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Stephen Sewalk*

Abstract

It is time for the European Union to dump the EU-ETS cap-and-trade system, as it is not working. By adopting a carbon tax with reinvestment, the European Union (EU) could reduce its economy-wide emissions by forty-eight percent (and emissions from buildings and utilities by sixty-five percent) within twenty years while automatically putting in place a border tax adjustment. By adopting the carbon tax with reinvestment, the EU's trading partners would be heavily encouraged to adopt the same system, thereby dramatically reducing global emissions. This adoption would occur much like the EU adopting the Value-Added Tax and 150 countries following within a short time after. The impacts would be dramatic, from potentially reducing emissions in the United States by forty-nine percent and emissions from building and utilities by sixty-seven percent over twenty years to China actually reducing its emissions over the next twenty years by a nineteen percent reduction in emissions for buildings and utilities, and a thirteen percent economy-wide reduction instead of almost doubling them. This system would also encourage countries such as Brazil and Malaysia to stop deforesting or else lose access to the world's largest markets for their exports.

The EU countries would utilize the proceeds from the tax, once collected, to rebuild the electric power grid in order to significantly reduce carbon emissions. The structure thereby creates both a penalty for states that emit significant amounts of greenhouse gases and an incentive for states to significantly change their emissions profile by investing in clean hybrid energy resources.

The EU once again has an opportunity to lead the world in climate change mitigation by adopting a tax that will fund the replacement of its current energy infrastructure, not only reducing emissions, but also

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increasing the region's energy security and reducing its reliance on unreliable energy suppliers.

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I. Introduction

A. Global Climate Change Implications

Global climate change has the potential to alter the landscape and characteristics of planet Earth as we know it.[1] The twelve warmest years in recorded history have all occurred in the past fifteen years, the oceanic temperature has recently reached record highs, and ice in the Arctic is melting faster than most models predicted.[2] A recent NASA-led study covering a fifty-year period discovered that higher temperatures are causing tropical forests to absorb less and less carbon dioxide every year.[3] Climate scientists have successfully provided analyses that yield "very high" confidence in attributing the bulk of the past fifty years' rise in global temperature to human-caused greenhouse gas (GHG)[4] emissions.[5] Some

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1. *See generally* THE WORLD BANK, WORLD DEVELOPMENT REPORT 2010 (2010), *available at* http://siteresources.worldbank.org/INTWDR2010/Resources/5287678-1226014527953/WDR10-Full-Text.pdf (discussing the effect that climate change will have on the planet and the need for mitigation efforts) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf [hereinafter IPCC SYNTHESIS REPORT] (synthesizing the scientific evidence of global climate change and discussing the effect that it will have on human populations) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); *see also* Stephen Sewalk, *Project Financing an Energy Revolution in the USA*, 3 THE ENGINEERING PROJECT ORG. J. 141, 142 (2012) (collecting research cataloguing the "irreversible processes" which may result from continued climate change, including ocean warming, loss of forests, and coastal flooding).

2. *See generally* IPCC SYNTHESIS REPORT, *supra* note 1; *see also* President Barack Obama, *'We Need to Act,' Transcript of Obama's Climate Change Speech*, BLOOMBERG (2013), *available at* http://www.bloomberg.com/news/2013-06-25/-we-need-to-act-transcript-of-obama-s-climate-change-speech.html (showing the President categorizing these climatic changes as scientific "facts") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

3. *See* Weile Wang et al., *Variations in Atmospheric CO_2 Growth Rates Coupled With Tropical Temperatures*, 110 PROCEEDINGS OF THE NAT'L ACAD. OF SCIS. 13061, 13061 (2013) (noting that this finding represents a "diagnostic tool for improved understanding of the contemporary and future global carbon cycle").

4. *See* U.N. Framework Convention on Climate Change art. 1.5, May 9, 1992, S. Treaty Doc. No. 102-381771 U.N.T.S. 107 (defining "greenhouse gases" as "those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation"); *see also* David G. Duff, *Tax Policy and Global Warming*, 51 CAN. TAX J. 2063, 2065 (2003) (explaining that different gases have different effects on global warming, so emissions are standardized to CO_2 equivalents when measuring effects on global warming).

5. *See* Camille Parmesan et al., *Beyond Climate Change Attribution in Conservation and Ecological Research*, 16 ECOLOGY LETTERS 58, 69 (2013) (showing that global meta-analysis provides the "most reliable, scientifically defensible and robust" approach to detect

climate scientists believe that Earth has already been irrevocably damaged by excess carbon emissions, effectively changing the atmospheric composition of our planet.[6] According to the Intergovernmental Panel on Climate Change (IPCC), fossil fuel consumption accounts for the majority of anthropogenic GHG emissions.[7] Many of the natural resources that have nurtured our survival and growth as a species—and represent the livelihood for entire industries and populations—are in peril.[8] Efforts to make the general populace aware of GHG emissions are leading to an outcry for countries to address their carbon emissions.[9] Without legislation to drastically curb the amount of GHG emitted into the atmosphere, the future of the earth's habitable environments may be irrevocably altered, and we may be jeopardizing the future of our own species.[10]

These uncontrolled, rapid increases in GHG emissions create a significant risk of further adverse impacts to the environment, potentially resulting in irreversible changes.[11] Global climate change could lead to melting snowcaps and glaciers, rising sea levels, and changing weather patterns (resulting in flooding and draughts).[12] Since 1880, it is estimated that the sea level has risen approximately eight inches due to global

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long-term global climate change, strongly evidencing the anthropogenic contributions to climate change).

6. *See* Robin Kundis Craig, *"Stationary is Dead" Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. 9, 27 (2010) (outlining the positive feedback loop which results in higher atmospheric concentrations of carbon dioxide and other greenhouse gases).

7. *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, SPECIAL REPORT ON RENEWABLE ENERGY SOURCES AND CLIMATE CHANGE MITIGATION SUMMARY FOR POLICY MAKERS 7 (2011), *available at* http://srren.ipcc-wg3.de/report/IPCC_SRREN_SPM.pdf (showing that, in 2004, 56.6% of CO_2 from fossil fuels was the highest single emission comprising the GHG composition) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

8. *See* Ove Hoegh-Guldberg & John F. Bruno, *The Impact of Climate Change on the World's Marine Ecosystems*, 328 SCIENCE 1523, 1523 (2010) (providing the example of rapidly changing marine ecosystems, threatening populations and industries given the "overwhelming importance of the ocean to life on our planet").

9. *See* Terry Townshend & Sam Fankhauser, *How National Legislation Can Help to Solve Climate Change*, 3 NATURE CLIMATE CHANGE 430, 430 (2013) (noting that the stagnation of international climate negotiations has increased the passage of national legislation on climate across the globe).

10. *See* Sewalk, *supra* note 1, at 141–42 (listing human health effects including substantial increases in malnutrition and cardio-respiratory diseases).

11. *See* WORLD DEVELOPMENT REPORT, *supra* note 1, at 48 (arguing for mitigation of GHG emissions due to "inertia in the climate system, meaning that warming and its impacts . . . are to a considerable extent irreversible").

12. *See* Brian C. Murray & Heather Hosterman, *Climate Change, Cap and Trade, and the Outlook for U.S. Policy*, 34 N.C. J. INT'L L. & COM. REG. 699, 699 (2009) (showing that significant climate and weather impacts have occurred around the globe in nearly every ecosystem).

warming.[13] Scientists estimate an additional twenty- to eighty-inch rise in sea level is possible during this century.[14] In the United Kingdom (U.K.) alone, as many as 490,000 properties are at risk of flooding due to rising sea levels; the risk of rising sea levels affects all countries with ocean shorelines.[15] In the U.S., approximately five million people live in 2.6 million homes that are less than four feet above high tide.[16] Climate change will affect infrastructure, agriculture, and lifestyle, potentially leading to decreasing standards of living, especially in communities that have economies sensitive to variations in climate.[17] This includes many of developing countries that have primarily agricultural economies.[18]

B. Responses to Climate Change

In response to this increasingly pressing situation, many nations have sought to implement climate change legislation that will lead to lower GHG emissions.[19] Many proposals for regulation of GHG emissions, however, have failed to persuade legislatures to embrace holistic climate

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13. *See* BEN STRAUSS, CLAUDIA TEBALDI & REMIK ZIEMLINSKI, SURGING SEAS: A CLIMATE CENTRAL REPORT 2 (2012), *available at* http://slr.s3.amazonaws.com/SurgingSeas.pdf [hereinafter SURGING SEAS] (adding that the rate of sea level rise is accelerating and some scientists estimate another twenty to eighty inches of sea level rise by the end of the century) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

14. *See id.* (explaining the relationship between a rising sea level and the increased probability of dangerous floods due to storm surges).

15. *See Climate Change Explained*, ENVIRONMENT AGENCY, http://www.environment-agency.gov.uk/homeandleisure/climatechange/31802.aspx (last visited Jan. 19, 2013) ("Small island states, including 15 nations found in the Pacific, may face the most dire and immediate consequences.") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

16. *See* SURGING SEAS, *supra* note 13, at 2 ("In 285 cities and towns, more than half the population lives on land below this line, potential victims of increasingly likely climate-induced coastal flooding.").

17. *See* THE WORLD BANK, WORLD DEVELOPMENT REPORT: DEVELOPMENT AND CLIMATE CHANGE 37 (2010) [hereinafter WORLD DEVELOPMENT REPORT] (providing examples of flooding coastal regions, contaminated freshwater sources, and exacerbated droughts in equatorial regions leading to decreased food security and malnourishment).

18. *See id.* (citing drought conditions and supplies of freshwater as the reason for this correlation).

19. *See* Nate Loewentheil, *Of Stasis and Movements: Climate Legislation in the 111th Congress* 5–6 (Yale Univ. Inst. For Soc. & Pol'y Stud. Working Paper No. ISPS12-020, 2013) (discussing attempts by the U.S. Congress to pass climate change legislation) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); *see also* Townshend & Fankhauser, *supra* note 9, at 430 (highlighting "nearly 300 pieces of climate change legislation or regulations of similar importance in . . . 33 countries").

change reform.[20] Nations may be waiting to see a well-implemented, efficient policy up and running in another nation before they attempt to adopt mitigation legislation for themselves.[21] This reluctance on the part of lawmakers around the globe can be attributed to a number of factors, including a fear of harming domestic business, a lack of confidence in proposed climate change schemes, and the continued skepticism of certain groups about the serious consequences of carbon emissions in the atmosphere.[22]

1. China

China has experienced astounding economic growth in the past thirty years, which has both greatly increased the country's GDP, and inundated the nation with environmental problems stemming from that rapid development.[23] Consequently, economic losses due to environmental degradation and pollution account for roughly ten percent of China's gross national income.[24] China is now the largest national emitter of CO_2 in the

20. *See* Townshend & Frankhauser, *supra* note 9, at 430 (noting that the "number of laws is not a perfect indicator of a country's response to climate change").

21. *See id.* (adding that some nations choose to pass laws related to disaster management before making the leap to climate change mitigation, showing the "close link between adaptation to climate change and the management of normal climate variability").

22. *See* Andrew J. Hoffman, *Talking Past Each Other? Cultural Framing of Skeptical and Convinced Logistics in the Climate Change Debate*, 24 ORG. & ENVT. 3, 4 (2011) (analyzing the social science research done to show the existence of "climate skeptics" and the effect of these groups on collective political action).

23. JUNJIE ZHANG, ASIA SOCIETY POL'Y INST., DELIVERING ENVIRONMENTALLY SUSTAINABLE ECONOMIC GROWTH: THE CASE OF CHINA 2 (2012) ("China has achieved miraculous economic growth over the past 30 years . . . . However, growing the gross domestic product (GDP) at any cost has created a series of social and environmental problems.") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

24. *See id.* (asserting that China's attempt to grow its economy "at any cost" created a series of social and environmental problems).

world.[25] However, China's role in remedying its high levels of emissions is somewhat undefined.[26]

China is a signatory to the Kyoto Protocol,[27] an international treaty that addresses GHG emissions and anthropomorphic climate change; however, the nation is exempt from the emissions lowering benchmarks proposed in the agreement.[28] Accordingly, even though China has failed to meet any of the emission reductions called for by the international agreement, it has seen no negative repercussions.[29] In 2008, China initiated a carbon-trading scheme that operates to lower GHG emissions through a voluntary carbon market.[30] A number of private companies manage this carbon-trading scheme; however, the Chinese government appears to be supporting the carbon markets, as are local governmental entities throughout China.[31] Despite the top-down approach, the government has no plans to establish a unified trading system for the country and seems satisfied to allow domestic emitters to create their own carbon markets.[32]

2. Other Developing Countries

In general, developed countries are quite concerned that heavy restrictions on carbon emissions will apply only to domestic producers and

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25. *See International Energy Statistics: Total Carbon Dioxide Emissions from the Consumption of Energy*, U.S. ENERGY INFO. ADMIN.: INDEPENDENT STATISTICS & ANALYSIS, http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=90 &pid=44&aid=8 (last visited Feb. 4, 2014) [hereinafter *International Energy Statistics*] (noting that China emitted over 8.7 million metric tons of carbon dioxide in 2011) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); *see also* ZHANG, *supra* note 23, at 5–6 (noting that the major contributors to CO_2 emissions are increased urbanization and new transportation systems, coal mining and combustion for increased energy demands, and rapid industrial development resulting in resource depletion and environmental pollution).

26. *See* ZHANG, *supra* note 23, at 7 (adding that energy use and GHG emissions in China will continue to rise as income increases).

27. Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 11, 1997, 2303 U.N.T.S. 148.

28. *See* ZHANG, *supra* note 23, at 19 ("Because of the principle of 'common but differentiated responsibility,' China is not subject to the quantified emissions limitation and reduction commitment in the Kyoto Protocol.").

29. *See id.* (discussing a lack of "meaningful participation" on the part of China).

30. *See* Yitian Huang, *Policy Experimentation and Emergence of Domestic Voluntary Carbon Trading in China*, 30 EAST ASIA 67, 68 (2013) (highlighting three voluntary exchanges in China allowing sellers and buyers to trade carbon credits).

31. *See id.* at 80 ("[T]he Chinese central government provides general support for voluntary carbon trading, with local governments being crucial to the proliferation of state-controlled exchanges.").

32. *See id.* at 80–81 (noting that this non-unified system allows for domestic players to experiment with various scales and structures for provincial exchanges).

not imports, leading to carbon leakage.[33] Carbon leakage occurs when a developed country threatens or puts into effect restrictions on carbon emissions (cap-and-trade, for example) and subsequently emission-dependent industries relocate to developing countries with no emissions restrictions.[34] Anecdotal evidence demonstrates that this occurred during the 1990s and 2000s.[35] The Earth Summit in Rio de Janeiro, Brazil in 1992, which led to the Kyoto Protocol, called upon developed countries to reduce GHG emissions.[36] Foreign direct investment (FDI) into developing countries with no emissions objectives or restrictions boomed following these announcements leading to rapidly rising emissions in developing countries.[37] It appears that developed countries promising or actually capping emissions resulted in significant FDI into developing countries, allowing "nations to benefit from the omission to internalize environmental negativities could be both environmentally and economically counter-productive . . . if mobile taxpaying industries relocate to pollution haven countries that offer little environmental regulation."[38] A significant amount of this FDI investment was directed to the "BRIC" nations.[39] In addition, the indirect consequence of Rio and Kyoto may have been to increase global emissions.[40]

This FDI not only propelled domestic growth, but also in many cases encouraged the development of trade globally to take advantage of cheap labor and non-existent or rarely-enforced environmental

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33. *See* Glen P. Peters & Edgar G. Hertwich, *Trading Kyoto*, 2 NATURE REP. 40, 40 (2008) (discussing hypothetical examples of carbon emissions from producers, often located in developing nations not restricted by the emissions standards of the Kyoto Protocol).

34. *See id*. at 41 (noting that the IPCC's definition of carbon leakage only considers leakage resulting from the Kyoto Protocol whereas in reality, the growth in China contributes a non-negligible amount to the problem).

35. *See id.* (explaining the reasons for increased emissions in developing countries).

36. *See* James D. Desmond, *The Earth Summit and Limits on Carbon Dioxide Emissions: Reading Between the Lines*, 8 J. NAT. RESOURCES & ENVTL. L. 357, 357 (1993) (showing that participants at the Summit proposed that "industrialized nations stabilize their carbon dioxide emissions at 1990 levels by the year 2000").

37. *See id*. at 365 (arguing that "by the year 2025 developing countries will be responsible for nearly 50% of the world's carbon dioxide output").

38. John M. Truby, *Towards Overcoming the Conflict Between Environmental Tax Leakage and Border Tax Adjustment Concessions for Developing Countries*, 12 VT. J. ENVTL. L. 149, 157–58 (2010).

39. *See* JIM O'NEIL, GOLDMAN SACHS, BUILDING BETTER ECONOMIC BRICS (2001), *available at* http://www.content.gs.com/japan/ideas/brics/building-better-pdf.pdf (defining BRICs as a term coined by Goldman Sachs to represent the largest and quickest growing developing countries: Brazil, Russia, India, and China) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

40. *See* Peters & Hertwich, *supra* note 33, at 40 (pointing to Kyoto's exemption of developing nations as the source of carbon leakage and, therefore, increased carbon emissions globally).

regulations.[41] This is why China has attempted to shift the blame of its emissions to importers of its goods, blaming fifteen percent of its emissions on exports to western countries,[42] a situation not anticipated by Kyoto.[43] Even though the European Union (the "EU") and the U.S. have minimized increases in their emissions levels since 2000, based on emissions intensities (GDP/total GHG emissions) of imports versus exports, total emissions including imports have skyrocketed.[44] Meanwhile, countries such as Brazil and Malaysia continue to contribute to global emissions by cutting down their forests.[45] These concerns led to U.S. legislation (Waxman-Markey bill) that proposed a carbon tax on imports for countries that do not internalize the cost of emissions.[46] In addition, this is why the EU has

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41. *See* GLOBAL AGENDA COUNCIL ON GLOBAL TRADE AND FDI, FOREIGN DIRECT INVESTMENT AS A KEY DRIVER FOR TRADE, GROWTH AND PROSPERITY: THE CASE FOR A MULTILATERAL AGREEMENT ON INVESTMENT 7 (2013) (explaining how FDI drove trade in sub-Saharan Africa).

42. *See* Duncan Clark, *West Blamed for Rapid Increase in China's CO_2*, THE GUARDIAN, (Feb. 22, 2009), http://www.theguardian.com/environment/2009/feb/23/china-co2-emissions-climate (discussing China's deflection of blame for its CO_2 emissions) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

43. *See* Peters & Hertwich, *supra* note 33, at 40 (describing the unanticipated consequences of Kyoto).

