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Beautifying the Ugly Step-Sister: Designing an Effective Cap-and-Trade Program to Reduce Greenhouse Gas Emissions

I. INTRODUCTION

In his message accompanying the United States 2009 Budget, President Barack Obama noted,

[T]here are the years that come along once in a generation, when we look at where the country has been and recognize that we need a break from a troubled past, that the problems we face demand that we begin charting a new path. This is one of those years.

Our nation indeed faces many challenges.¹ One such challenge that has risen to the forefront of both the national and global conscience is that of global warming.

While politicians and the media continue to debate the validity of global warming,² an increasing number of the world's preeminent scientists believe that "warming of the climate is unequivocal and that the world is in a crisis now."³ Coupled with the fact that President Obama and a majority of Congress are proponents of reducing greenhouse gases,⁴ the United States may implement an emissions regulatory program in the near future. The United States moved closer to this reality when, in June 2009, the U.S. House of Representatives approved the American Clean Energy and Security Act—a bill that would substantially reduce air pollutants by the year 2050.⁵

If the United States ultimately elects to lower greenhouse gas emissions, it will likely select from one of two regulatory approaches:

1. OFFICE OF MGMT. & BUDGET, EXEC. OFFICE OF THE PRESIDENT, A NEW ERA OF RESPONSIBILITY: RENEWING AMERICA'S PROMISE I (2009) [hereinafter OFFICE OF MGMT. & BUDGET], available at <http://www.gpoaccess.gov/usbudget/fy10/pdf/fy10-newera.pdf>. For example, "[o]ur economy is in a deep recession that threatens to be deeper and longer than any since the Great Depression." *Id.*

2. Richard J. Pierce, Jr., *Energy Independence and Global Warming*, 37 ENVTL. L. 595, 597 (2007).

3. Bill Westerfield et al., *EBA Climate Change Primer: Cap and Trade*, 29 ENERGY L.J. 173, 174 (2008).

4. OFFICE OF MGMT. & BUDGET, *supra* note 1, at 13.

5. H.R. 2454, 111th Cong. (2009).

either a “cap-and-trade system” or a “carbon tax.”⁶ In a cap-and-trade system, a regulatory body sets a cap on the amount of allowable carbon emissions; rights to emit carbon under this cap are then allocated to the regulated entities.⁷ Ideally, some entities will need less than their allocable lot, and other entities will require more than what is distributed to them. This creates a market for emission rights where entities that need additional permits to pollute may purchase supplementary units from those who pollute less.⁸ Carbon taxes, in contrast, are much simpler: they tax pollutants based on their concentration of carbon.⁹

This Comment argues that a carbon tax is the preferred regulatory approach; however, its political unpopularity makes it an unlikely solution to reduce greenhouse gas emissions. A cap-and-trade system, the ugly step-sister to a carbon tax, is the most probable alternative. To be successful, it must be “dressed up” and include several key components, including (1) a firm cap, (2) a one-hundred percent auction of allowances, (3) “carbon offsets,” (4) a characterization of carbon in the same manner as a currency, and (5) enforceability.

This Comment focuses, in particular, on the difficult choices policymakers face in determining how to address global warming. Part II provides an overview of global warming. It explains the current scientific research on climate change and discusses the threats that global warming poses. Part III explains United States reluctance to admit that climate change is a problem and why it is in the United States’ interest to implement a system to reduce greenhouse gas emissions. Part IV discusses the two leading regulatory approaches to reduce carbon emissions—a carbon tax and cap-and-trade system—and argues that a cap-and-trade system is the most feasible solution. Part V introduces several key components that a cap-and-trade system must possess to be successful, and Part VI concludes this Comment.

6. Eric A. Posner & Cass R. Sunstein, *Climate Change Justice*, 96 GEO. L.J. 1565, 1574–75 (2008).

7. See Carol M. Rose, *From H₂O to CO₂: Lessons of Water Rights for Carbon Trading*, 50 ARIZ. L. REV. 91, 91–92 (2008); see also Leila Abboud, *Paying to Pollute: Everything You Wanted to Know About Cap and Trade . . . But Didn’t Even Know to Ask*, WALL ST. J., Sept. 15, 2008, at R12.

8. Abboud, *supra* note 7.

9. Michael J. Zimmer, *Carbon Tax: Ready for Prime Time?*, 8 SUSTAINABLE DEV. L. POL’Y 67, 67 (2008).

II. GLOBAL WARMING

Although still highly debated, for purposes of this Comment, I will assume that the anthropogenic global warming hypothesis is valid and that prompt action is needed to curtail human effects on the climate. In analyzing this issue for its validity, it is helpful to review the collaborative efforts of those who seek to draw consensus from the world's scientific community¹⁰—individual reports may provide some insight, but they are less reliable than collaborative efforts.¹¹ This Comment will focus on data and reports compiled by organizations—such as the United Nations Intergovernmental Panel on Climate Change (“IPCC”)—that are subject to extensive peer evaluation and scientific analysis.

The IPCC was promulgated to review and publish objective reports on climate change.¹² This organization does not perform any research or collect any data of its own; rather, it assesses on a “comprehensive, objective, and transparent basis the latest scientific, technical, and socio-economic literature produced worldwide relevant to the understanding of the risk of human-induced climate change, its observed and projected impacts and options for adaptation and mitigation.”¹³

The IPCC is a scientific intergovernmental body created by the World Meteorological Organization (“WMO”) and the United Nations Environment Programme (“UNEP”). It consists of, and is open to, all nations that are members of these two organizations, as well as hundreds of scientists from all over the world who are chosen

10. Gary Bryner, *Reducing Greenhouse Gases Through Carbon Market*, 85 DENV. U. L. REV. 961, 961 (2008).

11. *Id.* Some of the individual reports are unreliable because of their bias, exemplified by the reports spawned by corporate groups with ulterior motives. “Exxon Mobile, for example, has led a long-running campaign designed to mislead the public about the threats of climate change.” Jonathan Zasloff, *The Judicial Carbon Tax: Reconstructing Public Nuisance and Climate Change*, 55 UCLA L. REV. 1827, 1882 n.276 (2008). A memo outlying the company’s strategy illustrates this point. The memo stated that “[v]ictory will be achieved when uncertainties in climate science become part of the conventional wisdom.” *Id.* (quoting Environmental Defense, Too Slick: Stop Exxon Mobile’s Global Misinformation Campaign, http://action.environmentaldefense.org/EDF_Action_Network/alertdescription.html?alert_id=244798).

12. <http://www.ipcc.ch/organization.htm>

13. *Id.*

by their governments to provide pro bono work as authors, contributors, and reviewers.¹⁴

The IPCC has taken the position that it is “‘likely’ or ‘very likely’ that anthropogenic [human-caused] increases in greenhouse gases are causing climate change, and that climate change will have significant effects.”¹⁵ Experts believe that climate change is due in large part to the growth in carbon dioxide emissions—the predominant anthropogenic gas.¹⁶ Although the world has seen increases in the emissions of greenhouse gases since pre-industrial times, the most notable changes occurred over the past forty years. In 2004, for example, carbon dioxide emissions were eighty percent higher than in 1970. The most dramatic increase occurred during the last decade due in large part to increases in the consumption of fossil fuels.¹⁷ Furthermore, in 2005, the level of carbon dioxide in the atmosphere overwhelmingly surpassed levels that have existed for 650,000 years.¹⁸

The growth in anthropogenic gases has led to the warming of the earth’s climate system. Over the past fifty years—when the largest growth in levels of carbon dioxide occurred—the rate of temperature increases has nearly doubled from levels seen during the prior fifty year period.¹⁹ The last two decades have also seen some of the warmest recorded temperatures. For example, the average Northern Hemisphere temperatures from 1950–2000 were “*very likely* higher than during any other [fifty]-year period in the last 500 years and *likely* the highest in at least the past 1300 years.”²⁰

The IPCC believes that rising temperatures are the cause of the consistent increase in sea levels over the past fifty years, as well as decreases in arctic ice, mountain glaciers, and snow cover.²¹ Even

14. *Id.*; see Bryner, *supra* note 10.

15. Zasloff, *supra* note 11, at 1870.

16. See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007 SYNTHESIS REPORT 36 (2007) [hereinafter SYNTHESIS REPORT], available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf (“[Carbon dioxide] represented 77% of total anthropogenic [greenhouse gas emissions] in 2004.”).

17. *Id.* at 36–37.

18. *Id.* at 37.

