

CLIMATE CHANGE AND TAX POLICY

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Abstract: Scientific evidence suggests that man-made greenhouse gas (GHG) emissions, especially carbon dioxide emissions, are a contributing factor to global climate change. This global climate change negatively impacts our Earth and policymakers must implement climate change policies in an effort to decrease carbon emission and mitigate its negative impacts. This Article will analyze three options for regulating GHG emissions: traditional command-and-control regulation, tradable permit markets, and taxes. Following a detailed analysis of both the theoretical and practical arguments regarding carbon taxation and alternative emissions permit trading schemes, this Article concludes that carbon taxation is the superior method of reducing carbon emissions.

INTRODUCTION

From the human perspective, global climate change will have net negative impacts.¹ As such, policymakers must implement climate change policies to mitigate these impacts to our Earth. Environmental or green taxation is one tool available to policymakers. Tax has the effect of encouraging a broad range of entities, through price incentives, to take measures to reduce greenhouse gases (GHGs). The ratification of the Kyoto Protocol in 2005, which imposes specific limits on GHG emissions for thirty-six nations, has reinvigorated the dialogue about green taxation.

Countries with previously little or no green taxation in their national systems now look to the examples of Nordic nations, which have used taxation to curb pollution for decades. Countries committed to GHG reduction should also look to politically favorable emissions trading schemes, such as those developed in the United States, and to other similar mechanisms available, to help meet Kyoto goals. Nevertheless, policy makers should not discount taxation on GHGs, especially on carbon dioxide, as a viable option.

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¹ DIRK T.G. RÜBELKE, INTERNATIONAL CLIMATE POLICY TO COMBAT GLOBAL WARMING: AN ANALYSIS OF THE ANCILLARY BENEFITS OF REDUCING CARBON EMISSIONS 7 (2002).

After discussing global climate change and the international response to climate change, this Article will analyze three options for regulating GHG emissions: traditional command-and-control (CAC) regulation, tradable permit markets, and taxes. The Article will then offer a detailed analysis of both the theoretical and practical arguments for and against carbon taxation and alternative emissions permit trading schemes. Based on this analysis, the author concludes that carbon taxation is the superior method of carbon abatement.

I. GLOBAL CLIMATE CHANGE

A. *Defining Global Warming, the Greenhouse Gas Effect, and Climate Change*

In 1898, the Swedish Nobel Prize winning chemist Svante Arrhenius first warned the world that carbon dioxide emissions could lead to a phenomenon called global warming.² Today, the majority of scientists now believe global warming is not just a threat, but a reality. Global warming describes the theory that man-made increases in carbon dioxide and other GHGs have rapidly accelerated the “greenhouse gas effect,” resulting in the Earth’s surface warming at unnatural rates.

GHGs trap heat in the Earth’s atmosphere. This greenhouse effect is essential to keeping the Earth’s surface warmer; a natural phenomenon, it keeps the Earth’s surface 40°C warmer than it would be without the greenhouse effect.³ At its natural rate the greenhouse effect is vital to life,⁴ however, the Earth’s positive imbalance between GHG emissions and absorption through natural processes (e.g. photosynthesis) results in the continuing increase of GHGs in the atmosphere.⁵ Therefore, the greenhouse effect continues to strengthen and the Earth continues to warm.

Scientists warn that increasing global temperatures could have catastrophic consequences. As the U.S. National Academy of Scientists (NAS) describes, “the phrase ‘climate change’ is growing in preferred

² United Nations, Combating Global Warming: The Climate Change Convention (1997), <http://www.un.org/ecosocdev/geninfo/sustdev/climate.htm> [hereinafter United Nations 1997].

³ ERIC CHAISSON & STEVE McMILLAN, ASTRONOMY TODAY 175 (5th ed. 2005); National Academy of Sciences (NAS), Understanding and Responding to Climate Change: Highlights of National Academies Report 2 (2005), <http://dels.nas.edu/basc/> [hereinafter NAS].

⁴ NAS, *supra* note 3, at 2.

⁵ ENERGY INFORMATION ADMINISTRATION, NATIONAL ENERGY INFORMATION CENTER, GREENHOUSE GASES, CLIMATE CHANGE, AND ENERGY (2003), <http://www.eia.doe.gov/oiaf/1605/ggcebro/chapter1.html> [hereinafter EIA].

use to ‘global warming’ because it helps convey that there are changes in addition to rising temperatures.”⁶ Specifically, the U.N. Intergovernmental Panel on Climate Change (IPCC) warns that “[f]uture changes in climate are expected to include additional warming, changes in precipitation patterns and amounts, sea-level rise, and changes in the frequency and intensity of some extreme events.”⁷ According to the IPCC, among those Earth systems “expected” to be impacted are “ocean circulation; sea level; the water cycle; carbon and nutrient cycles; air quality; the productivity and structure of natural ecosystems; the productivity of agricultural, grazing, and timber lands; and geographic distribution, behavior, abundance, and survival of plant and animal species, including vectors and hosts of human disease.”⁸

Observational evidence suggests that climate change has already affected the Earth’s systems.⁹ Impacts include “changes in Arctic temperatures and ice, widespread changes in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves and the intensity of tropical cyclones.”¹⁰

Scientists have been able to suggest with some certainty just how much the Earth has warmed. According to NAS, a growing body of evidence indicates “that the [Earth’s] surface temperatures have risen about 1.4°F (0.7°C) since the early twentieth century.”¹¹ Most alarming, however, is the contention of NAS that over seventy percent or “about 0.9°F (0.5°C) of this increase has occurred since 1978.”¹² The sharp blade-like rise of GHGs in the atmosphere in the past three decades is known as the “hockey stick result.”¹³

⁶ See NAS, *supra* note 3, at 3.

⁷ INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, TECHNICAL SUMMARY: IMPACTS, ADAPTATION AND VULNERABILITY 21 (2001), <http://www.grida.no/Newsroom.aspx?m=54&pressReleaseItemID=1050>.

⁸ *Id.*

⁹ See generally INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS (2007), available at <http://www.ipcc.ch/SPM2feb07.pdf>.

¹⁰ *Id.* at 8.

¹¹ NAS, *supra* note 3, at 1.

¹² *Id.* at 2.

¹³ Antonio Regalado, *Global-Warming Papers Question Skeptics’ Results*, WALL STREET JOURNAL, Oct. 26, 2005, at B3. The hockey stick result “prominently featured in a 2001 United Nations report.” *Id.*

B. *Human Activities Raising Levels of Greenhouse Gases (GHGs)*

Scientists seem to agree that the Earth's temperature is always changing; however, for the majority, the "key question is how much of the observed warming is due to human activities."¹⁴ Some GHGs occur naturally in the atmosphere, while others result exclusively from human activities. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride are among the class of GHGs generated exclusively through human industrial processes.¹⁵

In contrast, carbon dioxide (CO₂ or carbon), methane (CH₄), and nitrous oxide (N₂O) are naturally occurring GHGs, although certain human activities add to the levels of these naturally occurring gases.¹⁶ For instance, methane is emitted from "the decomposition of organic wastes in municipal solid waste landfills, and the raising of livestock" as well as during the "production and transport of coal, natural gas, and oil."¹⁷ Similarly, nitrous oxide is emitted during agricultural activities such as raising livestock, paddy rice farming, and wetland changes, as well as during industrial activities including the combustion of solid waste and fossil fuels.¹⁸ Thus, scientists urge a move to clean renewable energies, such as wind, solar, bioenergy, and hydroelectric as a means to curbing GHG emissions.¹⁹

C. *Why Carbon Dioxide Emissions are of Particular Concern*

While man-made increases in methane, nitrous oxide, and other GHGs are dangerous to the Earth's delicate balance, most scientists agree that carbon dioxide emissions are the primary concern. Carbon dioxide is released into the atmosphere through deforestation and through the burning of solid waste and fossil fuels, specifically oil, natural gas, and coal.²⁰ While natural processes, such as plant photosynthesis, can absorb "some of the net 6.1 billion metric tons of carbon dioxide emissions produced each year (measured in carbon equivalent terms), an estimated 3.2 billion metric tons is added to the atmosphere

¹⁴ NAS, *supra* note 3, at 2.

¹⁵ U.S. Environmental Protection Agency (EPA), Climate Change—Greenhouse Gas Emissions, <http://epa.gov/climatechange/emissions/index.html#ggo> (last visited Mar. 28, 2007) [hereinafter EPA Greenhouse Gas Emissions].

¹⁶ *Id.*

¹⁷ *Id.*

¹⁸ *Id.*

¹⁹ See Greenpeace International, Solutions, <http://www.greenpeace.org/international/campaigns/climate-change/solutions> (last visited Feb. 21, 2007).

²⁰ EPA Greenhouse Gas Emissions, *supra* note 15.

annually.”²¹ As a result, the Earth’s “carbon cycle” results in an enormous imbalance.²² Some studies suggest that concentrations of carbon dioxide have risen thirty percent since the Industrial Revolution.²³ In the United States, for instance, energy-related carbon dioxide emissions represent eighty-two percent of total U.S. man-made GHG emissions.²⁴ Thus, carbon dioxide is often referred to as the most critical GHG because of the unparalleled quantities produced by humans each year.

D. *Skeptics of Climate Change*

A small minority of scientists reject current climate change warnings as “alarmist.”²⁵ For instance, Dr. S. Fred Singer of George Mason University argues, “[c]limate keeps changing all the time. The fact that climate changes is not in itself a threat, because, obviously, in the past human beings have adapted to all kinds of climate changes.”²⁶ Dr. Singer is not alone. Other scientists express similar views that natural climate variability is not currently well understood, and that this variability may be greater than once thought.²⁷ As such, the minority caution that “[t]emperature extrapolations of the past are not precise enough to make dire conclusions about ‘normal’ warming.”²⁸

The minority have also dismissed computer models used by the United Nations and other organizations as “oversimplifications that cannot simulate the complexities of the real climate.”²⁹ For instance, a group of U.K. and U.S. scientists published a report in 2002 concluding that “[t]he IPCC simulation of surface temperature appears to be more a fortuitous case of curve fitting than a demonstration of human influence on the global climate.”³⁰ Similarly, Canadians Stephen

²¹ EIA, *supra* note 5.

²² *Id.* (explaining that carbon cycle is natural collective processes by which concentrations of carbon dioxide in atmosphere are regulated).

²³ Michael Coren, *The Science Debate Behind Climate Change*, CNN.COM, Feb. 10, 2006, <http://www.cnn.com/2005/TECH/science/04/08/earth.science/index.html>.

²⁴ EIA, *supra* note 5.

²⁵ Coren, *supra* note 23.

²⁶ Frontline, *What's Up with the Weather? Interview: S. Fred Singer*, April 2000, <http://www.pbs.org/wgbh/warming/debate/singer.html>.

²⁷ Coren, *supra* note 23.

²⁸ *Id.* See generally MARCEL LEROUX, GLOBAL WARMING—MYTH OR REALITY?: THE ERRING WAYS OF CLIMATOLOGY (2005); MICHAEL L. PARSONS, GLOBAL WARMING: THE TRUTH BEHIND THE MYTH (1995).

²⁹ Coren, *supra* note 23.

³⁰ JAMES SCHLESINGER & ROBERT SPROULL, GEORGE C. MARSHALL INSTITUTE, CLIMATE SCIENCE AND POLICY: MAKING THE CONNECTION 19 (2001), available at <http://www.marshall.org/article.php?id=86>.

McIntyre and Ross McKirtrick published a scientific study suggesting mathematical errors in the hockey stick result.³¹ Finally, some scientists believe the media and certain politicians promulgate unnecessary fears of dire global consequences.³²

II. INTERNATIONAL RESPONSE TO CLIMATE CHANGE

A. 1980s and 1990s Intergovernmental Conventions on Climate Change

The United Nations reacted to the growing scientific evidence of the harmful effects of GHGs by forming the IPCC in 1988. However, IPCC's purpose was limited. The Panel was charged only with collecting further data on the implications of climate change. It was three years later, with the formation of the U.N. Framework Convention on Climate Change (UNFCCC or Rio Convention on Climate Change), that real progress began.³³ The aim of the UNFCCC was to establish an actual process for responding to climate change over the next several decades. Along with devising more precise measures for collecting data, industrial nations agreed to "promote the transfer of funding and technology to help developing countries respond to climate change."³⁴ In total, 186 countries ratified the convention, all agreeing to "mitigate" GHG emissions.³⁵

Countries also agreed that their plans for tackling GHGs would incorporate "principles of 'common but differentiated responsibilities' according to economic and political situations."³⁶ As such, of the signatories, just twenty-four industrial nations specifically committed to take measures to ensure their GHG emissions in 2000 would not exceed their 1990 levels.³⁷ Though the UNFCCC was characterized as

³¹ Stephen McIntyre & Ross McKirtrick, *Corrections to the Mann et al. (1998) Proxy Database and Northern Hemisphere Average Temperature Series*, in 14 ENERGY AND ENVIRONMENT 751, 751–72 (2003); see also *Bush Firm over Kyoto Stance*, CNN.COM, Mar. 9, 2001, <http://archives.cnn.com/2001/US/03/29/schroeder.bush/> [hereinafter CNN (Mar. 9)].

³² Coren, *supra* note 23 (Richard Lindzen, a respected meteorologist from the Massachusetts Institute of Technology, notes that "scientists make meaningless or ambiguous statements. Advocates and media translate statements into alarmist declarations. Politicians respond to alarm by feeding scientists more money.").

³³ EARTH SUMMIT 2002, THE RIO CONVENTIONS COMMITTING TOWARD SUSTAINABILITY 1, 4 (2002), <http://Earthsummit2002.Org/Es/Issues/Conventions/Rioconventions.pdf> [hereinafter ES 2002].

³⁴ United Nations 1997, *supra* note 2.

³⁵ ES 2002, *supra* note 33, at 4.

³⁶ *Id.*

³⁷ *Id.*

“a legally non-binding voluntary pledge to reduce GHG emissions,”³⁸ those industrial nations that later signed the Kyoto Protocol transformed their voluntary pledges into legally binding obligations.³⁹

B. *The Kyoto Protocol*

1. History and Aims of the Kyoto Protocol

In 1997, world leaders assembled in Kyoto, Japan to address climate change. Led by the United Nations, these world leaders created the Kyoto Protocol to the UNFCCC. The Kyoto Protocol is an international agreement specifically designed to reduce the total GHG emissions of both developed countries and countries “undergoing the process of transition to a market economy.”⁴⁰ The Protocol sets targets for reducing the levels of six GHGs for the period from 2008 to 2012 (the first commitment period).⁴¹ While specific country targets vary, on average these nations pledged to cut their GHG emissions by 5.2 percent.⁴²

Under the rules negotiated in Kyoto, the Protocol did not become legally binding until ratified by countries representing fifty-five percent of the world’s GHG emissions. Many commentators believed that the signature of the United States, a nation responsible for roughly twenty-five percent of the world’s GHG emissions, was crucial to bring the Kyoto Protocol into force.⁴³ The Bush Administration refused to ratify the Protocol and its future looked bleak.

Russia’s crucial decision to ratify the Protocol in November 2004 brought the emission representation total up to sixty-one percent, and the Protocol came into force on February 16, 2005.⁴⁴ To date, 141 countries have pledged to reduce their GHG emissions under the

³⁸ INSTRUMENTS FOR CLIMATE POLICY 1 (Johan Albrecht ed., 2002).

³⁹ U.N. Secretary-General Receives Russia’s Kyoto Protocol Ratification, UNFCCC.INTERNET, Nov. 18, 2004, <http://unfccc.int/press/interviewsand-statements/items/3290.php>.

⁴⁰ Kyoto Protocol to the United Nations Framework Convention on Climate Change annex 1, Dec. 10, 1997, 32 I.L.M. 22, available at <http://unfccc.int/resource/docs/convkp/kpeng.html> [hereinafter Kyoto Protocol].