44. *See* Press Release, European Commission's Joint Research Centre, Greenhouse Gas Emissions Growing Faster Since 2000: New Data on Worldwide Emissions 1970–2005 (May 25, 2009), *available at* http://ec.europa.eu/dgs/jrc/downloads/jrc_090525_newsrelease_edgar.pdf (noting a fifteen percent increase in emissions between the years 2000 and 2005) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT). This is primarily due to carbon leakage of industry moving from the U.S., EU, and Japan to China, which has possibly had the unintended result of increasing global emissions by moving production from low emission intensity countries to high emission intensity countries. *See* Truby, *supra* note 38, at 157–58 (explaining that relocation of industries to pollution-haven countries could even increase pollution levels).

45. *See Reducing Emissions from Deforestation and Forest Degradation*, WORLD WILDLIFE FOUNDATION, http://wwf.panda.org/what_we_do/footprint/forest_climate2/forests_and_climate_change/ (last visited Feb. 5, 2014) (explaining that twenty percent of global emissions come from deforestation) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT). A carbon tax policy needs to take this source into account, thereby discouraging Brazil and Malaysia from cutting down their forests. *See* Michael Obersteiner, et al., Economics of Avoiding Deforestation 2 (Oct. 16, 2006) (presented at Climate Mitigation Measures in the Agro-Forestry Sector and Biodiversity Futures, International Centre for Theoretical Physics, Trieste, Italy, Oct. 16–17, 2006), *available at* http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.168.1653&rep=rep1&type=pdf (explaining that a carbon tax of nine U.S. dollars per ton of carbon could reduce deforestation by half) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

46. *See generally Analysis of H.R. 2454, the American Clean Energy and Security Act*, NRDC LEGISLATIVE FACTS (Natural Resources Defense Council, Washington, D.C.), Sept.

attempted to impose a carbon tax on airlines flying into the EU.[47] Developed countries, such as the U.S. and the EU member-states, are concerned that unless imports are included in emissions restrictions, many industries beneficial to their economies will relocate to avoid internalizing the cost of their emissions.[48] This difference between Annex I and II countries convinced the U.S. to not sign the treaty, as the U.S. noted that developing countries, such as China, would not be subject to emissions limits, and American industry would be unfairly burdened, resulting in companies' relocation to countries with no emissions limits.[49]

3. The United States

The second highest emitter of carbon dioxide is the U.S.[50] Similar to China's involvement in the Kyoto Protocol, the U.S. signed the agreement but did not ratify it, and has therefore been exempt from the emission regulation benchmarks.[51] The U.S., due in large part to the economic recession, however, was able to reduce its CO_2 emissions level below the Kyoto Protocol benchmark.[52] Despite this encouraging trend, the U.S. has never adopted any form of GHG emission reducing legislation.[53]

2009, *available at* http://www.nrdc.org/globalWarming/files/ACESLegFS.pdf (delineating the basic provisions of the Waxman-Markey bill) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

47. *See EU Ready to Compromise Over Airline Carbon Tax: EU Sources*, EUBUSINESS (Sept. 5, 2013), http://www.eubusiness.com/news-eu/transport-aviation.qdb (explaining that the EU was willing to compromise on the attempt to tax airlines in exchange for action from other leading countries) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

48. *See* Don C. Brunell, *U.S. Regulators Shipping Jobs Overseas*, WASHINGTON BUSINESS MAGAZINE, Fall 2013 (arguing that U.S. jobs and environmental protections will be lost as companies shift production to facilities in countries with less strict emissions standards) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

49. *See* JANE A. LEGGET ET AL., CONG. RESEARCH SERV., RL34659, CHINA'S GREENHOUSE GAS EMISSIONS AND MITIGATION POLICIES 25 (Sept. 10, 2008), *available* at http://www.fas.org/sgp/crs/row/RL34659.pdf (describing China as a non-Annex I country and stating that it therefore did not have binding emissions limits from 2008 until 2012).

50. *See International Energy Statistics*, *supra* note 25, at 44–57 (listing carbon emissions data from all countries).

51. *See* Jon Havi, Detlef Sprinz & Guri Bang, *Why the United States Did Not Become a Party to the Kyoto Protocol: German, Norwegian, and U.S. Perspectives*, 18 EURO. J. INT'L RELATIONS 130, 133 (2012) (explaining that the United States did not become a party to the protocol after the Senate failed to ratify the Protocol and after President Bush's repudiation of it).

52. *See* Allan LeBlanc, *Is The U.S. About to Accidently Meet the Kyoto Protocol Targets?*, BERKELEY ENERGY & RES. COLLAB. (Sept. 4, 2012), http://berc.berkeley.edu/is-the-us-about-to-accidentally-meet-kyoto-protocol-targets/ (stating that the United States,

Cap-and-trade programs are often the leading proposals when governments look to limit GHG emissions, and the United States has entertained the idea of a cap-and-trade system.[54] The American Clean Energy and Security Act, also known as the Waxman-Markey bill, was the most recent cap-and-trade proposal.[55] The bill, designed to lower carbon emissions and create clean energy jobs, was approved by the House of Representatives, but was voted down in the Senate in 2009.[56] The United States Congress has yet to pass any legislation that would mitigate carbon emissions.[57]

During his June 2013 environmental policy speech, President Obama outlined a series of initiatives that would continue to move the U.S. closer to implementing a holistic market-based climate change policy.[58] The President vowed his administration's continued support to lower GHG emissions below 2005 levels by seventeen percent.[59] He also announced a series of new federal measures to reduce the nation's impact on global climate change.[60] These new initiatives include allowing the EPA to complete pollution standards for new and existing power plants, directing the Interior Department to allow public lands to be reserved for new renewable energy facilities to be built, increasing the federal government's exclusive use of renewable sources of energy, and encouraging negotiations with other nations to allow free trade of environmental goods and services.[61] President Obama also encouraged lawmakers to work together to

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though late, has reached emissions levels below the 1990 levels required by the Kyoto Protocol) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

53. *See* Michael Wines, *E.P.A. Is Expected to Set Limits on Greenhouse Gas Emissions by New Power Plants*, N.Y. TIMES, Sept. 13, 2013, at A12 (stating that the EPA was taking its first-ever steps to reduce GHGs from new power plants).

54. *See* Richard Conniff, *The Political History of Cap and Trade*, SMITHSONIAN MAG., Aug. 2009 (explaining the development of the United States' proposals for cap-and-trade systems).

55. *See generally* Natural Resources Defense Council, *supra* note 46 (noting that the legislation was passed by the House of Representatives in 2009).

56. *See H.R. 2454 The American Clean Energy and Security Act of 2009*, OPEN CONG., http://www.opencongress.org/bill/111-h2454/actions_votes (last visited May 5, 2014) (providing the U.S. House of Representatives votes for and against the bill) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

57. *See* Townshend & Frankhauser, *supra* note 9, at 430 (stating that the United States has failed to pass legislation and instead attempts to regulate under the guise of the Clean Air Act).

58. *See* President Obama, *supra* note 2 (advocating for a bi-partisan, market-based solution to climate change).

59. *See id.* (addressing the goal that the President established the year he took office).

60. *See id.* (directing agencies like the EPA to develop standards to mitigate emissions).

61. *See id.* (outlining specific suggestions for agency action).

create a market-based GHG emission reduction system that the U.S. could implement in the near future.[62]

4. The European Union

This uncertainty among legislatures around the world will likely only be exacerbated by the recent news that Europe's flagship climate change initiative, the European Union's Environmental Trading System (EU-ETS), has failed to live up to its potential.[63] The program has been mired in economic inefficiency and plagued by unrealized environmental goals since its inception in 2005.[64] The EU-ETS is a cap-and-trade program designed to restrict carbon dioxide emissions in certain industries throughout much of Europe.[65] These industries include refineries, combustion-related facilities, iron and steel factories, cement plants, and electricity providers.[66] The goal of the cap-and-trade program was to create and maintain a market for carbon that would encourage investment into new low-emission technologies.[67] The legislation was hailed as a huge victory for proponents of climate change mitigation when it was implemented, and the world waited to see if the first large emissions trading scheme would prove successful.[68] Unfortunately, eight years into the program, many Members of European Parliament (MEPs) appear ready to

62. *See id.* (stating that the President would be willing to work with both Democrats and Republicans to enact legislation and regulations to mitigate the impact of emissions).

63. *See* RICARDO COELHO, TAMRA GILBERA & JOANNA CABELLO, CARBON TRADE WATCH, GREEN IS THE COLOR OF MONEY: THE EU ETS FAILED MODEL FOR THE "GREEN ECONOMY" 2 (2013) *available at* http://www.carbontradewatch.org/downloads/publications/EU-ETS_Report-web.pdf (explaining that the EU-ETS has failed to meet its objectives) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

64. *See* Anna Petherick, *Holding Out Hope*, 3 NATURE CLIMATE CHANGE 534, 534–35 (2013) (discussing the difficulties the EU-ETS program).

65. *See* COELHO ET AL., *supra* note 63, at 3 (explaining the EU-ETS cap-and-trade model).

66. *See generally* Julien Chevallier, *Banking and Borrowing in the EU ETS: A Review of Economic Modelling, Current Provisions and Prospects for Future Design*, 26 J. ECON. SURVEYS 158 (2012) (describing the types of facilities affected by the EU-ETS).

67. *See* A. DENNY ELLERMAN & PAUL L. JOSKOW, PEW CENTER ON GLOBAL CLIMATE CHANGE, THE EUROPEAN UNION'S EMISSIONS TRADING SYSTEM IN PERSPECTIVE 35 (2008), *available at* http://www.c2es.org/docUploads/EU-ETS-In-Perspective-Report.pdf (describing the goal of creating a marketplace that would facilitate cuts in emissions to meet the Kyoto Protocol requirements) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

68. *See* Helena Spongenberg, *EU's Carbon Trading Scheme Hailed as Success*, EUOBSERVER (May 29, 2007, 9:17 AM), http://euobserver.com/economic/24145 (noting that the EU-ETS was seen as a remarkable success despite challenges and concerns) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

abandon the EU-ETS.[69] On April 16, 2003, the European Parliament rejected a measure that would have back-loaded future carbon emissions allowances, a measure that some say could have bolstered the faltering program.[70] Because of the vote, the program's carbon market price for allowances fell to new lows.[71]

Part II of this article analyzes the EU-ETS system of carbon regulation using the cap-and-trade system to determine why it has not produced the results the EU expected. Part III provides an alternative approach to climate change legislation by discussing a carbon tax approach. Part IV details the benefits and results of a modified carbon taxation program that incorporates reinvestment. Part V summarizes why the EU should abandon the ETS in favor of a carbon tax with reinvestment.

II. EU-ETS (Cap-and-Trade)

A. What is Cap-and-Trade?

In a cap-and-trade program, a legislative body appoints a governmental agency to establish a maximum amount, or cap, on carbon emissions from certain carbon polluting parties.[72] These selected carbon polluters are then required to lower their GHG emissions below the cap.[73] To encourage compliance and minimize initial costs, these parties are given allowances to emit carbon, and should they fall below their cap, they can trade or sell these allowances to others.[74] Those who are not able to limit their GHG emissions under the cap are then able to purchase these leftover allowances.[75] In this manner, the cap-and-trade system creates a market among carbon polluters, and the availability and demand in trading for the allowances dictates their value and price of emissions—in this case, CO_2—by the ton.[76] The cap-and-trade system is designed to reduce GHG emissions by making it more economically viable for carbon polluters to develop and invest in new processes to mitigate or collect emissions, move

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69. *See ETS RIP?*, THE ECONOMIST, Apr. 20, 2013 ("It [the ETS] may well become an example of what not to do . . . .").

70. *See id.* (stating that the EU vote was 334 in favor of rejecting the proposal, to 315 against rejecting the proposal).

71. *See id.* (explaining the effect of the vote rejecting the proposal).

72. *See* Robert W. Hahn & Robert N. Stavins, *The Effect of Allowance Allocations on Cap-and-Trade System Performance*, 54 J.L. & ECON. S267, S270 (2011) (explaining that the government sets the overall emissions cap and can determine which firms are exempt).

73. *See id.* at S268 (describing how cap-and-trade systems function).

74. *See id.* at S270 (explaining the system of credit allocation).

75. *See id.* (explaining the options given to firms who exceed the cap).

76. *See id.* (describing the impact of the cap and trade system on market prices).

toward cleaner forms of energy and encourage consumers to use energy more efficiently due to rising costs.[77]

1. Advantages of Cap-and-Trade

There are a number of unique advantages to a cap-and-trade program that help lower GHG emissions. Politicians often favor this program because cap-and-trade is not a "tax," and the government has control over allocating the emissions allowances.[78] Some environmentalists have rallied behind the cap-and-trade method because it establishes a clear quantity restriction on carbon polluters.[79] In addition, many industry groups support cap-and-trade programs because of their inherent money-making potential.[80] All supporters of cap-and-trade programs believe two assumptions about the program: (1) Carbon emissions below a certain level (that designated by the cap, or its ultimate goal) do not cause undue harm to the environment, and (2) a market in trading pollution allowances is "the most cost-effective means of reducing pollution to the predetermined level . . . ."[81]

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77. *See id.* at S276 (finding that lower prices encourage a reliance on energy efficient emissions technology).

78. *See* Robert Hahn & Robert Stavins, *Why Cap-and-Trade Should (and Does) Have Appeal to Politicians*, VOX (Apr. 13, 2010), http://www.voxeu.org/article/why-cap-and-trade-should-and-does-have-appeal-politicians ("The political appeal of cap-and-trade can be explained, in part, by the fact that politicians can fiddle with the initial distribution of property rights . . . without affecting the final equilibrium . . . .") (on file with the WASHINGTON AND LEE JOURNAL OF CLIMATE, ENERGY, AND THE ENVIRONMENT).

79. *See* Robert F. Mann, *The Case for the Carbon Tax: How to Overcome Politics and Find our Green Destiny*, 39 ENVTL. L. REP. NEWS & ANALYSIS 10118, 10120 (Feb. 2009) (discussing politicians', economists', and environmentalists' reasons for favoring a cap-and-trade approach to climate mitigation); *see also* Stephen Sewalk, *Carbon Tax with Reinvestment Trumps Cap-and-Trade*, 30 PACE ENVTL. L. REV. 580, 587 (2013) ("Environmentalists favor this system for the absolute quantity restrictions on carbon emissions.").

80. *See* J.R. Deshazo & Jody Freeman, *Timing and Form of Federal Regulation: The Case of Climate Change*, 155 U. PA. L. REV. 1499, 1540–46 (2007) (discussing the reasons that industry groups and environmentalists both favor a cap and trade system); *see also* U.S. CLIMATE ACTION PARTNERSHIP, A BLUEPRINT FOR LEGISLATIVE ACTION 6 (2009), *available at* http://www.us-cap.org/pdf/USCAP_Blueprint.pdf (advocating for industry groups and environmentalists to establish a legislative framework to address climate change) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

81. *See* Mann, *supra* note 79, at 10120 (2009) (detailing the assumptions underlining support for cap-and-trade).

2. Disadvantages to Cap-and-Trade

There are also disadvantages to approaching the problem of climate change through a cap and trade system. Determining a baseline amount of emission reduction targets, the allocation of allowances, and the use of offsets, often slows down cap-and-trade programs.[82] Thus, the period of adoption of a cap-and-trade program and its implementation is often lengthy.[83] There is also no certainty of the price required to achieve the promised reduction levels defined by the emissions cap.[84] Cap-and-trade programs require constant monitoring, the balancing of many factors, and history has shown the U.S. that carbon markets experience volatile, often unforeseen, price shifts.[85] If the price of carbon is too high, there will be pressure to relax the cap.[86] Yet, when the cap is relaxed too much, the carbon market itself is decimated.[87]

Perhaps more important than all of the drawbacks elicited above is the fact that a cap-and-trade system does not guarantee a reduction in GHG emissions, defeating the purpose of enacting such a scheme. Cap-and-trade requires certainty about the demand for emissions, and that those regulations are regulated precisely.[88] An effective cap-and-trade program requires that all emission allowances be auctioned off.[89] If, however, there is any uncertainty in the demand for emissions, or if problems arise while regulating the emissions permits, the cap-and-trade program becomes

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82. *See* Edward Nell & Armon Rezai, *Economic Growth and Climate Change: Cap-and-Trade or Emission Tax?* 9–11 (Schwartz Ctr. for Econ. Pol'y Analysis Working Paper No. 2009-4, Feb. 2009) (explaining the drawbacks of a cap-and-trade system) (on file with the WASHINGTON AND LEE JOURNAL OF CLIMATE, ENERGY, AND THE ENVIRONMENT).

83. *See id.* at 2 (estimating the time required for implementation).

84. *See id.* at 11 ("The high volatility on the return, due to the tremendous fluctuations of the emission price, poses considerable uncertainty for firms in their investment decisions.").

85. *See* Julien Chevallier et al., *Options Introduction and Volatility in the EU ETS*, 33 RESOURCE AND ENERGY ECON. 855, 873 (2011) (explaining the uncertain nature of predicting the behavior of carbon markets).

86. *See id.* at 863 ("These asymmetries reflect the hedging strategies constructed by market agents to reduce the risk of their position with regard to high/low carbon price changes.").

87. *See id.* at 873 ("Because options enable a more complete and liquid market, and a greater flexibility for market participants to hedge their position on the carbon market, they seem to have a significant impact on the level of volatility in the futures market.").

88. *See* Philip I. Levy, *The Carbon Tax/Cap-and-Trade Royal Rumble*, FOREIGN POL'Y (May 13, 2009), http://shadow.foreignpolicy.com/posts/2009/05/13/the_carbon_taxcap_and_trade_royal_rumble ("Cap-and-trade can do a very good impersonation of a carbon tax when we know the demand for emissions with certainty, when we do a great job of regulation, and when we auction off all the emissions permits.").

89. *See id.* (explaining the cap-and-trade auctioning system).

unstable and unworkable.[90] Furthermore, if the dispersal of permits is obstructed by political interference, the viability of cap-and-trade programs is further weakened.[91]

Cap-and-trade programs, while rudimentary on their face, are somewhat complex in their implementation. They rely on (hopefully) identifying low carbon technologies for cost management in emissions reductions.[92] The objective is that price signals provided by caps extending decades into the future will incentivize the development and use of these low carbon technologies.[93] This is a key assumption to the hoped-for lower future costs of achieving those reductions set by the decreasing cap. Due to the inherent uncertainty of those ideas, however, supplementary policies are necessary to assure further governmental funding and increased incentives for private funding in research and development.[94] These policies take the form of multi-year compliance periods, banking and borrowing provisions, a cost containment mechanism to prevent extreme pricing, and the availability of offsets for carbon capture and sequestration.[95]

The message cap-and-trade programs send to carbon polluters can also be confusing regarding emissions reduction,[96] even though the end goal of a cap-and-trade program is to reduce GHG emissions.[97] These programs propose to reach that goal by requiring polluters to purchase the right to pollute or use permits to pollute for free.[98] In both instances, the government in essence gives permission to carbon polluters to continue

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90. *See id.* (describing the volatile and unreliable nature of the cap-and-trade system because of their reliance on unpredictable factors).