19. *Id.* at 30.

20. *Id.* Although global temperatures have increased, the effect is not uniform; the greatest increases are found around the North Pole. *Id.* The Arctic’s temperature has increased nearly twice as much as the global average rate. *Id.*

21. *Id.*

though some regions have seen significant increases in precipitation since 1990, droughts are more prevalent and affect more regions than they did forty years ago.²² Some argue that the effects of climate change are minute and that it is only a future problem; its effects, however, are already visible. Changed temperatures, for example, are already causing severe weather patterns. The tropical cyclone Hurricane Katrina exemplifies the potential physical and economic consequences natural disasters pose. Increased temperatures are also impacting the earth's physical and biological systems:²³ it is predicted that "global warming will eliminate 15–37 percent of the species now on the planet."²⁴

The problem with climate change is that to combat its effects, significant change is required. Current regulations do little to slow the effects of climate change, and carbon emissions will likely continue to grow.²⁵ Moreover, the carbon dioxide that is already present in our atmosphere will continue to contribute to global warming for centuries to come because carbon cannot readily be removed from the atmosphere.²⁶ This indicates that temperatures may continue to increase despite valiant efforts to curb future emissions.

Because increases in the earth's temperature will likely occur, efforts to *stop* global warming are futile. But even though it is impossible to *stop*, the world can *slow* global warming to mitigate its effects. Scientists, in general, have concluded the increase in global temperature should be limited to two degrees Centigrade to mitigate the damage that global warming will cause.²⁷ To accomplish this, the

22. *Id.*

23. *Id.* at 31.

24. Pierce, *supra* note 2, at 598.

25. SYNTHESIS REPORT, *supra* note 16, at 44.

26. *See id.* at 47. For example, about one-half of the carbon dioxide released in the year 1907 is present in today's atmosphere. Posner & Sunstein, *supra* note 6, at 1579. Even if it were possible to eradicate our current carbon emissions, in 2107 ninety percent of these emissions would linger in the atmosphere. *Id.*

27. Bryner, *supra* note 10, at 965. Scientists fear that

if the average temperature increases by more than two degrees Centigrade . . . the planet would enter into uncharted waters, where the temperature would be hotter than it has been for hundreds of thousands of years and would create an environment much different than the one in which current life has evolved.

Id.

world's current emissions rates need to be reduced by sixty to eighty percent of 1990 levels by the year 2050.²⁸

III. THE FIRST STEP ON THE ROAD TO RECOVERY IS ADMITTING THAT YOU HAVE A PROBLEM

With many preeminent scientists in agreement that carbon emissions are causing our earth's temperature to rise and that this change will have significant impacts, it seems surprising that the United States has heretofore been reluctant to address this issue.²⁹ When one examines the situation, however, several factors become apparent that explain why, until recently, the United States has declined to admit that there is a problem: the United States is the world's largest contributor to greenhouse gas emissions, the United States may actually stand to benefit economically from global warming, and proposals to address climate change receive opposition from constituencies on both the right and the left of the political spectrum. Despite these hurdles, the United States should actively promote a policy to reduce its, and the world's, greenhouse gas emissions.

A. Contributors to Greenhouse Gas Emissions

Greenhouse gases, unlike some other pollutants, are especially challenging because they pose threats not only to the locale where they are emitted, but also to the rest of the world. For example, carbon dioxide—the major contributor to global warming³⁰—

28. *Id.*

29. The United States, for example, failed to join international collaborative efforts to curb greenhouse emissions when it refused to ratify the Kyoto Protocol—an international agreement which required its member states to reduce emissions to 5% below 1990 levels. Joshua P. Fershee, *Levels of Green: State and Regional Efforts, in Wyoming and Beyond, to Reduce Greenhouse Gas Emissions*, 7 WYO. L. REV. 269, 276 (2007); see also United Nations, *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, 1998, at 3 art. 3, available at <http://unfccc.int/resource/docs/convkp/kpeng/pdf>. The United States has also paid little attention to climate change domestically. Fershee, *supra*, at 270 n.5 (quoting Peter Baker & Steven Mufson, *Bush's Climate Remarks Weighted for Policy Shift*, WASH. POST, Jan. 27, 2007, at A1) (“[T]he 2007 State of the Union address was ‘the first time in Bush’s six years in office that he mentioned [climate change] in a State of the Union.’”).

30. Michael P. Vandenbergh & Brooke A. Ackerly, *Climate Change: The Equity Problem*, 26 VA. ENVTL. L.J. 55, 58 (2008); see also Federico Cheever, *Everyone Complains About the Weather, but No One Ever Does Anything About It: Interjurisdictional Failure to Designate Responsible Parties for the Climate Crisis*, 85 DENV. U. L. REV. 765, 777 (2008)

emitted in the United States would have just as great an impact on increases in global temperature as would the same proportion of carbon dioxide emitted in Thailand; regardless of locale, emissions are all trapped in the same atmospheric bubble.³¹ Thus, because of carbon emissions' worldwide effect, it is reasonable to assume that those nations who historically and currently emit the most carbon dioxide would oppose efforts to reduce emissions. The rationale for their opposition is twofold: (1) admitting that global warming is a problem may result in penalties for those countries who contributed the most to the current carbon emissions stockpile, and (2) it is reasonable to estimate that those nations who are the largest polluters will bear the heaviest cost to reduce their emissions.³²

Table 1 illustrates the largest emitters of carbon dioxide as of 2004.

TABLE 1. "SHARE OF GLOBAL EMISSIONS, 2003 AND 2004"³³

	2003	2004
United States	22.7%	22.0%
Europe ³⁴	16.9%	16.3%
China	15.3%	17.5%
India	4.1%	4.1%
Japan	4.9%	4.7%
Africa	3.5%	3.4%
Russia	4.2%	4.2%

The United States, which had "long led the world in greenhouse gas emissions,"³⁵ was the largest emitter in 2004, followed by China

("Carbon dioxide constituted 84.6 percent of greenhouse gases emitted in the United States.")

31. Rose, *supra* note 7, at 106.

32. Posner & Sunstein, *supra* note 6, at 1567, 1576–77.

33. *Id.* at 1577 (referring to DEP'T OF ENERGY, INT'L ENERGY OUTLOOK, DOE/EIA-0484, 81 tbl.A8 (2007), www.eia.doe.gov/oiaf/ieo/index.html).

34. Posner and Sunstein's measurements for Europe refer to only those European nations that are part of the Organization for Economic Cooperation and Development ("OECD"). *Id.* at 1577 n.67. The following European countries are members of OECD: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, and the United Kingdom. *Id.* (citing OECD, Members and Partners, http://www.oecd.org/pages/0,3147,en_36734052_36761800_1_1_1_1_1,00.html).

and Europe. China, in 2007, supplanted the United States as the world's leading emitter of greenhouse gases.³⁶ It is therefore unsurprising that both China and the United States have not accepted a proposal to limit their carbon emissions.³⁷ What may be surprising is that Europe, the third leading emitter of carbon dioxide, has accepted a proposal to limit its carbon output.³⁸ Perhaps Europe's acceptance of such a proposal can be explained by the fact that its carbon emissions were already decreasing before it signed the agreement. This is illustrated in Table 2.

TABLE 2. "RELATIVE CONTRIBUTIONS OF ANNUAL CARBON DIOXIDE EMISSIONS BY COUNTRY/REGION (APPROXIMATE PERCENTAGE OF WORLDWIDE EMISSIONS)"³⁹

	1990	2003	2004	2010	2015	2020	2025	2030
U.S.	23.5%	22.7%	22.0%	20.1%	19.4%	18.8%	18.7%	18.5%
Europe	19.3%	16.9%	16.3%	14.6%	13.4%	12.4%	11.6%	10.9%
China	10.5%	15.3%	17.5%	21.1%	22.4%	23.9%	25.0%	26.2%
India	2.7%	4.1%	4.1%	4.2%	4.4%	4.7%	4.9%	5.0%
Japan	4.8%	4.9%	4.7%	4.1%	3.8%	3.5%	3.3%	3.0%
Africa	3.1%	3.5%	3.4%	3.7%	3.8%	3.9%	3.9%	3.9%

The United States and China are both projected to maintain their position as the world's leading emitters; however, China's proportion of global emissions is expected to be substantially greater than the United States' by 2030.⁴⁰ This is due in large part to the explosive growth in China's emissions over the past two decades compared to the rest of the world.⁴¹

35. *Id.* at 1567.

