastrophic effects."[440]

There are several issues with afforestation that revolve around additionality; including 1) the efficiency of afforestation projects; 2) monitoring and verification of reductions; 3) permanence and longevity of forestation projects.

Biologically-based sequestration projects create issues with establishment of the appropriate baseline in a dynamic biologic system, the permanence of the reduction given forest change over time, and "leakage" from forest destruction focused elsewhere.[441] Forestry offsets provide a challenge for preventing leakage, as logging can move to an unregulated region, causing the net world impact to be zero. Legal mechanisms to ensure the value of biological credits against underperformance of credited value include insurance and bond products, buffer or surplus contingency accounts, and

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436. U.S. CONG. RESEARCH SERV., RL33898, CRS REPORT FOR CONGRESS: CLIMATE CHANGE: THE ROLE OF THE U.S. AGRICULTURE SECTOR x (June 20, 2008) [hereinafter CRS REPORT ON ROLE OF U.S. AGRICULTURE], *available at* http://www.ncseonline.org/NLE/CRSreports/08July/RL33898.pdf.

437. Ecology and Econ. Research Dep't., Wilderness Soc, Measuring Forest Carbon: Strength and Weakness of Available Tools, WILDERNESS SOC'Y. SCI. & POLICY BRIEF, Apr. 2008, http://wilderness.org/files/Measuring-Forest-Carbon.pdf.

438. *Forestry CO_2 Offsets*, CARBON CONTROL NEWS, July 17, 2008, http://www.carboncontrolnews.com/index.php/ccn/show/forestry_co2_offsets.

439. James Hansen, et al., *supra* note 1, at 217.

440. *Id.*

441. *See generally* Mike Rosen-Molina, *Carbon Credit Report: Can Buying Carbon Credits to Offset the Greenhouse Gases You Spew in Daily Life Really Help Save Us from Global Warming?*, MONTHLY, Aug. 2007, http://berkeleymonthly.net/feature-08-07.html.

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covenants on land-use and long-term leases and easements on use of covered land.

A recent Australian study claims that natural forests are 60% more efficient than new human-made forests for the purpose of sequestering carbon.[442] If so, preservation of existing forests is more critical than afforestation of new land areas. Yet afforestation is eligible to create an offset under Kyoto, EU-ETS or RGGI, while the more valuable presently existing forest is not. If the Australian study is correct, there is a significant carbon sequestration loss upon the destruction of natural forest, even if replaced with new afforestation acreage that can earn offsets. Of course, preservation of forests is not eligible to create any credits under either the Kyoto Protocol or RGGI.

There is debate concerning whether such new forestation is additional, and how it is monitored and verified. Under the RGGI Model Rule, even new afforestation projects, unless insurance against biomass loss is purchased for the forest, receive credits equal only to 90% of their absorption of CO_2, to account for possible loss of forest mass over time due to fire, pests, or other causes.[443] In addition, to ensure permanent forest use, a restrictive conservation easement is required for new forest projects that create credits.[444] For some RGGI states, the in-state agricultural opportunities are minimal. California is exploring reforestation projects in Mexico to comply with California's imminent carbon GHG cap-and-trade program.[445]

Under RGGI, most offset credits have a ten-year period, and are eligible for a second ten-year period. New afforestation projects, by contrast, are eligible for a three twenty-year credit periods.[446] This substantially favors the net present value of afforestation projects. By comparison, some Kyoto CERs related to forestry projects are deemed temporary for a period of up to 60 years,[447] subject to verification on a recurring 5-year basis that burning or logging does not later release carbon from the forest. In the international Kyoto Protocol, forestation eligibility treatment is similar to that received in RGGI and the

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442. *Growing Forestry Offsets*, CARBON CONTROL NEWS, Aug. 11, 2008, http://www.carboncontrolnews.com.

443. RGGI MODEL RULE § XX-10.5(c)(4)(iii).

444. *Id.* § XX-10.5(c)(6)(i).

445. *California Officials Eye Mexico Reforestation Projects for GHG Offsets*, *supra* note 151.

446. RGGI MODEL RULE § XX-10.3(e)(2).

447. CLIMATE CHANGE: A GUIDE TO CARBON LAW AND PRACTICE, *supra* note 265, at 96.

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European Union: preservation of existing forests does not qualify; adding new forests does. Kyoto's CDM only counts the following: projects that involve planting forest in areas that were deforested before 1990 and afforestation, defined as planting forest in areas where there was previously no forest vegetation for at least 50 years.[448]

Under the Kyoto Protocol, offset carbon credits can be obtained for planting trees but not for preserving existing forests. Leading up to the Kyoto Protocol, developed nations objected to forest credits, arguing that it would be difficult to monitor and measure the amount actually preserved, as well as to ensure that preservation would endure over time.[449] Efforts of some developing countries to include avoiding deforestation as a CDM project were tabled in 2005 meetings and not resolved at the Kyoto group Bali meetings in late 2007. Thus, conservation of forests has been tabled until after 2012 by the Kyoto parties. The U.N. IPCC report notes that forest offsets under Kyoto are "being lost in the current institutional context and lack of political will to implement and has resulted in only a small portion of this potential being realized at present."[450]

Even the EU-ETS program excludes forestry credits, including those from forestation and reforestation projects. [451] Likewise, forest eligibility has been controversial in the consideration of U.S. federal legislation. In 2008 there was an effort to expand the farming and forestry offsets available under the 2008 Lieberman-Warner carbon legislation proposal, which included no-till agricultural practices.[452] This legislation was amended to allow a larger amount of

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448. UNFCCC, *First Session*, *supra* note 278.

449. Dean Scott & Eric J. Lyman, *Negotiators Finalize Measure on Forests, Fund for Adapting to Global Warming Effects*, 38 ENVTL. REP. 2699–700 (2007).