91. *See id.* ("[I]f politics intrudes into the process of handing out emissions permits, then the two approaches [cap-and-trade and carbon taxes] veer apart.").

92. *See* Hahn & Stavins, *supra* note 78, at 3 (outlining the underlying principles of a cap-and-trade system).

93. *See* Robert N. Stavins, *Addressing Climate Change with a Comprehensive U.S. Cap-and-Trade System*, 24 OXF. REV. ECON. POLICY 298, 299 (2008) (outlining the desired effect of a successful cap-and-trade system).

94. *See id.* at 300 ("[A] cap-and-trade system alone will not encourage the socially desirable level of investment in research, development, and deployment of new technologies that could reduce future emission-reduction costs.").

95. *See id.* at 303 (evaluating additional incentive plans to encourage emission reduction).

96. *See* David Driesen, *Capping Carbon* 36 (Syracuse Univ. Coll. of Law, Working Paper No. 31, 2009) ("Trading does not solve any of the key problems hindering effective cap setting, so while it proves useful in reducing costs, it does nothing to improve on traditional approaches in solving environmental problems.") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

97. *See id.* (explaining the desired purpose of the cap-and-trade system).

98. *See* Reuven Avi-Yonah & David Uhlmann, *Combating Global Climate Change: Why a Carbon Tax is a Better Response to Global Warming than Cap and Trade*, 28 STAN. ENVTL. L.J. 3, 5 (2009) (describing the ambiguous message of cap-and-trade as "the government permit[ting] you to pollute as long as you are willing to pay").

polluting. This "right to pollute" notion that cap-and-trade sends to polluters, however, may not be in tune with society's desire to reducing GHG emissions.[99] Even though wording GHG reduction programs as a "tax" may make the programs less likely to pass through the political process, the term sends the message that emitting high levels of carbon is the legislation's target.

B. The EU-ETS and Why it Has Proven Ineffective

1. Inception of the EU-ETS

The EU-ETS is the largest and most influential GHG emission reduction program in the world, comprising every nation in the European Union along with Croatia, Iceland, Norway, and Liechtenstein.[100] Since its inception, it has failed to live up to expectations.[101] With the European Parliament rejection of a back-loading attempt to strengthen the faltering cap-and-trade market for emission allowances, the carbon trading behemoth's days may be numbered. With the ever-growing need for comprehensive carbon emission regulation facing legislatures around the world, the question becomes, what should we do now? It is crucial to understand why the EU-ETS is failing, and what changes must be adopted in order to avoid making the same mistakes again.

The EU-ETS came from very humble beginnings, and can be said to be an amalgam of two other failed climate change initiatives.[102] The sapling that grew into the largest cap-and-trade system of its kind resembles both a failed attempt by the European Commission to install a carbon tax in the 1990s, and the Commission's failed attempt to reject flexible trading principles set forth in the Kyoto Protocol of 1997.[103] The EU-ETS was eventually implemented in 2005 and was split into phases designed to allow

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99. *See* Petherick, *supra* note 64, at 595 (explaining negative social impacts of cap-and-trade).

100. *See EU ETS 2005–2012*, EUROPEAN COMMISSION, *available at* http://ec.europa.eu/clima/policies/ets/pre2013/index_en.htm (last visited Mar. 13, 2014) (describing the history and evolution of the EU ETS and its membership) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

101. *See* Petherick, *supra* note 64, at 595 (noting the failures of the EU-ETS).

102. Frank J. Convery, *Origins and Development of the EU ETS*, 43 ENVTL. RES. ECON. 392, 392 (2009) ("The sapling that became EU-ETS was a product of two failures; first, the European Commission failed in its initiative to introduce an effective EU-wide carbon energy tax in the nineties. Secondly, the Commission fought unsuccessfully against the inclusion of trading as a flexible instrument in the Kyoto Protocol in 1997.").

103. *See id.* at 392 (noting the EU-ETS's failure to satisfy the requirements of the Kyoto Protocol).

changes to the program over time.[104] The first phase, sometimes referred to as the pilot phase, ran from January 2005 to December 2007 and was designed to be a feeling-out process in which the ETS allocated allowances freely.[105] The EU described the first stage as a "learning by doing phase."[106] Fifteen member states of the EU initially adopted the program, incorporating around 12,000 carbon polluters from many different industries.[107] During 2005, the ETS traded 260 million tons of CO_2.[108]

During the following year, the price of the allowances rose to approximately thirty Euros per ton of carbon dioxide, representing the highest level an allowance for carbon has been traded in the ETS program.[109] Then, a handful of EU countries confirmed that their actual emissions were less than the number of allowances allocated to them, resulting in the price of allowances plunging fifty-four percent in one week.[110] The EU had inadvertently over-allocated allowances to the emitters and the lack of scarcity continued to push the price of allowances down.[111] By 2007, the price of allowances in the ETS was almost zero, which in turn obliterated the incentive for the targeted polluters to continue to limit their GHG emissions.[112] The overabundance was caused by the EU allocating too many allowances, and by the fact that during the first few years of the program, polluters lowered their carbon emissions, so they did not need as many additional allowances.[113] In the first phase of the EU-ETS, carbon emissions actually rose by 0.68%.[114]

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104. *See* C. Böhringer & A. Lange, *European Union's Emissions Trading System*, 3 ENCYCLOPEDIA OF ENERGY, NAT. RESOURCE & ENVTL. ECON., 155–60 (2013) (describing the origins of the EU-ETS).

105. *See id.* at 156 (detailing the early phases of the program).

106. *See* Marjan Peeters & Stefan Weishaar, *Exploring Uncertainties in the EU ETS: "Learning by Doing" Continues Beyond 2012*, 2009 CARBON AND CLIMATE L. REV. 88, 91 (2009) (explaining the early uncertainties of the EU-ETS).

107. *See* Yue-Jun Zhang & Yi-Ming Wei, *An Overview of Current Research on EU ETS: Evidence from Its Operating Mechanism and Economic Effect*, 87 APP. ENERGY 1805, 1807 (2010) (detailing the early impacts of the EU-ETS).

108. *See id.* (stating the amount of carbon credits that the EU-ETS traded in 2005).

109. *See* Beat Hintermann, *Allowance Price Drivers in the First Phase of the EU ETS*, 59 J. OF ENVTL. ECON. MGMT. 43, 48 (2010) ("The price [of allowances] increased from around €7 in January 2005 to above €30 in April 2006 before crashing to below €10 within three days.").

110. *See id.* (explaining trends in allowances for cap-and-trade).

111. *See id.* (describing imprecise allocation of allowances that frustrated the purpose of the program).

112. *See id.* (noting the failure of allowances to incentivize carbon polluters to reduce their emissions).

113. *See* Simon Caney & Cameron Hepburn, *Carbon Trading: Unethical Unjust and Ineffective* 31 (Centre for Climate Change Econ. and Pol'y Working Paper No. 49, June 2011), *available at* http://www.cccep.ac.uk/Publications/Working-papers/Papers/50-59/WP59_carbon-trading-caney-hepburn.pdf ("[F]irms actually reduced their emissions in

2. Impact of the EU-ETS on Aviation

An expansion of the scope of the program, and a desire to incorporate aviation emissions underscored the second phase of the EU-ETS.[115] The program began including aviation emissions in 2008.[116] All flights to or from airports in the ETS countries, no matter the carrier nationality, would be required to obtain allowances to cover CO_2 emissions.[117] This was Europe's attempt to create a Border Tax Adjustment (BTA) by selecting the aviation industry as the first to try this scheme.[118] The European Committee believed that this additional industry of polluters would increase the scarcity of the allowances by creating more demand for said allowances, while making a larger impact on lowering carbon emissions in the transportation sector.[119] Some foreign governments and airlines argued "that the EU-ETS in its current form is both unjustly harmful to airlines" and works to effectively nullify previous treaties.[120] Most notably, the U.S. and China opposed the expansion of the EU-ETS into aviation emissions.[121] The U.S. even went so far as to pass anti-ETS legislation called the European Union Emissions Trading Scheme

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the first two years of the phase, motivated by high prices in the 2005 and 2006 period, so that they didn't need as many allowances in 2007. Second, regulators handed out too many EUAs in the first place.") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

114. *See* Press Release, European Commission, Emissions Trading: 2007 Verified Emissions from EU ETS Businesses (May 23, 2008), *available at* http://europa.eu/rapid/press-release_IP-08-787_en.htm?locale=en (highlighting the net increase in carbon emissions during the preliminary phase of the program) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

115. *See* Robert Malina, *The Impact of the European Union Trading Scheme on U.S. Aviation*, 19 J. OF AIR TRANSP. MGMT. 36, 36 (2012) (stating that in 2008 the emissions trading scheme was expanded to include air travel).

116. *See* Annela Anger & Jonathan Köhler, *Including Aviation Emissions in the EU ETS: Much Ado About Nothing?*, 17 TRANSP. POL. 38, 39 (2010) (discussing the implementation of the EU-ETS pursuant to the EU's adoption of the Kyoto Protocol).

117. *See id.* at 39 (noting that the program includes all international flights, unlike the Kyoto Protocol, which only tracked domestic flights).

118. *See* Robert Ireland, *The EU Emissions Policy and Border Tax Adjustments* 3 (World Customs Organization Research Paper No. 26, 2012) (discussing the analogy between the European Union's aviation emissions policy and carbon border tax adjustments) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

119. *See* Anger & Köhler, *supra* note 116, at 42 (noting that more efficient airlines that release fewer emissions incur lower costs).

120. Malina, *supra* note 115, at 36.

121. *See id.* at 36 (stating that both the United States and China have requested exemptions).

Prohibition Act of 2011.[122] In response, the EU included an exemption clause.[123]

3. Recent EU-ETS Developments

Phase I of the EU-ETS implementation saw another issue with an over-allocation of allowances causing the price of those allowances to fall again.[124] One factor for the fall in the allowance prices is that the European nations as well as most of the developed world suffered a recession in 2008.[125] This resulted in corporations and citizens using less energy, and as a result, carbon polluters lowered their output, creating less need for allowances.[126] During Phase II, the price for allowances plummeted further, diminishing the incentive polluters had to reduce their GHG emissions.[127] By the time the EU voted against a proposal to withhold some 900 million future-dated allowances in January 2013, the price for an allowance of one ton of carbon fell to under three Euros.[128] As more countries joined the EU-ETS during the second phase from 2008 to 2012, the program looked to begin incorporating national emissions registries into one EU registry.[129]

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122. *See* European Union Emission Trading Scheme Prohibition Act of 2011, Pub. L. No. 112-200, 126 Stat. 1477 (prohibiting civil aircrafts from the United States from participating in the EU-ETS).

123. *See* Malina, *supra* note 115, at 36 ("Under current EU legislation, an exemption may be granted for airlines from countries that implement measures 'equivalent' to those in the EU to reduce GHG emissions.").

124. *See* Hintermann, *supra* note 109, at 6 (displaying data that documents the price decline, and discussing the possibility that over-allocation may have been part of the reason that aggregate emissions were below total allocations).

125. *See* COMMITTEE ON CLIMATE CHANGE, MEETING CARBON BUDGETS—THE NEED FOR A STEP CHANGE: PROGRESS REPORT TO PARLIAMENT COMMITTEE ON CLIMATE CHANGE 34 (2009), *available at* http://www.official-documents.gov.uk/document/other/9789999100076/9789999100076.pdf [hereinafter MEETING CARBON BUDGETS] (stating that the recession caused the price of carbon to fall) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

126. *See id*. at 67 (noting that the recession has impacted energy-intensive industries and that emissions have thus fallen, so there is less emissions reduction effort needed to meet the cap).

127. *See id.* at 68 (presenting data that shows that the price of allowances declined during Phase II).

128. *See ETS RIP?*, *supra* note 69 (presenting data showing the decline in price for a carbon allowance from approximately twenty euros in 2010 to less than three euros in 2013).

129. *See* Prajakt Samant & Simone Goligorsky, *EU Emissions Trading System Single Registry: Timetable Announced*, NAT'L. L. REV. (May 14, 2012), http://www.natlawreview.com/article/eu-emissions-trading-system-single-registry-timetable-announced (stating that the European Commission announced a single registry with the purpose of incorporating the national emissions registries into a single location) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

Now in Phase III, running from 2013 to 2020, the EU-ETS is focusing on switching from allocating allowances, to auctioning them off.[130] The program will also look to incorporate Australia's carbon trading system to make both systems compatible with one another.[131] The last phase, Phase IV, slated for 2021–2028, could look to increase the rate at which the cap is decreased each year.[132]

According to the UBS Investment Research, the EU-ETS cost $287 billion through 2011 and had "almost zero impact" on the volume of overall emissions of the EU.[133] If that same amount of money had been used to upgrade power plants, or in another targeted way, it could have lowered emissions in the EU by forty-three percent.[134]

4. Why the EU-ETS is Failing

Over the course of its eight-year lifespan, the EU-ETS has struggled to maintain viability throughout Europe, due to a number of factors that have led this system to be inefficient.[135] First and foremost, as

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130. *See* Tim Laing, *Assessing the Effectiveness of the European Union Emissions Trading System* 22 (Ctr. for Climate Change Econ. and Pol. Working Paper No. 126, 2013), *available at* http://www.lse.ac.uk/GranthamInstitute/publications/WorkingPapers/Papers/100-109/WP106-effectiveness-eu-emissions-trading-system.pdf ("Phase II allocation plans have made a move away from free allowance allocation, with all power generation installations in the UK required to buy their permits in auction. The EU ETS as a whole is moving in this direction and will move away from free allocation in the power sector, virtually completely, by Phase III.") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

131. *See The EU Emissions Trading System*, EUROPEAN COMM'N, http://ec.europa.eu/clima/policies/ets/index en.htm (last visited Jan. 30, 2014) ("The European Commission has agreed in principle to link the ETS with Australia's system in stages from mid-2015.") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

132. *See 2030 Framework for Climate and Energy Policies*, EUROPEAN COMM'N, http://ec.europa.eu/clima/policies/2030/index_en.htm (last visited Jan. 30, 2014) (stating that the rate has to be increased to forty percent of 1990 levels by 2030) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

133. *See* Sid Maher, *Europe's $287bn Carbon "Waste:" UBS Report*, THE AUSTRALIAN (Nov. 23, 2011), http://www.theaustralian.com.au/national-affairs/europes-287bn-carbon-waste-ubs-report/story-fn59niix-1226203068972# ("UBS says the European Union's emissions trading scheme has cost the continent's consumers $287 billion for "almost zero impact" on cutting carbon emissions . . . .") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

134. *See id.* ("In a damning report to clients, UBS Investment Research said that had the €210bn the European ETS had cost consumers been used in a targeted approach to replace the EU's dirtiest power plants, emissions could have been reduced by 43% . . . .").

135. *See* Hintermann, *supra* note 109, at 29 (finding that the main problem was inefficiency, led by failures in equality of price allowance and marginal abatement costs).

detailed above, there was a vast over-allocation of allowances in both Phase I and Phase II of the program.[136] This over-allocation clearly illuminates the difficulties inherent when a regulator attempts to set a carbon emissions cap that is both workable and sustainable.[137] There will always be imperfections in a cap because there is no way to predict the future of a national economy, much less dozens of them.[138] The allocation process was also flawed in that it effectively rewarded the worst emitters.[139] Allocations were awarded based on the historical emission levels for the targeted emitters.[140] In function, this gave the most advantage to the continent's worst GHG emitters.[141] In addition, it was very difficult to predict how a given country would react to the implementation of the EU-ETS. Many targeted emitters in the scheme were able to successfully reduce emissions below the initial cap.[142] This led to countries seeing a reduction in the amount of carbon emissions they were producing.[143] While this is obviously a positive change toward the end goal of lowering carbon emissions, it also exacerbated the issue the EU-ETS created when it over-allocated the emissions allowances.[144] In correlation with this two-fold issue of over-allocation, the price of the allowances dropped due to the most basic principles of supply and demand.[145] There was simply no demand for the high supply of allowances that the EU-ETS had allocated to the various targeted

136. *See id.* at 2 (stating that the price crashed after the first round of emissions verifications and after Phase II showing that the markets were over-allocated).

137. *See id.* (discussing how difficult it is to find the specific reasons for the allowance price movement, which still confounds market analysts and economists).

138. *See id.* (implying that there will always be imperfections in the cap due to the inability to predict how the market will move the price, as the underlying reasons are still unknown).

139. *See* COELHO, *supra* note 63, at 2 (noting that the first two phases allocated free permits according to historical emissions, which effectively served as a subsidy for the biggest polluters).

140. *See id.* ("In the first phase, from 2005 to 2007, free permits were allocated according to historical emissions.").

141. *See id.* (stating that the historical emissions policy had a tendency to benefit the biggest polluters).

142. *See* Press Release, *supra* note 114 (providing data regarding emissions reductions).

143. *See id.* (illustrating that several countries, including Belgium, France, Portugal, and Sweden, reduced the amount of carbon emissions that they were emitting).

144. *See* Hintermann, *supra* note 109, at 6 (stating that over-abatement and over-allocation was such a problem because of the much lower actual emissions).

145. *See* Reem Heakal, *Economics Basics: Supply and Demand*, INVESTOPEDIA, http://www.investopedia.com/university/economics/economics3.asp (last visited Feb. 6, 2014) (defining the relationship between supply and price: as supply increases, price decreases) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

emitters.[146] This factor, more than any other, has plagued the cap-and-trade system because it has given emitters no economic incentive to lower their carbon emissions.

The economic recession is also causing problems for the EU-ETS market, as a recession reduces the need for emission permits, as actual output is lower than the scheme's projections that dictate the availability of emission permits.[147] The 2008 banking (and oil)[148] recession, which severely affected the economic foundation of the several EU countries (leading to bailouts)[149] as well as the world economy, created a large drop in the amount of energy that nations used.[150] Three "main determinants" influence the level of emissions in an economy: the demand for electricity, the price of carbon dioxide, and fuel prices.[151] Power plants release significant emissions used by commercial, residential, and industrial

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146. *See* Hintermann, *supra* note 109, at 6 (arguing that there was no demand for allowances because the actual emissions were substantially less than the allocations provided).