36. *Id.* at 1579.

37. *Id.* at 1567.

38. The European Union's carbon marketplace opened in 2005. EUROPA, EMISSION TRADING SYSTEM (2009), http://ec.europa.eu/environment/climat/emission/index_en.htm.

39. Posner & Sunstein, *supra* note 6, at 1578.

40. *Id.*

41. *See id.* at 1578-79.

TABLE 3. "CARBON DIOXIDE EMISSIONS CHANGES, 1990–2004"⁴²

	1990–2004
China	108.3%
United States	19.8%
India	87.5%
Russia	-24.8%

Thus, if the United States and China emit as projected, they will continue to potentially place their own populations, as well as other nations, at risk to the negative impacts of climate change.⁴³

B. Disparate Impact of Global Warming

The United States' hesitance to address climate change can further be explained by the fact that scientists predict that the American economy will remain relatively unaffected by increases in the earth's temperature.⁴⁴ Estimates prepared by two Yale economists indicate that global warming will not uniformly affect the world's nations, at least in terms of Gross Domestic Product.⁴⁵ Nordhaus predicts that "annual global output" will likely be reduced by 3%—which would have enormous consequences—while Mendelsohn predicts the United States' annual output would only be reduced by a negligible .03%.⁴⁶ The lesson to be drawn from this analysis is that while the cause of climate change is not proportionally distributed, neither are its consequences.⁴⁷

The United States, which has contributed the most to the existing stockpile of carbon in our atmosphere, would remain relatively unaffected economically by climate change and may in fact experience small gains.⁴⁸ China, the current leader in emissions, and Russia would also stand to profit from climate change. Both of these

42. *Id.* at 1578.

43. *See id.* at 1567.

44. *Id.* at 1581–82.

45. Pierce, *supra* note 2, at 597.

46. *Id.*

47. *See* Cheever, *supra* note 30, at 771 ("[A]lthough wealthy countries are responsible for most of the accumulated greenhouse gases in the atmosphere, they will . . . face less damage than poor countries." (quoting Sujatha Byravan & Sudhir Chella Rahan, *Immigration Could Ease Climate-Change Impact*, 434 NATURE 435, Mar. 24, 2005)).

48. Pierce, *supra* note 2, at 598.

nations are expected to benefit from increased agricultural production due to warmer temperatures.⁴⁹ Nevertheless, despite overall gains, some regions within these nations would be detrimentally affected. States in the American southwest, such as Oklahoma, would likely not benefit from increased temperatures and may, in fact, be adversely affected due to drought.⁵⁰

In addition to the United States and China, the world's most affluent nations are the most protected from the effects of climate change.⁵¹ Three reasons have been posited why these nations will fare better. First, they are more capable of adapting.⁵² These nations have the resources to implement new technology to cope with global warming. Second, the strength of their economies is not reliant on agricultural output.⁵³ This should be contrasted with the agricultural economies of India and Africa. These nations are generally regarded to be the biggest losers in regards to climate change and are expected to suffer significant losses in agriculture and health.⁵⁴ India's agricultural economy, in particular, would suffer significant losses from climatic changes to the monsoon, on which it relies for agricultural production.⁵⁵ Third, the wealthiest nations are less vulnerable to temperature increases because they are located in "cooler, higher latitudes."⁵⁶ Thus, some increases in temperature are likely to substantially benefit nations with traditionally cooler temperatures, such as Russia and Canada. A rise in temperatures would not only increase Russia's agricultural production, but it would also significantly reduce heating costs.⁵⁷

C. Global Warming: A Catch-22

If the wealthiest nations fail to address climate change, the poorest nations, which contribute the least to the supposed causes of

49. See Posner & Sunstein, *supra* note 6, at 1581–82.

50. See Pierce, *supra* note 2, at 598; Cheever, *supra* note 30, at 771.

51. Posner & Sunstein, *supra* note 6, at 1580; see also Cheever, *supra* note 30, at 771.

52. Posner & Sunstein, *supra* note 6, at 1580.

53. *Id.*

54. See Pierce, *supra* note 2, at 597–98; see also Posner & Sunstein, *supra* note 6, at 1580–81.

55. Pierce, *supra* note 2, at 597–98.

56. Posner & Sunstein, *supra* note 6, at 1580.

57. See Pierce, *supra* note 2, at 598.

global warming, would be most affected.⁵⁸ But if the United States takes steps to reduce its carbon output through the imposition of environmental regulations, the resulting increase in prices would be passed on to consumers.⁵⁹ Some observers have claimed that any efforts to reduce emissions in the United States, as well as the world, are elitist and push down poor people.⁶⁰ Because of the possible disparate impact on poor people, opponents of legislation to stop climate change can appeal to both conservatives and liberals.⁶¹ Accordingly, global warming is in essence a Catch-22, where we are essentially “damned if we do” and “damned if we don’t” take steps to successfully reduce carbon output.

D. The United States Needs to Act

Although, as previously stated, there are several reasons why the United States would not want to take regulatory measures to reduce its carbon emissions, it should implement a reduction policy and choose a method that could be implemented by the rest of the world. Such a plan could benefit the United States in helping the country (1) mitigate the negative environmental impacts of climate change, (2) maintain its leading economic and political position in the world, and (3) uphold its standing as a world leader.

Even assuming that the United States will not be as adversely affected economically as other nations by climate change, global warming still poses significant environmental risks. For example, global warming has been linked to natural disasters. Hurricane Katrina demonstrated the United States’ vulnerability to tropical cyclones and the heavy human and economic costs associated with these storms.⁶² The United States has significant coastlines and valuable property that will be affected by tropical storms and rising ocean levels.⁶³ Prolonged and more severe droughts in the American southwest also pose significant threats to the U.S. water supply.⁶⁴

58. See Posner & Sunstein, *supra* note 6, at 1580–82.

59. See Vandenberg & Ackerly, *supra* note 30, at 55.

60. See Robert Hardaway, *Carbon Markets in Context: Into Which Component of Holdren’s Equation Do They Fit?*, 85 DENV. U. L. REV. 983, 986–87 (2008).

61. See Vandenberg & Ackerly, *supra* note 30, at 60–62.

62. See Louise K. Comfort, *Cities at Risk: Hurricane Katrina and the Drowning of New Orleans*, 41 URB. AFF. R. 501, 507 (2006).

63. See Zasloff, *supra* note 11, at 1841.

64. *Id.*

In addition to environmental concerns, the United States would benefit economically from carbon regulation. As of 2008, the international market for the right to emit carbon was valued at \$64 billion, an astounding number when compared to its relatively humble beginnings—\$200 million—in 2003.⁶⁵ The growth of the international market for carbon is largely due to the development of the European Union's Trading System, which accounts for sixty-five percent of the market.⁶⁶ Currently the United States, the leading contributor to the existing stockpile of greenhouse gases, is only a nominal player in the global carbon market.⁶⁷ This is largely due to the fact that the U.S. market is primarily driven by voluntary participation, as opposed to Europe's mandatory participation as a signatory of the Kyoto Protocol.⁶⁸ "Now, with everyone from PepsiCo to Google to Pearl Jam striving to offset their carbon footprints, placing a value on carbon reduction has become commonplace."⁶⁹ The United States needs to take advantage of this growing market and design its own mandatory participation system.

In order to maintain its political clout throughout the next century, the United States needs to reduce its emissions and encourage the world to do so as well. Though observers project that the U.S. economy will fare better than most nations, these same observers expect China and Russia—two of its major political and economic rivals—to fare even better.⁷⁰ The United States needs to do what is within its power to proactively address this concern. Regulating carbon emissions and creating a system that would encourage world participation is one effective method of achieving this goal. Not only would the United States maintain its political position by spearheading this program, but it would also mitigate the substantial economic benefits that China and Russia would derive from climate change. The United States needs to lead the world in reducing carbon emissions because it is unlikely that either China or other developing nations—whose per capita rate of emissions are

65. Ann Grodnik & Radha Kuppalli, *Investors Willing to Bet U.S. Carbon Market Has Legs*, THE BOND BUYER, Nov. 17, 2008, at 29.

66. *Id.*

67. *Id.* ("The 2007 value of the U.S. carbon market was \$331 million, or 0.5% of the global market.")