450. WORKING GROUP III [WGIII], INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: MITIGATION OF CLIMATE CHANGE 543 (2007), http://www.mnp.nl/ipcc/pages_media/AR4-chapters.html

451. Stuart E. Eizenstat, *Seeing the Climate Policy for Trees*, N.Y. TIMES, Nov. 4, 2006, http://www.nytimes.com/2006/11/04/opinion/04eizenstat.html?_r=1&oref=slogin.

452. America's Climate Security Act of 2007, S. 2191, 110th Cong. (2008); *see also Senate Panel Urged to Expand Agriculture Offsets in Lieberman-Warner Bill*, CARBON CONTROL NEWS, May 27, 2008, http://www.carboncontrolnews.com/index.php/ccn/show/senate_panel_urged_to_expand_agriculture_offsets_in_lieberman_warner_bill (reporting some of the concerns and recommendations of subcommittee members and witnesses before the subcommittee).

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international forest projects to create offsets, allowing up to 15% percent use of all offsets to create compliance. An amendment in the Senate, however, sought to eliminate offsets created overseas, since they would encourage carbon spending in China instead of in the United States.[453]

So forest preservation, the natural biological mechanism for carbon absorption, has become the legal orphan of all U.S., E.U., and Kyoto carbon programs. Here, additionality becomes a double-edged sword that does little to prevent deforestation, which is proceeding at alarming rates. Eligible actual reforestation does not compensate even on the order of magnitude of the much greater forest loss. Additionality applied to new afforestation only is not preserving the best natural renewable resources.

VIII. CONCLUSION

Carbon control is the major environmental challenge now confronting the world. The new regulatory requirement for additionality is a critically important component of the new carbon control regulatory constructs, yet it is infrequently addressed. The three carbon regulation schemes in effect today—RGGI in the United States, EU-ETS, and the Kyoto Protocol—all require additionality of offsets. Additionality has emerged as the dominant and controlling meta-screen for legal qualification of offset credits in carbon regulation in the United States and around the world. It has become even more important than the goal of substituting renewable low-carbon power generation in place of traditional power generation. As such, additionality has even worked as an absolute prohibition against any renewable power in the new U.S. carbon regulatory schemes.

As a result, each of the carbon programs has discouraged renewable power substitution for traditional power generation and has failed to recognize the importance of preserving existing forests as biological carbon sequestration mechanisms. The Kyoto system allows renewable energy project CDM offsets, where the U.S. RGGI program specifically excludes them. All programs exclude the preservation of existing forest resources from credit, despite rampant deforestation.

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453. *Senate Climate Debate's Focus on Costs Poses Political Risks for Both Sides*, CARBON CONTROL NEWS, June 2, 2008, http://www.carboncontrolnews.com/index.php/ccn/show/senate_climate_debates_focus_on_costs_poses_political_risks_for_both_sides.

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But even under the Kyoto Protocol, where renewable CDM offsets are allowed, there is not widespread renewable energy technology deployment. Rather, the clear majority of CDM offset projects around the world are concentrated in one country and avoid renewable energy projects. Long-term, these failures to facilitate the necessary transition to renewable energy and to protect existing forest in various countries threaten to be the death knell of the CDM program.

It is not too late to make the necessary regulatory transition. According to climate scientists, however, there is scant time left: climatologist James Hansen notes that if we wait a mere decade until 2018 to "stop the growth of greenhouse gas emissions," then we reduce the probability of "avoiding catastrophic effects" of warming to almost zero.[454] The basic world agreement for carbon emission control was conceived more than 15 years ago and the Kyoto Protocol more than a decade ago, yet success is not evident. Carbon concentrations in Kyoto-regulated developed countries, in unregulated developing countries, and indeed, throughout the world, continue to climb. Rather than declining in 2007, carbon emissions from "burning fossil fuels and cement production" actually climbed 2.9% over the prior year, due primarily from emissions from developing countries.[455]

Even the transition between state-level and federal carbon regulation in the United States poses issues. Pending federal legislation creates an interesting conversion among programs: The proposed Waxman-Markey carbon legislation provides that any allowances issued before 2012 could be exchanged for federal allowances based on the average auction price for allowances issued in a given year.[456] Therefore, conversion of allowances or offsets issued or certified during the first 3 years of RGGI, or early reduction credits issued in California or the regional state carbon programs, can be converted to any new federal carbon currency. This could either amplify or mitigate "additionality" concerns raised in this article.

Additionality employs a new math where the necessary long-term investment does not add up. It is a key regulatory concept that must be retooled to certify offset projects that recognize and count technologies that shift the power generating base to a more substantial renewable power component. The concept is one of

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454. Chase, *supra* note 34.

455. Eilperin, *supra* note 367.

456. Christine Cordner & Gail Roberts, *RGGI Expects Compensation for Early Action if Federal Legislation is Approved*, PLAT'S ELECTRIC UTILITY WEEK, Apr. 20, 2009, at 23.

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regulatory math, and that math can be changed to comport with the technical component. It now works a disconnect between means and ends: the end is a long-term renewable power base and preservation of forest cover, but the means—employing additionality—by definition preclude reaching the desired end. Reformulating the additionality requirement to encourage more renewable power generation projects to qualify as offsets and to credit the preservation of existing forest canopy that otherwise could be destroyed, is the first legal task for reforming carbon regulation. If the uptake of renewable projects in either developed or developing countries had been vigorous since the 2005 initiation of the EU-ETS, or the destruction of existing forest canopy had been arrested in developing countries, "additionality" as currently defined and required might be justified. However, the failure of either achievement requires a new look at the effect and application of the ill-defined novel legal concept of additionality in carbon regulation.