147. *See* MEETING CARBON BUDGETS, *supra* note 125, at 2 (noting that the biggest challenge for cap-and-trade programs is the economic environment, as economic conditions will have major implications for the path of emissions).

148. *See* Maximilian A. Staedtler, *Crude Oil Prices*, WHAT MATTERS, http://economatters.files.wordpress.com/2008/10/what-matters-crude-oil-price-chart.pdf (last visited Feb. 6, 2014) (displaying the drop in oil prices before and after the 2008 recession) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); *see also* Sam Montana, *What Caused the Great Recession of 2008–2009?*, KNOJI, http://economics-the-economy.knoji.com/what-caused-the-great-recession-of-20082009/ (last visited Feb. 16, 2014) (discussing how the 2008 recession is referred to as the banking or housing recession due to the housing price boom and lax lending standards) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); Tom Therramus, *Oil Caused Recession, Not Wall Street*, OIL-PRICE.NET, http://oil-price.net/en/articles/oil-caused-recession-not-wallstreet.php (last visited Feb. 16, 2014) (arguing that the crisis was exacerbated because the price of oil climbed from $10 a barrel in 1998 to $147 a barrel by the summer of 2008 and that the rapid rise in energy prices reduced economic demand and made homeownership difficult for many as transportation costs soared) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

149. *See Cyprus Becomes Fifth Country To Seek Bailout*, DEUTCHE WELLE, http://www.dw.de/cyprus-becomes-fifth-country-to-seek-bailout/a-16049277 (last visited Feb. 16, 2014) (stating that several European countries have been bailed out due to the severe recession, including Greece, Ireland, Cyprus, Spain and Portugal, which has distracted the EU from its goal of leading the world to lower levels of emissions) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

150. *See* Bruno Declercq, Erik Delarue & William D'haeseleer, *Impact of the Economic Recession on the European Power Sector's CO_2 Emissions*, 39 ENERGY POLICY 1, 11–12 ("The total difference in emissions of the simulated European power sector during [2008 and 2009] amounts to 175 Mton.").

151. *See id.* at 1 (examining "the impact of the economic recession on CO_2 emissions in the European power sector").

buildings.[152] Typically, building and utility sectors account for around sixty-three percent of an economy's total emissions.[153] As the recession reduced the demand for electricity because consumers had to save money (high unemployment and financial crises along with corporations going bankrupt), the level of carbon emissions declined significantly among power sector facilities.[154] While the lowering of carbon emissions from the power sector is a good result for the environment and public health, it exacerbated the over-allocation issue that was disintegrating the carbon trading market in the EU-ETS.[155]

This global economic phenomenon was not something designed into the ETS system, and because it was beyond the ETS system's control and required multiple countries to vote to change the rules, a quick response was near impossible.[156] This recession highlighted a key problem with cap-and-trade systems using this type of market-based carbon reduction strategy: external pressures on the carbon market can further cripple cap-and-trade systems, which rely on stability and are not readily adaptable to extreme market forces.[157] In a cap-and-trade approach, as goes the economic climate, so goes the effectiveness of the legislation.[158]

Lastly, the EU-ETS is failing because it is not creating the desired effect on its targeted emitters.[159] The cap-and-trade legislation was first proposed because the EU believed carbon dioxide posed a serious threat to the nations making up the EU and to the rest of the world.[160] The ETS was

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152. *See id.* at 11 (describing a model based upon the significant emissions of power plants).

153. *See Sources of Greenhouse Gas Emissions*, ENVTL. PROT. AGENCY, http://www.epa.gov/climatechange/ghgemissions/sources.html (last visited Feb. 6, 2014) (stating that electricity creation comprises thirty-three percent, industry twenty percent, and real estate eleven percent of United States greenhouse emissions) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

154. *See* Bruno et al., *supra* note 150, at 2 (stating that the recession decreased demand for electricity).

155. *See* LUCAS MERRILL BROWN, ENVTL. DEF. FUND, THE EU EMISSIONS TRADING SYSTEM: RESULTS AND LESSONS LEARNED 11 (2012), *available at* http://www.edf.org/sites/default/files/EU_ETS_Lessons_Learned_Report_EDF.pdf (stating that while firms invested in emission reductions, over-allocation was a serious problem) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

156. *See id.* at 27 (discussing the feasibility of quickly responding to phenomena by explaining rigorous regulations that each of the twenty-seven member states must adhere).

157. *See id*. at 5 (noting that commentators have argued that the reductions occurred because of the recession).

158. *See id.* (stating that the EU-ETS is based on other cap-and-trade systems, which tend to have faster and cheaper results).

159. *See* Frank Convery, *Origins and Development of the EU ETS*, 43 ENVTL. RES. ECON. 391, 392 (2009) (outlining a primary failure of the EU-ETS).

160. *See id.* (describing the reasoning behind the system).

designed to tackle the dangers of rapidly rising GHG emissions by creating an incentive for polluters to invest in energy efficiency and clean energy, while consumers reduced demand for carbon-intensive products and fuels.[161] Yet due to the program allocating (and over-allocating) allowances instead of auctioning them, emitters had no incentive to change their habits.[162] For all of the money, time, and resources used to implement this program, it has failed to reach the primary goal of its enactment.[163]

5. Windfall Profits and Uneven Burdens

While proving inefficient in combatting carbon emissions and failing to establish a viable carbon market in all economic conditions, the EU-ETS has been biased, providing a distinct economic advantage to some of the players.[164] A detailed analysis of the power sector under the EU-ETS shows that a significant portion of the costs of carbon emission allowance (whether allocated freely or auctioned) have been passed on to consumers, generating windfall profits for wholesale power producers in Europe.[165] In essence, the EU-ETS has unintentionally worked to bolster the power industry's profits throughout Europe.[166] This realization further demonstrates just how ineffective the cap-and-trade approach has been at sending the correct message to emitters.[167] Instead of rebuking the power industry for emitting carbon into the atmosphere by ensuring that it incurs economic penalties, the EU-ETS has instead allowed emitters to see record profits while ignoring the underlying purpose of the program altogether.[168]

While the power companies' profits soared, electricity consumers throughout Europe have been forced to bear the burden of the program.[169] Studies show that electricity consumers have seen an increase in costs for

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161. *See id.* at 395 (explaining the benefits and incentive structure of the EU-ETS).

162. *See* Coelho, *supra* note 63, at 6 (outlining why the EU-ETS has been so ineffective in reducing emissions).

163. *See id.* at 4 (noting that the EU-ETS did not achieve its intended goal).

164. *See* Wietze Lise et al., *The Impact of the EU ETS on Prices, Profits and Emissions in the Power Sector: Simulation Results with the 47 COMPETES EU20 Model*, 47 ENVTL. RES. ECON. 23, 24 (2010) (describing the unintended advantages of the EU-ETS).

165. *See id.* (explaining the unintended consequence of the carbon emission allowances under the EU-ETS).

166. *See id.* (noting the increased profits to an industry the regulations were supposed to discourage).

167. *See id*. (outlining how windfall profits undermine the purpose of an emissions reduction regime).

168. *See id.* (describing how the EU-ETS actually resulted in increased emissions).

169. *See id.* at 23 (stating that consumers, the intended beneficiaries of this system, are actually paying for the system).

using energy due to the trickledown effect of this approach.[170] Rather than creating stability and certainty, the EU-ETS over the course of eight years has resulted in a fragile, unpredictable, inefficient, and unfair approach to reducing carbon emissions.[171]

6. Carbon Leakage and the Need for Border Tax Adjustments

The EU's competitiveness with other global economies has been impacted by carbon leakage, a by-product of the EU-ETS.[172] Carbon leakage occurs when a developed country threatens or puts into effect restrictions on carbon emissions (cap-and-trade for example) and subsequently emission-dependent industries relocate to countries with no emissions restrictions.[173]

The emitter under restriction—here, industries based in the EU—will need to increase the price of their goods to compensate for internalizing the cost of their emissions.[174] A competitor, from China, the U.S., or another global economy, however, can keep its prices low (or add to profits) because it does not need to internalize the cost of its emissions by adhering to such a restriction.[175] This leakage not only leads to an economic disadvantage for industries in regulated areas, but also undercuts the efforts of the reduction program by increasing emissions in non-regulated areas.[176] Anecdotal evidence shows this already occurred during the 1990s and 2000s. The 1992 Earth Summit in Rio de Janeiro, Brazil led to the drafting of the Kyoto Protocol and called upon developed countries to reduce their GHG emissions.[177] This seems to have led to rapid increases in foreign

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170. *See id.* (verifying that the cost is being passed on to the intended beneficiaries through studies).

171. *See id.* (noting the negative results of the EU-ETS).

172. *See* Stephanie Monjon & Phillippe Quirion, *A Border Adjustment for the EU ETS: Reconciling WTO Rules and Capacity to Tackle Carbon Leakage* 3 (2012) (presented at the X Annual Conf. of the Euro-Latin Study Network on Integration and Trade, Inter-American Development Bank, Milan, Italy, Oct. 19–20, 2012) (describing how border tax adjustments could revive the global competitiveness of the EU economy) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

173. *See* Glen P. Peters & Edgar G. Hertwich, *Trading Kyoto*, 2 NATURE REPORTS 40, 40 (2008) (defining the process of carbon leakage).

174. *See id.* at 41 (describing the industry sales and cost structure under this regime).

175. *See* Kathy Baylis et al., *Leakage, Welfare, and Cost-Effectiveness of Carbon Policy* 2 (Dec. 2012) (unpublished manuscript) (explaining that economies that do not follow the regulations will reduce the regulated area's competitiveness) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

176. *See id*. (describing the result in non-regulated jurisdictions).

177. *See* John M. Truby, *Towards Overcoming the Conflict Between Environmental Tax Leakage and Border Tax Adjustment Concessions for Developing Countries*, 12 VT. J. ENVTL. L. 149, 161 (2010) (outlining the Kyoto Protocol's GHG reduction requirements).

direct investment (FDI) into developing countries with no emissions objectives or restrictions following these announcements.[178] The result: rapidly rising emissions in developing countries.[179] It appears that developed countries promising or actually capping emissions resulted in significant FDI into developing countries, allowing "nations to benefit from the omission to internalize environmental negativities could be both environmentally and economically counter-productive . . . [i]f mobile taxpaying industries relocate to pollution haven countries that offer little environmental regulation . . . ."[180]

In an effort to combat the problem of carbon leakage, many economists and environmentalists have suggested the implementation of Border Tax Adjustments (BTAs).[181] These taxing mechanisms work to create a more even playing field by levying fees onto goods manufactured in countries without carbon emission measures, which are imported into an area that uses some form of carbon taxation.[182] This strategy reduces or eliminates the advantage gained by emitters not operating under emission reduction implements.[183]

The EU-ETS does not incorporate a BTA strategy and the EU continues to be disadvantaged on the global economic stage.[184] The reasons the European Commission has yet to enact a BTA program is likely tied to the difficulty in implementing such a program.[185] The EU would need to determine the scope and extent to which the BTA would apply, and ensure that it satisfies the World Trade Organization's rules.[186] The EU's reluctance could also be attributed to the fear that implementing a BTA would upset the fragile trading balance in the region.[187]

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178. *See id.* at 164 (noting a loophole in which enterprises move to countries with few or no environmental restrictions).

179. *See id.* (explaining that the loophole actually leads to more GHG emissions in the unregulated countries).

180. *Id.* at 157–58.

181. *See id.* at 153 (explaining the economic and scientific justifications for BTAs over cap-and-trade programs).

182. *See id.* at 153–54 (describing how BTAs operate).

183. *See id.* at 152 (arguing that BTAs resolve the problems that have arisen under the EU-ETS).

184. *See* Frank Venmans, *A Literature-Based Multi-Criteria Evaluation of the EU ETS*, 16 RENEWABLE AND SUSTAINABLE ENERGY REVS. 5493, 5498 (2012) (outlining the EU's current regime and how it does not include a BTA strategy).

185. *See id.* (explaining one of the possible reasons why a BTA strategy has not been utilized).

186. *See* Monjon, *supra* note 172, at 2 (noting the potential for a BTA strategy to conflict with WTO rules).

187. *See* Venmans, *supra* note 184, at 5498 (describing a possible reason for not enacting a BTA policy).

Nevertheless, it is important to ask whether cap-and-trade is the best system or whether a carbon tax more efficiently reduces emissions for the EU?[188]

III. Carbon Tax

A. Carbon Tax at a Glance

With the struggles of the EU-ETS weighing heavily on the minds of legislatures around the world, the question becomes: is there a more effective way to enact climate change legislation?[189] The most popular alternative to the cap-and-trade scheme is carbon taxation.[190] A carbon tax is a tax levied on each ton of carbon dioxide emitted.[191] Most of the literature recognizes the carbon tax as the most basic form of climate change regulation that aims to lower carbon emissions.[192] As I have previously discussed, carbon emitters, be they consumers, producers, or distributers, create negative externalities in the form of pollution that affects every aspect of society.[193] A carbon tax acts as an instrument that internalizes those negative externalities.[194] Environmentally, a carbon tax implements the "polluter pays" principle, outlined in Principle 16 of the Rio Declaration.[195] Economically, this internalization through carbon taxation

188. *See* Michael J. Waggoner, *The House Erred: A Carbon Tax is Better than Cap and Trade* 1257–62 (U. of Colo. Law School, Working Paper No. 09-18, Oct. 15, 2009) (outlining the differences between a carbon tax and a cap-and-trade system).

189. *See id.* (describing a more effective alternative to the EU-ETS).

190. *See generally* Levy, *supra* note 88 (explaining that carbon taxation is most attractive option other than the cap-and-trade system).

191. *See* Miles Young*, Beautifying the Ugly Step-Sister: Designing an Effective Cap-and-Trade Program to Reduce Greenhouse Gas Emissions*, 5 BYU L. REV. 1379, 1380 (2009) (explaining how a carbon tax operates).

192. *See* Waggoner, *supra* note 188, at 1258 (outlining the basic nature of the carbon tax system).

193. *See* Sewalk, *supra* note 1, at 3 (citing W.J. Baumol, *On Taxation and the Control of Externalities*, 62 AM. ECON. REV. 307 (1972); R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (Oct. 1960)) (explaining that there are numerous negative consequences from carbon emissions).

194. *See* Duff, *supra* note 4, at 2069 (describing how a carbon tax would reduce the negative consequences currently associated with a cap-and-trade system).

195. *See* United Nations Conf. on Environment and Development, Rio de Janeiro, Braz., June 3–14, 1992, *Rio Declaration on Environment and Development*, princ. 16 U.N. Doc. A/CONF.151/26 (Vol. I) Annex I (Aug. 12, 1992), *available at* http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm ("[T]he polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.").

creates a justifiable reason to impose the tax.[196] In summary, a carbon tax mandates that whoever causes the pollution is responsible for bearing the costs of the harm the pollution creates, as well as the cost of minimizing future harm.[197]

Interestingly, many politicians do not support a carbon tax.[198] As detailed above, this negativity likely stems from the unpopularity of anything called a tax.[199] Carbon taxes, however, have many distinct benefits that should make the strategy appealing to both politicians and citizens alike.[200] Carbon taxes ensure that products reflect their environmental impacts, advocate new environmental technologies, generate revenue, and concern a very limited implementation phase.[201] Additionally, proponents of carbon taxes champion the advantages of the tax for its lack of interference with other regulatory systems, the unmistakable message the tax sends, and the price stability of carbon taxation.[202]

Carbon taxation proposals generally offer two directions for the revenue created by the revenue-neutral tax.[203] The first is an equal dividends approach, where the revenues would be rebated directly to all residents of a particular country or region in equal portions.[204] The second revenue direction, a taxation shift approach, takes each dollar of revenue and reduces the existing taxes by that amount.[205] This approach could offset federal or state income taxes, payroll taxes, or sales (VAT) taxes.[206] Both of these approaches return revenue to consumers and would make the public

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196. *See* Duff, *supra* note 4, at 2069 ("[E]nvironmental taxation is typically justified as a way to internalize negative externalities, requiring economic actors to take the full costs of their behaviour into account when determining their actions.").

197. *See* Sewalk, *supra* note 1, at 3 (explaining that future harm will be minimized if the carbon tax is implemented).

198. *See* Hahn & Stavins, *supra* note 72, at 25 (stating that many legislatures have only enacted a cap-and-trade system).

199. *See id.* (describing the reasons why cap-and-trade systems have been embraced rather than carbon tax systems).

200. *See* Duff, *supra* note 4, at 2069 (noting the advantages of a carbon tax system).

201. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 7 (outlining specific benefits of a carbon tax).

202. *See, e.g.*, Roberta Mann, *To Tax or Not to Tax Carbon—Is That the Question?*, 24 NAT. RES. & ENV'T 44, 44 (2009) (describing the advantages of a carbon tax system over a cap-and-trade system).

203. *See Pricing Carbon Efficiently and Equitably*, CARBON TAX CTR., http://www.carbontax.org/introduction (last updated Sept. 17, 2013) ("Two primary return approaches are being discussed.") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

204. *See id.* (discussing the equal dividends approach).

205. *See id.* ("In the other revenue return method, each dollar of carbon tax revenue would trigger a dollar's worth of reduction in existing taxes . . . .").

206. *See id.* (noting that federal payroll tax and state sales tax could be reduced under the plan).

more amenable to a carbon tax, and both approaches are generally designed to ensure that the tax does not become regressive.[207] Unfortunately, much like cap-and-trade proposals, there is no assurance that the underlying goal of lowering carbon emissions will be served by these types of carbon taxes because they focus on consumers reducing their carbon consumption through new and improved technologies, energy efficiencies and cleaner power plants.[208]

Before the adoption of the EU-ETS, the EU proposed a carbon tax to be implemented broadly over Europe.[209] However, many EU members viewed the broad taxation as a threat to national autonomy because tax authority is traditionally a sovereign right of individual countries.[210] Similar arguments for autonomy would likely occur if similar mitigation efforts involving taxation were attempted in NAFTA[211] or other economic or political unions. Every nation belonging to the EU, however, has some form of an energy tax.[212] Additionally, the European Commission has issued directives recommending energy taxes that address global climate change.[213]

Carbon taxation has the potential to be more effective than the current EU-ETS cap-and-trade program currently in place; however, a carbon tax has many of the same drawbacks.[214] The largest potential pitfall of a carbon tax is that while it provides price certainty, it does not guarantee that emissions will be reduced.[215] Just like cap-and-trade systems, there are

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207. *See id.* (explaining that equal dividends and taxation shift approaches are both progressive schemes and not regressive).

208. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 26 (discussing consumer choice in automobiles and the higher price of low emission vehicles as reasons why the increased production of more efficient cars might not immediately reduce emissions).