68. *See id.*

69. *Id.*

70. *See supra* Part III.B.

much lower than the United States⁷—would participate unless it leads the way.⁷¹

IV. PROPOSED SOLUTIONS: CARBON TAX VERSUS CAP-AND-TRADE

There is a growing adherence to the prediction that if the world chooses to lower greenhouse gases it would do so through either a tax on the carbon content of fuels or a carbon cap-and-trade system.⁷² The majority of economists argue that a “price-based regulatory system”—such as a carbon tax—is preferable to a quantity-based scheme like cap-and-trade;⁷³ however, it is unlikely that the world, and the United States especially, would choose a tax over other regulatory approaches.⁷⁴

A. Carbon Tax

A carbon tax is a tax on fuels that emit high levels of carbon dioxide.⁷⁵ Despite widespread support from economists,⁷⁶ few politicians favor this approach.⁷⁷ This is surprising because—when compared to other regulatory proposals—a carbon tax offers numerous advantages: it forces fuels to reflect their negative impact on the environment,⁷⁸ it encourages technological innovation,⁷⁹ its revenue can be used to reduce other taxes,⁸⁰ and it is easy to administer.⁸¹ That said, the lack of political support for carbon taxes makes them an unlikely solution to global warming.

The most common rationale for imposing carbon taxes on fossil fuels is that their current price does not accurately reflect the costs

71. See Posner & Sunstein, *supra* note 6, at 1576 n.61.

72. *Id.* at 1574.

73. See Zasloff, *supra* note 11, at 1842.

74. See Cheever, *supra* note 30, at 768 (noting that cap-and-trade is the most discussed and probable legislative solution to greenhouse gas emissions).

75. Zimmer, *supra* note 9, at 67.

76. See Zasloff, *supra* note 11, at 1842.

77. See Cheever, *supra* note 30, at 779–80 (citing Victor B. Flatt, *Taking the Legislative Temperature: Which Federal Climate Change Legislative Proposal Is “Best”?*, 102 NW. U. L. REV. 123, 123, 135 (2007), available at <http://colloquy.law.northwestern.edu/main/2007/12/taking-the-legi.html>).

78. See Zimmer, *supra* note 9, at 67 (noting that a carbon tax is a tax on the carbon emissions produced by burning a fossil fuel).

79. Bryner, *supra* note 10, at 968; see Hardaway, *supra* note 60, at 991.

80. Pierce, *supra* note 2, at 601.

81. *Id.* at 600–01.

and damages (“externalities”) associated with their consumption.⁸² Proponents of these taxes would argue, for example, that the cost of gas does not adequately account for the harm associated with the carbon dioxide emissions that are released when it is burned or reflect the effect this pollution has on physical health.⁸³ The levy of a carbon tax would force such fuels to accurately represent these costs, and consumers, in turn, would demand cleaner products to replace the high-cost carbon-rich fuels.⁸⁴ This corollary to a carbon tax—the effect on consumers—is imperative to the success of any regulatory plan because individual behavior accounts for a significant portion of U.S. carbon emissions.⁸⁵

If the carbon tax were set at the right level, it would also provide businesses with incentives to innovate.⁸⁶ Regulatory proposals that set emissions standards on vehicles provide little incentive to design a vehicle that performs substantially below the proscribed emissions rate.⁸⁷ Companies faced with carbon taxes, by contrast, would continually seek to develop more efficient products to decrease their tax burden and, in turn, increase profits.⁸⁸

Another significant benefit derived from carbon taxes is the new tax revenue it would generate; this could be used for several different purposes, including paying down the federal deficit.⁸⁹ Liberals and conservatives alike are concerned with the United States’ increasing deficit. Several agencies within the federal government have also acknowledged this serious problem.⁹⁰ A carbon tax can be specifically crafted to address this concern, and it is arguably a superior alternative to the political firestorm that would result from an

82. Zimmer, *supra* note 9, at 67.

83. *See id.*

84. *Id.*

85. *See* Vandenberg & Ackerly, *supra* note 30, at 59–60 (estimating that 4.1 trillion pounds, or roughly thirty-two percent, of carbon dioxide in the United States in the year 2000 was attributable to individual behavior).

86. *See* Bryner, *supra* note 10, at 968.

87. *Id.* (noting that taxes, as opposed to emissions standards, provide a continuous incentive to innovate).

88. *See* Zimmer, *supra* note 9, at 67.

89. *See* Westerfield, *supra* note 3, at 181 (noting that carbon tax revenues could be used to reduce other pre-existing taxes).

90. Pierce, *supra* note 2, at 601 (“The Federal Reserve Board has identified . . . [the U.S.] budget deficit as . . . [the nation’s] most serious long-term economic problem.” (citing Associated Press, *Bernanke Warns of ‘Vicious Cycle’ in Deficits*, MSNBC.COM, Jan. 18, 2007, <http://www.msnbc.msn.com/id/16688089/>)).

increase in income taxes and reduced spending by the federal government to decrease the deficit.⁹¹

Imposition of a carbon tax could also be used to offset or lower current federal taxes to minimize any possible negative economic consequences.⁹² Because of its relative simplicity, the tax could be evaluated periodically and adjusted to compensate businesses and social groups who are unduly injured by the tax.⁹³

A carbon tax is also one of the most effective regulatory approaches in providing stability and price predictability to the market.⁹⁴ The tax would set the price of carbon, which would allow manufacturers and consumers to make energy-informed decisions about their future consumption in advance.⁹⁵ This predictability provides stability to the market. A lack of stability is one of the serious grievances cited by businesses in the United Kingdom, which are regulated by a cap-and-trade system.⁹⁶ Nearly two-thirds of all companies in the United Kingdom are dissatisfied with the unpredictable cap-and-trade market and would prefer a carbon tax.⁹⁷ Perhaps the overwhelming factor for this preference is their inability to make future financial plans on their business's future energy costs.⁹⁸

Carbon taxes also better address timeliness and corruption concerns than would a cap-and-trade approach. The timeliness of a carbon tax is attractive because, if approved by Congress and the President, it could go into effect immediately.⁹⁹ Additionally, the tax would likely be less susceptible to bureaucratic manipulation; it is not

91. *See id.* at 600–01.

92. Zimmer, *supra* note 9, at 69; *see* Westerfield, *supra* note 3, at 181; *see also* Fershee, *supra* note 29, at 290 (commenting that Al Gore, an advocate of carbon taxes, “suggested using a carbon tax in place of some payroll taxes”).

93. *See* Zimmer, *supra* note 9, at 69.

94. *Id.* at 68.

95. *Id.*

96. *See id.* (“Over fifty percent of U.K. companies today are struggling with long-term strategic and business . . . decisions in the face of the current unstable policy and tax environment.”).

97. *Id.* (“[S]ixty-six percent of U.K. companies welcome the use of the tax system to provide incentives for them to become carbon neutral.”).

98. *Id.* at 67–68. Market instability from cap-and-trade is not unique to the United Kingdom. In the United States, for example, “tradable permits [for sulfur dioxide] have varied in price by over forty percent.” *Id.*

99. *Id.* at 68.

allocated and it would apply to everyone.¹⁰⁰ This removes the possibility of companies and individuals illegally paying for the right to receive extra allocations.

Another benefit of the carbon tax is that it avoids some of the administrative difficulties that would likely be posed by the implementation of a cap-and-trade system.¹⁰¹ The tax is relatively simple to administer. “The carbon content of every form of fossil fuel is precisely known, as is the amount of [carbon dioxide] released when that fuel is burned.”¹⁰² And most businesses monitor their consumption of fuel.¹⁰³ These factors would make the tax relatively simple to fit into our current tax system.¹⁰⁴ Although a carbon tax may require a substantial reconstruction of the environmental and energy sections in the tax code,¹⁰⁵ it is less abstract and more straightforward than cap-and-trade.¹⁰⁶

Unfortunately, its relative simplicity also makes it unpalatable. Because the carbon tax would be relatively clear and easy to understand, the public could readily see how such a tax would affect them.¹⁰⁷ Any opposition would make it difficult to impose such a tax. One illustration of this difficulty is President Clinton’s failed attempt to introduce a carbon tax. His proposal to introduce a relatively small tax on hydrocarbons was immediately rejected.¹⁰⁸ Thus, the transparency of the carbon tax makes it unlikely to gain support of politicians, especially when today’s carbon tax would likely have to be much larger than the small hydrocarbon tax proposed by President Clinton.¹⁰⁹ Politicians’ fear of proposing a carbon tax is

100. Zasloff, *supra* note 11, at 1842.

101. See Pierce, *supra* note 2, at 600–01 (noting the difficulty in global coordination of appropriate cap-and-trade baselines, price volatility, increased transactions costs, and potential corruption as consequences of a global cap-and-trade program).