⁴¹ New Zealand Climate Change Office, The Kyoto Protocol (2006), available at <http://climatechange.govt.nz/about/kyoto.html>.

⁴² Kyoto Protocol Comes into Force, BBC NEWS, Feb. 16, 2005, <http://news.bbc.co.uk/2/hi/science/nature/4267245.stm>.

⁴³ Vinay Ganga & Simon Armitage, *The Kyoto Protocol, Carbon Credit Trading and Their Impact on Energy Projects in Europe and the World*, 2005 INT’L ENERGY L. & TAX’N REV. 73, 73–74.

⁴⁴ Kyoto Protocol Comes into Force, *supra* note 42.

Protocol, and of those countries, thirty-six developed countries and transitional economies are legally bound to do so.⁴⁵ While the Protocol sets limits on the emissions of those thirty-six nations, it does not impose specific mechanisms for meeting them.⁴⁶

2. U.S. Federal Resistance to the Kyoto Protocol

According to some figures, the United States has “just six percent of the world’s total population yet produces a quarter of the globe’s carbon dioxide,” making the United States the largest carbon dioxide producer in the world.⁴⁷ U.S. rejection of the Kyoto Protocol garnered enormous amounts of criticism. In the Bush Administration’s defense, the United States produces huge volumes of carbon dioxide not only because it has the highest material wealth (both total and per capita), but because it also “suffers from a relatively extreme continental climate,” a point many Europeans forget.⁴⁸ U.S. residents use enormous amounts of energy to air condition the nation’s desert summers and heat the Midwest winters. The U.S. also loves its automobiles. Gasoline is relatively cheap (at least from a European perspective) and public transportation is severely lacking in most parts of the United States.

With the U.S. dependency on fossil fuels at the forefront, President Bush rejected the Kyoto Protocol on two grounds:

I oppose the Kyoto Protocol because it exempts 80 percent of the world, including major population centers such as China and India, from compliance, and would cause serious harm to the U.S. economy. The Senate’s vote, 95-0, shows that there is clear consensus that the Kyoto Protocol is an unfair and ineffective means of addressing global climate change concerns.⁴⁹

⁴⁵ Ganga & Armitage, *supra* note 43, at 74 (“Only four of the original 34 industrialised nations to sign up to the Protocol have refused to take part: the United States, Australia, Liechtenstein and Monaco.”).

⁴⁶ *Id.*

⁴⁷ CNN (Mar. 9), *supra* note 31.

⁴⁸ National Energy Foundation, Why Do Some Countries Have Higher Greenhouse Gas Emissions Than Others? (2006), <http://www.nef.org.uk/energyadvice/co2emissionsctry.htm> [hereinafter NEF].

⁴⁹ Letter from George W. Bush, U.S. President, to Senators Hegel, Helms, Craig, and Roberts, U.S. Senators (Mar. 13, 2001), *available at* <http://www.whitehouse.gov/news/releases/2001/03/20010314.html> [hereinafter Letter to Senators]. Australia also refused to ratify Kyoto. While Australia only accounts for 1.4 percent of global GHG emissions, it has the third highest greenhouse pollution per capita in the world. Australia has cited similar reasons as the United States for its decision not to ratify. Australia has, however, set its own target of an eight percent increase in GHG emissions by 2012, which the Australian

President Bush (and ninety-five U.S. Senators) rejected the Kyoto Protocol in part because the agreement initially excluded the U.S.'s global competitors, namely China and India.⁵⁰ The irony is almost deafening. The United States produces on a per capita and aggregate basis vastly more carbon dioxide than the developing nations of the world, including China and India.⁵¹ For instance, in 2001 the United States generated 20 tons of carbon dioxide per capita, while China generated 2.4 tons per capita, and India 0.9 tons per capita.⁵² Yet U.S. Government officials walked away from the Kyoto Protocol pointing their fingers at China and India. Professor Stephen H. Schneider of Stanford University further explains the fallacy of the President's position:

We have to begin allowing the developing world to leapfrog past the Victorian Industrial Revolution to new technologies. And that's going to involve having them in the game. But they're not even going to listen unless we have ten years to show them that we're serious, by taking the first step. And how can somebody who created 80 percent of the problem not be responsible for taking the first step?⁵³

President Bush also based his rejection of the Kyoto Protocol on the belief that mandatory emissions cuts were a serious threat to the

Government claims is in line with the Kyoto targets of other industrialized nations in terms of economic adjustment required. See Ganga & Armitage, *supra* note 43, at 74.

⁵⁰ In late June 1997, President Clinton addressed a special session of the United Nations in New York and urged the world community to consider economic strategies for reducing greenhouse gas emissions. THE RFF READER IN ENVIRONMENTAL AND RESOURCE POLICY 205 (Wallace E. Oates ed., 2d ed. 2006) [hereinafter RFF]. The following month the U.S. Senate passed a resolution 95-0 warning the president not to agree to any treaty at the upcoming Kyoto conference that would hurt the U.S. economy or fail to commit the large developing nations to similar action. *Id.* at 206. President Clinton signed the Kyoto Protocol in 1998, but it was a "gesture of support with little legal significance." *Id.* at 207; see also *U.S. Signs Global Warming Treaty*, CNN.COM, Nov. 12, 1998, <http://www.cnn.com/TECH/science/9811/12/climate.signing/index.html>. The President never submitted the treaty to the Senate for ratification. RFF, *supra* note 50, at 207. However, in the last few years some members of Congress have proposed alternative measures for dealing with climate change. For example, Senator John McCain (R-AZ) has joined with Senator Joe Lieberman (D-CT) in sponsoring the Climate Stewardship Act. "The bill would require mandatory reductions in greenhouse gas emissions from the electricity generation, transportation, industrial, and commercial sectors of the economy, which represent 85% of overall US greenhouse gas emissions." Brad Knickerbocker, *Kyoto Era Begins*, USA TODAY, Feb. 15, 2005, http://www.usatoday.com/news/world/2005-02-15-kyoto-csm_x.htm.

⁵¹ See *Who Turned Up The Heat?*, in RFF, *supra* note 50, at 202.

⁵² *Id.* at 202.

⁵³ Frontline, *What's Up with the Weather? Interview: Stephen H. Schneider*, April 2000, <http://www.pbs.org/wgbh/warming/debate/schneider.html>.

U.S. economy.⁵⁴ Mandatory emissions cuts could negatively affect some U.S. industries at the outset of compliance with the Protocol. Fred Palmer, President of Western Fuels Association, Inc., called the issue of global warming “a game-ending kind of issue for the American coal-fired electricity industry.”⁵⁵ This type of rhetoric from industry crippled the chances of the Protocol succeeding on Capital Hill.

Nevertheless, the United States must make changes in how it does business as usual and it must make well-informed policy choices in dealing with GHGs. Many believe that the Kyoto Protocol would have been a step in the right direction. Initially, experts urged the United States to commit to reducing GHG emissions by thirty-three percent. President Clinton agreed to a seven percent reduction, a commitment higher than the European average commitment. The Bush Administration actually received everything it asked for during the Kyoto negotiations, namely the ability to use carbon sinks and cap and trade programs to reduce GHGs.⁵⁶ Indeed, Kyoto provided the United States with a broad range of policy tools to curb GHG emissions.⁵⁷

The United States has, for the time being, abandoned the international community in the growing fight against climate change. As one scholar put it, “[w]hereas the U.S. provided political leadership at crucial junctures in the creation and evolution of the ozone regime, it has emerged as one of the most important opponents of drastic international action to combat GHGs.”⁵⁸ Yet even without the Kyoto Protocol, the United States must reduce its dependence on fossil fuels, especially coal.

For instance, the United States could utilize non-polluting energy sources as its northern neighbor has done. Canada generates much of

⁵⁴ President Bush stated, “The Kyoto treaty would have wrecked our economy, if I can be blunt.” *Bush Rejects Kyoto-style G8 Agreement*, BBC NEWS, July 4, 2005, <http://news.bbc.co.uk/2/hi/americas/4647383.stm>.

⁵⁵ Frontline, *What's Up with the Weather? Interview: Fred Palmer*, April 2006, <http://www.pbs.org/wgbh/warming/debate/palmer.html>. Mr. Palmer argued that the coal industry would be first in the firing line, ahead of oil and gas, in mandatory carbon emission cuts, stating that “[t]he carbon content of the fuel, of the fossil fuel, determines the amount of carbon dioxide that is created in a combustion process. And coal is the most carbon-rich in terms of the content of the fuel, and it's 60 to 65 percent carbon. So compared with natural gas, that's down in the 30 to 35 percent range, I believe.” *Id.*

⁵⁶ Patrick Parenteau, *Anything Industry Wants: Environmental Policy Under Bush II*, 14 DUKE ENVTL. L. & POL'Y F. 363, 365 (2004).

⁵⁷ Kyoto Protocol, *supra* note 40, art. 2. The U.S. introduced trading emissions to negotiations at Kyoto based on the U.S.'s success with the Clean Air Act. RFE, *supra* note 50, at 207.

⁵⁸ THE ENVIRONMENT, INTERNATIONAL RELATIONS AND US FOREIGN POLICY 166 (Paul G. Harris ed., 2001).

its electricity through hydroelectricity, which experts say is one reason Canada (also plagued by severe winters) emits much lower carbon dioxide amounts than the United States.⁵⁹ In fact, hydroelectricity powers much of the U.S. Pacific Coast.⁶⁰ The United States could also use other non-polluting sources of energy, including biomass, wind, and solar energy. The problem is making these technologies as efficient as burning fossil fuels.

Some scholars believe that the United States is already on its way to cleaning up industry. David Gardiner, former Executive Director of the White House Climate Change Task Force (under President Clinton), argued in 2000: “[I]n the USA we’ve broken a cycle dating back to the Industrial Revolution, a cycle in which economic growth inevitably leads to more pollution.”⁶¹ According to some figures, during the 1990s, the U.S. economy “grew almost three-times faster than energy-related carbon dioxide emissions.”⁶² Slowing the *rise* in carbon dioxide emissions may be a start, but it is not enough.

C. Use of Green Taxation in Response to the Conventions

In 1997, heeding the warning of climate change, the Organization for Economic Co-operation and Development (OECD) began investigating a uniform carbon dioxide or energy tax for all OECD countries.⁶³ The OECD produced a number of working papers under the project entitled “Policies and Measures for Possible Common Action,”⁶⁴ but the project generally produced more questions than answers and failed to produce a serious proposal for a uniform OECD carbon or energy tax.⁶⁵

In contrast, the European Parliament has officially proposed a “50/50” tax on both carbon dioxide emissions and general energy in

⁵⁹ NEF, *supra* note 48.

⁶⁰ *What’s Up with the Weather? Interview: Stephen H. Schneider*, *supra* note 54 (noting that on the East Coast of the United States, electricity is mainly derived through oil, gas, and nuclear power; coal accounts for about fifty-six percent of overall electricity in the United States).

⁶¹ INSTRUMENTS FOR CLIMATE POLICY, *supra* note 38, at 22.

⁶² *Id.*

⁶³ RUUD A. DE MOOIJ, ENVIRONMENTAL TAXATION AND THE DOUBLE DIVIDEND I (2000).

⁶⁴ OECD, Climate Change, Energy and Transport, http://www.oecd.org/document/36/0,2340,en_2649_34359_2346468_1_1_1_1,00.html (last visited Feb. 21, 2007) [hereinafter OECD 1997].

⁶⁵ See generally, e.g., Richard Baron, *Economic/Fiscal Instruments: Taxation (i.e., Carbon/Energy)* (OECD Working Paper No. 4, 1997), available at <http://www.oecd.org/data-oecd/36/50/2392474.pdf>; Richard Baron, *Economic/Fiscal Instruments: Competitiveness Issues Related to Carbon/Energy Taxation* (OECD Working Paper No. 14, 1997).

response to climate change concerns. However, European Union (EU) countries have failed to agree even on the need for such an EU-imposed tax, much less a full strategy for implementation.⁶⁶ Nevertheless, several EU countries have implemented national carbon taxes, including Denmark, Finland, Sweden, and the Netherlands.

III. TAX POLICY AND THE ENVIRONMENT

A. *Options for Environmental Regulation of GHG Emissions*

1. Traditional Command-and-Control Regulation

Under traditional command-and-control (CAC) regulation, polluters are required to comply with specified standards (the command) and the regulatory authority conducts stringent monitoring and enforcement (the control).⁶⁷ CAC regulation ensures that firms curb polluting practices. Moreover, CAC regulation is source specific, meaning it requires every firm under its scope to reduce emissions.

While many countries have had some form of CAC over the past few decades (especially with regard to air and water pollution), many policymakers believe this approach is inflexible and inhibits innovative development by placing all the decision-making power in the hands of bureaucratic regulators.⁶⁸ CAC regulation is also costly to administer because of the need for close monitoring.

2. Economic Incentives

Economic incentives (EIs), on the other hand, have become increasingly popular around the globe. The Environmental Protection Agency (EPA) has adopted a broad definition of EIs as “any instrument that provides continuous inducements, financial or otherwise, to encourage responsible parties to reduce their release of pollutants or make their products less polluting.”⁶⁹ As such, EIs include tradable

⁶⁶ The Mandala Projects, Trade Environment Database (TED), TED Case Studies: EC Carbon Tax, *available at* <http://www.american.edu/TED/eccarbon.htm> (last visited Mar. 13, 2007).

⁶⁷ CLARE BAYLEY, U.K. PARLIAMENTARY OFFICE OF SCIENCE AND TECH., ENVIRONMENTAL POLICY AND INNOVATION 1 (2004), *available at* <http://www.parliament.uk/documents/upload/POSTpn212.pdf>.

⁶⁸ See Richard A. Kerr, *Acid Rain Control: Success on the Cheap*, 282 SCIENCE 1024, Nov. 6, 1998, *available at* <http://www.sciencemag.org/cgi/content/full/282/5391/1024?ck=ck>.

⁶⁹ U.S. EPA, INTERNATIONAL EXPERIENCES WITH ECONOMIC INCENTIVES FOR PROTECTING THE ENVIRONMENT 2 (2004), *available at* <http://yosemite.epa.gov/ec/epa/ecrmfile>.

permit schemes and green taxes. EIs have a number of advantages over traditional CAC regulation in controlling GHG emissions.⁷⁰ First, EIs encourage polluters to “reduce pollution below permitted amounts when it is relatively inexpensive to do so.”⁷¹ Second, EIs promote technological innovation. Polluters will be willing to spend resources on alternative energy sources, for example, when economically efficient.⁷² Third, EIs are better suited to cover a wide range of polluters, large and small, because EIs do not demand the amount of enforcement required by CAC regulation.⁷³

One form of EIs is emissions trading schemes. Under an emissions trading scheme, the environmental authority allocates to participants a certain number of permits to release emissions (or “right to pollute” coupons), which can be sold or traded among the participants. Polluters who can curb their emissions at a low cost can sell their excess permits to other participants for whom it would be very costly to reduce emissions. Emissions trading schemes are not source specific; rather the target set by the environmental authority is a total of emissions. Conceptually, the same net reduction of emissions that would be achieved through CAC regulation can be achieved through trading schemes, but at a much lower cost.⁷⁴

Some policymakers favor so-called grandfathered permit markets that give polluters their initial distributions of permits according to historical emissions.⁷⁵ In other words, under a grandfathered regime, well-established businesses are favored over new industry entrants. Following the popularity of grandfathered permit markets in the United States, several similar schemes have developed across the globe.⁷⁶

nsf/vwAN/EE-0487-01.pdf/\$File/EE-0487-01.pdf [hereinafter EPA INTERNATIONAL ECONOMIC INCENTIVES].