209. *See* Convery, *supra* note 159, at 392–93 (2009) (discussing the failure of the 1992 EU-wide proposal).

210. *See id.* (discussing concerns that the tax would impede on States' autonomy to tax and manage their economies).

211. *See generally* North American Free Trade Agreement, Dec. 17, 1992, H.R. Doc. No. 103-159, 32 I.L.M. 289 (creating a free trade region that includes the United States, Canada, and Mexico).

212. *See* EUROPEAN COMMISSION, TAXATION TRENDS IN THE EUROPEAN UNION 5 (2009) (discussing the different tax rates of members of the European Union) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

213. *See, e.g.*, Council Directive 2003/96, art. 1, 2003 O.J. (L283) (EC) ("Member States shall impose taxation on energy products and electricity in accordance with this Directive.").

214. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 17–20 (discussing the drawbacks of a carbon tax).

215. *See* Naomi Oreskes, *Metaphors of Warfare and the Lessons of History: Time to Revisit a Carbon Tax?*, 104 CLIMATIC CHANGE 223, 227–28 (2011) (discussing the argument that taxation does not guarantee reduction in emissions).

incentives under a carbon tax for polluters to lower their carbon emissions, but this does not ensure that the reductions will occur, or that they will be sufficient to avoid the disastrous impacts of global warming.[216] Nothing in the carbon tax system implements new cleaner forms of energy.[217] A carbon tax has the same limitations that cap-and-trade programs have in that they may not address the main underlying issues for the GHG emission legislation, environmental and public health.[218]

B. Advantages of Carbon Taxation Over Cap-and-Trade

Carbon taxation has some clear-cut advantages over the current EU-ETS system as well as other cap-and-trade emission reduction strategies. These advantages are present in the implementation of the program, the certainty of the program's effectiveness, the ability to enforce the carbon tax, and the environmental impact of the program.[219]

1. Certainty of Cost and Benefit

It is clear that both carbon taxation and cap-and-trade systems are market-oriented schemes constructed to reduce carbon emissions.[220] Yet, there is still an ongoing debate on which approach is superior.[221] Perhaps the largest area of discrepancy between the two approaches is the benefit certainty versus cost certainty standard.[222]

In a cap-and-trade system, the cap, or maximum amount of allowable emissions, provides the environmental benefit from the emissions reduction.[223] This is called the "benefit certainty."[224] "Benefit certainty," however, does not mean that benefits will actually occur, as we have

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216. *See id.* at 227 (arguing that neither cap-and-trade programs nor a tax on carbon emissions can guarantee that GHG emission reductions will be made).

217. *See id.* (stating that carbon taxes are only proven to raise revenue).

218. *See id. at* 228 (explaining that the public's approach to a carbon tax regime affects the amount that GHG emissions are lowered).

219. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 37–45 (discussing the advantages of a carbon tax).

220. *See id.* at 5–7 (noting that both a carbon tax and a cap-and-trade system are market based approaches).

221. *See id.* at 50 (concluding that a carbon tax is a better approach than cap-and-trade).

222. *See id.* at 36 (discussing the relationship of benefit certainty to cap-and-trade and cost certainty to a tax on carbon emissions).

223. *See id.* ("Cap and trade, because it imposes an overall cap on the level of emissions permitted in the economy, provides certainty as to the environmental benefit that results from its implementation.").

224. *See id.* (discussing the meaning of "benefit certainty").

noticed in the EU, which is the biggest flaw of cap-and-trade.[225] Additionally, all cap-and-trade programs have reversion mechanisms to a carbon tax should the price of carbon get out of hand.[226] In other words, a country would never shut down its power sector simply because emission permits for the year were all used by November.

The carbon taxation system, on the other hand, relies on a pre-determined carbon emissions price, set in advance, allowing emitters to plan future power plant upgrades to reduce emissions and improve efficiencies.[227] It also allows consumers to plan their purchases.[228] With this set pricing strategy, carbon taxation establishes cost certainty.[229] Cap-and-trade programs cannot match this cost certainty because there will be fluctuations in the market over time, and the cost will be adjusted accordingly.[230] In practice, this stability in price that coincides with a carbon tax could prove to be as much as five times more cost-effective than cap-and-trade programs.[231] It is also important to note that the "benefit certainty" of the cap-and-trade program can be nullified if the cap is set at an inappropriate level and there is no incentive for emitters to comply with the regulations.[232] This is precisely what occurred in the initial phases of the EU-ETS.[233] The "benefit certainty" was undermined because over-allocation of allowances negated the incentive for emitters to comply with the regulation, leading to disappointing emissions reduction results.[234] Thus, the certainty of the benefit is somewhat of a misnomer because the benefit is not concrete. In carbon taxation, while there is no "benefit certainty" (an

225. *See supra* Part II.A.2 (discussing disadvantages of cap-and-trade).

226. *See* Avi-Yonah & Uhlmann, supra note 98, at 43 (discussing safety valves as the only way to prevent cost uncertainty in cap-and-trade regimes).

227. *See id.* at 36 ("[T]he precise amount of the tax is set in advance.").

228. *See id.* at 42–44 (stating that cost certainty for businesses allows them to plan ahead because they are certain of possible tax rates).

229. *See id.* at 42 (describing the pricing of a carbon tax regime).

230. *See id.* at 42–43 (discussing how market fluctuation and the changing price of allowances in a cap-and-trade system could undermine the entire system).

231. *See* Kenneth C. Johnson, Beware of the Dogmatist: A Consensus Perspective on the Tax-Versus-Cap Debate 1 (July 4, 2008) (unpublished manuscript), *available at* http://ssrn.com/abstract=1154638 ("A carbon tax . . . would provide price stability, and could theoretically be five times more cost-efficient than cap-and-trade.") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

232. *See id.* at 1 ("[T]he 'environmental certainty' of caps and standards is a dubious advantage if emissions are not actually capped at a sustainable level, and if the regulations provide no incentive for over compliance even when emission prices are very low.").

233. *See* Hintermann, *supra* note 109, at 45 (describing the first phase of the EU-ETS).

234. *See id.* at 45–46 (stating that emissions were well under the cap set based on industry projections and the price of allowances dropped substantially).

issue addressed by carbon tax with reinvestment),[235] there is, however, clear "cost certainty."[236] The debate between which "certainty" is better becomes tilted heavily in cost certainty's favor when political intervention and unsustainable caps join the equation. In this regard, carbon taxation is a superior market-based approach to reduce GHG emissions.

2. Implementing the Strategy

Cap-and-trade is a strategy wrought with complexity.[237] This complexity is somewhat limited due to the "upstream" nature of the program.[238] In essence, the cap imposes taxation onto the producer, rather than the final produced good, meaning most of the citizenry is unaffected by the taxation.[239] Citizens will see the added cost, but do not need to purchase permits to pollute. While this appears to imply a more simple approach because fewer emitters are involved, the system creates complexity in implementation and oversight of the scheme.[240] First, the cap-and-trade program calls for extensive data collection in order to establish the cap amount.[241] Then a decision to allocate, evenly distribute, or auction allowances must be made.[242]

While this is simple in theory, the EU-ETS has shown it can be complex in its application and can create serious deficiencies if the program is not adjusted appropriately.[243] When the legislation calls for free allowance allocation, the regulators in the scheme must decide who is to

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235. *See* Sewalk, *supra* note 79, at 613–14 (arguing for a regime of carbon tax with reinvestment).

236. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 42 (describing the cost certainty of carbon tax regimes).

237. *See* Zhang, *supra* note 107, at 1805 (stating that the complexity of the EU-ETS is "universally acknowledged").

238. *See* Joseph Aldy & Robert Stavins, *Economic Incentives in a New Climate Agreement* 3 (Belfer Ctr. Sci. & Int'l Aff., Working Paper, 2008) (discussing policy choices that lead to upstream regulation) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

239. *See id.* (stating that cap-and-trade works to limit the emissions of a producer).

240. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 38 ("[T]he trading in allowances needs to be set up and monitored: a system needs to be devised to prevent the same allowance from being used twice, and penalties need to be established for polluters who exceed their allowances.").

241. *See id.* at 38–39 (explaining that one complexity of a cap-and-trade system is determining where to set the cap).

242. *See id.* at 38 (describing that another complexity of a cap-and-trade system is that "the proposal needs to determine how allowances will be created and distributed, either for free or by auction").

243. *See generally* Petherick, *supra* note 64 (analyzing the cost of carbon in the European market).

receive the allowances and how many allowances they should receive.[244] Again, a simple-sounding task proved to be difficult during Phase I and II of the EU-ETS.[245] In an auction of allowances, the regulating body must monitor the process of the auctioning to prevent fraud.[246] This necessary fraud management strategy would also surely increase the cost of the cap-and-trade program.[247] Next, another system of monitoring needs to be enacted to ensure fair trading of the outstanding allowances, those allocated freely or auctioned off. This endeavor would ensure that allowances are utilized once, but not more.[248] In addition, cap-and-trade legislation must create an international enforcement policy for rule breakers if allowances are traded across international borders.[249] Lastly, provisions must be put in place to regulate banking and borrowing allowances.[250] These provisions would create safety measures to protect against extreme cost uncertainty.[251] If the cap-and-trade program calls for offsets for carbon sequestration and storage, a provision must also regulate these activities.[252] Cap-and-trade programs, if they are to be effective, must also entail intense monitoring and reporting initiatives.[253] It cannot be denied that all the requirements inherent in a cap-and-trade program impose complexities onto the implementation of the program.[254] Further, the more complex the program, the longer it takes to create and adjust each aspect of the scheme.[255] In

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244. *See* Aldy & Stavins, *supra* note 238, at 2 (describing the decisions that policymakers face after choosing an allowance program).

245. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 49 (stating that the initial EU-ETS has not been successful).

246. *See id.* at 38 (discussing how the auction system requires a complex monitoring system in order to prevent cheaters).

247. *See id.* at 48 (favoring tax programs over cap-and-trade because tax programs are far less complex and can be administered by the IRS).

248. *See id.* at 49 (explaining the need for fraud prevention).

249. *See id.* at 47 (discussing the importance of incentivizing renegade nations to impose carbon taxes).

250. *See* Aldy & Stavins, *supra* note 238, at 3 (explaining the importance of banking and borrowing provisions for effective emissions regulation).

251. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 47 (stating that banking and borrowing provisions smooth the prices of allowances over time).

252. *See* Metcalf & Weisbach, *supra* note 246, at 38 (stating that multiple obstacles, including regulatory obstacles, are associated with carbon sequestration).

253. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 32 (discussing how monitoring and enforcement costs can easily become unwieldy in a complex cap-and-trade program).

254. *See id.* at 38 (explaining the complexities of cap and trade systems as they compare to taxes on carbon emissions).

255. *See* Kenneth Richards & Stephanie Richards, The Evolution and Anatomy of Recent Climate Change Bills in the U.S. Senate: Critique and Recommendations 110 (July 2009) (unpublished manuscript) (explaining the desirability of administrative simplicity in any program) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

summation, the EU should cut its losses with the ETS altogether and adopt a new program, one based on a carbon tax, rather than attempt to adjust the failing cap-and-trade program, which is so difficult and slow to implement.

Carbon taxation is built around a simpler approach that can be implemented into the framework that already exists in the European Commission. There is no need to create and regulate a market, a continuing struggle for the EU-ETS. A carbon tax could be imposed on all goods and services in Europe, as well as on all imported goods and services.[256] For example, the tax could be set at ten dollars for every ton of carbon emitted to create the commodity. The tax could then increase over time as emitters become more accustomed to the tax.[257] A carbon tax program can become more complex, but complicating it by incorporating tax credits and other measures would make it more cumbersome to manage. Regardless, it is much simpler to adopt and manage than similar cap-and-trade approaches.[258]

3. Revenue Creation

Another clear advantage of a carbon tax-based program for reducing carbon emissions over cap-and-trade based programs is that a carbon tax, no matter the form, will create revenue for the administrator.[259] For example, a very low tax of only ten dollars per ton of carbon would generate multiple billions of dollars for the EU each year.[260] Of course, the higher the tax levied on the carbon emitted, the greater the revenue amount.[261] The use of this revenue would be very determinative of how the regulated population felt toward the legislation. One of the biggest criticisms against the carbon tax approach is that it has the potential to be jeopardized by becoming regressive.[262] A cap-and-trade system has the same drawback.[263]

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256. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 32 (stating that a carbon tax would be imposed on all carbon, oil, and natural gas, whether domestically produced or imported).

257. *See id.* at 32–33 (explaining that the tax could be adjusted over time to produce the desired results).

258. *See id.* at 7 (arguing that a carbon tax system is comparatively easier to implement, adjust, and enforce).

259. *See id.* at 40 ("A carbon tax by definition generates revenue.").

260. *See id.* (predicting that a modest tax of ten dollars per ton of carbon content could generate upward of fifty billion dollars annually).

261. *See id.* (stating that an increase in the rate of taxation will produce an increase in revenue).

262. *See id.* at 41 (suggesting that revenue from the tax should first be used to address regressive effects).

263. *See id.* at 33 (discussing the potentially regressive effects of both tax and cap-and-trade programs).

Low-income households spend a greater percentage of their income on energy needs than do higher income earning households.[264] Accordingly, the brunt of any rise in the energy price will be felt more severely by the low-income earning households.[265] Also, certain nations that are more dependent on coal will participate more in the carbon emissions reductions set forth in the program.[266] The best policy for the EU, or any regulating group around the world, is to accommodate these political and economic issues while not compromising the principles that make the program cost-effective.[267] If enacted correctly, with price stability, carbon taxes will generate revenues that may be utilized to provide compensation to those most affected by the tax.

4. Environmental Impact

While we may lose our focus by looking exclusively at economics, politics, and finance; it is important to remember why this legislation is important. The goal is to protect the environment and the public's health.[268] In terms of climate change, everyone is a polluter, though not everyone pollutes to the same extent.[269] Perhaps the biggest downfall for the proposals to date is that neither cap and trade nor carbon taxes have provided proof that there will be a real reduction of carbon emissions if their approach is adopted.[270] Both merely propose that a reduction of carbon emissions will likely follow the adoption of the program.[271] Cap-and-trade

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264. *See* Dallas Burtraw, Rich Sweeney & Margaret Walls, *The Incidence of U.S. Climate Policy: Where You Stand Depends on Where You Sit* i (Resources for the Future, Discussion Paper 08-28, Sept. 2008) (stating that lower income households spend proportionately more of their incomes on energy expenses) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

265. *See id.* (finding that this distinction in proportional spending will lead to lower income families experiencing a more noticeable increase in energy prices).

266. *See* Richard Tol, *The Polluter Pays Principle and Cost-Benefit Analysis of Climate Change: An Application of Fund* 9 (FEEM Working Paper No. 88.2006) (explaining that in some scenarios, countries will be responsible for participation in the program proportional to their coal use).

267. *See* Burtraw et al., *supra* note 267, at iv (discussing the difficulty in choosing an environmental policy in a cost-effective manner in the face of the constraints that Congress faces).

268. *See id.* at xi (suggesting that regardless of the type of legislation that Congress ultimately implements, it should make a statement to the effect that all provisions are drafted with the goal of environmental protection).

269. *See* Tol, *supra* note 266, at 6 (proposing different scenarios that would take into account the amount in which a nation contributed to climate change).

270. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 39 (discussing the untested nature of carbon tax programs and cap-and trade-programs).

271. *See id.* (stating that the results of these programs are essentially hypothetical).

assumes that market-based implementations will provide enough incentive for emitters to invest in and utilize new, "greener" technologies.[272] Proponents of cap-and-trade believe that this incentive will lead to an overall reduction in carbon emissions.[273] On the other hand, carbon taxation is designed on the theory that by increasing the cost of carbon production throughout the chain of distribution, the use of carbon intensive products will be less desirable and the public will be prompted to purchase items with a lower carbon intensity or usage.[274] Estimates and educated guesses as to the effect of any particular program's efficiency in lowering GHG emissions jeopardizes the credibility of the approach as a whole, and may jeopardize the environment as well.

IV. Carbon Tax With Reinvestment

A. All Consumers Pay Under Carbon Tax with Reinvestment

As I have previously argued, neither cap-and-trade nor carbon taxation are capable of reducing GHG emissions with any concrete certainty.[275] If the EU and other nations are to have a resonant impact on carbon emissions in the future, it is imperative that the system approaches lowering GHG emissions aggressively. The EU-ETS has shown that without a program that will approach lowering carbon emissions with certainty; it may prove difficult to achieve the emissions reductions nations are hoping to achieve.[276] To ensure a decrease in emissions, new legislation must look to regulate all emitters, not just a certain subset.[277] A better alternative is the carbon tax with reinvestment approach.[278] A carbon tax with reinvestment is unique in that it directly targets all carbon consumers and taxes them through a downstream strategy.[279] Uniquely, a carbon tax with reinvestment looks to incorporate the societal costs of GHG emissions

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272. *See* Hahn & Stavins, *supra* note 72, at 11 (arguing that utilities will spend money on further abatement measures).

273. *See id.* at 3–4 (discussing the theoretical underpinnings of a cap-and trade-ystem).

274. *See* Waggoner, *supra* note 188, at 1260–61 (stating that cap-and-trade programs will behave like a sales tax, and have the same effect on consumers as any regressive tax).

275. *See* Sewalk, *supra* note 79, at 609 (explaining that there is no certainty that implementing a cap-and-trade or carbon tax policy will result in real reductions of GHG emissions, particularly ones that the economy can afford).

276. *See id.* at 593 (discussing the many problems the EU-ETS had during its first trading period).

277. *See id.* at 609 (proposing that a new regulation must include all emitters and guarantee real reductions in carbon emissions).

278. *See id.* at 610 (discussing a carbon tax with reinvestment policy and its effectiveness).

279. *See id.* (analyzing the carbon tax with reinvestment strategy).

and promote emissions reductions.[280] The most obvious difference with this program is the reinvestment piece, which will work to nullify any doubt that the proposal will achieve the goals of benefitting society through environmental and health implications.[281] The monetary payment acts as a payoff of the environmental costs imposed from the destructive emission of carbon, and it serves to send an undeniable message about how serious curbing GHG emissions will be taken.[282] Constructing environmentally friendly energy production facilities will only further the message that the tax itself sends.