102. Zimmer, *supra* note 9, at 68 (citing Carbon Tax Center, Introduction, <http://www.carbontax.org/introduction/> (last visited Oct. 27, 2009)).

103. *Id.*

104. *Id.* at 67.

105. *Id.* at 70.

106. Bryner, *supra* note 10, at 968.

107. Zimmer, *supra* note 9, at 69.

108. Pierce, *supra* note 2, at 601 (“When President Clinton attempted to persuade Congress to enact a [carbon tax] . . . his proposal was pronounced dead on arrival in the Senate.” (citing Steven Greenhouse, *Moyinhan Predicts a Deal on Bigger Energy Tax*, N.Y. TIMES, July 12, 1993, at A18)).

109. *Id.* at 601–02 (noting that an effective carbon tax would have to be twenty times larger than President Clinton’s proposed tax).

further illustrated by the fact that there are relatively few carbon tax proposals,¹¹⁰ and most notably, the U.S. House of Representatives recently opted to pass a bill that provides for carbon cap-and-trade.¹¹¹

B. Cap-and-Trade

Cap-and-trade is touted as the market-based solution to limit carbon emissions,¹¹² and likely will be the approach that the United States adopts to combat climate change. Many American officials prefer this market-based method,¹¹³ and President Obama has advocated a cap-and-trade system and outlined a rudimentary plan to reduce carbon emissions through cap-and-trade in his 2009 Budget.¹¹⁴

Cap-and-trade limits pollution to a specific level (the “cap”) and distributes the right to pollute to those regulated under the cap.¹¹⁵ These rights may be traded; thus, the system’s goals are met through limiting pollution to one’s allocable share or by purchasing rights¹¹⁶ to exceed the allowance from those who are below their individual cap.¹¹⁷ It is important to note that although allocations may be traded, the cap remains fixed.¹¹⁸ The effect of a cap-and-trade is that it incentivizes participants to decrease their emissions so that they may realize the gains that may be achieved in selling rights to pollute.¹¹⁹ It is important that the cap is set sufficiently low so that

110. See Cheever, *supra* note 30, at 779–80 (citing Victor B. Flatt, *Taking the Legislative Temperature: Which Federal Climate Change Legislative Proposal Is “Best?”*, 102 NW. U. L. REV. 123, 123, 135 (2007), available at <http://colloquy.law.northwestern.edu/main/2007/12/taking-the-legi.html>).

111. See H.R. 2454, 111th Cong. §§ 701–05 (2009).

112. Tseming Yang, *The Problem of Maintaining Emission “Caps” in Carbon Trading Programs Without Federal Government Involvement: A Brief Examination of the Chicago Climate Exchange and the Northeast Regional Greenhouse Gas Initiative*, 17 FORDHAM ENVTL. L. REV. 271, 272 (2006).

113. Rose, *supra* note 7, at 92–93.

114. See OFFICE OF MGMT. & BUDGET, *supra* note 1, at 21, 100.

115. See Rose, *supra* note 7, at 91–92; see also Yang, *supra* note 112, at 272–73.

116. It is important to note that what is allocated under a carbon cap-and-trade is not physical, but rather, it is the right to emit greenhouse gases. See Jillian Button, Note, *Carbon: Commodity or Currency? The Case for an International Carbon Market Based on the Currency Model*, 32 HARV. ENVTL. L. REV. 571, 571 (2008).

117. Hardaway, *supra* note 60, at 990–91; see also Yang, *supra* note 112, at 273.

118. Rose, *supra* note 7, at 92.

119. Yang, *supra* note 112, at 273.

those regulated will need to trade in order to comply with the regulations.

Cap-and-trade schemes are most successful when used to reduce prevalent, continuous problems rather than specific instances of pollution.¹²⁰ A cap on carbon would address this concern because scientists believe it is the primary pollutant causing global warming. Further, cap-and-trade is most effective when the price of reducing emissions is not uniform across sources and there is a regulated market where those who can reduce their emissions at a cheaper cost can sell their extra allowances on the market.¹²¹

Although this method is just one of the available approaches to reduce emissions,¹²² it is the method that Congress will most likely support.¹²³ A plethora of both voluntary¹²⁴ and mandatory¹²⁵ cap-and-trade systems in both the domestic¹²⁶ and international¹²⁷ markets currently exist; however, the two most well-known programs are the U.S. Acid Rain Market and the European Emissions Trading System.¹²⁸

The U.S. Acid Rain Market, on which the Kyoto Protocol and many subsequent cap-and-trade models are based, is the best example of a successful cap-and-trade program.¹²⁹ This “poster child” of cap-and-trade came to form in the 1990 Clean Air Act Amendments.¹³⁰ This Act set a cap on the emissions from coal-fired power plants that were causing acid rain.¹³¹ These plants were deemed to be responsible for ninety-five percent of the sulfur dioxide

120. Westerfield, *supra* note 3, at 176.

121. *Id.*

122. *Id.*

123. Vandenberg & Ackerly, *supra* note 30, at 73.

124. Examples of voluntary programs are the Kyoto Protocol Clean Development Mechanism and the Chicago Climate Exchange Program. Hardaway, *supra* note 60, at 991.

125. Examples of pending mandatory programs are the Regional Greenhouse Gas Initiative, California Global Warming Solutions Act, and the Climate Stewardship Act. *Id.*

126. Examples of domestic markets are the Regional Greenhouse Gas Initiative and Western Climate Initiative, which also includes Canada. *See* Button, *supra* note 116, at 571.

127. Some examples of markets outside of the United States are the European Union’s Emissions Trading System, United Kingdom’s Emissions Trading System, and New Zealand’s Emissions Trading Scheme. *Id.* at 571.

128. Hardaway, *supra* note 60, at 990.

129. Westerfield, *supra* note 3, at 177.

130. Rose, *supra* note 7, at 92.

131. Bryner, *supra* note 10, at 970.

in the northeast.¹³² In 1990 there were high levels of wet-sulfate deposition—“the predominant component of acid rain”—in the northeastern United States.¹³³ Relatively quickly, this program produced sizeable reductions in the levels of wet-sulfate deposition in this region.¹³⁴

The program established a cap on the sulfur-dioxide that coal-fired power plants could emit. This cap has been lowered over time to ensure that the environmental goals for reduction will be met.¹³⁵ The “[c]ap on [the] total emissions projected, by the year 2010, . . . [was set to decrease] sulfur dioxide emissions [by roughly] ten million tons from the 1980 levels.”¹³⁶ In addition to providing clear guidelines on when the cap would be lowered, the program also specified from the onset how rights to emit would be allocated.¹³⁷

Although acid rain is still a problem—wet-sulfate deposition was reduced, not eliminated¹³⁸—the U.S. Acid Rain Program is considered a success. Aside from the fact that the program reduced acid rain, the program has also been considered a success because it attained these results at a much lower cost than expected.¹³⁹ Prognosticators originally believed the program would cost \$7 to \$8 billion per year; surprisingly, the program only cost \$2 billion per year.¹⁴⁰ This is an astounding result because this cost is roughly fifty percent cheaper than the cost of a command-and-control approach, which would have created a uniform emissions standard and would not have permitted trading.¹⁴¹

The success of the U.S. Acid Rain Program catapulted cap-and-trade to the forefront of the discussion on climate change regulatory methods. Although it should be noted that not all existing cap-and-trade programs have successfully reduced emissions,¹⁴² the cap-and-trade on sulfur dioxide “dramatically reduced acid rain at much

132. Westerfield, *supra* note 3, at 176.

133. *Id.*

134. *Id.* at 177.

135. *Id.* at 176.