⁷⁰ *Id.* Some literature uses the term “economic incentives” to encompass not only market based instruments but also liability, information disclosure, voluntary measures, and non-monetary rewards. *Id.* at 4–6.

⁷¹ *Id.* at 2.

⁷² *Id.*

⁷³ *Id.* at 3.

⁷⁴ U.S. EPA, THE UNITED STATES EXPERIENCE WITH ECONOMIC INCENTIVES FOR PROTECTING THE ENVIRONMENT 67 (2001), available at <http://www.4uth.gov.ua/usa/english/tech/environ/economic.pdf> [hereinafter EPA U.S. ECONOMIC INCENTIVES].

⁷⁵ GERT TINGGAARD SVENDSEN, PUBLIC CHOICE AND ENVIRONMENTAL REGULATION 34–35 (1998).

⁷⁶ EPA INTERNATIONAL ECONOMIC INCENTIVES, *supra* note 69, at 6.

3. Environmental Taxation

Green taxes can also be useful tools in regulating GHG emissions. There is no generally accepted definition of an environmental tax. According to the Statistical Office of the European Communities (Eurostat), an environmental or green tax is: "A tax whose tax base is a physical unit (or a proxy of it) of something that has a proven, specific negative impact on the environment."⁷⁷ According to this definition, the tax base determines whether the tax is an environmental tax. Understandably, Eurostat has chosen a pragmatic definition. The motivation behind implementing a tax can be difficult to quantify, and thus Eurostat, being in the business of statistical analysis, looks simply at what is being taxed.

In contrast, the OECD has used the following definition:

Full coverage of the use of fiscal instruments in environmental policy will . . . need to consider both:

(i) Taxes which have been introduced to achieve a specific environmental objective, and which have been explicitly identified as "environmental taxes."

(ii) Taxes which are introduced initially for non-environmental reasons, but which impact on environmental objectives, and which may be increased, modified or reduced for environmental reasons.⁷⁸

This Article focuses on taxes in category (i), taxes motivated by environmental concern. Though outside the scope of this Article, policymakers, when making difficult policy choices regarding climate change, should also consider category (ii) taxes, those taxes that have accidentally had positive environmental affects.

Like permit trading schemes, taxes are economic incentives designed to change behavior. Green taxes encourage a broad range of entities to take environmentally friendly measures through price incentives. In contrast to permit schemes, policymakers can use taxes to raise public revenue. For instance, the U.K. Office of National Statistics reports that environmental taxes raised thirty-two billion pounds in 2001 (approximately forty-six billion dollars).⁷⁹ Large figures such

⁷⁷ NATIONAL STATISTICAL OFFICES IN NORWAY, SWEDEN, FINLAND & DENMARK, ENERGY TAXES IN THE NORDIC COUNTRIES—DOES THE POLLUTER PAY? 1, 6 (2003) [hereinafter ENERGY TAXES IN NORDIC COUNTRIES].

⁷⁸ OLE KRISTIAN FAUCHALD, ENVIRONMENTAL TAXES AND TRADE DISCRIMINATION 30–31 (1998).

⁷⁹ BAYLEY, *supra* note 67, at 2.

as this almost certainly do not include the administrative costs of implementing green taxes and will often include taxes not motivated by environmental concerns (e.g. transport taxes).

Carbon taxes are excise taxes based on the carbon content of fuel, requiring the payment of a fixed fee for every ton of carbon emitted.⁸⁰ The basic economic premise behind carbon taxation is straightforward: market prices for carbon-based fuels such as oil, coal, and gas do not reflect the full environmental costs of their production and consumption and, therefore, the price of these fuels should be raised to account for these negative externalities. Raising the price of carbon-content fuel relative to cleaner burning fuel will encourage some consumers to decrease their use of carbon-content fuel. Policymakers thus guide consumers where Adam Smith's "invisible hand" failed. Implementing such a tax, however, is not as straightforward.

B. *Supporters of These Emissions Regulation Options*

1. Private Industry

In his book, *Public Choice and Environmental Regulation*, Gert Tinggaard Svendsen of the Aarhus School of Business in Denmark discusses the general attitude of private industry, state government, heavily regulated industry, and environmental groups toward the options for emissions regulation.⁸¹ Svendsen reports that private industry generally supports permit markets.⁸² Permit trading schemes are more flexible than CAC regulation, which does "not readily adapt to changing economic conditions, and therefore, does not embrace new technological solutions."⁸³ Green taxes are rigid and may be arbitrarily set, while permit markets allow the market to set prices. Moreover, private industry particularly supports grandfathering schemes that effectively make it more difficult for future competitors to enter the industry.⁸⁴

⁸⁰ RFF, *supra* note 50, at 226.

⁸¹ See generally SVENDSEN, *supra* note 76.

⁸² *Id.* at 26.

⁸³ *Tradeable Emissions: Hearing Before the Joint Economic Committee*, 105th Cong. (1997) (statement of Carleton W. Bartels, Managing Director, Canter Fitzgerald Environmental Brokerage Services), available at <http://www.house.gov/jec/hearings/emission/bartels.htm>.

⁸⁴ SVENDSEN, *supra* note 75, at 36.

2. State Government

Svendsen argues that state governments prefer green taxes because of the ability to maximize tax revenues.⁸⁵ Nordic green taxes in the 1990s taught policymakers that it can be difficult to net substantial revenues through green taxation. Governments should consider the ability for even relatively small amounts of revenue to self-sustain further environmental projects. In other words, revenue from green taxes can be recycled back into projects that further environmental protection.

The political success of trading permit schemes should not be overlooked. The environmental success of trading schemes in the United States has encouraged several other governments to choose permit trading over green taxation. For many governments, green taxation is an uphill battle against the powerful forces of industry, a battle potentially not worth fighting.⁸⁶

3. Heavily Regulated Industry

Svendsen contends that heavily regulated industry, for example public utilities, will generally follow the state's interest and chose green taxation or CAC regulation; in return, regulated industry can maintain their monopoly.⁸⁷ It seems plausible that regulated industry would follow the interests of government, because such entities are essentially an extension of government. However, for the reasons outlined above, governments may instead choose permit schemes. Heavily regulated industry will lobby for exemption from whatever form of regulation is implemented, and are often successful.⁸⁸

4. Environmental Groups

Svendsen reasons that environmental groups will chose to cooperate with industry out of self-interest. He argues that members of environmental groups must pay membership fees, paying members want results, and the best way for the organization to provide results is by cooperating with industry and lobbying for permit trading schemes. This proposition seems overly cynical, and based on more recent research, unsubstantiated. Sierra Club, the environmental group Svend-

⁸⁵ *Id.* at 40.

⁸⁶ See discussion *infra* Part IV.D.2.e (the case of Japan).

⁸⁷ SVENDSEN, *supra* note 75, at 35.

⁸⁸ See discussion *infra* Part IV.D.2.c (the case of Norway).

sen uses as an example, supports a wide range of policy tools.⁸⁹ For example, the Sierra Club supports U.S. federal regulation requiring automakers to use modern fuel-saving technology, a type of CAC regulation.⁹⁰

Moreover, the Sierra Club opposes emissions trading schemes because of resulting “hotspots.”⁹¹ In essence, because most emissions trading schemes do not put a CAC-type limit on the amount of pollution allowed from a particular source (i.e. polluters can purchase an unlimited number of permits), areas around these remaining high polluters become hotspots. The Sierra Club opposes the EPA’s proposed mercury trading scheme under the Clean Air Act because “dirty plants could continue to emit high levels of mercury beyond 2018 and create mercury ‘hotspots’ by simply purchasing mercury pollution credits from cleaner plants.”⁹²

Traditional CAC regulation is source specific, requiring each polluter to reduce GHG emissions. Green taxation and emissions trading schemes, on the other hand, provide economic incentives for polluters to reduce emissions but do not demand that each polluter reduce emissions. Instead, these EIs focus on total reduction of emissions and as such allow industry greater flexibility in compliance.

IV. ENVIRONMENTAL (GREEN) TAXATION

A. *What Can Green Taxation Achieve?*

Green taxes may be used to punish polluters. The general principle of increasing taxes on “bads” (e.g. polluting, smoking) and decreasing taxes on “goods” (e.g. labor)⁹³ was first adopted by the OECD in

⁸⁹ See generally Sierra Club Conservation Policies, Federal Tax Law, May 4–5, 1985, available at <http://www.sierraclub.org/policy/conservation/fedtaxlaw.asp> (explaining that “[t]he Sierra Club favors those reforms in federal tax law that will encourage environmentally sound action and discourage environmentally damaging action”); Sierra Club Policies, 2006 Energy Resources Policy, available at <http://www.sierraclub.org/policy/conservation/energy.asp> (follow “energy policy as a PDF file” hyperlink).

⁹⁰ Press Release, Sierra Club, Bush Fuel Economy Standards Fail to Cut Oil Addiction (Mar. 29, 2006), available at <http://www.sierraclub.org/pressroom/releases/pr2006-03-29.asp>.

⁹¹ See Sierra Club Conservation Policies, Pollution Trading, Feb. 20–21, 1999, available at <http://www.sierraclub.org/policy/conservation/trading.asp>.

⁹² Press Release, Sierra Club Ozark Chapter, Bush Administration’s Fishy Rule Would Weaken Clean Air Act Hold the Mercury, Please! (Mar. 19, 2004), available at <http://missouri.sierraclub.org/frontpage2004/MercuryFacts.htm>.

⁹³ DE MOOIJ, *supra* note 58, at 1.

1972.⁹⁴ Environmental agencies across the globe use this underlying principle as a reason for implementing green taxes.⁹⁵ Countries including Sweden, Norway, Finland, Denmark, and the Netherlands have attempted to shift the tax burden of labor and capital to the use of environmental resources through the implementation of green taxes.⁹⁶ Green taxes are also often designed to change behavior. Taxes must be set high enough to “make it attractive for customers to use more environmentally benign products and practices.”⁹⁷ For example, in 1989 the U.S. Congress introduced a federal tax on Ozone Depleting Chemicals. Initially the tax on chlorofluorocarbons (CFCs) was \$1.37 per pound, approximately twice the then-current product price.⁹⁸ By 1995, the federal tax was \$3.10 per pound.⁹⁹ The Federal Government simultaneously introduced the Clean Air Act, which put a cap on most CFCs with a phase-out in 2000. Nevertheless, many analysts believe that the tax, not the cap, is responsible for U.S. ozone gas reduction.¹⁰⁰

Similarly, policymakers can use green taxes to channel good behavior and influence the choice of resources used. For example, governments may want to discourage the use of exhaustible natural resources and provide more attractive alternatives through the use of the tax system.¹⁰¹ Governments may also use green taxes to generate revenue. Governments may choose to use the resulting revenue to pay for damages created from past pollution or for measures to reduce future pollution. For example, of the thirty-two billion pounds generated by U.K. environmental taxes in 2001, fourteen percent purportedly was allocated to environmental projects.¹⁰²

Tax shifting describes the economic theory that by combining a significant pollution tax with a major restructuring of the national tax system, government can make the overall economy more efficient.

⁹⁴ FAUCHALD, *supra* note 78, at 15.

⁹⁵ News Release, Royal Comm’n on Envir. Pollution, Climate Change Tax Should Relate Directly to Carbon Dioxide Emissions (June 10, 1999), *available at* <http://www.rcep.org.uk/news/99-2.htm> [hereinafter Royal Comm’n News Release] (Sir Tom Blundell, Chairman of Royal Commission, states in a letter, “the Royal Commission on Environmental Pollution strongly supports [the] intent to use the tax system to deliver environmental objectives, so achieving a shift in the overall tax burden from ‘goods’ to ‘bads’.”).

⁹⁶ EPA INTERNATIONAL ECONOMIC INCENTIVES, *supra* note 69, at 55.

⁹⁷ DAVID MORRIS, INST. FOR LOCAL SELF-RELIANCE, GREEN TAXES (1994), <http://www.ilsr.org/ecotax/greentax.html>.

⁹⁸ *Id.*

⁹⁹ *Id.*

¹⁰⁰ *Id.*

¹⁰¹ FAUCHALD, *supra* note 78, at 32.

¹⁰² BAYLEY, *supra* note 67, at 2.

This theory often arises in conjunction with raising revenue. In the early 1990s, many scholars suggested that governments could eradicate unemployment by implementing high environmental taxes. The debate was most vigorous in European countries with strong environmental political parties and high unemployment.¹⁰³

B. *At What Stage Should Green Taxation Be Applied?*

1. Direct Tax on Emissions

Environmental taxes may be applied directly or indirectly to GHGs.¹⁰⁴ Taxing greenhouse emissions is a form of direct tax. When a country seeks to reduce or curb GHG emissions, it seems reasonable to directly tax emissions, and thus provide an immediate price incentive to stop polluting. However, calculating the amount a polluter emits can be difficult and/or costly.¹⁰⁵ Thus, direct emissions taxes may be useful when there are few large polluters and, as such, calculation of emissions is feasible.¹⁰⁶ Policymakers may also choose an emissions tax when there is no correspondence between input or final products and emissions, the alternative form of tax.¹⁰⁷ For instance, there is generally “full correspondence between characteristics of raw materials and emissions of CO₂,” but “little correspondence in relation to emissions of NO₂.”¹⁰⁸

2. Indirect Tax on Inputs or Final Products

Alternatively, in order to curb GHG emissions, policymakers may choose to apply an indirect tax on inputs or final products. Historically, OECD countries have chosen this form of indirect tax, rather than tax emissions directly.¹⁰⁹ Ole Fauchald suggests that one reason countries have chosen the indirect tax route is their aim to establish neutral tax systems in relation to the behavior of consumers and producers.¹¹⁰ Fauchald argues that such an approach “does not seem appropriate” because the objective of environmental taxes is “precisely to affect the choices of producers and consumers for the benefit of

¹⁰³ MORRIS, *supra* note 97.

¹⁰⁴ See FAUCHALD, *supra* note 78, at 30–1.

¹⁰⁵ *Id.* at 32.

¹⁰⁶ *Id.*

¹⁰⁷ *Id.*

¹⁰⁸ *Id.* at 32.

¹⁰⁹ FAUCHALD, *supra* note 78, at 33.

¹¹⁰ *Id.*

the environment.”¹¹¹ While there is evidence that countries seek neutrality (or at least the appearance of neutrality), the primary choice of the indirect tax over the direct emissions tax is probably the relative ease to which it can be implemented.

C. *Limits to Green Taxation*

1. Death of the Double Dividend Hypothesis?

In the early 1990s, Dutch and Northern European scholars produced a large volume of literature proclaiming the merits of environmental taxes.¹¹² This literature included a number of economic models suggesting that environmental taxes could be used to raise significant public revenue.¹¹³ One such model, the “double dividend hypothesis,” envisaged a two-fold return from environmental taxation.¹¹⁴ The first return, or dividend, was the increase in environmental quality.¹¹⁵ The second dividend was the reduction of other taxes, namely the ability to shift the burden of taxation away from labor and toward the environment in order to boost employment or public welfare.¹¹⁶

Currently, most policymakers believe that the second dividend is unrealistic.¹¹⁷ The green tax, like any other tax, exacerbates the inefficiencies of the existing tax system.¹¹⁸ Much of the early double dividend literature previously ignored this negative “tax interaction ef-

¹¹¹ *Id.*

¹¹² See, e.g., OECD, WORKING PARTY ON NATIONAL ENVIRONMENTAL POLICY, ENVIRONMENT AND EMPLOYMENT: AN ASSESSMENT 45 (2004) [hereinafter OECD ASSESSMENT] (highlighting numerous economic studies on environmental taxes). See generally WORLD WIDE FUND FOR NATURE (WWF), THE IMPACTS OF THE EUROPEAN EMISSIONS TRADING SCHEME ON COMPETITIVENESS AND EMPLOYMENT IN EUROPE (2006); A. Lans Bovenberg & Ruud A. de Mooij, *Environmental Levies and Distortionary Taxation*, 84 AM. ECON. REV. 1085 (1994); David Pearce, *Role of Carbon Taxes in Adjusting to Global Warming*, 101 ECON. J. 938 (1991). But see generally Lawrence H. Goulder, *Environmental Taxation and the “Double Dividend”*: A Reader’s Guide, 2 INT’L TAX & PUB. FIN. 157 (2004) (for a U.S. scholar’s perspective).