B. The Basics of Carbon Tax with Reinvestment (CTR)

One of the most striking aspects of carbon tax with reinvestment is its simplicity. For example, the tax could be initially set at five dollars per ton of carbon contained within the product based on emissions intensity.[283] The tax can be assessed either at the source or at the border on the good or service based on the emission's intensity (GPD/ton of CO_2), with the tax eventually paid by the consumer, as is always the case for a carbon tax or cap-and-trade.[284] Because everyone is an emitter based on carbon intensity, no one is exempt from the tax.[285] Following an implementation period, the tax rate increases systematically and provides certainty to industries and consumers for investment and planning purposes.[286] Despite an analysis remarking on the ability of increasing taxes to reduce future emissions, the carbon tax with reinvestment does not rely on the public option to reduce carbon emissions.[287] Unlike cap-and-trade and a carbon tax, the carbon tax with reinvestment is not linked to the merely possible acquiescence of the

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280. *See id.* ("This carbon tax with reinvestment would directly tax all carbon emitters through a downstream approach, as opposed to cap-and-trade's limited upstream proposals. This tax accounts for the societal costs of carbon emissions, and through this accountability promotes emission reductions just like cap-and-trade.").

281. *See id.* at 616 (explaining that the effective emission reductions would mitigate negative environmental and social health impacts of climate change).

282. *See* Sewalk, *supra* note 1, at 144 (noting that the goal of the CTR is to refund monies collected over a long period of time through cheaper and cleaner energy).

283. See *id.* ("For the base model, the assumption is that the CTR would start in year 1 at $5/ton.").

284. *See* Sewalk, *supra* note 79, at 591 (explaining the cost-shifting occurrence after the CTR is implemented).

285. *See id.* at 619 (discussing how the downstream tax works and stating that no one will be exempted from the tax).

286. *See id.* at 610 (explaining that every year the tax rate increases by $5 per ton of carbon).

287. *See id.* ("Despite an analysis remarking on the ability of increasing taxes to reduce future-and short-term emissions, the carbon tax with reinvestment does not rely on a public option to reduce GHG emissions.").

power sector to adopt greener means of production.[288] The revenue from the taxation will be funneled into building new infrastructure for energy production.[289] Wind, geothermal, nuclear, and solar facilities and other renewable and clean sources of power are built, taking the place of power plants that rely on carbon-emitting processes.[290] This alleviates the need to provide other incentives such as tax credits or incentives to develop and build these industries.

Further, because the revenue for the construction of these facilities will come from the tax implemented by the program, there will be no disadvantages for utility providers, because they will not bear the burden of paying for building new plants.[291] Perhaps even more significantly, there will be no loss of jobs or production.[292] The investment in new infrastructure will actually create new jobs, estimated at over 600,000 jobs for construction and over 2.5 million direct, indirect, and induced jobs for the EU.[293] By transforming old power installations into new low-to-no emissions facilities, the carbon tax with reinvestment program will more quickly force emissions down without having to rely on market forces.[294] Strategically, this tax is designed to be phased out over time.[295] Although the tax rate rises from five dollars to fifty dollars per ton over a ten-year

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288. *See* Sewalk, *supra* note 1, at 144 (discussing how the CTR would motivate industry to purchase energy-efficient machinery).

289. *See* Sewalk, *supra* note 79, at 610 (discussing how the revenue from the tax will be used to build new, low emission infrastructure for energy production).

290. *See* Sewalk, *supra* note 1, at 146 (determining that the amount of infrastructure is contingent on the means of energy production).

291. *See* Sewalk, *supra* note 79, at 611 ("There will be no added expense for the utilities, as they will not be the ones bearing the cost of construction, and neither jobs nor production will be lost.").

292. *See* Sewalk, *supra* note 1, at 148 (explaining that both political parties will support CTR because it actually creates a significant number of jobs).

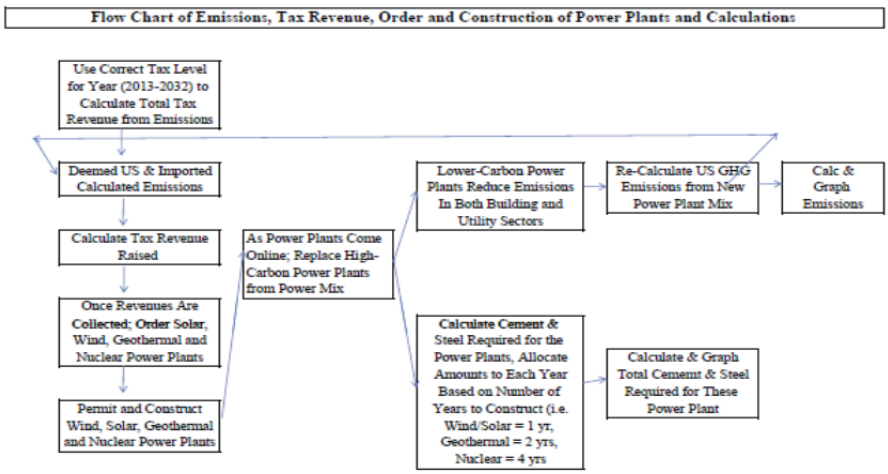
293. *See generally* ROBERT BACON & MASAMI KOJIMA, THE WORLD BANK, ISSUES IN ESTIMATING THE EMPLOYMENT GENERATED BY ENERGY SECTOR ACTIVITIES (2011), *available at* http://siteresources.worldbank.org/INTOGMC/Resources/Measuring_the_employment_impact_of_energy_sector1.pdf (using carbon tax revenues to calculate direct, indirect, and induced jobs, and calculating total jobs from those data sets) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); EUROPEAN COMMISSION, SOCIO-ECONOMIC ROLE OF NUCLEAR ENERGY TO GROWTH AND JOBS IN THE EU FOR TIME HORIZON 2020-2050 (undated), *available at* http://ec.europa.eu/energy/nuclear/forum/opportunities/doc/opportunities/2012_04_04/socio economic_role_nuclear_2020_2050_final.pdf (calculating increased employment from nuclear energy production) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

294. *See infra* Figs. 6 & 7 (showing how an implemented carbon taxation with reinvestment plan would lower emissions substantially over time).

295. *See* Sewalk, *supra* note 79, at 588 (showing how the proposal creates a system that gradually decreases the tax over time).

period, there is a peak in total tax in the tenth year, followed by a rapidly declining period of tax collection as a percentage of the economy.[296] This occurs, as shown in Figure 1, because as new power plants replace older power plants the level of emissions declines significantly.[297] Figure 1 is the flow chart to explain how funds are collected and used. The model is based on all GHG emissions being taxed. The taxes raised are used to order and construct new power plants.[298] These power plants, once on line, replace existing power plant infrastructure.[299] Replacing existing power plants reduces emissions, resulting in future lower tax revenues.[300]

Figure 1: Model Flow Chart[301]



In twenty years, EU countries or the U.S., slower growing developed countries, can achieve a thirty-eight to seventy-four percent

296. *See id.* at 623 (describing the tax structure).

297. *See id.* at 611 (discussing how replacing power plants will reduce emissions significantly).

298. *See id.* at 610 (explaining that the tax will be funneled to constructing new power plants).

299. *See id*. at 611 (discussing how current power plants will be replaced by nuclear, geothermal, solar, and wind facilities, among others).

300. See *id*. (explaining how the new infrastructure will emit less carbon, causing less carbon tax to be collected).

301. Unless otherwise noted, all figures appearing in this article were created by the author for his dissertation: Carbon and Energy: The Limitations of Utility and Building Infrastructure (2010) (unpublished Ph.D. dissertation, University of Colorado at Boulder) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

reduction in GHG emissions in the building and utilities sector.[302] The benefits afforded to all nations or unions that adopt the carbon tax with reinvestment are substantial.[303] As dirty, expensive energy is eventually replaced with energy that is clean and inexpensive, nations will have adopted highly energy-efficient devices.[304]

The tax begins simply enough at five dollars per ton of CO_2 and increases by five dollars per ton each year until the tax reaches fifty dollars per ton in year ten.[305] Figures 2 and 3 show the economic impact of this tax based on revenues raised from that tax as a percentage of the EU and U.S. economies. The tax peaks at 1.84% for the EU-27 and 2.49% for the United States. It peaks higher in the U.S. because the U.S. is more carbon-intensive (using more fossil fuels) than the EU.[306]

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302. *See infra* Figs. 6 & 7.

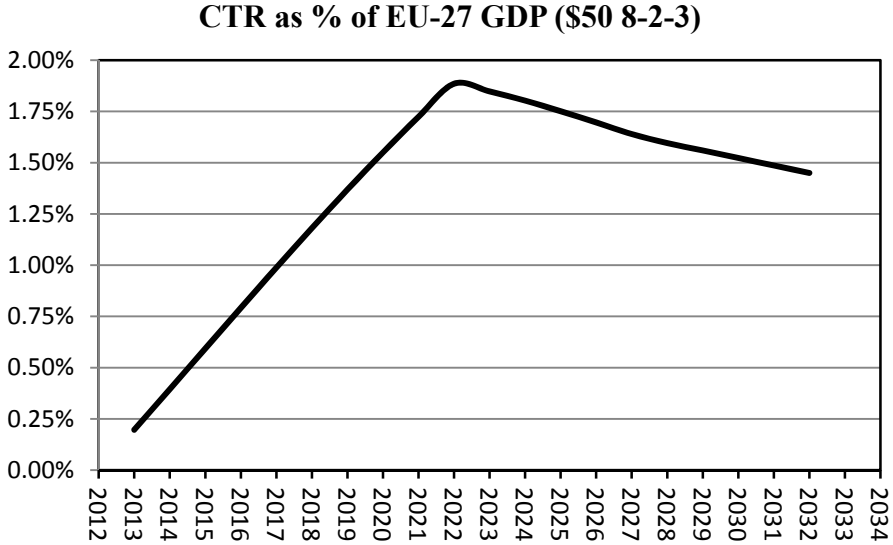
303. *See* Sewalk, *supra* note 1, at 144 (highlighting the benefits of switching from dirty to clean energy).

304. *See id.* (analyzing the switch from dirty to clean energy).

305. *See* Sewalk, *supra* note 79, at 611 (discussing the carbon tax with reinvestment model).

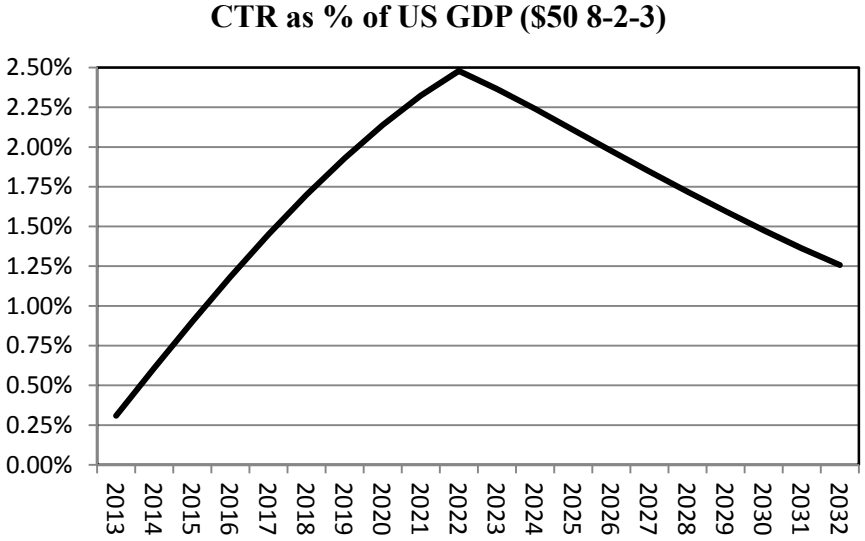
306. *See id.* at 595 (explaining that the United States has higher regional carbon emission intensities).

Figure 2: Estimated Revenues from CTR as a percentage of the EU-27 GDP (2013–2032)[307]



307. Revenues are calculated at five dollars per ton of GHG emissions in year one, rising by five dollars per ton each year until the carbon tax rate reaches fifty-dollars per ton in year ten. All goods and services, domestic and imported, are taxed based on emissions intensity.

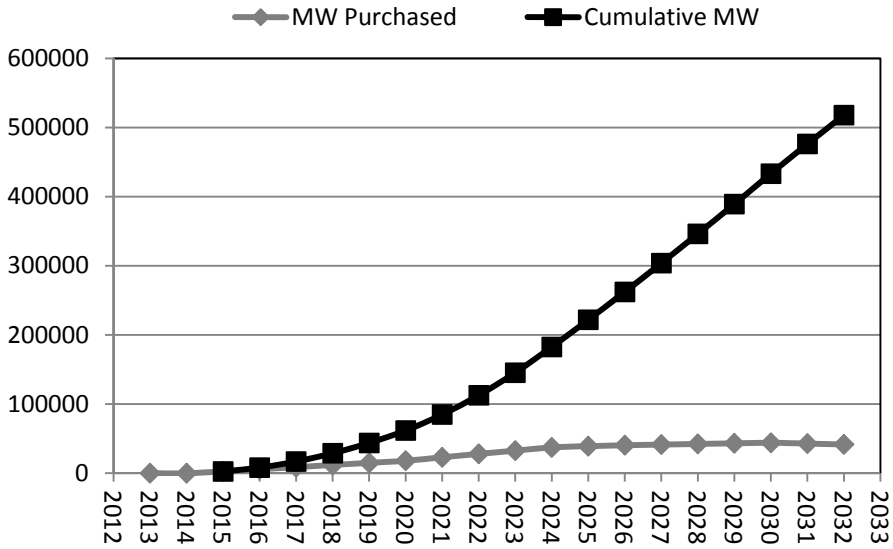
Figure 3: Estimated Revenues from CTR as a percentage of the U.S. GDP (2013–2032)



The revenues from the CTR are used to order clean power plants to replace existing power plants.[308] This reinvestment results in significant new power plants construction, as shown in Figures 4 and 5. Figure 4 shows the purchases in the EU and Figure 5 those in the United States.

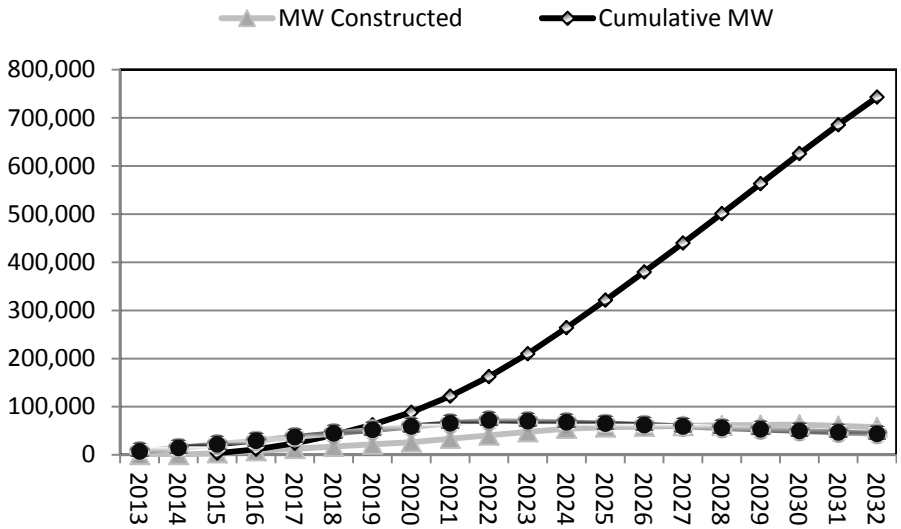
308. *See* Sewalk, *supra* note 79, at 621 (showing a figure displaying power plant construction funded by revenues from the CTR).

Figure 4: EU-27 Power Plant Purchases (Annual and Cumulative) in MW_e[309]



309. Figures 4 and 5 indicate the amount of power plants purchased and constructed each year in Megawatts of capacity.

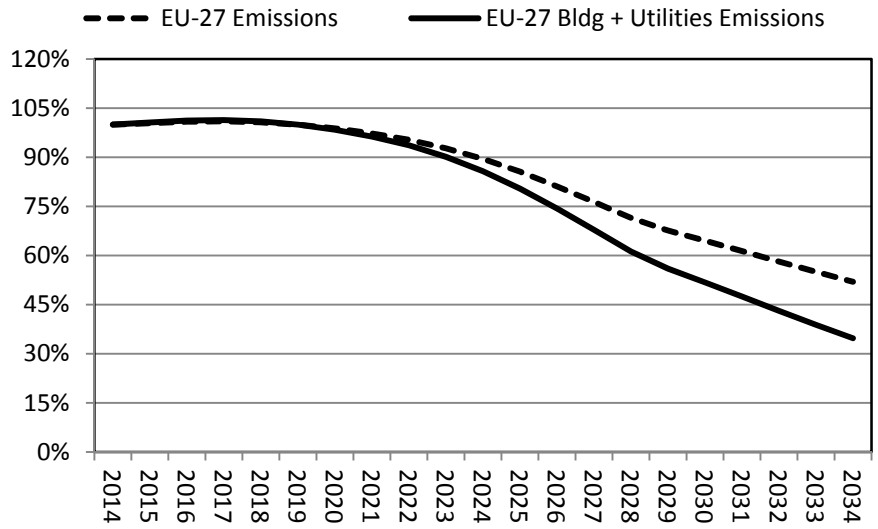
Figure 5: U.S. Power Plant Purchases and Deliveries (Annual and Cumulative) in MW_e[310]



These power plant purchases and replacements produce real emissions benefits. While I have modeled multiple scenarios, I present these as intermediate, conservative results.

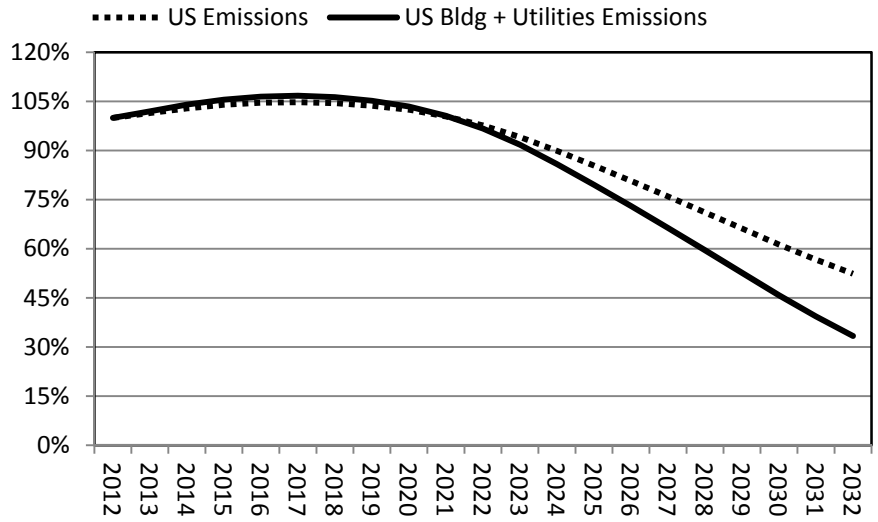
310. The construction line trails orders indicating that a plant ordered needs to be constructed, which takes a significant amount of time. While not calculated, every billion dollars in construction expenditure creates approximately 25,000 direct and indirect jobs, thus creating potentially a valuable stimulus to the economy.