136. Bryner, *supra* note 10, at 970.

137. Westerfield, *supra* note 3, at 176.

138. See Bryner, *supra* note 10, at 971.

139. Westerfield, *supra* note 3, at 177.

140. *Id.*

141. Button, *supra* note 116, at 580.

142. For example, the European cap-and-trade is regarded as having failed to reduce carbon emissions. See Zasloff, *supra* note 11, at 1842; see also Zimmer, *supra* note 9, at 68.

lower costs than the traditional government regulations and mandates of the past.”¹⁴³ This program’s success has led to speculation that a global carbon market could significantly lower the cost of greenhouse gas emissions reductions.¹⁴⁴

Part of the reason politicians support cap-and-trade, as opposed to a carbon tax, is that the global carbon credit market has experienced tremendous growth.¹⁴⁵ In the two years after the Kyoto Protocol went into effect (2005 to 2006) the global marketplace for carbon credits—the tradable unit of carbon under a cap-and-trade system—reached an annual value of over \$30 billion.¹⁴⁶ Experts expect that this market will continue to grow: its estimated value by the year 2020 is predicted to be \$144 billion U.S. dollars, which “represents approximately one-fifth of the current total value of global trade in fuels.”¹⁴⁷

The existence of an international market for carbon is one of the major selling points for cap-and-trade. To successfully limit carbon emissions, any effort must be on a global scale and involve the United States, the European nations, India, China, and other major countries.¹⁴⁸ If the United States unilaterally committed to an effort to reduce carbon emissions, its efforts would be negligible on global warming by the year 2100.¹⁴⁹ Thus, a U.S. cap-and-trade system is popular because there is the possibility that it can function on an international level.¹⁵⁰

143. OFFICE OF MGMT. & BUDGET, *supra* note 1, at 21, 100; *see* Button, *supra* note 116, at 580 (commenting that the success of the Acid Rain Program showed that it may be possible to reduce carbon emissions “up to fifty percent more cheaply than under a command-and-control approach”); *see also* Bryner, *supra* note 10, at 969.

144. Button, *supra* note 116, at 580.

145. Christopher Carr & Flavia Rosebuj, *Flexible Mechanisms for Climate Change Compliance: Emission Offset Purchases Under the Clean Development Mechanism*, 16 N.Y.U. ENVTL. L.J. 44, 51 (2008).

146. *Id.* at 44, 51.

147. Button, *supra* note 116, at 591.

148. Pierce, *supra* note 2, at 600.

149. *See* Posner & Sunstein, *supra* note 6, at 1576 (explaining that because the Kyoto Protocol did not place any restrictions on developing nations, “[f]ull compliance with the Kyoto Protocol would have reduced global warming by merely 0.03°C by 2100”).

150. *See* Bryner, *supra* note 10, at 969; Button, *supra* note 116, at 571–72 (stating that the International Carbon Action Partnership (ICAP), a forum for existing and new governments looking to establish cap-and-trade programs, was established on October 29, 2007, and that the European Union is encouraging governments outside of the EU to link to their market).

Cap-and-trade will also provide incentives for companies to innovate and develop new technology to reduce carbon emissions.¹⁵¹ Additionally, the emission allowances may be sold in an auction, the proceeds, of which, can fund alternative energy projects.¹⁵² The use of these proceeds for clean energy, combined with the possibility that the carbon market could produce up to \$100 billion annually for investment in poor nations,¹⁵³ could serve the ultimate goal of reducing emissions.

A notable characteristic of a cap-and-trade system is that the “future emission targets for reductions are fixed and known.”¹⁵⁴ This emphasizes emission reduction rather than economic stabilization.¹⁵⁵ Thus, “[i]f accurately set, the cap ensures environmental protection goals are achieved”¹⁵⁶

The most important attribute of cap-and-trade, however, is that it is politically feasible. Unlike carbon taxes, a cap-and-trade program would not be plagued with the heightened opposition that proposals for higher taxes receive.¹⁵⁷ Even though cap-and-trade creates a cost penalty charge much like a carbon tax, policymakers prefer it because it avoids the “T” word.¹⁵⁸ Furthermore, the industrial constituencies of elected officials often prefer the idea of a cap-and-trade system because there is the possibility that this system will allocate free allowances.¹⁵⁹

Cap-and-trade is also advantageous because it shifts the discussion from who is actually responsible for climate change to what we should do about it.¹⁶⁰ Any discussion about who is responsible would ultimately be detrimental to the United States, the largest contributor to the atmospheric greenhouse gas stockpile. The ability of cap-and-trade to shift the discussion on responsibility illustrates that the details involved in a cap-and-trade regulatory plan could get muddled, obscuring what is really going on. This can lead

151. See Hardaway, *supra* note 60, at 991.

152. Bryner, *supra* note 10, at 969.

153. Carr & Rosembuj, *supra* note 145, at 51.

154. Zimmer, *supra* note 9, at 69.

155. See Bryner, *supra* note 10, at 969–70.

156. *Id.* at 969.

157. See *id.*

158. Pierce, *supra* note 2, at 601.

159. See Bryner, *supra* note 10, at 970.

160. See Cheever, *supra* note 30, at 768.

to corruption and manipulation,¹⁶¹ especially when oversight will be subject to reliance on fiduciary duties that have been compromised in the past and are not currently established on a global level. There is ample opportunity for self-interested parties to design the system in a manner that hinders competition or increases their standing within their respective industries.¹⁶² Additionally, in a market system the reason for price increases can be obscured.¹⁶³

Even though cap-and-trade has many positive attributes, it is subject to several criticisms. A cap-and-trade system, for example, is subject to market fluctuations. The possibility of an unpredictable carbon market, which leads to uncertain carbon permit pricing, could make compliance costs difficult to project.¹⁶⁴

The most difficult and problematic aspect of a cap-and-trade system, however, is its administration. For the carbon market, essentially a whole new market system must be created.¹⁶⁵ Cap-and-trade approaches are particularly troublesome because there are multiple questions to address: the ideal “cap, timing, allowance allocations, pre-emption, certification procedures, standards for use of offsets, [and] penalties”¹⁶⁶ These difficulties are further compounded by the concern that cap-and-trade should be modeled after the Acid Rain Program—a program that operates on a notably smaller scale than what is envisioned for a carbon cap-and-trade system.¹⁶⁷

C. Choosing Cap-and-Trade

Even though a carbon tax provides a quick, relatively simple alternative to reduce carbon emissions, it is not the most feasible alternative. Its main flaw is that it has relatively little political support and that much of the world’s attention has focused on a cap-and-trade solution.

161. See Pierce, *supra* note 2, at 601.

162. See Zimmer, *supra* note 9, at 69.

163. *Id.* at 69.

164. See Bryner, *supra* note 10, at 969; see also Hardaway, *supra* note 60, at 991; Pierce, *supra* note 2, at 600–01.

165. See Zimmer, *supra* note 9, at 68.

166. *Id.*; see also Bryner, *supra* note 10, at 969 (commenting on the difficulty that arises when too many allocations are made and the uncertainty within which these decisions are made); Pierce, *supra* note 2, at 600 (commenting on the difficulty of setting emissions baselines).

167. Zimmer, *supra* note 9, at 68.

Cap-and-trade provides a viable alternative to reducing carbon emissions because it can be implemented on a global scale and is promoted widely by elected officials. Because this system will likely be the model on which the United States and the world seek to combat climate change, we must pay particular attention to its construction to ensure its success.

V. DESIGNING AN EFFECTIVE CAP-AND-TRADE

The details of President Obama's plan to institute a carbon cap-and-trade system are vague, but it is clear that the administration intends to develop an economy-wide emissions reduction program that would reduce greenhouse gas emissions. Although there are currently several carbon cap-and-trade systems in existence, none of these have been heralded as a success, and the European system, in particular, is largely regarded as a failure. Based on their relative lack of success, it is best to examine the model upon which these systems are based, the U.S. Acid Rain Program, rather than on its progeny. The U.S. Acid Rain Program, however, was relatively simple compared to what will need to be designed for a carbon market, so it can only serve as a reference point and not the model for a carbon emissions trading system. Thus, the following are suggestions of what a carbon market must include in order to meet its defined environmental goals and alleviate some of the possible collateral problems relating to its imposition.

Perhaps the most significant aspect that must be kept in mind when creating a cap-and-trade system is that it must link to other international systems or be the model for an international cap-and-trade program. This is important because if only the United States binds itself to significant cutbacks, the effect on global warming by the year 2100 would be minimal.¹⁶⁸ It is likely that any effort to reduce emissions must not only incorporate the Europeans, but it must also incorporate China and India to be successful.¹⁶⁹ Although the United States was able to act unilaterally in the fight against acid rain, the challenges posed by carbon emissions require international collaboration.¹⁷⁰

168. Posner & Sunstein, *supra* note 6, at 1576.

169. See Zasloff, *supra* note 11, at 1830; see also Rose, *supra* note 7, at 99.

170. Posner & Sunstein, *supra* note 6, at 1576.

A. The "Cap"

In President Obama's 2009 budget he notes that his administration will work to create an "economy-wide emissions reduction program to reduce greenhouse gas emissions approximately 14 percent below 2005 levels by 2020, and approximately 83 percent below 2005 levels by 2050" through a cap-and-trade system.¹⁷¹ This brief outline is vague and begs several questions: First, what does economy-wide mean and which emissions will be capped? Second, does a reduction of greenhouse gases mean that all greenhouse gases will be capped, or only carbon, the leading greenhouse gas? And third, are these reductions enough to reduce or slow global warming?