¹¹³ See generally OECD ASSESSMENT, *supra* note 112.

¹¹⁴ See generally Pearce, *supra* note 112.

¹¹⁵ See *id.*

¹¹⁶ Laura Marsiliani & Thomas I. Renström, *Imperfect Competition, Labour Market Distortions, and the Double Dividend Hypothesis: Theory and Evidence from Italian Data 1* (Tilburg University Center for Economic Research, FEEM Working Paper Series, Working Paper No. 11.00, 2000), available at <http://ssrn.com/abstract=229157>.

¹¹⁷ See Martin A. Sullivan, *Economic Analysis: The Carbon Tax Name Game*, 113 TAX NOTES 537, 537 (2006).

¹¹⁸ *Id.* at 537.

fect,”¹¹⁹ focusing only on the good aspects of carbon taxes—the reduction of carbon emissions and the ability to raise revenue that could be used to reduce existing taxes and their inefficiencies (“revenue recycling effect”).¹²⁰ However, most economists now agree that “the tax interaction effect does exist and may actually be as large as—or even larger than—the revenue recycling effect, so the double dividend argument has pretty much been ruled out.”¹²¹ For this reason, the first dividend—the promise of a cleaner environment—must be the driving force behind green taxes. While this may be a harder sale, the onset of the Kyoto Protocol has made countries more amenable to the possibilities of carbon and energy taxes. Although taxes may not be set high enough to eradicate unemployment, revenues from green taxes can be recycled back to at least partially offset “bad” taxes.¹²² Moreover, some of the revenues raised by green taxes may be recycled into environmental projects and research. Such a program, in essence, creates a green double dividend and makes good policy sense.

In an extreme example, some Belgian green taxes are so low it costs the government more to collect them.¹²³ This fact alone does not necessarily make the tax inefficient. The persistence of such taxes signals that the Belgian Government has determined that the social benefits outweigh the administrative costs.

A minority of scholars still believe the double dividend is possible through tax shifting—a complete restructuring of the national tax system.¹²⁴ One study by Dutch economist Ruud de Mooij claims that the double dividend could be achieved by improving terms of trade.¹²⁵ For example, de Mooij’s model suggests that an OECD-wide energy tax would force energy demand within the OECD to fall.¹²⁶ If such demand fell by a significant amount (de Mooij’s model suggests a fall of 1.8 percent), the price of energy on the world market would fall and improve the terms of trade for OECD countries.¹²⁷ Finally, improvement in

¹¹⁹ *Id.*

¹²⁰ *Id.*

¹²¹ *Id.*

¹²² See Sullivan, *supra* note 117, at 537.

¹²³ Paul O’Brien et al., *Encouraging Environmentally Sustainable Growth in Belgium* 25 (Economics Dep’t, Working Paper No. 300, 2001), available at http://www.oecd.org/search/Result/0,2665,en_33873108_33873261_1_1_1_1_1,00.html.

¹²⁴ DE MOOIJ, *supra* note 58, at 1.

¹²⁵ *Id.*

¹²⁶ *Id.*

¹²⁷ *Id.* at 148.

terms of trade could yield a “strong” double dividend for the countries of OECD.¹²⁸

2. Political Barriers to Direct Emissions Policies

Big industry is sometimes a big problem for policymakers devoted to environmental taxes. Energy industry groups argue that environmental taxes hinder global competitiveness.¹²⁹ The effectiveness of this claim is perhaps most evident in the public statements by leaders of the United States and Australia in rejecting the Kyoto Protocol.¹³⁰ A survey of recent literature reveals that scholars are working to counter this fear and have suggested at least five techniques to reduce the effects from environmental taxes on competitiveness.¹³¹

First, a country may introduce a relatively low rate of environmental tax.¹³² A tax that is too low, however, will not only fail to affect competitiveness, but will also fail to have substantial beneficial environmental effects. In the words of the OECD, a tax that is too low will simply be a “revenue raising device” not an environmental tax.¹³³ Indeed, the EPA proposes that green taxes tend to be set too low to have a significant impact on the environment, with few exceptions.¹³⁴

Second, scholars suggest that countries may “exempt those industries or products that are exposed to international competition from the tax.”¹³⁵ Many countries have used this technique, but this method “raises serious problems related to cost-effectiveness and the achievement of the environmental objective in question.”¹³⁶ Third, countries may subsidize parts of industry subject to competitive disadvantages.¹³⁷ Fourth, countries can make domestic taxes dependent on whether foreign producers competing in the same market as domestic producers are subject to similar taxes.¹³⁸ Finally, countries can offset the adverse effects of environmental taxes through a mechanism called a “border

¹²⁸ *Id.*

¹²⁹ See, e.g., American Petroleum Institute, Tax and Trade, <http://new.api.org/policy/tax/index.cfm> (last visited Apr. 24, 2007).

¹³⁰ *Australia Rejects Kyoto Pact*, BBC News, June 5, 2002, <http://news.bbc.co.uk/1/hi/world/asia-pacific/2026446.stm>; Letter to Senators, *supra* note 49.

¹³¹ FAUCHALD, *supra* note 78, at 35.

¹³² See *id.* at 45.

¹³³ *Id.* at 35.

¹³⁴ EPA INTERNATIONAL ECONOMIC INCENTIVES, *supra* note 69, at 3.

¹³⁵ FAUCHALD, *supra* note 78, at 35.

¹³⁶ *Id.*; see also discussion *infra* Part IV.D.2.c (on Norway).

¹³⁷ FAUCHALD, *supra* note 78, at 35.

¹³⁸ *Id.* at 36.

tax adjustment.”¹³⁹ For example, by applying the tax to final products rather than to raw materials, a country has greater freedom to adjust the tax as the product either enters or leaves the country.¹⁴⁰

D. Carbon Taxes and Credits

1. Defining Carbon Taxation

Currently, carbon is regarded as the most threatening GHG. As such, several countries have implemented carbon taxes in an effort to curb the potential destruction from increasing carbon in our atmosphere.¹⁴¹

Carbon taxes are generally revenue neutral: revenue generated is recycled back into the economy to enhance welfare, usually in an attempt to offset tax burdens in other areas or to invest in environmentally sound technology.¹⁴² True carbon taxes are based on the carbon content of fuel, however, some literature incorrectly sweeps general taxes on energy under the umbrella of “carbon taxes,” because such taxes are often aimed at lowering concentrations of carbon dioxide (and possibly other GHGs) in the atmosphere.¹⁴³ Most scholars agree that general energy taxes are inferior to true carbon taxes in reducing carbon dioxide in the atmosphere.¹⁴⁴

2. Case Studies

a. *European Union*

The EU-15 committed collectively to reduce their 1990 greenhouse gas emission by eight percent by 2012.¹⁴⁵ However, in EU Coun-

¹³⁹ *Id.*

¹⁴⁰ *Id.*

¹⁴¹ See discussion *infra* Parts IV.D.2.b-c (on Denmark and Norway). Switzerland recently announced the introduction of a carbon tax, which will become effective in 2009. See Daniel Pruzin, *Swiss Parliament OKs Carbon Tax but Delays Effective Date until 2009*, DAILY TAX REPORT (BNA), Dec. 20, 2006, at G-4.

¹⁴² See discussion *infra* Part IV.C.1 (double dividend).

¹⁴³ Zhong Xiang Zhang & Lucas Assuncao, Domestic Climate Policies and the WTO, at 17 (FEEM Working Paper No. 91, 2001), available at <http://ssrn.com/abstract=288273>.

¹⁴⁴ *Id.*

¹⁴⁵ Kyoto Protocol, *supra* note 40, annex B. The European Union currently has twenty-seven members, with the accession of much of the former Eastern Block in 2004. Europa, The History of the European Union: 2000—today, A decade of further expansion, http://europa.eu/abc/history/2000_today/index_en.htm (last visited May 3, 2007). EU-15 identifies the members prior to that accession and they are: Germany, France, Italy, the

cil Decision 358/CE, the EU-15 separately agreed to redistribute the burden among themselves.¹⁴⁶ For example, under the Decision, France is committed to reduce greenhouse gas emissions by zero percent.¹⁴⁷ Germany is committed to reduce greenhouse gas emissions by twenty-one percent.¹⁴⁸ Members outside the EU-15 made commitments ranging from six to eight percent.¹⁴⁹ For example, Hungary and Poland committed to a six percent reduction of greenhouse gas emissions from 1990 levels.¹⁵⁰

EU bodies have debated the utility of a common carbon tax applied across the European Commission (EC) Community.¹⁵¹ Following the Rio Conference on Climate Change in 1991, the EC Community began evaluating mechanisms for reducing GHGs, particularly carbon emissions, including the concept of an EU common carbon tax. Eventually, the EC gave its approval for a fifty percent carbon content and fifty percent energy cost tax ("50/50 tax") to be applied to all Member States.¹⁵² As the name suggests, fifty percent of the tax would be based on carbon emissions, while the other fifty percent would be imposed on energy production (including nuclear power, but excluding renewable energy sources).¹⁵³

Under this proposal, Member States would be free to allocate the revenue raised through the tax as they wished.¹⁵⁴ The proposal was met with early resistance. Spain, Portugal, Greece, and Ireland objected to the 50/50 tax because they were at earlier stages of industrialization than other EU Members. They argued that a common EU tax would cripple any hopes of catching up to more industrialized nations like France, Germany, and the United Kingdom.¹⁵⁵ In addition, they argued that their respective energy use was relatively lower than

Netherlands, Belgium, Luxembourg, Denmark, Ireland, United Kingdom, Greece, Spain, Portugal, Austria, Finland, and Sweden. Europa, *The History of the European Union: 1990–1999, A Europe without frontiers*, http://europa.eu/abc/history/1990-1999/index_en.htm (last visited May 3, 2007).

¹⁴⁶ Council Decision 358/CE, pmbl., art. 2, annex II, 2002 O.J. (L 130) 1, 2, 3, 19 (EU).

¹⁴⁷ *Id.* at 19, Annex II.

¹⁴⁸ *Id.*

¹⁴⁹ Kyoto Protocol, *supra* note 40, Annex B.

¹⁵⁰ *Id.*

¹⁵¹ The Mandala Projects, *supra* note 66.

¹⁵² *Id.*

¹⁵³ Larry Pakerr, Almanac of Policy Issues, Global Climate Change: Market-Based Strategies to Reduce Greenhouse Gases, Oct. 1, 2002, *available at* http://www.policyalmanac.org/environment/archive/crs_climate_change_market.shtml.

¹⁵⁴ The Mandala Projects, *supra* note 66.

¹⁵⁵ *Id.*

other EU members and thus did not demand immediate response through a rigid tax scheme.¹⁵⁶ All fifteen members of the EU, apart from the United Kingdom, eventually formed a consensus and “agreed upon the necessity of the tax on an EU level.”¹⁵⁷ The United Kingdom was not entirely alone—the EC also could not agree to EU-wide implementation.¹⁵⁸ Nevertheless, some European countries, such as Finland, subsequently modified their energy taxation schemes to fit the model discussed by the EC.¹⁵⁹

The idea of a common carbon tax in the European Union is not entirely dead. In 2005, the EC published an external study finding that “a common EU carbon tax would be the most cost-efficient way of reaching the EU climate policy objectives.”¹⁶⁰ However, the study acknowledged that a carbon tax “would have a somewhat negative impact on competitiveness in some energy-intensive sectors” and that “[t]hese effects would be alleviated only slightly by exempting energy-intensive sectors from energy taxation.”¹⁶¹

The EU governing bodies have also encouraged tax as a useful tool in achieving Member States’ Kyoto targets. For instance, while Directive 2003/87 establishes a scheme for emissions trading, the Directive states that “the instrument of taxation can be a national policy to limit emissions from installations temporarily excluded.”¹⁶² In other words, the Directive encourages the use of tax on activities not presently covered by the EU Emissions Scheme.

A majority of EU-15 members have enacted some form of carbon or energy tax (or both) as part of their plan to reduce GHG emissions. EU countries with carbon taxes include Finland, Sweden, the Nether-

¹⁵⁶ *Id.*

¹⁵⁷ *Id.* The United Kingdom objected to the tax “based on the principle of national sovereignty, and have proposed an internal increase on VAT on domestic power and road fuel, rather than a tax on emissions or energy.” *Id.*

¹⁵⁸ *Id.*

¹⁵⁹ For example, Finland imposed the first carbon dioxide tax in 1990 and modified it in 1994. The Finnish tax has two components: (1) a basic tax component to meet fiscal needs and (2) a combined energy/carbon dioxide tax component. Pakerr, *supra* note 153.

¹⁶⁰ EU Taxation and Customs Union, Impacts of Energy Taxation in the Enlarged European Union (Nov. 7, 2005), available at http://europa.eu.int/comm/taxtion_customs/taxation/excise_duties/energy_products/studies_reports/index_en.htm.

¹⁶¹ *Id.* The study also breathed life into the double dividend principle, stating “that Member States would benefit from common energy/carbon tax policies in the form of higher employment and welfare if they used tax revenues to reduce employers’ social security contributions.” *Id.*

¹⁶² Council Directive 87/EC, 2003 O.J. (L 275) 32 (EU).

lands, Denmark, Italy, and France.¹⁶³ Other European countries have so far rejected true carbon taxes and opted for general energy taxes instead. These countries include Germany, the United Kingdom, Austria, and Belgium.

It may be helpful to view the introduction of carbon taxes across Europe in two distinct waves. The first wave of carbon taxes began in Northern Europe and the Netherlands in the early 1990s. With the exception of the Netherlands, these carbon taxes were introduced into already existing general energy tax regimes.¹⁶⁴ Finland introduced the world's first carbon tax in 1990.¹⁶⁵ In 1991, Sweden followed, introducing a carbon tax and cutting existing energy taxes by fifty percent as part of a comprehensive reformation of the tax system.¹⁶⁶ The overall effect was a significant increase in energy taxation.¹⁶⁷ In 1992, the Netherlands introduced a fuel environmental tax with taxation basis of fifty percent for energy and fifty percent for carbon.¹⁶⁸ Denmark introduced its own carbon tax in 1993.¹⁶⁹

Other EU members have only reluctantly decided on taxation as a tool for emissions reduction after facing poor Kyoto target outlooks. This second wave of countries are divided over whether to introduce general energy taxes or more specific carbon taxes. For instance, Italy

¹⁶³ EPA, NATIONAL CENTER FOR ENVIRONMENTAL ECONOMICS, ECONOMIC INCENTIVES FOR POLLUTION CONTROL: CHAPTER 11.1.5.2 ENERGY/CARBON TAXES, available at <http://yosemite.epa.gov/EE/Epalib/incent.nsf/0/0483a144da8fa434852564f7004f3e68?OpenDocument> (last visited May 3, 2007) [hereinafter Pollution Control Chapter]; see also *id.* (follow hyperlink for Table 11-12).

¹⁶⁴ See Jean-Philippe Barde, *Environmental Taxation: Experience in OECD Countries*, in ECOTAXATION 223, 233 (Timothy O'Riordan ed., 1997).

¹⁶⁵ FINLAND'S NATIONAL REPORT UNDER THE UNITED NATION'S FRAMEWORK CONVENTION ON CLIMATE CHANGE 10 (1995), available at <http://unfccc.int/resource/docs/natc/finnc1.pdf>.