Figure 6: EU-27 Declining Emission Levels as Power Plants are Completed[311]



311. This figure shows the impact of replacing high emission power plants with low emission power plants. For the EU-27 total emissions decline by forty-eight percent, and by sixty-three percent for buildings and utilities as power plants are completed. This case, using an eight-two-three scenario, implies that it will take eight, two and three years to order, construct, permit and bring online nuclear, solar/wind and geothermal power plant among others. In general, results can be much better for quicker permitting periods and lower for longer permitting periods.

Figure 7: U.S. Declining Emission Levels as Power Plants are Completed[312]



C. Carbon Tax with Reinvestment Complies with International Law

It is important to recognize and consider the potential difficulties that arise under international trade law when attempting to mitigate climate change, particularly through a cap-and-trade program. As previously argued[313] in relation to the United States, this proposal to implement a carbon tax with reinvestment is in compliance with international law.[314]

Under the General Agreement on Tariffs and Trade/World Trade Organization (GATT/WTO) framework, nations have three important obligations. First, they must adhere to the most favored nation (MFN) principle.[315] This requires that all like products be treated the same between

312. For the U.S., the results are forty-seven percent for total emissions and sixty-seven percent for buildings and utilities. The results are improved for buildings and utilities since the U.S. relies more heavily on coal; however, total results are less since the U.S. relies more heavily on oil for transportation.

313. *See* Sewalk, *supra* note 79, at 615–17 (arguing that a carbon tax with reinvestment complies with international trade law).

314. *See id.* (placing the implementation of a carbon tax in the context of international trade obligations of the United States).

315. *See* General Agreement on Tariffs and Trade art. I, III, XI, Oct. 30, 1947, 61 Stat. A-11, 55 U.N.T.S. 194, 196–98, 204–06, 224–26 [hereinafter GATT] (describing the three main obligations of the treaty).

countries.[316] The foreign products are not to be treated any less favorably than national products under the National Treatment principle.[317] Third, and most relevant to cap-and-trade, is the prohibition on quantitative restrictions.[318] This prohibition prevents countries from issuing any embargoes, quotas, or licensing schemes on both imported and exported products.[319]

A carbon tax with reinvestment, however, does not suffer from these problems.[320] Each country and company is subject to the same treatment for the same conduct.[321] There is no restriction or additional tariff on imported and exported goods.[322] Therefore, this proposal finds a common ground between international trade law and the international goal of mitigating climate change.

The effectiveness of a carbon tax with reinvestment on the international level could benefit the European Union in several ways.[323] First, effective emission reductions would mitigate the negative environmental, social, and health impacts of climate change.[324] Second, the tax would encourage economic advancements through infrastructure development and job creation.[325] Finally, the international effects resulting from the carbon tax with reinvestment would assist the European Union in maintaining its standing as a world leader.[326]

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316. *See id.* at 196–98 (introducing the most favored nation principle, which states that any advantage given to one product must be accorded to any similar product originating from any territory).

317. *See id.* at 204–06 (stating that the national treatment principle, which states that any imported products must not face taxes that are not applied to products of national origin).

318. *See id.* at 224–26 (outlining the restriction on quantitative restrictions).

319. *See id.* (stating that no party to the treaty shall use quotas, import, or export licenses on imports from other territories); *see also* Erik B. Bartenhagen, *The Intersection of Trade and the Environment: An Examination of the Impact of the TBT Agreement on Ecolabeling Programs*, 17 VA. ENVTL. L.J. 51, 60 (1997) (explaining that the prohibition on quantitative restrictions "prevents member countries from using quotas, embargoes, or licensing schemes on imported or exported products").

320. *See* Sewalk, *supra* note 79 at 615–17 (discussing the advantages of a carbon tax over cap-and-trade in the context of international trade law).

321. *See id.* (noting the technical aspects of a carbon tax).

322. *See id.* (stating that because a carbon tax is neutral to producers, it does not create impermissible tariffs).

323. *See* Young, *supra* note 191, at 1389 (explaining the potential benefits of a carbon emissions reduction policy).

324. *See id.* at 1388 (suggesting that a global emissions reduction policy would help mitigate "significant losses in agriculture and health").

325. *See id.* at 1389 (arguing that a global emissions reduction policy would propel a country's economic position).

326. *See id.* (suggesting that the United States, if it had implemented an emissions reduction policy, could "uphold its standing as a world leader").

V. The EU Should Adopt Carbon Tax With Reinvestment in Place of the Current ETS Program

A. Benefits to the EU

If the EU were to drop the failing ETS program, it would not only reap the benefits of climate legislation that is simple to implement and both environmentally and economically efficient, it would also effectively usher in a new age of climate change policy around the world. Adopting a carbon tax with reinvestment approach would still allow Europe to uphold previously enforced tenements from the cap-and-trade scheme, but also enable the legislation to be much more flexible in response to price changes and volatility induced by external pressures.[327] Also, the revenue generated from the tax could immediately be utilized to construct new low-carbon emitting energy facilities.[328] One of the major critiques regarding the EU-ETS is that for all the money that it took to enact and maintain the reduction strategy, the EU could have had a greater impact if they had instead focused on funding building new "green" infrastructure.[329] The carbon tax with reinvestment solves that problem by both benefitting from the lesser cost of implementation that would be inherent in a carbon tax approach, and by channeling money toward the building of cleaner energy sources.[330] Carbon tax with reinvestment represents the quickest way that the EU could begin to cut down on GHG emissions because the revenue will be available as soon as the program is underway.[331] Adopting the program would also guarantee that energy prices throughout Europe would fall as alternative energy projects continue to be built at no cost to the utilities.[332]

A carbon tax with reinvestment is a designedly streamlined approach to ensure feasibility and effectiveness.[333] Starting a CTR at five dollars per ton of CO_2[334] and then increasing the level each year until it

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327. *See* Sewalk, *supra* note 79, at 606 (explaining that enforcing a carbon tax would only require use of current agencies and their existing staffs).

328. *See id.* at 607 (stating that the revenue generated from a carbon tax could be returned to the public or be used for other means).

329. *See* Maher, *supra* note 133 (describing the main criticisms of the EU-ETS).

330. *See supra* Fig. 2 (showing the amount of revenue the EU would collect as a percentage of its GDP if it were to switch to a CTR approach).

331. *See* Maher, *supra* note 133 (explaining that carbon pricing would be the cheapest and most efficient way to cut GHG emissions).

332. *See id.* (explaining that one of the biggest problems with the current emissions trading system is the fluctuation of energy prices).

333. *See* Sewalk, *supra* note 79, at 609 (suggesting that a carbon tax would be simple, feasible, and extremely effective).

334. *See id.* at 610 (discussing the mechanics of a carbon tax with reinvestment proposal).

reaches a peak of fifty dollars per ton[335] would provide market certainty, while allowing the construction and materials sectors to build capacity to avoid demand-induced inflation.[336] The revenues from the tax would peak, and then decline rapidly as the emissions decline due to the adoption of cleaner energy sources.[337] The tax could be administered under the European Commission because it will utilize the same tax-monitoring techniques that the EU has had in place for years.[338]

The European economy is increasingly becoming dependent on energy and infrastructure.[339] With reinvestment of the revenues from a carbon tax, countries in the EU would stimulate their economies, creating jobs for their citizens, while lowering GHG emissions. Most carbon tax schemes are not capable of being "benefit certain," because there can be no sound guarantee that the tax will encourage emitters to invest in cleaner technology.[340] A carbon tax with reinvestment, however, does not stake its effectiveness on the ability or will of the utilities, industry and public to adopt new technologies to reduce carbon emissions.[341] Rather, the CTR adopts the latest technologies in tried-and-true fields, relying on investment from the tax revenue to develop and construct cleaner alternative energy power plants to lower GHG emissions.[342] Previous debates between cap-and-trade proponents and carbon taxation proponents have always boiled down to deciding whether "cost certainty" or "benefit certainty" was the more desirable attribute of a carbon emissions reduction program.[343] Carbon taxation with reinvestment is able to provide both "certainties," and is therefore the most effective approach to actually reduce GHG

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335. *See id.* (explaining the graduated steps that would be used to increase the tax on carbon emissions).

336. *See id.* at 617 (arguing that a carbon tax is the best approach, in part because it would provide cost certainty and price stability).

337. *See id.* at 611 (explaining that tax revenues will initially rise and then over time the revenues will decrease because new non-emitting energy facilities will not face a carbon tax).

338. *See id.* at 606 (stating that while cap-and-trade imposes high costs and difficulties with monitoring, a carbon tax could utilize the same monitoring techniques already in place).

339. *See* David Victor & Linda Yueh, *The New Energy Order: Managing Insecurities in the Twenty-first Century*, 89 FOREIGN AFF. 61, 61 (2010) (noting that Europe is dependent on energy and is concerned about its energy security).

340. *See* Mann, *supra* note 202, at 45 (explaining that one of the main disadvantages of a carbon tax system is that it does not set carbon reduction targets and thus results in uncertain emissions).

341. *See* Sewalk, *supra* note 79, at 613 (stating that a carbon tax with reinvestment does not rely on public accountability to reduce carbon emission).

342. *See id.* at 610 (noting that carbon tax reinvestment takes tax revenue and uses it to build new infrastructure for energy production).

343. *See id.* at 613–14 (explaining that until now, one had to choose either "cost certainty" or "benefit certainty" when picking an emissions reduction system).

emissions.[344] The EU should not continue losing money while having little impact on lowering carbon emissions utilizing the ETS cap-and-trade program, and should switch to a carbon tax with reinvestment approach to ensure a cost-effective and efficient reduction in carbon emissions.[345]

B. Autonomy and Fairness Among Nations

Not only would carbon tax with reinvestment make more environmental sense than the current EU-ETS program, it is also more malleable, allowing it to better serve each European nation's particular needs. In the cap-and-trade system, the cap is set and remains rigid while the price of allowances fluctuates according to demand from emitters.[346] This style of carbon emission legislation has proven difficult to apply to an area as diverse as Europe.[347] Each country in the EU has its own needs from a climate change initiative according to its current energy infrastructure and economy.[348] Germany relies more heavily on coal and Russian gas, while France uses more nuclear power, and Denmark has invested heavily in significant wind power capacity.[349] Each country has its own challenges, and the CTR would allow each country to set up its own priorities for reinvestment to rid itself of the highest carbon emission power plants.[350]

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344. *See id.* (noting that a carbon tax with reinvestment can provide both "cost certainty" and "benefit certainty").

345. *See id.* at 609–10 (explaining that there is no data to suggest that cap-and-trade is actually reducing emissions, and a more effective and efficient market-based approach is a carbon tax with reinvestment).

346. *See* Nell & Rezai, *supra* note 82, at 8 ("Enforcement of the cap is difficult and trading of emission certificates are exposed to speculative investments, generating a high volatility of the carbon price as the European example shows.").

347. *See* COELHO, *supra* note 63, at 3 (noting that the "collective target [for emission reduction] was translated into differentiated national emissions targets for each Member State according to the 'burden-sharing' agreement").

348. *See id*. ("Each Member State however is responsible for their Kyoto targets, which cover other sectors, either by reducing emissions at source or by buying credits from offset projects.").

349. *See* INTERNATIONAL ENERGY AGENCY, KEY WORLD ENERGY STATISTICS 2013 11, 15 (2013), *available at* http://www.iea.org/publications/freepublications/publication/KeyWorld2013.pdf (providing data regarding Germany's reliance on imported natural gas and production of coal for consumption) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); *see id.* at 17 (noting that France is the second highest consumer of nuclear energy in the world); *see also Wind Energy*, OFFICIAL WEBSITE OF DENMARK, http://denmark.dk/en/green-living/wind-energy/ (last visited Mar. 14, 2014) (stating that twenty-eight percent of the electricity supply in the country is from wind power) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

350. *See* Young, *supra* note 191, at 1391–94 (describing the flexibility of a carbon tax and arguing that it could be "evaluated periodically and adjusted").

Carbon taxation with reinvestment is flexible enough to allow each country in the program to maintain autonomy and receive equal benefit according to its need.[351] Each country that participates in the carbon tax with reinvestment approach would have its own tax rates, and each country would collect its own share of taxes to rebuild its power facilities.[352] In essence, thirty-one different carbon tax rates would operate in the EU under this approach.[353]

Another important measure that can be implemented within the framework of a carbon tax with reinvestment approach is border tax adjustments.[354] These adjustments are designed to create a fairer playing field between domestic producers who are faced with constraints on their GHG emissions and foreign competitors who have no such restrictions.[355] This strategy has been proposed under the EU-ETS to help European nations compete with other countries like the U.S. and China.[356] Countries operating without climate change mitigation have an economic advantage because they are typically able to offer lower prices because they are not being taxed or punished for their carbon output.[357] If border tax adjustments were implemented with carbon taxation with reinvestment, it would serve to strengthen each country's ability to enjoy autonomy while cooperating fairly in the program.[358]

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351. *See* Sewalk, *supra* note 79, at 584 (explaining that an EU-wide tax proposal was unpopular because member nations considered it an affront to their sovereign tax power).

352. *See id.* at 582 ("The tax is structured so that there is no incentive to invest in production in non-compliant regions.").

353. *See id.* (examining alternatives to cap-and-trade regimes that might provide more incentive for each country to reduce carbon emissions).

354. *See generally* Stéphanie Monjon & Philippe Quirion, *Addressing Leakage in the EU ETS: Border Adjustment of Output-Based Allocation?* 70 ECOLOGICAL ECON. 1957 (2011) (examining the competitiveness problems with the EU cap-and-trade system and border tax adjustments as a response).

355. *See id.* at 1958 (explaining that border adjustments are a "trade measure designed to level the playing field between domestic producers facing costly climate policy and foreign producers with no or little constraint on their GHG emissions").

356. *See id.* at 1957 (noting a recent EU Directive that mentions border adjustments as a possible solution to the problem of carbon leakage).

357. *See id.* at 1958 ("[T]he EU ETS increases the production cost of European producers in GHG intensive sectors, some of which are exposed to international competition.").

358. *See id.* at 1970 (discussing certain European countries and suggesting that "a border adjustment covering only imports may be easier to negotiate because it generates public revenues, which may be redistributed to exporting countries").

C. An Example to the U.S. and the World

GHG emissions are unlike many other regulated articles as they are not stationary, so their damaging effects are not limited to any particular region.[359] Carbon emissions travel around the Earth's atmosphere and create the "global" climate change issue we know today.[360] This phenomenon clearly implies that tackling the issue of global climate change must be a unified endeavor among nation states and unions of nations.[361] If nations around the world are unwilling to adopt climate change regulation and take serious steps to mitigate their carbon emissions, the concentration of these harmful gases in the atmosphere could rise to twice the level of pre-industrialized levels before the end of the century.[362] Many proponents of climate change policy viewed the Kyoto Protocol as the tool that would create cohesion among nations to address climate change holistically.[363] The Kyoto Protocol was an international treaty that set regulations on industrialized countries to attempt to curb GHG emissions.[364] There has not been an international effort to rally around the Kyoto Protocol in the way that many climate scientists hoped.[365] This only further strengthens the argument that the world desperately needs a new plan and direction, one that actually works, to unify the world in the joint effort of lowering GHG emissions.

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359. *See* Hans Gersbach & Noemi Hummel, *Climate Policy and Developing Countries*, 1 (Ctr. for Econ. Policy Research, Working Paper No. 8685, 2011) (explaining how "greenhouse gases travel around the world") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

360. *See id.* (noting the emissions burden carried by developing countries around the world).

361. *See* Johnathon H. Adler, *Eyes on a Climate Prize: Rewarding Energy Innovation to Achieve Climate Stabilization*, 35 HARV. ENVTL. L. REV. 1, 2 (2011) ("Without concerted efforts by nearly all industrialized and industrializing nations to drastically reduce net greenhouse gas . . . emissions, atmospheric concentrations will likely grow to double those of pre-industrial levels before century's end.").

362. *See* IPCC SYNTHESIS REPORT, *supra* note 1, at 37 (describing the changes in atmospheric concentration of greenhouse gas emissions).

363. *See* Christina Figueres, *Environmental Issues: Time to Abandon Blame-Games and Become Proactive*, THE ECON. TIMES (Dec. 15, 2012, 5:51 AM), http://articles.economictimes.indiatimes.com/2012-12-15/news/35836633_1_emission-reduction-targets-global-greenhouse-gas-emissions-climate-change (detailing how the Kyoto Protocol was initially seen as a rallying cry for nations of the world) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

364. *See id.* (describing the commitment of thirty-seven countries to reduce emissions to levels below their 1990 levels).

365. *See id.* ("Governments are driving change, but have not yet proven their intent through a robust and immediate implementation of what has already been promised.").

If the EU were to abandon the ETS system, which has done little to advance the lowering of carbon emissions toward a level that is required to limit global climate change, and adopt a carbon tax with reinvestment, it could likely produce a chain reaction with other countries following suit. One country keeping a close eye on EU policies on climate change is the U.S.[366] A carbon taxation system would also be the best approach for the U.S., but many legislators still lean toward cap-and-trade-type programs to address climate change.[367] It would likely be foolish to follow the EU down the path of market-based carbon emissions regulation given the ETS's checkered record.[368] The U.S. has had extensive experience working within the framework of an economy-wide excise tax.[369] Setting up a new cap-and-trade-based program would not only be very difficult to draft, it would likely take years to implement, which is more time wasted battling against global climate change.[370] A carbon tax with reinvestment would be comparatively easy to enact because it fits into already-existing tax laws.[371] Many climate change scientists believe that governments have already waited too long to initiate climate change measures.[372] More time equates to a greater harm to the environment due to GHG emissions.[373] As Figure 7 showed, significant emissions reductions are possible in the U.S.

The very same benefits that will be realized by countries in the EU would be realized by states in the U.S. if it were to adopt a carbon tax with reinvestment program.[374] The U.S., like Europe, would see an immediate

366. *See* Sewalk, *supra* note 79, at 618 (discussing the U.S. observation of Europe's cap-and-trade initiative).

367. *See* Bruce McClain & Heidi Meier, *The U.S. Cap and Trade Initiative: Current Status and Potential Impact on Business*, 28 AM. J. OF BUSINESS 1, 13 (2013) (displaying recent cap-and-trade legislation in the United States and its support in Congress).

368. *See generally* George Daskalakis & Raphael Markellos, *Are the European Carbon Markets Efficient?*, 17 REV. OF FUTURES MARKETS 103 (2008) (discussing the potential for inefficiencies in the European cap-and-trade system because the carbon allowances do not reflect all available information).