To determine which emissions should be capped, it is first important to determine the origin of the nation's carbon emissions. The bulk of carbon dioxide emissions, the leading greenhouse gas in the United States, come from the generation of energy, transportation, and industrial sources.¹⁷² The remaining carbon emissions come from "agricultural, commercial, and household sources."¹⁷³ Although the majority of current regulatory proposals target industrial emitters,¹⁷⁴ these regulations may ignore the fact that individual behavior, including transportation and household emissions, is responsible for roughly one-third of U.S. carbon emissions.¹⁷⁵ Thus, the majority of proposals seek to influence individual behavior only indirectly through increased product and energy prices. There are relatively few proposals that seek to address individual behavior directly; however, the United Kingdom's environment secretary has proposed implementing a "personal carbon trading" system where citizens in the United Kingdom would

171. OFFICE OF MGMT. & BUDGET, *supra* note 1, at 100.

172. Bryner, *supra* note 10, at 966 (commenting that one-third of all emissions come from the generation of electricity, 28% from transportation, and 19% from industrial sources); Cheever, *supra* note 30, at 777 ("Transportation and electrical generation are by far the two largest sectors, with industry coming in a distant third."). Some observers suggest that the electricity sector is responsible for as much as 40% of the carbon dioxide emissions in the United States. Westerfield, *supra* note 3, at 180.

173. Bryner, *supra* note 10, at 966.

174. Vandenbergh & Ackerly, *supra* note 30, at 58.

175. *Id.* at 59-60.

be forced “to pay for their energy-intensive activities by spending allocated carbon credits.”¹⁷⁶

Although current regulations tend to focus entirely on industrial sources of carbon, a worldwide emissions cap-and-trade program would likely require a new approach. Perhaps a program that would address climate change indirectly would be more successful than a program that seeks to directly regulate individual behavior. This program would, at least initially, place a cap on the emissions of large industrial and energy producers. The program, however, would also seek alternative measures to reduce transportation emissions, such as emissions requirements on auto producers.

By using an alternative program to address climate change, the decreasing cap proposed by President Obama could mitigate climate change—if the United States can convince China to make similar concessions. The eighty-three percent reduction of 2005 levels by the year 2050 should sufficiently limit global warming to the two degrees Centigrade level proposed by climate scientists.¹⁷⁷

B. Allowances

There are two main questions that arise with emissions allocations: First, how to prevent over-allocation? And second, what method should be used to make these initial allocations?

One concern with the distribution of allowances is that there is a “natural tendency” to over-allocate.¹⁷⁸ To resolve this problem, one can look to the U.S. Acid Rain Program, which allowed a governmental agency—the EPA—to “ratchet back” allocations in the event that Congress granted too many allowances.¹⁷⁹ This ensured that the integrity of the cap was maintained to meet the environmental goals of the program.¹⁸⁰ This type of provision should be placed in any proposed cap-and-trade system because it would serve as a safeguard against intentional manipulation as well as the unintentional results that naturally arise from politicians fighting for their constituencies.

176. Button, *supra* note 116, at 579.

177. See *supra* notes 27–28 and accompanying text.

178. See Westerfield, *supra* note 3, at 176.

179. *Id.*

180. *Id.*

The next concern is how to distribute these allocations—whether through an auction, free allocation, or some combination of the two. President Obama proposed that these allocations be given through a one-hundred percent auction.¹⁸¹ Direct allocations through auctions are important because they create more certainty; this allows businesses to make long-term financial decisions.¹⁸² Auctions are also favored by economists and environmentalists because the revenue generated can be used to further climate change goals, for instance, by funding alternative energy research.¹⁸³ Auctions also simplify the method of allocating allowances:¹⁸⁴ those who want them must purchase them.

Furthermore, an auction also has the potential to raise, annually, billions of dollars.¹⁸⁵ Even a moderate representation of the annual revenue that the distribution of allowances would generate is estimated to be \$50 to \$60 billion per year.¹⁸⁶ Because of the high stakes and high incentives involved, some commentators have compared the distribution of allowances to the “opening up of the great American West and the distribution of initial property rights two centuries ago.”¹⁸⁷

Because of the substantial value these allocations would be given once the government recognized this valuable right to pollute, it is important that they are not given away. Aside from any possible unfair practices that could result, free allocation could also lead to windfall profits for beneficiaries who receive substantially more allocations than they need.¹⁸⁸ Also, it is questionable why these polluters should receive the benefit of free allocations when it is the consumer who will ultimately be charged—it is estimated that consumers would pay eight times more than electric utilities for the use of the electricity, even after taking into consideration the costs of complying with a regulatory program, such as cap-and-trade.¹⁸⁹ Even though there may be some advantages in giving allocations as

181. OFFICE OF MGMT. & BUDGET, *supra* note 1, at 100.

182. *See* Westerfield, *supra* note 3, at 177.

183. *Id.* at 181.

184. *Id.*

185. *Id.* at 180.

186. *Id.*

187. *Id.*

188. *Id.* at 181.

189. *Id.*

compensation—to compensate businesses, for example, that are disproportionately affected by climate regulation or to encourage technological innovation¹⁹⁰—these subsidies may be better obtained through tax credits.

Besides avoiding the problems mentioned above, an auction approach could also provide valuable benefits. Cleaner technology, for instance, could be promoted with auction-generated funds. President Obama took this approach by proposing to use auction proceeds to fund \$150 billion in clean energy projects over the next ten years beginning in 2012.¹⁹¹ And, as proposed by President Obama's budget, this revenue could be used to serve as a tax break for the poor and others who would be most detrimentally affected by the transition to a clean energy economy.¹⁹²

C. Offsets

It is important to note that this Comment has focused extensively on the necessity of reducing carbon emissions through cap-and-trade. A cap-and-trade system, however, would probably only focus on large energy producers, ignoring many other emitters of greenhouse gases. In order to reach these carbon emissions, it is important to allow emitters to meet targets through “carbon offsets.”¹⁹³

Emissions offsets are credits that can be earned through projects and other efforts that reduce greenhouse gases in areas that are not specifically listed under the cap in a cap-and-trade system.¹⁹⁴ Those who are regulated under the cap can use these extra offsets to meet their emissions goals or sell them to others who may need them to satisfy their own obligations under the cap.¹⁹⁵

Offsets are generated from a variety of sources, but they are typically limited to larger endeavors, such as wind farm ventures or projects to remove the harmful greenhouse gases that escape from

190. *Id.*

191. OFFICE OF MGMT. & BUDGET, *supra* note 1, at 21.

192. *Id.*

193. See DAVID J. HAYES, CENTER FOR AMERICAN PROGRESS, GETTING CREDIT FOR GOING GREEN I (2008), available at http://www.americanprogress.org/issues/2008/03/pdf/carbon_offsets.pdf.

194. See Carr & Rosebuj, *supra* note 145, at 52; see also Westerfield, *supra* note 3, at 186–87.

195. Carr & Rosebuj, *supra* note 145, at 44–45.

garbage in landfills.¹⁹⁶ Under the current offset system, the majority of these projects are being performed in China, but over forty-five countries are currently represented.¹⁹⁷

The offset market is voluntary, and some observers characterize it as uncertain and prone to fraud because of the confusion and lack of regulation in the market.¹⁹⁸ Others also argue that allowing some entities to meet their emissions goals with offsets reduces the probability of meeting goals set by the cap.¹⁹⁹ This can occur a few different ways. Individuals, for instance, may purchase offsets instead of decreasing emissions. An example of this behavior comes from Al Gore, a proponent of offsets, who defends his high level of consumption because he buys carbon offsets.²⁰⁰ Critics also argue that emissions goals would not be met because it can lead to difficulty in regulating and controlling the offset credits that could be awarded.²⁰¹ Under the Kyoto Protocol, there have been reports that officials in China are lowering the requirements for offset projects and are awarding credits to marginal endeavors.²⁰² Further, under Kyoto, there are complaints that industries are awarded offsets at very low costs and are ignoring needed changes.²⁰³

Despite these challenges, there are many benefits that could accrue from the inclusion of carbon offsets in a cap-and-trade system. The primary benefit is that they could enable cap-and-trade to benefit sectors that are not under the cap, such as forestry and agricultural endeavors.²⁰⁴ This could be highly beneficial because some of the areas that are unlikely to be included under the cap contribute heavily to the greenhouse gas stockpile—tropical deforestation, for example, is estimated to account for twenty-percent of global emissions.²⁰⁵

196. Vandenbergh & Ackerly, *supra* note 30, at 65–66.

197. Carr & Rosembuj, *supra* note 145, at 53.

198. See HAYES, *supra* note 193, at 1, 7–8.

199. *Id.* at 15.