¹⁶⁶ Barde, *supra* note 164, at 232.

¹⁶⁷ See *id.* at 232-33. However, in 1993 the "manufacturing industry and commercial horticulture were granted a total exemption of energy tax and a 75 percent rebate on the carbon dioxide tax," undermining the environmental objectives. *Id.*

¹⁶⁸ JAPANESE MINISTRY OF THE ENVIRONMENT, FINAL REPORT OF RESEARCH PANEL ON ECONOMIC INSTRUMENTS SUCH AS TAXATION AND CHARGES IN ENVIRONMENTAL POLICIES 1-1a(c) (1995), available at <http://www.env.go.jp/en/policy/tax/ch1.html> [hereinafter Japanese Ministry of the Environment: Final Report].

¹⁶⁹ See *id.* at 1-1a(b). However, "the tax system was reformed in 1996, and in addition to the traditional CO₂ [carbon dioxide] taxes, more comprehensive and new environment and energy taxes were introduced, which was composed of the establishment of CO₂ and energy taxes, SO₂ [sulfur dioxide] taxes, natural gas taxes, battery surcharge, chlorine solvent taxes and agricultural chemicals taxes and the increase of gasoline taxes." *Id.*

and France introduced carbon taxes in 1999 and 2000, respectively.¹⁷⁰ However, Germany, Austria, the United Kingdom, and Belgium have opted for general energy taxes.¹⁷¹ Slovenia was the first accession state to implement a carbon tax in 1997.¹⁷² Poland also has a small tax on carbon emissions that amounts to a carbon tax.¹⁷³

b. *Denmark*

Under the Kyoto Accord, Denmark, a wealthy, green-friendly, nation, pledged to cut its 1990 GHG emissions twenty-one percent by 2012.¹⁷⁴ Denmark's carbon tax went into effect in 1992 for households and in 1993 for industry.¹⁷⁵ The tax was "levied on all fossil fuels in proportion to their carbon content" and accompanied a general energy tax and sulfur dioxide (SO₂) tax.¹⁷⁶ Scholars have criticized the

¹⁷⁰ See generally ENERGY INFORMATION ADMINISTRATION, ITALY: ENVIRONMENTAL ISSUES (2003), <http://www.eia.doe.gov/emeu/cabs/itenv.pdf> (providing information on Italy's carbon tax); ENERGY INFORMATION ADMINISTRATION, FRANCE: ENVIRONMENTAL ISSUES (2003), <http://www.eia.doe.gov/emeu/cabs/franenv.pdf> (providing information on France's carbon tax).

¹⁷¹ See generally DIEFENBACHER ET. AL., FEASTA REVIEW No. 2, HOW HAVE ECOTAXES WORKED IN GERMANY?, available at <http://www.feasta.org/documents/review2/ecotaxes.htm> (for information on Germany's energy tax); see also German Embassy Washington, D.C., Germany's Ecological Tax Reform, available at http://www.germany.info/relaunch/business/taxes/eco_tax.html (last visited Feb. 21, 2007); AUSTRIAN ENERGY AGENCY, RENEWABLE ENERGY IN AUSTRIA, available at <http://www.energyagency.at/projekte/ren-in-a01.htm> (for information on Austria's energy tax) (last visited Apr. 24, 2007); ODYSSEE PROJECT, ENERGY EFFICIENCY AND CO₂ EMISSIONS IN AUSTRIA (2004), available at <http://www.odyssee-indicators.org/Publication/Energy%20efficiency%20policies%20measures.html>; ODYSSEE PROJECT, ENERGY EFFICIENCY IN THE UK (2004), available at http://www.odyssee-indicators.org/Publication/PDF/uk_r04.pdf (for information on U.K. energy taxes); *UK Fuel Tax: the Facts*, BBC NEWS, Sept. 21, 2000, available at http://news.bbc.co.uk/1/hi/in_depth/world/2000/world_fuel_crisis/933648.stm (for information on U.K. fuel tax); PAUL O'BRIEN ET AL., OECD, ENCOURAGING ENVIRONMENTALLY SUSTAINABLE GROWTH IN BELGIUM (2001), available at [http://www.oilis.oecd.org/oilis/2001doc.nsf/linkto/eco-wkp\(2001\)26](http://www.oilis.oecd.org/oilis/2001doc.nsf/linkto/eco-wkp(2001)26) (select English language adobe file) (for information on energy taxes in Belgium).

¹⁷² UNITED NATIONS, ECONOMIC ASPECTS OF SUSTAINABLE DEVELOPMENT IN SLOVENIA, available at <http://www.un.org/esa/agenda21/natlinfo/countr/slovenia/eco.htm> (last visited May 4, 2007).

¹⁷³ Pollution Control Chapter, *supra* note 163.

¹⁷⁴ Kyoto Protocol, *supra* note 40, Annex B (allocating eight percent to EU-15); Council Decision 358/CE, *supra* note 146, Annex II (redistributing burden among EU Members).

¹⁷⁵ SVENDSEN, *supra* note 75, at 147; see also DANISH ENERGY AUTHORITY, GREEN TAXES IN TRADE AND INDUSTRY—DANISH EXPERIENCES 3 (2005) [hereinafter DANISH ENERGY AUTHORITY].

¹⁷⁶ ENERGY TAXES IN NORDIC COUNTRIES, *supra* note 77, at 14.

Danish carbon tax on three grounds.¹⁷⁷ First, the tax has been criticized for being far too low.¹⁷⁸ Second, the tax has been criticized because the refund system for energy-intensive firms provided little economic incentive to reduce emissions.¹⁷⁹ Under the carbon tax scheme, VAT-registered firms were required to pay only half per ton of carbon emitted as were Danish households burning fossil fuels.¹⁸⁰ Finally, some commentators argued that the accompanying energy tax wrongly “favoured fossil fuel-based energy production by electric utilities because it [was] levied on electricity consumption and not on fuel inputs.”¹⁸¹

In 1996, Denmark modified its green tax system with the introduction of the aptly titled Green Tax Package.¹⁸² Again, the Green Tax Package included a carbon tax and a tax on energy and sulfur dioxide. This time around, however, the Government implemented a system whereby tax rates increased gradually, “thus giving companies time to improve energy efficiency.”¹⁸³ However, little else about the carbon tax changed. Nevertheless, in 1999, the Danish Energy Authority gave the tax scheme a glowing review, claiming:

[T]he Green Tax Package has contributed significantly to the attainment of the expected targets for CO₂ emissions . . . the additional taxes on trade and industry had no noticeable consequences for the economy or competitiveness of the companies as a whole. This is mainly due to the redirection of revenue to trade and industry and tax rebates for energy-intensive enterprises.¹⁸⁴

The merit of these glowing claims is suspect in view of Denmark's Kyoto target projections. Rather than working toward reducing levels by twenty-one percent, Denmark has so far *increased* emissions by 6.3 percent since 1990.¹⁸⁵ One commentator quipped, “the likely gap between [Denmark's] Kyoto commitment and its emissions levels projected for 2010 is 25.2 percentage points . . . despite all those wind-mills.”¹⁸⁶ The likely reason that Denmark's current green tax system

¹⁷⁷ See *supra* notes 179–82.

¹⁷⁸ SVENDSEN, *supra* note 75, at 147.

¹⁷⁹ *Id.*

¹⁸⁰ *Id.*

¹⁸¹ *Id.*

¹⁸² DANISH ENERGY AUTHORITY, *supra* note 175, at 3.

¹⁸³ *Id.*

¹⁸⁴ *Id.*

¹⁸⁵ *Kyoto's Big Con*, WALL STREET JOURNAL, Jan. 19, 2006, at A14.

¹⁸⁶ *Id.*

does not find much support in economic theory is that it contains high environmental taxes on consumers and, by European standards, low environmental taxes on industry.

c. *Norway*

Norway is not a member of the European Union, but it is a signatory to the Kyoto Protocol. Under the Protocol, Norway is actually allowed to *increase* emissions one percent over 1990 levels for the first commitment period (2008-2012).¹⁸⁷ As a wealthy nation, some scholars argue that it can easily “afford” environmental protection, a contention supported by the fact that Norway has had some form of environmental taxes since the 1970s.¹⁸⁸

Norway introduced a carbon tax in 1991. At that time, however, a general tax on energy was already in place.¹⁸⁹ There was not a large-scale tax system reformation because of the carbon tax, but there was a simultaneous decrease of the income tax.¹⁹⁰ A 2004 report by the OECD noted that Norway has “one of the highest OECD levels of carbon taxes,” signaling “a willingness by Norwegian society to sacrifice near-term interests for the greater good.”¹⁹¹ However, the report also stated that the effectiveness of Norway’s carbon tax “has often been undermined by inconsistencies, either within policy design itself or with other policy goals.”¹⁹²

Norway’s carbon tax has been criticized on several fronts. Most significantly, for failing to evenly apportion the tax burden, instead favoring certain industries.¹⁹³ According to the OECD, “[t]he carbon tax scheme has been inefficient because of high variability of tax rates across emission sources and exemptions.”¹⁹⁴

In 1999, Norway restructured its energy tax system.¹⁹⁵ Part of the reform transformed previous carbon-components in various energy taxes into one unified carbon tax, the motivation of which was to spe-

¹⁸⁷ Andreas Tjernshaugen, *Viewpoint: What Does the Kyoto Protocol Mean for Norway?*, CICERO 1 (2002), at 1, available at <http://www.cicero.uio.no/media/1721.pdf>.

¹⁸⁸ FAUCHALD, *supra* note 79, at 37.

¹⁸⁹ Japanese Ministry of the Environment: Final Report, *supra* note 169, ch. 1.

¹⁹⁰ *Id.*

¹⁹¹ OECD, Economic Survey—Norway 2004: Some Aspects of Sustainable Development, 2004 available at http://www.oecd.org/document/19/0,2340,en_2649_34359_29709971_1_1_1_1,00.html [hereinafter OECD Norway Economic Survey].

¹⁹² *Id.*

¹⁹³ Barde, *supra* note 165, at 242.

¹⁹⁴ OECD Norway Economic Survey, *supra* note 191.

¹⁹⁵ ENERGY TAXES IN NORDIC COUNTRIES, *supra* note 77, at 11.

cifically reduce carbon dioxide emissions.¹⁹⁶ Norway's current carbon tax is a tax on the use of mineral oils (including fuel oils, auto diesel, and jet fuel), petrol, coal, and coke.¹⁹⁷ Norway also implemented an additional carbon tax on petroleum activities on the continental shelf.¹⁹⁸ However, the Norwegian tax scheme continues to exempt a large sector of industry.¹⁹⁹ The Norwegian carbon tax on coal and coke exempts industries using those products as raw materials, meaning that ninety percent of carbon dioxide emissions are not subject to the carbon tax.²⁰⁰ A report sponsored by Eurostat concluded that Norway, like Denmark and the other Nordic countries, needed to readjust its carbon tax system in order to make polluters pay in proportion to their emissions.²⁰¹

d. *The United Kingdom*

The United Kingdom is the world's seventh largest producer of carbon emissions.²⁰² The United Kingdom agreed, under the Kyoto Protocol, to keep annual greenhouse emissions to 12.5 percent below its 1990 levels during the initial period (2008-2012).²⁰³ It set a goal to reduce carbon dioxide emissions by twenty percent by the year 2010.²⁰⁴

The Climate Change Levy (CCL) came into force on April 1, 2001.²⁰⁵ The CCL taxes non-domestic use of electricity, natural gas as supplied by a gas utility, liquefied petroleum gas, and coal.²⁰⁶ The CCL proposes to "encourage the efficient use of energy, in order to meet the U.K.'s target under the Kyoto Protocol."²⁰⁷ While some lit-

¹⁹⁶ *Id.*

¹⁹⁷ *Id.* at 12.

¹⁹⁸ *Id.*

¹⁹⁹ See Barde, *supra* note 165, at 242.

²⁰⁰ ENERGY TAXES IN NORDIC COUNTRIES, *supra* note 77, at 12.

²⁰¹ ENERGY TAXES IN NORDIC COUNTRIES, *supra* note 77, at 29-30; see also Tone Smith, Environmental taxes in Norway 1991-2004, Statistisk Sentralbyrå (Statistics Norway), 2005, available at <http://www.ssb.no/english/magazine/art-2005-11-17-01-en.html>.

²⁰² Union of Concerned Scientists, The Top 20 Carbon Dioxide Emitters (1996), http://www.ucsusa.org/global_warming/science/each-countrys-share-of-co2-emissions.html (last visited Mar. 12, 2007); see also *Who Turned Up the Heat?*, *supra* note 51.

²⁰³ Richard Black, *UK Could 'Miss Kyoto Gas Target'*, BBC NEWS, Apr. 1, 2005, available at <http://news.bbc.co.uk/1/hi/sci/tech/4399323.stm>.

²⁰⁴ *Id.*

²⁰⁵ The primary law on the Climate Change Levy is contained in the Finance Act 2000, Part II. Finance Act 2000, 2000, ch. 17, § 12, § 30, scheds. 6, 7.

²⁰⁶ Finance Act 2000, ch. 17, sched. 6, pt. I 3(1), available at <http://www.opsi.gov.uk/acts/cts2000/00017-ad.htm#sch6>.

²⁰⁷ Dep't for Envtl. Food & Rural Aff., Climate Change Agreements: The Climate Change Levy, <http://www.defra.gov.uk/environment/ccl/intro.htm> (last visited May 4, 2007).

erature misleadingly refers to the levy as a carbon tax, the levy is actually a tax on energy, applied at a specific rate per unit of energy consumed.²⁰⁸ The CCL notably excludes oil, road fuel gas, and heat.²⁰⁹

The Royal Commission on Environmental Pollution was particularly critical of the CCL for taxing the downstream use of energy.²¹⁰ In other words, the levy is paid by energy users, but “collected from the suppliers of energy products”²¹¹ Instead, the Royal Commission argued for the implementation of an upstream carbon tax,²¹² or excise tax, on the producers of raw fossil fuels based on the relative carbon content of those fuels.²¹³ As the Royal Commission suggested, a true carbon tax applied to all energy users raises the cost of carbon-packed fuels and appropriately discourages the use of such fuels.²¹⁴ In contrast, the CCL does not discourage the use of carbon-packed fuels because the levy is fixed to energy used and not to carbon content.²¹⁵ Carbon taxes are more efficient than general energy taxes because they specifically target those fuels that contribute to climate change.²¹⁶

Sometimes, politics can be to blame. The Labour party believed a domestic secondary tax on fuel could be “easily portrayed” by opponents as a “stealth tax” to U.K. consumers, a political killer to a party whose platform included not raising taxes.²¹⁷ Even the developers of

²⁰⁸ There is a separate rate for each category of taxable commodity, which “has meant a 10-15% increase in energy bills, although the business cost of the CCL has been partly offset by a reduction in National Insurance contributions, among other measures.” Oxford City Council, *Climate Change Levy* (2005), available at <http://www.oxford.gov.uk/environment/levy.cfm>. For this reason, the HMRC refuse to label the CCL as a tax, stating: “The CCL is not a ‘tax’ because the revenue from the CCL will be offset by a 0.3 percent reduction in employers’ National Insurance Contributions.” U.K. Environment Agency, *Climate Change Levy (CCL) and EU Emissions Trading Schemes (EU ETS)*, available at http://www.netregs.gov.uk/netregs/275207/1018642/?version=1&lang=_e.

²⁰⁹ Her Majesty’s Revenue & Customs (HMRC), *A General Guide to Climate Change Levy* § 2.5 (2006).

²¹⁰ Royal Comm’n News Release, *supra* note 95.

²¹¹ *Economic Instruments and the Business Use of Energy: A Report by Lord Marshall* (HM Treasury, Nov. 1998) at 20, available at <http://www.hm-treasury.gov.uk/media/E9E/5D/EconomicInstruments.pdf>.