369. *See* Sewalk, *supra* note 79, at 618 (arguing that a carbon tax, utilizing existing excise tax laws, could be quickly enacted).

370. *See* Zhang, *supra* note 107, at 1805 (discussing the complex arrangement and initiation of the European ETS scheme).

371. *See* Young, supra note 191, at 1394 (stating that a carbon tax would be "relatively simple to fit into our current tax system" even though it "may require a substantial reconstruction of the environmental and energy sections in the tax code").

372. *See* Craig, *supra* note 6, at 6 ("American law and policy are not keeping up with climate change impacts and the need for adaptation.").

373. *See id.* at 12 ("[W]ithout mitigation efforts, mass destruction of both natural systems and human societies becomes an increasingly likely eventuality.").

374. *See* Sewalk, *supra* note 1, at 144 ("[T]he goal of the [carbon tax with reinvestment] is to potentially refund monies collected over a longer time period through cheaper and cleaner energy.").

influx of revenue from the approach that would be utilized to change the highest carbon emitting facilities into low-to-no-carbon emitting facilities.[375] And the benefits in terms of economic stimulus and clean energy self-sufficiency would be significant, benefiting the whole world.[376] States in the U.S. would also reap benefits of new energy facilities, which would not cost them anything.[377] This means an influx of jobs for the construction of the new low carbon emitting facilities and for the operation and maintenance of those facilities.[378] Also, just as citizens in European countries would soon be paying much less for energy under a carbon tax with reinvestment approach, so too would citizens of the U.S.[379] Not only would the U.S. be embarking on a new era of providing clean and renewable energy options to its citizens at a lower price, but it would be creating jobs throughout the country and it would be reducing the high levels of carbon emissions that it has produced for generations.

An implemented carbon tax with reinvestment strategy in Europe would put pressure on other nations to adopt stricter GHG emission measures.[380] The carbon leakage that has proven to be an issue in the current EU-ETS strategy would be nullified by a CTR's ability to tax all products at a rate according to carbon intensity.[381] This amount would be determined by the total emissions in an economy or region, divided by the GDP of that economy or region, and easily calculated by summing the grams of carbon dioxide released per mega joule of energy produced, or the ratio of greenhouse gas emissions produced to GDP.[382] This strategy creates an equitable trading system between nations, and nullifies the threat of the

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375. *See id.* at 142 (noting that the program would provide a "revenue stream based on a carbon tax that replaces the existing power infrastructure, thereby reducing total emissions").

376. *See* Adler, *supra* note 361 and accompanying text.

377. *See* Sewalk, *supra* note 1, at 144 (noting that "[a]s new power plants are constructed using . . . funds (collected from taxpayers) and transferred to PUCs and utilities, the total capital invested by the utility over time is lowered, thereby resulting in lower electricity prices").

378. *See id.* at 148 ("[I]t produces more secure energy future and environmental future and creates a significant number of jobs.").

379. *See* Young, *supra* note 191, at 1379 (discussing the aspects of a carbon tax that would discourage energy companies from passing increased costs to consumers).

380. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 44 ("A carbon tax sends a clear signal to polluters: pollution imposes a negative externality on others, and you should be forced to internalize that cost by paying the tax.").

381. *See id.* at 32 ("The tax rate would . . . reflect the increase in the harmful effects of carbon dioxide emissions. A carbon tax thereby would provide a price signal that captures . . . the harmful effects of carbon dioxide emissions.").

382. *See* Wojciech Budzianowski, *Target for National Carbon Intensity of Energy by 2050: A Case Study of Poland's Energy System*, 46 ENERGY 575, 576–77 (2012) (explaining the methodology for determining carbon intensity).

EU being undermined by carbon leakage to other markets.[383] Taken a step further, taxing imports by their carbon intensity creates a powerful incentive for EU trading partners to adopt emissions strategies as well.[384] Table 1 compares emissions intensity for several U.S. states and different EU and World countries.

Table 1: Emissions Intensity, Comparing U.S. States vs. Select Countries[385]

Emissions Intensities: U.S. States vs. Select Countries **$ of GDP per Ton of CO_2 Emissions**			
Alabama	$892.86	India	$448.43
California	$3,703.70	Japan	$3,448.28
		France	$4,000.00
Washington	$2,941.18	UK	$3,571.43
Colorado	$1,886.79	Euro Area	$2,500.00
		United States	$2,040.82
Texas	$1,250.00	Australia	$1,298.70
Wyoming	$305.81	China	$312.50

383. *See id.* at 578 (using Poland as an example to show how carbon intensity can more fairly capture the emissions of any country).

384. *See id.* at 575 (noting that taxation by carbon intensity means "countries having highly GHG-intensive power sectors might need deep structural and technological changes of their energy systems").

385. GDP and emissions data for U.S. states provided by the Bureau of Economic Analysis (BEA) and the World Recourses Institute's Climate Analysis Indicator Tool (CAIT), respectively. GDP for countries from World Bank 2012. Emission intensities calculated by dividing GDP of the selected Nations and U.S. States by tons of GHG emissions. This results in U.S. dollars of GDP per ton of GHG emissions, compared between countries or states. Structuring a program in this manner avoids the World Trade Organization challenge of method of production as global methods occur in different states and countries.

D. Carbon Tax with Reinvestment Will Create an Influx of New Jobs

The reinvestment of an implemented carbon tax would have a significant impact on job creation in the EU.[386] First, the revenue from the tax will be used to update old power facilities and establish new low- to no-emission facilities, which will require a number of new construction jobs.[387] The EU, and any other nation that adopts carbon tax with reinvestment, could anticipate creating a minimum of 11,000 new direct construction jobs for each billion dollars in tax created revenue.[388] These jobs would create an instant boost to any economy and functionally uplift the entire construction industry.[389] Also, after the initial construction on the facilities is finished, additional jobs will be created for maintenance and operation of the greener facilities.[390] This ensures that there will not be a drop in long-term employment numbers when the older facilities are retrofitted.[391] Studies have shown that the number of jobs actually increases when low- to no-carbon facilities are used instead of their higher-polluting counterparts.[392] This two-pronged employment benefit allows carbon taxation with reinvestment to have an immediate and lasting effect on economies that implement the approach.[393]

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386. *See* Sewalk, *supra* note 1, at 4 (describing the benefits that the carbon tax with reinvestment would have on employment).

387. *See id.* (explaining that such revenue could be "used to build low- or no-carbon-emitting power plants, including but not limited to solar, wind, geothermal, hydroelectric, nuclear and other non-emitting energy sources").

388. *See* Rania Antonopoulos et al., *Investing in Care: A Strategy for Effective and Equitable Job Creation* 16 (Levy Economics Institute Working Paper No. 610, 2011), *available at* http://www.levyinstitute.org/publications/?docid=1291 (explaining that a $50 billion investment creates 556,000 construction jobs) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

389. *See id.* at 16–27 (describing both direct and indirect job creation in the construction industry).

390. *See* Ulrike Lehr & Christian Lutz, *Green Jobs? Economic Impacts of Renewable Energy in Germany* 7 (2011) (presented at Ecomod 2011, International Conference on Economic Modeling, Azores, Portugal, June 29–July 1, 2011) (explaining that in 2009 in Germany, 339,500 people worked in energy production, operation, and maintenance) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

391. *See id.* at 7 (noting that the number of people employed in the operation and maintenance industry is expected to double by 2025).

392. *See id.* at 5 ("The increase of renewable energy leads in most of the scenarios studied to positive net employment, rising steadily, particularly from 2020 onwards.").

393. *See* Sewalk, *supra* note 1, at 145 ("[T]his policy . . . provides a significant stimulus to the construction industry, thereby stimulating the economy; . . . results in the production of clean power sooner, thereby reducing emissions; . . . resulting in lower total taxation to achieve the end result of reducing emissions.").

E. Would Reinvestment in the Cap-and-Trade System Work?

Despite its initial appeal, a cap-and-trade system that also incorporates reinvestment simply does not work. A cap-and-trade system is based on emission caps that are assumed to be effective maximums, but reinvestment destroys this system by significantly reducing emissions supply.[394] While in theory a cap-and-trade program can generate as much revenue as a carbon tax,[395] it would require a very hands-off approach—auctioning off all allowances, and providing no free permits as has been the procedure of EU-ETS so far.[396] In fact, the EU-ETS has only actually auctioned around five percent of all the allowances it administered.[397] With the lackluster performance of the EU-ETS thus far, it is difficult to imagine the program only auctioning off allowances in the future. The program will probably have to continue to rely on allocating allowances in at least some instances. This of course means less revenue for the program, and less revenue correlates to a decreased ability to address carbon emissions.[398] Thus, the ability for the EU to invest into new forms of clean energy would not be as robust, leaving the EU again in the unenviable position of implementing climate change legislation that is not actually promoting the development of cleaner technologies.[399]

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394. *See supra* Part III.B.4 (describing the way in which carbon emissions will be reduced over time if a carbon tax with reinvestment plan is adopted).

395. *See* Driesen, *supra* note 96, at 5 ("Many regulators and scholars recognize that auctioning enhances efficiency, avoids windfall profits, and generates revenues that government can spend to further advance environmental or other societal goals . . . .").

396. *See id.* at 18 (explaining that the 2009 amendment made full auctioning the "basic principle" for allocating allowances after receipt of free permits led to substantial windfall profits for European electric utilities).

397. *See* Corina Haiti, *International Center for Climate Governance, Recycling the Auction Revenue from Phases I and II of the EU Emissions Trading Scheme* 2 (International Ctr. For Climate Governance Reflection No. 15/2013, 2013), *available at* http://www.iccgov.org/FilePagineStatiche/Files/Publications/Reflections/15_Reflection_March_2013.pdf (graphing the percentage of allowances auctioned during Phases I and II of the ETS) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

398. *See* Sewalk, *supra* note 1, at 145 (explaining that the revenue generated from the program "results in the production of clean power sooner, thereby reducing emissions; and . . . leads to lower emissions, resulting in lower total taxation to achieve the end result of reducing emissions").

399. *See* Driesen, *supra* note 96, at 4 ("[C]ap-and-trade programs do not necessarily deliver better environmental performance than the BAT regulations they aim to replace, a troublesome conclusion give the seriousness of the climate disruption problem.").

VI. Conclusion

It is becoming ever more evident that countries around the world need to adopt climate change policies that proactively reduce GHG emissions. Global ecosystems are suffering what could prove to be irreparable harm due to the inability for nations and unions of nations to enact legislation that limits carbon emissions, which are currently wreaking havoc on our global climate. The EU-ETS was touted as the implement that would usher in a new era of climate change legislation that put the goals of public health care and environmental factors in harmony with an efficiently functioning market-based economic force. This cap-and-trade system, however, which has (1) seen the market for carbon become inoperable, (2) given windfall profits to certain large emitters while being over-burdensome to smaller targeted emitters, and (3) failed to be effective in curbing Europe's carbon output, is no longer a rallying point for other nations who are seeking to initiate climate change policies concerning GHG emissions. The EU-ETS's faltering has created doubt in the climate change community, and has given climate change policy opponents one more talking point to challenge future measures worldwide.[400]

A carbon taxation system with reinvestment represents the best option for the EU at this point. Carbon taxation is uncomplicated in both implementation and design: it offers a "cost certainty" element that is missing in cap-and-trade programs, promises price stability to avoid the issues that have plagued the EU-ETS, and represents a unique ability to raise revenue for use by nations that implement the carbon taxation approach. A carbon tax that utilizes reinvestment is even more effective than either a carbon tax or cap-and-trade approach because it ensures that revenue raised by the taxation is used to combat carbon emissions and create new low-carbon or no-carbon facilities. Also, a carbon tax with reinvestment works in a unique way to target all polluters of carbon, not just selected emitters who fall in the targeted cap area or selected taxation pool. To date, there has never been a climate change policy that could boast the unique advantages that carbon tax with reinvestment is able to utilize to ensure effectiveness.

Some policymakers argue that cap-and-trade is the best approach for climate change legislation.[401] Much of the affinity toward cap-and-trade programs began because of successful programs in the past.[402] One of the

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400. *See ETS RIP?*, *supra* note 69 (explaining that members of the European Parliament appear ready to abandon the system entirely).

401. *See supra* Part II.A.1 (describing the advantages of cap-and-trade).

402. *See* Driesen, *supra* note 96, at 13 (noting that the 1990 amendments to the Clean Air Act inaugurated the first major successes with emissions trading).

more prolific examples of cap-and-trade success is the U.S. acid rain reduction measures, which were implemented in 1995.[403] Many proponents of the cap-and-trade approach to carbon emission regulation will use this program as an example of how well cap-and-trade works.[404] The acid rain program, however, is different than most cap-and-trade programs in many ways, most notably in that it was not economy-wide.[405] Furthermore, if a tax with reinvestment scheme had been used to reduce sulfur in the atmosphere, it would have been more effective.

The EU-ETS is the biggest and best example of a large-scale trading-based program designed to produce environmental impacts.[406] As illuminated above, the EU-ETS is proving that large-scale cap-and-trade can be a very fragile system as shown in Figure 8.

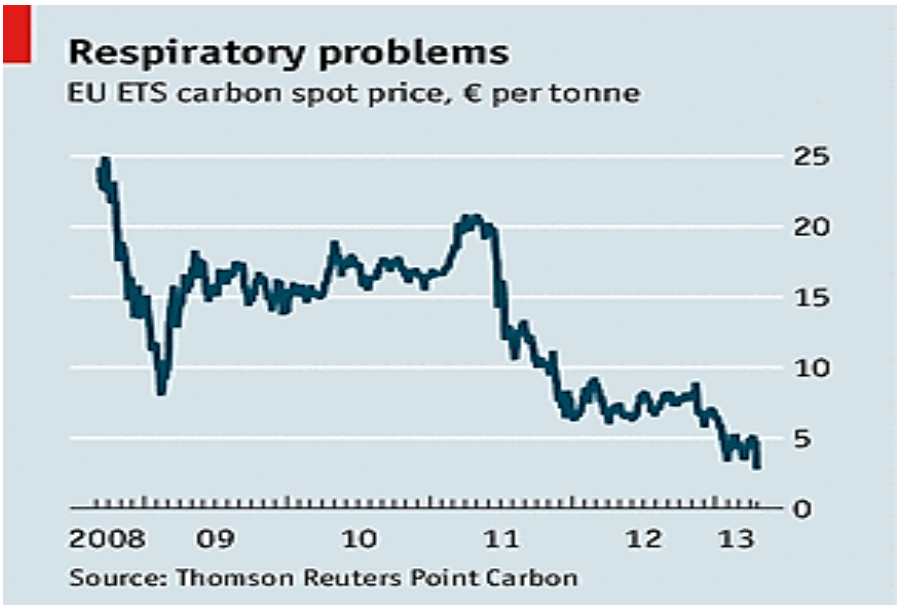
403. *See id.* (explaining that the acid rain trading program demonstrated that a properly-designed trading program could be successfully implemented).

404. *See id.* at 14–15 (describing the way that the acid rain cap-and-trade program impacted the Kyoto Protocol's formulation).

405. *See id.* at 13 (explaining that Congress placed individual caps on each regulated unit in the electricity industry).

406. *See* Avi-Yonah & Uhlmann, *supra* note 98, at 19 (explaining the advantages that the EU-ETS has over the efforts of the United States).

Figure 8: No Certainty - EU-ETS Carbon Price (Euros / Ton) August 2008 to May 2013[407]

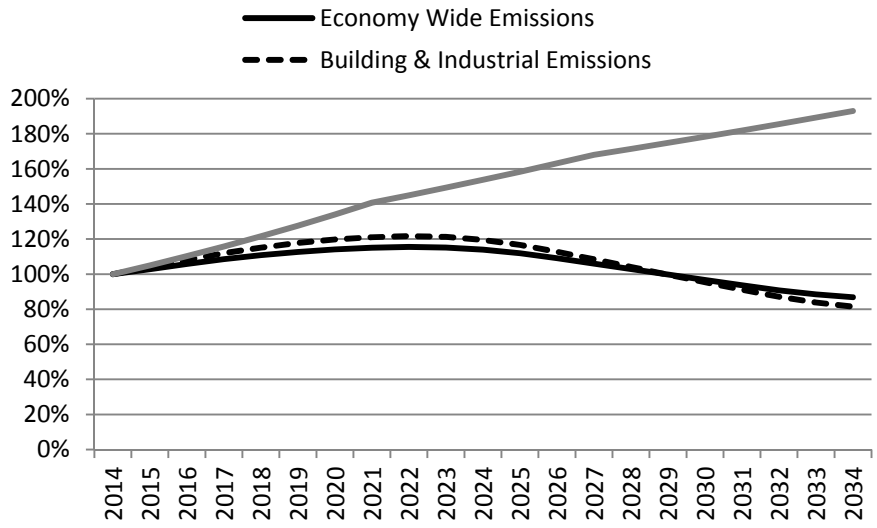


Carbon taxation with reinvestment will create a downstream tax effect that will ensure that no one is exempt from enforcement of the legislation. The revenue that is created by the tax will be available immediately and the monies will be directed at creating the sincere carbon reducing impact that has proved elusive for the EU-ETS. By constructing low- or non-emitting power sources like wind, geothermal, nuclear, and solar, the carbon tax with reinvestment revenue will be put to use in a very effective way. The global environment will benefit from the new clean energy options that will have taken the place of high carbon emitting plants. Further, the citizens of EU countries will experience economic benefits because they will be utilizing cheaper energy that runs from the new, more efficient infrastructure. European countries in the program will see new jobs spring up alongside the new power facilities, and the countries will become examples for the rest of the world to follow. For this reason, the successful implementation of a carbon tax with reinvestment program in the EU has the potential to influence the world and usher in a new age of environmentally responsible business practices that could prove fruitful for

407. This figure details the falling price for carbon emissions from the beginning of the EU-ETS carbon-trading program to early 2013. The figure is characterized by an overall downward price trend, along with high fluctuations on a monthly basis.

generations. Upon successful implementation, the EU's trading partners would be encouraged to adopt the CTR, thus enabling emission reductions on a large scale, as shown in Figures 6 and 7.[408] Significantly, successful implementation of the carbon taxation and reinvestment program in the EU would necessitate China's adoption of a comparable program that would help it remain competitive in the global market. The world would benefit from reductions in total Chinese emissions, which are projected to rise to 193% of today's levels.

Figure 9: China Declining Emission Levels as Power Plants are Completed[409]



408. *See supra* notes 311–312 and accompanying text.

409. Total Chinese emissions would decline by thirteen percent from today's levels, while emissions from industry and buildings would decline by nineteen percent. This is in sharp contrast to projections showing that Chinese emissions could double in the next twenty years.