200. See Hardaway, *supra* note 60, at 986–87. Al Gore was criticized because he encouraged others to decrease their consumption while he continued to heat his large home and take private flights. *Id.* at 987.

201. See HAYES, *supra* note 193, at 7–8, 14.

202. *Id.* at 10.

203. *Id.* at 1 (citing David G. Victor & Danny Cullenward, *Making Carbon Markets Work*, SCI. AM., Dec. 2007, at 75–76).

204. *Id.*

205. *Id.* at 13.

Offsets also provide a way for individuals to combat global warming. This is best exemplified by the growth in the voluntary carbon offset market. In 2004, this market was valued at approximately \$6 million.²⁰⁶ In a mere two years, the market was in excess of \$110 million.²⁰⁷ The voluntary carbon offset market is taking off, and there are more opportunities for individuals to participate every day. The vast potential of this important market can lead individuals to support corporate and government actions that would reduce greenhouse emissions.

Because there is a possibility of abuse, it is important to establish procedures and verification of the actions that earn offset credits. Companies should not be able to circumvent their responsibility to comply under the cap by purchasing offsets. Rather, there should be a limit on the maximum amount of offsets they are able to produce. For example, under the Lieberman-Warner bill—a cap-and-trade proposal—regulated entities could only use offsets to reduce their commitment under the cap by fifteen percent.²⁰⁸

D. Carbon as a Currency

The key to a cap-and-trade system providing a reprieve from global warming is its ability to reduce global emissions of greenhouse gases. In order to ensure its success, it must be designed to integrate other cap-and-trade systems that reduce emissions on a global scale. This is difficult because the current carbon markets are insular: the new tradable units that are created are not yet recognized and are not freely exchangeable in other markets.²⁰⁹ These factors make global convergence of cap-and-trade systems problematic. To encourage the establishment of other systems and the exchange of credits internationally, the issue of what legal characteristic carbon credits will possess must be determined from the outset so that this definition can be uniformly applied on a global scale.²¹⁰

Although the unit of exchange for carbon in all markets is relatively uniform—it represents the right to emit greenhouse gas

206. Vandenberg & Ackerly, *supra* note 30, at 67 (citing James Kanter, *Guilt-Free Pollution. Or Is It?*, N.Y. TIMES, Feb. 20, 2007, at C1).

207. *Id.* (citing James Kanter, *Guilt-Free Pollution. Or Is It?*, N.Y. TIMES, Feb. 20, 2007, at C1).

208. HAYES, *supra* note 193, at 2.

209. See Button, *supra* note 116, at 574.

210. *Id.* at 572–73.

equivalent in greenhouse effect to one ton of carbon dioxide—it is likely that the value of these credits across markets will vary.²¹¹ The current industry practice, “particularly in the United States, [is] to treat emissions rights as commodities,” and the “legal and policy literature” has also referred to them in this respect.²¹² Their treatment as such is understandable due to some of the similarities that commodities and emissions rates share. Both, for example, “can be sold through spot trades for immediate delivery, or through futures contracts”²¹³ Additionally, both are “generally made in very large volumes” and their prices can be particularly “fluid across time, but at any given time . . . [their price] will be generally uniform across the marketplace.”²¹⁴

Despite these similarities, it would be more beneficial to treat emissions units in another fashion to encourage global convergence; this can best be achieved by defining these units in a manner similar to that of currencies, a method supported by the International Accounting Standards Board.²¹⁵ Emissions units and currencies have many similarities. Both, for example, are useless until the government establishes and enforces a property right in this area.²¹⁶ Commodities, in contrast, such as corn or oil, have value regardless of government endorsement.²¹⁷

The main benefits of a currency model are that it would promote environmental integrity, encourage convergence of market systems, create competition, and foster a desire for the most highly valued units.²¹⁸ If carbon is listed as a commodity, the environmental integrity of the carbon units is jeopardized; the level of regulation between markets, for example, may vary and create a disparity between the environmental benefit of each carbon unit.²¹⁹ Under this scenario, the treatment of all carbon units as equivalent is unfair

211. *Id.* at 573.

212. *Id.* at 575–76.

213. *Id.* at 576.

214. *Id.*

215. *Id.* at 579.

216. *Id.* at 577; *see also* Westerfield, *supra* note 3, at 180 (commenting that the intangible right to emit nitrous oxide and sulfur dioxide “is a value that previously did not exist until the government stepped in and said that it was going to enforce a property right in this area”).

217. Button, *supra* note 116, at 577.

218. *Id.* at 583–84.

219. *Id.* at 584–85. This problem is evident in commodities markets where the price of goods is uniform across the market at any given time. *Id.* at 588.

and impractical. This problem could be avoided in a currency model because there can be different values at any given time—much like the fluctuation of the Mexican peso to the U.S. dollar—to take into account the environmental integrity of the unit.²²⁰

Because units can be traded at different values, this encourages the convergence and trade of other carbon units in other markets. Although trading is not always encouraged between markets at the present time, a currency model would alter the status quo and facilitate exchange.²²¹

E. Enforcement

The United States will need to play a central part in any plan to reduce carbon emissions. The vital role the United States can fulfill is to verify that emission limits are observed precisely, that the regulated entities comply, and make clear that if they do not, the government will enforce penalties for failure to maintain emissions below a cap.²²²

The government's primary responsibility after creating the cap-and-trade system would be to regulate compliance within the system in order to achieve the desired level of emissions and to maintain the integrity of the traded credits.²²³ Although opponents of cap-and-trade maintain that monitoring of a system is as difficult as obtaining an accurate reading of greenhouse gas emissions, in reality, much is possible. A cap-and-trade system focused on large industrial polluters would be able to monitor this sector to ensure these emissions goals are met.²²⁴

Compliance and enforcement of this system, if comparable to the U.S. Acid Rain Program, should be relatively high. The U.S. Acid Rain Program has been one of the EPA's most successful programs, in terms of compliance, with a ninety-nine percent compliance rate.²²⁵

The increased costs of bureaucracy that will no doubt result can be funded through the purchase of the credits on the market.

220. *See id.* at 588.

221. *See id.* at 586–87.

222. Bryner, *supra* note 10, at 979.

223. *See* Westerfield, *supra* note 3, at 179–80.

224. *Id.* (commenting that currently, the emissions from every power plant are known and are accessible on the web).

225. *Id.* at 180.

Offsets can also help funding. President Obama proposes an allocation of \$19 million to the EPA to fund climate change research.²²⁶

VI. CONCLUSION

This Comment has focused on two difficult climate change questions that currently face policymakers: whether the United States should take action to mitigate climate change, and how to best reduce carbon emissions. The United States should recognize that climate change is occurring and that it will continue to have negative impacts if action is not taken. Even though it is possible global warming would not substantially affect the United States' current Gross Domestic Product, it is likely that its economic and political rivals—China and Russia—stand to gain significantly from increases in global temperatures. To mitigate the United States' rivals' possible gains and to maximize its share of the ever-expanding global carbon market, the United States should implement a mandatory emissions reduction program.

Of the two most recognized regulatory programs—carbon tax and cap-and-trade—a carbon tax would be the most administratively simple and timely method to reduce carbon emissions. Because carbon taxes are politically unsavory, however, both domestically and internationally, they are an unlikely solution to climate change.

Cap-and-trade, a more complex and volatile system, is the political frontrunner and the solution proposed by President Obama and his administration. If designed correctly, cap-and-trade offers many of the same benefits as a carbon tax and also provides more certainty that environmental goals will be met. A cap-and-trade system should include the following components: a firm cap, a one-hundred percent auction of allowances, carbon offsets, characterization of carbon in the same manner as a currency, and enforceability. If these measures are met, cap-and-trade will mitigate the environmental effects of climate change and ease the transition to a clean energy economy.

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226. OFFICE OF MGMT. & BUDGET, *supra* note 1, at 100–01.

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