²¹² Royal Comm’n News Release, *supra* note 95. The Royal Commission on Environmental Pollution is an independent body, appointed by Her Majesty The Queen on the advice of the Prime Minister. See Royal Comm’n on Envtl. Pollution, *Royal Commission Calls for Transformation in the UK’s Use of Energy to Counter Climate Change*, (June 16, 2000), available at <http://www.rcep.org.uk/news/00-2.htm>.

²¹³ OECD, *Glossary of Statistical Terms*, Nov. 2, 2001, <http://stats.oecd.org/glossary/detail.asp?ID=287>.

²¹⁴ Royal Comm’n News Release, *supra* note 95.

²¹⁵ *Id.*

²¹⁶ See *id.*

²¹⁷ See Common & Stagl, *supra* note 211, at 54.

the CCL agreed that because energy is used in the production of all commodities, the CCL tax on energy would eventually “increase the prices paid by final consumers for *all* commodities.”²¹⁸

Moreover, the Royal Commission rejected Her Majesty’s Revenue and Custom (HMRC) claim that a tax directly relating to the carbon content of fuels was impractical, explaining, “[i]n the case of a fuel used for electricity generation the generator would pay an amount in tax determined by reference to its carbon content and would pass the tax on to distributors and end users through the price charged for the electrical energy.”²¹⁹ The Royal Commission’s plan would then exempt carbon-free sources such as wind or hydropower.²²⁰ Ideally, the Royal Commission would like to see such a carbon tax applied Europe-wide; however, the current Government has made it very clear it is against such a tax.²²¹

e. *Japan*

Japan has pledged, under the Kyoto Protocol, to reduce its emission of GHGs to six percent below its 1990 level in the first commitment period (2008-2012).²²² Originally, Japan’s plan to meet its Kyoto commitment consisted of the use of carbon sinks and the reduction of fluorocarbons.²²³ Japan determined merely to keep carbon emissions of energy sources from increasing (a zero percent reduction) and set a 0.5 percent reduction target of carbon-dioxide emissions from non-energy sources.²²⁴ The Japanese Government later reconsidered and adopted a new package to achieve its goals under the Kyoto Protocol. The industrial sector is now requested to reduce its carbon emissions by 8.6 percent from 1990 levels in 2010.²²⁵

In 2004, the Japanese Ministry of Environment first announced a plan for implementation of a carbon tax to help meet Kyoto targets. The proposed tax was directed at all types of fossil fuels and electricity, imposed at the stage of shipment from refineries for gasoline, light

²¹⁸ *Id.*

²¹⁹ Royal Comm’n News Release, *supra* note 95.

²²⁰ *Id.*

²²¹ *Id.*

²²² Kazuhiro Nakatani, *Recent Developments Regarding the Implementation of the Kyoto Protocol in Japan*, 2006 INT’L ENERGY L. & TAX’N REV. 1, 21–28.

²²³ *Id.*

²²⁴ *Id.*

²²⁵ This means that the industrial sector must reduce carbon dioxide emissions by 7.1 percent in 2010 from the 2002 level. *Id.*

oil, kerosene, and liquefied petroleum gas, and at the final consumption stage for coal, heavy oil, natural gas, city gas, electricity, and jet fuel.²²⁶ However, after enormous pressure from industry, the Ministry announced a revised tax plan on October 25, 2005. The proposed carbon tax exempted coal used in certain types of manufacturing and halved tax rates for businesses that produced large amounts of carbon.²²⁷ The Ministry also delayed the implementation of tax on "gasoline, diesel and jet fuel to avoid putting too much economic burden on end-users."²²⁸ Under the new plan, a Japanese household would pay an average of 2100 yen a year for electricity, gas, kerosene, and other fuels, 900 yen more per year than under the old plan.²²⁹

In the OECD's 2002 Environmental Performance report on Japan, the OECD noted that environmental taxes and charges were used less frequently in Japan than in a number of other OECD countries, and urged that this policy be reviewed.²³⁰ The Japanese Government finally responded to the OECD's report last year, reporting merely that it was investigating the impact of environmental taxes and discussing the consequences with industry.²³¹ Indeed, the weight of industry pressures has meant that the Japanese Government has yet to commit to a carbon tax.²³² Yet the Japanese Government must do something, and soon, if it hopes to hit Kyoto targets. Instead of being on track to *reduce* its GHG levels by six percent, GHG emissions in 2004 were 7.4 percent *higher* than the 1990 levels.²³³

²²⁶ JAPANESE MINISTRY OF THE ENVIRONMENT, DETAILED PLAN FOR ENVIRONMENTAL TAXES (BASIC OUTLINE) 2, Oct. 25, 2005.

²²⁷ *Id.*

²²⁸ *Japan's Environment Ministry Now Calls for Carbon Tax by 2007*, REUTERS, Oct. 26, 2005, available at http://www.greencarcongress.com/2005/10/japans_environment.html [hereinafter *Japan's Environment Ministry*]. Under the revised tax plan the tax would be 2400 yen per carbon ton (approximately U.S. 20.8 dollars per carbon ton). For example, prices would rise 0.25 yen per kilowatt hour on electricity and 1.5 yen per liter on gas. The burden on the average household would be 2100 yen per year and derive revenue of 370 billion yen per year (approximately U.S. 3.2 billion dollars). *Id.*

²²⁹ Eriko Arita, *New Carbon Tax Plan Limits Levy*, JAPAN TIMES, Oct. 26, 2005, available at <http://search.japantimes.co.jp/cgi-bin/nn20051026a3.html>.

²³⁰ See OECD, THE OECD ENVIRONMENT PROGRAMME, ENVIRONMENTAL PERFORMANCE REVIEW OF JAPAN (2002).

²³¹ *Id.*

²³² *Japan's Environment Ministry*, *supra* note 228.

²³³ Arita, *supra* note 229.

3. Tax Credits: The U.S. Example

Fearing a negative impact on industry, the Bush Administration rejected the Kyoto Protocol. Had the United States ratified the Protocol, it would have been required to cut GHG emissions by 7.2 percent of its 1990 level by 2012.²³⁴ Instead, President Bush's climate change policy aims to cut GHG emission *intensity* by eighteen percent by 2012.²³⁵ The plan also uses tax credits to support the invention and use of energy-saving technologies, and promote absorption of carbon dioxide through forestry and agriculture.²³⁶ Finally, the plan requires recordkeeping of GHG emissions and encourages the private sector to reduce emissions voluntarily.²³⁷

The Bush Administration will likely meet its target of reducing emissions intensity by eighteen percent over a decade.²³⁸ Policies set in motion by the Bush Administration will probably have little to do with this success; rather a bit of black magic accounting is likely to carry the day. Emissions intensity is calculated by dividing emissions by the real gross domestic product (GDP). With GDP projected to grow by three percent annually, the Bush Administration's figures suggest that emissions can actually increase by 10.2 percent and still satisfy the intensity target.²³⁹ To avoid this result, the Kyoto Protocol sets a base year and requires its signatories to reduce actual emissions levels relative to that base year.²⁴⁰ In contrast, the Bush Administration's own forecasts "indicate that the plan allows emissions in 2012 to be over 95 percent of what they would have been with no policy."²⁴¹

The Energy Policy Act of 2005 (EPACT) provides several tax credits to businesses and individuals who choose environmentally friendly

²³⁴ CNN (Mar. 9), *supra* note 31.

²³⁵ Press Release, Bureau of Oceans and International Environmental and Scientific Affairs, United States Global Climate Change Policy, Oct. 23, 2002, *available at* <http://www.state.gov/g/oes/rls/fs/2002/14576.htm>. Emissions intensity is the ratio of emissions to Gross Domestic Product (GDP). *Id.* According to the U.S. State Department, "[t]he President's goal is to lower the United States' rate of emissions from an estimated 183 metric tons per million dollars of GDP in 2002, to 151 metric tons per million dollars of GDP in 2012." *Id.*

²³⁶ LAWRENCE GOULDER, STANFORD INST. FOR ECON. POLICY RESEARCH, U.S. CLIMATE CHANGE POLICY: THE BUSH ADMINISTRATION'S POLICY AND BEYOND 1 (2002), *available at* http://iis-db.stanford.edu/pubs/20399/Bush_and_Climate_Change_Policy.pdf.

²³⁷ *Id.*

²³⁸ RFF, *supra* note 50, at 208.

²³⁹ See GOULDER, *supra* note 236, at 2-3.

²⁴⁰ Kyoto Protocol, *supra* note 40, art. 3.

²⁴¹ GOULDER, *supra* note 236, at 3.

products.²⁴² As a tax credit, a consumer or business will be able to reduce its federal tax liability dollar for dollar.²⁴³

EPACT “offers consumers and businesses federal tax credits beginning in January 2006 for purchasing fuel-efficient hybrid-electric vehicles and energy-efficient appliances and products,”²⁴⁴ including up to a 3400 dollar reduction in income tax liability for individuals and business that purchase a hybrid gas-electric car.²⁴⁵ However, according to a recent Consumer Reports, “hybrids are typically priced thousands of dollars higher than similar all-gas models,”²⁴⁶ and “even the most cost-effective models require an investment of about five years for the owner to break even.”²⁴⁷

Thus, in terms of the hybrid car, the federal tax credit simply realigns the cost of the vehicle with that of a non-hybrid vehicle. Similarly, EPACT’s credit system may not make other environmental friendly alternatives (for example, solar-heated pools and energy-efficient windows) cheaper than their unfriendly alternatives. Notably, however, a consumer must pay a premium price (potentially thousands of dollars) for these alternatives for the promise of reimbursement a year later on his or her tax return. Given this extra hurdle, EPACT will probably only impact already green-minded consumers.

EPACT should be extended beyond its 2007 expiration because it is an aid to already green-minded consumers and, over time, the increased demand for environmentally friendly alternatives could drive down the prices of such alternatives. However, EPACT is not enough. The United States must also adopt a direct emissions policy to have any real impact.

²⁴² See generally Energy Policy Act of 2005, Pub. L. No. 109–58, 119 Stat. 594 (2005).

²⁴³ See generally *id.*

²⁴⁴ U.S. Dep’t of Energy, The Energy Policy Act of 2005: What the Energy Bill Means to You, available at <http://www.energy.gov/taxbreaks.htm> (last visited Jan. 10, 2007).

²⁴⁵ *Id.*

²⁴⁶ *The Dollars & Sense of Hybrid Cars*, CONSUMER REPORTS, Apr. 2006, available at <http://www.consumerreports.org/cro/cars/new-cars/high-cost-of-hybrid-vehicles406/overview.htm>.

²⁴⁷ See *id.* Cost savings over time, if any, will vary. Factors include the model of car, how much a person drives, and state tax incentives. See *id.*

V. ALTERNATIVES TO GREEN TAXATION

A. Carbon Sinks

Trees and other plants use carbon to grow while releasing oxygen into the atmosphere.²⁴⁸ Carbon sinks are simply large areas or reservoirs where this process takes place.²⁴⁹ The Earth's largest carbon sinks are its oceans and forests.²⁵⁰ In other words, more trees means less carbon dioxide. Under the Kyoto Protocol, a new or expanded forest is allowed to generate credits for removing carbon from the atmosphere.²⁵¹

Several countries have embraced carbon sinks as part of their plans to meet Kyoto targets.²⁵² Japan, as mentioned, expects carbon sinks to play an integral part in meeting its Kyoto targets. Under Japan's Action Plan, it is "allowed credits of up to 13 million tons of carbon per year from forest sequestration, which can be used against its emissions."²⁵³ As such, the use of carbon sinks in Japan may account for more than half of the carbon reductions from the 1990 base year.²⁵⁴ To this aim, Japan has enacted the Forest and Forestry Plan and other relevant plans.²⁵⁵ According to economists Masahiro Amano and Roger A. Sedjo, Japan is in a particularly good position with regard to carbon sinks because it has relatively young forests and more carbon will be sequestered as they mature.²⁵⁶ However, once trees mature carbon sequestration levels off. Japan may still need to decrease current rates of deforestation.²⁵⁷ This could mean substituting lost timber with imports, not a globally satisfying outcome as this simply displaces timber harvesting offshore.²⁵⁸

²⁴⁸ Roger A. Sedjo, *Forest 'Sinks' as a Tool for Climate-Change Policymaking: A Look at the Advantages and Challenges*, RFF, *supra* note 50, at 240.

²⁴⁹ *Id.*

²⁵⁰ *See id.*

²⁵¹ *Id.*

²⁵² The Kyoto Protocol allows Annex 1 countries to take into account "land use change and forestry activities" (carbon sinks) as part of their plan to reduce emission in Articles 3.3, 3.4, 6, and 12. *See* MASAHIRO AMANO & ROGER A. SEDJO, *RESOURCES FOR THE FUTURE, FOREST CARBON SINKS: EUROPEAN UNION, JAPANESE, AND CANADIAN APPROACHES* 3 (2003), available at <http://www.rff.org/documents/RFF-DP-03-41.pdf> (for a discussion of carbon sinks).

²⁵³ *Id.* at 13.

²⁵⁴ *Id.*

²⁵⁵ Nakatani, *supra* note 222.

²⁵⁶ AMANO & SEDJO, *supra* note 252, at 13.

²⁵⁷ *Id.* at 13.

²⁵⁸ *Id.*

Similarly, the New Zealand Government is relying on carbon sinks to meet its Kyoto targets and negotiated a "Forest Industry Development Agenda" with the forest sector in 2005. The New Zealand Government expects that forests planted after 1990, Kyoto's base year, will absorb around seventy million tons of carbon dioxide in the period from 2008 to 2012.²⁵⁹

Though carbon sinks seem promising, in a report published by the U.K. Royal Society, scientists warned that carbon sinks are not a long-term substitute for emissions cuts.²⁶⁰ Professor David Read, chair of the report, warned that "the size of the potential sinks is quite modest," and as such, they would "all be used up in a few decades."²⁶¹ Read also argued that rising global temperatures could make bacteria more active, which will break down carbon faster.²⁶² Other scientific studies suggest that carbon sinks cannot possibly keep up with rising carbon emissions.²⁶³ A Princeton-led study found that in the United States alone, forests and soil absorb from one-third to two-thirds of a billion tons of carbon each year (an amount that surprised many of the participating scientists), yet U.S. carbon emissions are up to four times that amount, indicating the need for actual emissions cuts.²⁶⁴ A spokesperson for the Norwegian Ministry of the Environment stated that Norway would probably not use carbon sinks to reach its targets, because Norway is "concerned with real qualitative emissions reductions, not fictitious ones that are just on paper."²⁶⁵

²⁵⁹ New Zealand Climate Change Office, *Sink Credits*, Mar. 10, 2006, available at <http://www.climatechange.govt.nz/policy-initiatives/sink-credits.html>.

²⁶⁰ Alex Kirby, *Carbon Sinks 'Little Help to Climate'*, BBC NEWS, July 8, 2001, <http://news.bbc.co.uk/1/hi/sci/tech/1426453.stm>.

²⁶¹ *Id.*

²⁶² *Id.*

²⁶³ See, e.g., Inez Y. Fung et al., *Evolution of Carbon Sinks in a Changing Climate*, 102 PROC. NAT'L ACAD. SCI. 11201, 11205 (2005).

²⁶⁴ John Roach, *Studies Measure Capacity of "Carbon Sinks,"* NATIONAL GEOGRAPHIC NEWS, June 21, 2001, http://news.nationalgeographic.com/news/2001/06/0621_carbon-sinks.html.

²⁶⁵ Bunny Nooryani, *Norway Says Will Not Use Kyoto 'Sink' Loophole*, REUTERS, Aug. 7, 2001, <http://www.planetark.org/dailynewsstory.cfm?newsid=11926>.

B. Emissions Permit Trading Schemes

1. In General

The most commonly implemented form of emissions trading is a cap-and-trade system.²⁶⁶ Under a cap-and-trade scheme, regulators first set emission reduction goals and then, from this figure, establish a cap on total emissions. Regulators then allocate a fixed number of allowances to participants, each allowance representing a specific authorization to pollute (e.g. one ton).²⁶⁷ These allowances are often referred to as rights-to-pollute or credits. The regulatory authority monitors participants closely and at the end of the compliance period participants must have a sufficient number of allowances to cover their pollution for that period.²⁶⁸ Participants anticipating a shortfall in allowances at the end of the compliance period can buy additional allowances from participants holding excess allowances. Unlike traditional CAC systems, individual control requirements are not set for specific sources, making the trading scheme more flexible for industry.²⁶⁹

2. U.S. Success with Permit Trading

The EPA first applied the concept of emissions permit trading in the United States in the mid-1970s. Notably, the Agency based the original model on an interpretation of the Clean Air Act, not on specific statutory authority.²⁷⁰ At the time, the EPA viewed permit trading as a sensible model for preventing air quality from worsening. Under

²⁶⁶ Cap-and-trade and emissions trading are often used synonymously in the academic literature. Systems of rate-based trading or project-based trading are also possible. In a rate-based emissions trading scheme, the “regulatory authority sets a constant or declining emission rate of performance standard (e.g. tons of emissions per megawatt hour).” EPA, Types of Trading, <http://www.epa.gov/airmarkets/cap-trade/index.html> (last visited Jan. 10, 2007) (follow “Types of Trading (PDF)” hyperlink).

In a project-based trading scheme (sometimes called a credit or offset program), participants “earn credit for projects that reduce emissions more than is required by a pre-existing conventional regulation or other benchmark” and these credits can then be traded to other facilities. *Id.*; see also EPA, *Three Forms of Emissions Trading*, CLEAN AIR MARKETS UPDATE, Issue 3, Winter 2002, available at <http://www.epa.gov/airmarkets/camupdate/camupdate3.pdf> [hereinafter *Three Forms of Emissions Trading*].

²⁶⁷ *Three Forms of Emissions Trading*, *supra* note 266, at 1.

²⁶⁸ EPA, *Clean Air Markets—Allowance Trading*, EPA.gov, <http://www.epa.gov/airmarkets/trading/> (last visited May 4, 2007) (follow “Allowance trading basics and concepts” hyperlink).

²⁶⁹ *Id.*

²⁷⁰ EPA U.S. ECONOMIC INCENTIVES, *supra* note 74, at 67.

the aptly named Emissions Trading Program (ETP), new entrants to the market were required to purchase credits from already existing industry members.²⁷¹ Building on the ETP's success, Congress, under the 1990 Clean Air Act amendments, specifically authorized a variety of emissions trading schemes, including the Acid Rain Program.²⁷²

The Acid Rain Program is perhaps the best-known trading success story out of the United States. In the 1970s, emissions of sulfur dioxide, the leading component of acid rain, posed a serious threat to U.S. fish, water supplies, and was a known cause of respiratory disease. Under the 1977 Clean Air Act, regulators commanded polluters to affix a "scrubber" to factory stacks, to strip out sulfur dioxide emissions.²⁷³ Economists estimated that it would cost industry ten billion dollars each year to comply with traditional CAC regulation, such as the "scrubber" solution, to deal with acid rain.²⁷⁴

Congress instead gave polluters more flexibility with the 1990 Amendments.²⁷⁵ The cap-and-trade program gave polluters a limited number of emissions allowances that polluters were allowed to sell.²⁷⁶ In the end, the cost of cleaning up sulfur dioxide in the United States is about one billion dollars per year.²⁷⁷ Partial credit should be given to the flexibility of the cap-and-trade scheme.²⁷⁸ The start of the Acid Rain Program in 1995 also lowered sulfur dioxide emission levels from the power sector and has contributed to significant improvements in air quality and public health.²⁷⁹

Apart from the Acid Rain Program, the United States has implemented a number of other successful trading schemes on a national level, including CFC and halon trading.²⁸⁰ In 2006, the EPA proposed cap-and-trade rules to address mercury, sulfur dioxide, and nitrogen oxide emissions. Under the Clean Air Mercury Rule (CAMR), the EPA plans to "permanently cap and reduce mercury emissions from coal-fired power plants."²⁸¹ If implemented, the United States would be

²⁷¹ *Id.*

²⁷² SVENDSEN, *supra* note 75, at 72 (The United States also implemented a trading program to phase-out the use of lead in gasoline between 1982 and 1987.).

²⁷³ Kerr, *supra* note 68.

²⁷⁴ *Id.*

²⁷⁵ Clean Air Act of 1990, 42 U.S.C. §§ 7401–7671.

²⁷⁶ *See, e.g., id.* § 7651 (providing for a cap-and-trade program to reduce acid rain).

²⁷⁷ *See* EPA U.S. ECONOMIC INCENTIVES, *supra* note 74, at 70.

²⁷⁸ *See id.*

²⁷⁹ *See id.* at 69–70.

²⁸⁰ SVENDSEN, *supra* note 75, at 72.

²⁸¹ U.S. EPA, *Clean Air Mercury Rule*, EPA.gov (2007), <http://www.epa.gov/mercuryrule/rule.htm> [hereinafter Mercury Rule].

the first country in the world to regulate mercury admissions.²⁸² The partner to CAMR is the Clean Air Interstate Rule (CAIR), which aims to permanently cap emissions of sulfur dioxide and nitrogen oxides in the eastern United States.²⁸³ Both cap-and-trade schemes allow states to administer the plans, determine their own caps on emissions, and develop their own system of distributing allowances.²⁸⁴ Each state's plan is subject to the approval of the EPA.²⁸⁵

Environmentalists have accused the EPA of caving to political pressure and abandoning its initial position in favor of traditional CAC regulation for mercury pollution.²⁸⁶ The EPA originally favored a law requiring utility coal-fired power plants to install controls to scrub off as much mercury as possible before it could be released into the air.²⁸⁷ Environmentalists contend, and the EPA's own studies suggest, that trading schemes can result in "hotspots" or pockets of pollution around companies that purchase excess allowances. Still, the EPA says it now favors the proposed trading scheme, the alternative favored by the Bush Administration and industry, in cleaning up mercury.²⁸⁸ Despite the presumed compromise, neither CAMR nor CAIR have been implemented.²⁸⁹

A number of U.S. States have successfully implemented emissions trading schemes. For example, in 1994, California initiated the Regional Clean Air Incentives Market (RECLAIM) program to curb nitro-

The first phase cap is 38 tons and emissions will be reduced by taking advantage of "co-benefit" reductions—that is, mercury reductions achieved by reducing sulfur dioxide (SO₂) and nitrogen oxides (NO_x) emissions under CAIR. In the second phase, due in 2018, coal-fired power plants will be subject to a second cap, which will reduce emissions to 15 tons upon full implementation.

Id.

²⁸² Felicity Barringer, *Bush to Permit Trading of Credits to Limit Mercury*, N.Y. TIMES, Mar. 14, 2005, at A1.

²⁸³ See U.S. EPA, *Clean Air Interstate Rule*, EPA.GOV, <http://www.epa.gov/CAIR/> (last visited Jan. 10, 2007).

²⁸⁴ *Id.*; Mercury Rule, *supra* note 282.

²⁸⁵ Barringer, *supra* note 283.

²⁸⁶ See, e.g., *id.*

²⁸⁷ *Id.* For instance, "Felice Stadler, a mercury policy specialist at the National Wildlife Federation, was sharply critical when told . . . of the thrust of the new rule, saying that it was 'the weakest air-toxics rule ever written for a major industry' by the E.P.A." *Id.*

²⁸⁸ Press Release, U.S. EPA, Clean Air Proposals Promise Sharp Power Plant Pollution Reductions (Dec. 15, 2003), available at <http://www.epa.gov/newsroom/newsreleases.htm> (search by date (2003), then scroll down to 12/15/2003).

²⁸⁹ See generally U.S. EPA, Fact Sheet—Reconsideration of the Clean Air Mercury Rule, <http://www.epa.gov/mercuryrule/fs20051021a.html> (last visited May 4, 2007) (explaining EPA's decision granting requests of several petitions to reconsider CAMR).

gen oxides and sulfur oxides (contributors to smog) in the Los Angeles Basin.²⁹⁰ RECLAIM covers a range of industries and its diverse participants include “refineries, power plants, cement kilns, aerospace, food manufacturing, textiles, metal melting, hotels, and even amusement parks.”²⁹¹ RECLAIM replaced thirty-two command-and-control rules.²⁹² According to the EPA, the RECLAIM program improves air quality, despite the lower than expected market price for emissions credits.²⁹³ Other States with trading schemes include Illinois, Michigan, Pennsylvania, Colorado, New Jersey, Texas, and Washington.²⁹⁴

In the United States, trading schemes have also developed regionally. For instance, several Northeast States developed the Budget Trading Program (BTP) of the Ozone Transport Commission (OTC), a cap-and-trade program, aimed at reducing summertime nitrogen oxide emissions.²⁹⁵ The BTP actively traded from 1999 to 2002, when it was replaced by the current SIP Call.²⁹⁶

Surprisingly, private U.S. companies have also developed emissions trading schemes without the heavy-hand of government. The Chicago Climate Exchange (CCX) is a voluntary, legally binding GHG emissions trading scheme in North America.²⁹⁷ Twenty-eight companies, including the Ford Motor Company and DuPont, developed the CCX in conjunction with the cities of Chicago and Mexico City.²⁹⁸

²⁹⁰ SVENDSEN, *supra* note 76, at 72; *see also* Regional Clean Air Incentives Market (RECLAIM), South Coast AQMD (2004), <http://www.aqmd.gov/reclaim/reclaim.html> (requiring industries and businesses to cut their emissions by a specific amount each year, resulting in a seventy percent reduction for nitrogen oxides and a sixty percent reduction for sulfur oxides by 2003).

²⁹¹ *Implementing the Proposed New Air Standards and the Use of Emission Trading Programs: Hearing Before the Subcomm. on Clean Air, Wetlands, Private Prop. and Nuclear Safety of the S. Comm. on Envtl. and Pub. Works*, 105th Cong. (1997) (Statement of Pat Leyden, Deputy Executive Office, S. Coast Air Quality Mgmt. Dist.), *available at* http://epw.senate.gov/105th/ley_4-24.htm.

²⁹² *Id.*

²⁹³ EPA U.S. ECONOMIC INCENTIVES, *supra* note 74, at 96.

²⁹⁴ *Id.*

²⁹⁵ *See* EPA Overview of the Ozone Transport Commission (OTC) NOx Budget Program, <http://epa.gov/airmarkets/progsregs/nox/otc-overview.html> (last visited May 4, 2007).

²⁹⁶ U.S. EPA, *Ozone Transport Commission (OTC) NOx Budget Program*, EPA.GOV, <http://www.epa.gov/airmarkets/otc/overview.html> (last visited Jan. 10, 2007). “SIP Call” somehow stands for “Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone.” *Id.*

²⁹⁷ Chicago Climate Exchange, <http://www.chicagoclimatex.com> (last visited Jan. 31, 2007).

²⁹⁸ *The Chicago Climate Exchange: Trading Hot Air*, ECONOMIST, Oct. 19, 2002, at 60.

Members made modest pledges to reduce GHG emissions by two percent from 1999 levels in 2002 and by an additional one percent per year for the period from 2003 to 2006.²⁹⁹ The decision by corporate business to form the CCX probably had a lot to do with the anticipation of future government-imposed emissions restrictions, and a lot less to do with being good global citizens.³⁰⁰ Thus, with the subsequent U.S. rejection of the Kyoto Protocol it remains to be seen whether U.S. corporate business will continue to develop and voluntarily participate in such schemes.

3. EU Emissions Trading Scheme (Directive 2003/87)

Following the Council's ratification of the Kyoto Protocol in 2002, the European Parliament and Council enacted Directive 2003/87 in 2003.³⁰¹ Directive 2003/87, the "Emissions Trading Directive," establishes a scheme for GHG emission allowance trading within the EC Community.³⁰² Under the Emissions Trading Directive, each Member State must develop a National Allocation Plan (NAP) for GHG emission allowances, within the parameters set by the Directive.³⁰³

Initially, the scheme "covers only carbon dioxide emissions from installations in five sectors (power, oil, steel, minerals, and pulp and paper)."³⁰⁴ While Members States are allowed to devise their own schemes as set forth in their NAP, each plan is subject to the Commission's approval, similar to the U.S. CAMR and CAIR programs. For instance, each Member State determines the total quantity of allowances it intends to allocate, and precisely how it plans to allocate them. An important aspect in the success of an emissions trading scheme is the level of scrutiny the acting authority has in approving

²⁹⁹ *Id.*

³⁰⁰ *Id.*

³⁰¹ See generally Council Directive 87/EC, *supra* note 163; see also U.K. Department for Environment, Food and Rural Affairs—European Union Emissions Trading Scheme, <http://www.defra.gov.uk/environment/climatechange/trading/eu/> (last visited Jan. 31, 2007) [hereinafter DEFRA].

³⁰² See generally Council Directive 87/EC, *supra* note 162. Directive 2004/101, called the Linking Directive, amends the Emissions Trading Directive to "enable Member States to allow operators to use credits obtained through Kyoto mechanisms (certified emissions reductions and emissions reduction units) to comply with their obligations" under the Emissions Trading Directive. Council Directive 2004/101, ¶ 2, 2004 O.J. (L 338) 18 (EU).

³⁰³ Council Directive 87/EC, *supra* note 162, at 35–6, art. 9.

³⁰⁴ Andrew G. Thompson, *Australia and an Emissions Trading Market—Opportunities, Costs and Legal Frameworks*, 4 INT'L ENERGY L. & TAX'N REV. 79, 81 (2005). "Combustion installations over 20MW [megawatts] capacity in other sectors are also included. Other sectors and other gases may be included from 2006." *Id.*

and monitoring plans.³⁰⁵ The Commission must approve the NAPs submitted by Member States, though it is debatable whether the Commission has committed the necessary resources to evaluate adequately whether the programs will actually work.³⁰⁶

Economists have criticized the EU Trading Scheme as “almost worthless” because Member States, in caving to industry, have issued too many allowances.³⁰⁷ Michael Grubb, an expert economist in climate change, agrees with this grim outlook and believes “[t]here will be very few buyers [of allowances] and prices will fall through the floor.”³⁰⁸ For example, a report by the U.K. Department for Environment, Food and Rural Affairs (DEFRA) suggests that the original figure of 736 million tons of carbon dioxide, submitted by the United Kingdom in its NAP, would only have required industry to reduce emissions by less than one percent.³⁰⁹ To make matters worse, industry successfully lobbied the U.K. Government and the figure was increased to 756 million tons of carbon dioxide in an amendment to its NAP.³¹⁰ While this figure has met resistance by the Commission, it provides an example of a Member State willing to do the paperwork

³⁰⁵ See, e.g., CHRIS DEKKERS, EMISSIONS TRADING IN THE EU: THE IMPORTANCE OF COMPLIANCE AND REDUCING UNCERTAINTY 2–3, 7 (2007), available at http://www.ipieca.org/activities/climate_change/downloads/workshops/jan_07/1Dekkers.pdf.

³⁰⁶ See generally Communication From the Commission to the Council and to the European Parliament on Commission Decisions of 7 July 2004 Concerning National Allocation Plans for the Allocation of Greenhouse Gas Emissions Allowances of Austria, Denmark, Germany, Ireland, the Netherlands, Slovenia, Sweden, and the United Kingdom in Accordance with Directive 2003/87/EC, COM (2004) 500 final (July 7, 2004).

The United Kingdom challenged the Commission’s refusal to accept the U.K. amendment to its NAP in *United Kingdom v. Commission of the European Communities*. Notice C22/27, 2006 O.J. (C 22) 14, 14 (referring to case T-178/05, decided in the Court of First Instance on Nov. 23, 2005). The Commission actually notified the United Kingdom that parts of the original NAP were unacceptable and thereby required the United Kingdom to change certain aspects of the original NAP by amendment. Case T-178/05, U.K. v. Comm’n Eur. Cmities., 2005 ECJ CELEX LEXIS 609, ¶¶ 7, 8. However, the Commission refused to accept the amendment because the United Kingdom had included an increase in the total emissions allowed. *Id.* ¶ 10. The court held in favor of the United Kingdom, finding that the United Kingdom had a right to amend its NAP, in every aspect, up to the deadline. *Id.* at Decision, pt. 1. Nonetheless, this is a shallow victory for the United Kingdom as the Commission still has the right, after review, to deny the current proposal.

³⁰⁷ Fred Pearce, *European Trading in Carbon-Emission Permits Begins*, NEW SCIENTIST, Jan. 6, 2005, available at <http://www.newscientist.com/article.ns?id=dn6846>.

³⁰⁸ *Id.*

³⁰⁹ DEFRA, *supra* note 301.

³¹⁰ *Emissions Trading: UK Retreats to Lower Limits, But Sues Commission*, EURACTIV.COM, Mar. 11, 2005, available at <http://www.euractiv.com/en/sustainability/emissions-trading-UK-retreats-lower-limits-sues-commission/article-136711>.

for the EU Trading Scheme, but unwilling to do the hard work in curbing carbon emissions.

Other experts have criticized the Emissions Trading Scheme for its limited scope. The current scheme covers emissions only until 2007. Further, the Scheme only addresses about half of the carbon emitted in the European Union because it does not address emissions from vehicles.³¹¹ Finally, not all countries of the European Union have joined: Poland, Italy, the Czech Republic, and Greece failed to submit allocation plans in time.³¹²

VI. DECIDING BETWEEN GREEN TAXATION AND EMISSIONS TRADING

A. *The Case for Permit Trading over Green Taxation in Lowering Carbon Emissions*

Permit trading can oftentimes be politically achievable when industry interests have stalled green taxation. In some cases, the implementation of an environmental tax will involve enormous increases in costs to industrial polluters.³¹³ Therefore, these polluters will expend large sums of money lobbying politicians to reject the tax and put in its place a trading scheme.

Politicians must also answer to their constituents. Taxes can be extremely hard to sell to voters, especially outside of Northern Europe. Indeed, most policymakers have accepted that economic models promising to rid countries of unemployment and the like through the application of a green tax simply could not work in the real world.³¹⁴ Even in Northern Europe, taxes could not be set high enough to achieve such lofty goals.³¹⁵ In the case of the European Union, its own structure inhibits the implementation of a common carbon tax because it requires unanimity for fiscal measures.³¹⁶ Countries such as the United Kingdom have stood firm against a common carbon tax.³¹⁷ In contrast, a

³¹¹ Pearce, *supra* note 307.

³¹² JOHN M. REILLY & SERGEY PALTSEV, AN ANALYSIS OF THE EUROPEAN EMISSION TRADING SCHEME 5 (2005), available at http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt127.pdf.

³¹³ SVENDSEN, *supra* note 76, at 45.

³¹⁴ See discussion *supra* Part IV.C.1 (double dividend).

³¹⁵ *Id.*

³¹⁶ SVENDSEN, *supra* note 76, at 167.

³¹⁷ See discussion *supra* Part IV.C.1 (double dividend).

permit market is not fiscal in nature and may thus be passed by majority rule.³¹⁸

Whereas the idea of permit markets may be more politically attainable than green taxes, getting these markets off the ground can be a political struggle.³¹⁹ It is often difficult to gain agreement on the distribution of the initial assignment. For example, the EPA has yet to get political and industry agreement to implement the CAMR and CAIR trading programs.³²⁰

Permit trading is also more economically feasible for industry than green taxation. Even the most devout environmentalists must acknowledge the potential for economic damage as a result of ill-conceived green taxes.³²¹ Trading schemes provide greater flexibility for industry than green taxes and the market, rather than a government agency, is better able to determine the cost of cleaning up GHGs under emissions trading schemes.³²² Conceptually, trading schemes should be more economically efficient than green taxes.

Governments, like industry, are also concerned about maintaining industrial competitiveness in the world market, and thus, may favor trading schemes.³²³ For instance, the United States and Australia unapologetically withdrew their support for the Kyoto Protocol citing their concern that binding emissions cuts would hinder competitiveness.³²⁴ Many politicians fear green taxes will similarly impede industry and hamper their own political ambitions.³²⁵ In contrast, permit trading schemes are more flexible and allow industry a greater opportunity to mitigate loss.³²⁶ Less cost to national industry means it can maintain its position on the global market.

Permit trading systems may also induce reluctant members through the application of grandfathered schemes. A grandfathered permit market builds on historical emission levels and the status quo, thus assuring current members of the market an advantage over new entrants.³²⁷ GHG emissions do not abide by human borders; therefore, countries that continue to do business as usual can benefit from

³¹⁸ SVENDSEN, *supra* note 76, at 167.

³¹⁹ See discussion *supra* Part III.B.1.

³²⁰ See discussion *supra* Part V.B.2.

³²¹ See discussion *supra* Part IV.C.

³²² See, e.g., discussion *supra* Part V.B.2 (describing various U.S. programs).

³²³ SVENDSEN, *supra* note 76, at 166.

³²⁴ See discussion *supra* Part IV.C.2.

³²⁵ *Id.*

³²⁶ See discussion *supra* Part V.B.1.

³²⁷ See discussion *supra* Part III.A.2.

the decrease in GHG emissions elsewhere (i.e. become “free riders”).³²⁸ Inducing reluctant international members to join the scheme may mean the permit market can mitigate the free-rider problem.

On a more cynical note, industries may be more likely to comply with permit trading schemes. Green taxes, like most taxes, encourage creativity on behalf of taxpayers. For instance, due to the high carbon tax in Norway, Statoil, an integrated oil and gas company, has developed a process to divert its carbon emissions into a large aquifer under the North Sea.³²⁹ The most liberal estimates suggest that this layer of permeable sandstone rock may be able to store carbon for several hundred years.³³⁰ However, even if these optimistic projections are true, this process only delays the inevitable release of carbon emissions into the atmosphere. Storing carbon and hoping that future generations develop the means to ameliorate the problem is not sound environmental policy. Though Norwegian policymakers probably did not expect to encourage such activities, this result is the risk run by implementing any form of green tax.

This is not to insinuate that the possibility of tax planning or tax avoidance should nullify the use of a carbon taxes. The likelihood that more companies will follow the example of Statoil, however, suggests two important policy ideas. First, drafters of a carbon tax should be aware of such technological developments and need to determine if such developments should be addressed.³³¹ Second, taxpayers will inevitably try to avoid taxation, which may be one reason for choosing a permit scheme in addressing GHG emissions.³³²

In implementing a trading scheme, the environmental authority will first determine the maximum amount of allowable emissions for the year. Then the authority allocates the corresponding number of permits to the trading participants (e.g. one ton per allowance). If a participant does not have enough permits to cover its emissions at the end of the trading period, the participant will be charged with a steep fine and potentially face other consequences. Assuming these consequences are stiff enough to be an adequate deterrent, the target set by the authority should be closely tied to the actual emissions in that

³²⁸ See SVENDSEN, *supra* note 75, at 146.

³²⁹ *Rocks Could Store All Europe's CO₂*, BBC NEWS, <http://news.bbc.co.uk/2/hi/business/4717578.stm> (last visited Jan. 17, 2007).

³³⁰ *Id.*

³³¹ *See id.*

³³² *See id.*

period.³³³ In this respect, the permit trading scheme has a similar effect to traditional CAC regulation, although a closely monitored CAC rule may come even closer to the target.³³⁴

In contrast, a tax on emissions is relatively poor at producing the target level of pollution.³³⁵ Taxes on GHG emissions provide a price incentive for industry to decrease polluting, but it can be extremely difficult for the environmental authority to anticipate the reaction by industry.³³⁶ In some cases, the tax may be too low, and thus emissions levels may not improve much at all.

Taxes require a trial-and-error process and can require costly readjustments.³³⁷ The charging authority may require years to determine where the GHG is most efficient. Administrative costs, not to mention the economic and environmental costs, can be large. Additionally, complications inevitably arise due to price inflation and economic growth.³³⁸ Thus, the tax will always require readjustments.

B. *The Case for Green Taxation over Permit Trading in Lowering Carbon Emissions*

While green taxation can provide government with a revenue source, the amount of revenue will be a function of the level of tax and administrative costs.³³⁹ The days of the golden double dividend appear to be gone. Economic models suggesting governments could eradicate unemployment with sufficient green taxes did not stand up in the real world.³⁴⁰ That said, existing green tax regimes suggest it is entirely possible to simultaneously reduce other “bad” taxes.³⁴¹ Also, governments may choose to recycle some tax revenue back into environmental projects.³⁴² Such systems reflect sound policy choices because, in essence, the environment receives a double dividend. Naturally, government must spend sufficient resources in determining the appropriate level of tax and where to appropriate any resulting revenue. In some cases, ad-

³³³ See, e.g., discussion *supra* Part V.B.3 (criticizing the EU Trading Scheme).

³³⁴ See discussion *supra* Part III.A.1.

³³⁵ SVENDSEN, *supra* note 75, at 45.

³³⁶ See discussion *supra* Parts III.B.1, IV.C.2.

³³⁷ SVENDSEN, *supra* note 75, at 45–46.

³³⁸ *Id.*

³³⁹ See discussion *supra* Part III.A.3.

³⁴⁰ See discussion *supra* Part IV.C.1.

³⁴¹ See, e.g., discussion *supra* Part IV.D.2.c (regarding Norway’s income tax reduction).

³⁴² See discussion *supra* Part IV.A.

ministrative costs can be greater than the tax assessed and thus provide a negative source of revenue, a result to be avoided.

Since permit trading schemes allow polluters to purchase extra allowances, some polluters will continue doing business as usual. As such, environmentalists criticize some trading schemes for creating “hotspots” (areas in which GHG emissions remain strong).³⁴³ For instance, environmental groups have called for stringent mercury regulation in the United States and have argued that mercury is too great a health hazard to be an appropriate candidate for market-based regulation, which can result in uneven enforcement and protect some populations more than others.³⁴⁴

Taxation on GHGs is also market-based and simply provides a price incentive for firms to decrease GHG emission and can, theoretically, result in hotspots.³⁴⁵ Recent studies suggest permit trading schemes are more likely culprits. Grandfathered permit schemes are especially likely to create this negative public health effect because entrenched industry is favored and thus may be allocated enough permits to cover its prior emissions levels. These established industries are also quite likely to reside in the same geographical area for reasons having to do with available resources or the history of development. Further scientific discovery will answer whether carbon dioxide and other greenhouse gases lead to such hotspots.

Carbon taxation may also make more sense in economic terms than the alternative permit trading system. There is enormous uncertainty regarding the costs and benefits of carbon abatement and, therefore, “it can make a big difference whether you regulate by quantity (that is, caps) or with price (that is, with taxes).”³⁴⁶ Economists argue that the per-unit benefits of carbon abatement change little relative to the amount of the overall carbon dioxide in the Earth’s atmosphere.³⁴⁷ Conversely, the per-unit costs to factories and utilities change a lot.³⁴⁸ Therefore, economists reason the tax is preferable to a trading system because the tax, theoretically, can be set at a rate that can never greatly exceed the benefits.³⁴⁹ (Extensive research would be required to achieve the correct tax rate.) The trading system, on the other hand,

³⁴³ See discussion *supra* Part III.B.4.

³⁴⁴ See discussion *supra* Part V.B.2.

³⁴⁵ See *id.* (describing “hotspots” in trading schemes).

³⁴⁶ Sullivan, *supra* note 117, at 538.

³⁴⁷ *Id.*

³⁴⁸ *Id.*

³⁴⁹ *Id.*

depends on a volatile market with much less certainty.³⁵⁰ In other words, “a reasonable carbon tax would never impose unreasonable costs on the reduction of carbon emissions, but a quantity target could”³⁵¹ and “preserving the cap at all costs is simply not worth it.”³⁵²

Carbon taxes also have the ability to reduce other taxes.³⁵³ Theoretically, the permit trading system may also raise revenue which may in turn be used to reduce bad taxes. In practice, governments simply give away permits to polluters, raising no public revenue.³⁵⁴ Moreover, while both carbon taxes and permit trading systems carry administrative burden, the permit market may turn out to be more costly because of the need to develop a complex secondary market.³⁵⁵ For example, hiring brokers and developing expertise in the secondary permit market is expensive.³⁵⁶

Finally, fairness should be considered. Getting industry-wide agreement on the “fair” allocation of permits can be especially difficult, perhaps impossible.³⁵⁷ In grandfathered permit schemes, emissions allocations are normally determined as a percentage of historical emissions.³⁵⁸ However, companies that reduced emissions prior to the base year or companies rapidly growing will inevitable get the short end of the stick compared to entrenched large polluters.³⁵⁹ As such, the carbon tax may be across the board “fairer.”

C. Carbon Taxations Is Preferable to Permit Trading

Policy choices regarding carbon emissions are not simple. The meeting of politics, science, economics, and moral choice will always lead to lively discussion. Indeed, climate change and what to do about it has leapt from scholarly journals and now entered our everyday conversations, for good reason. Now the tough choices have to be made. With what we know today, carbon taxation is the superior form of carbon abatement. On balance, carbon taxation provides greater price certainty to industry, is simpler to implement, produces the greatest

³⁵⁰ *Id.* at 538–39.

³⁵¹ Sullivan, *supra* note 117, at 538.

³⁵² *Id.* (quoting economist William Pizer).

³⁵³ See discussion *infra* Part IV.C.1 (double dividend).

³⁵⁴ Sullivan, *supra* note 117, at 539.

³⁵⁵ *Id.* at 538.

³⁵⁶ *Id.*

³⁵⁷ *Id.* at 539.

³⁵⁸ *Id.*

³⁵⁹ See Sullivan, *supra* note 117, at 539.

chance of reducing bad taxes, and is arguable fairer to all types of polluters than the alternative permit trading scheme.

CONCLUSION

Mounting scientific evidence suggests that man-made GHG emissions (especially carbon dioxide emissions) are a contributing factor to global climate change. In economic terms, pollution is a negative externality that the market itself cannot correct. As such, governments have traditionally used CAC regulation to control emissions. CAC regulation is effective in controlling emissions as it requires each polluter to reduce GHG emissions, for example, by forcing polluters to install scrubbers to industrial stacks to remove pollutants. Unsurprisingly, this heavy-handed approach has proved unpopular with industry due to its inherent inflexibility.

Green taxation and emissions trading schemes, on the other hand, provide economic incentives for polluters to reduce emissions. As such, these EIs do not demand each polluter reduce emissions, but rather aim to reduce overall GHG emissions. Green taxation provides a price incentive for polluters to curb GHG emissions. However, green taxation may be ineffective in curbing GHG emissions if the tax is set too low or exempts large sectors of industry. Taxes set too low become mere revenue raising mechanisms at best. Exempting large polluters abandons the "polluter pays principle" and can have little effect in curbing GHG emissions.

Alternatively, permit trading schemes have been successfully implemented in the United States and have proven effective in curbing sulfur dioxide emissions, for one. While these markets are often supported by industry policymakers should consider the superiority of green taxation. A detailed analysis of both the theoretical and practical arguments regarding carbon taxation and alternative emissions permit trading scheme shows that carbon taxation is the superior method of carbon abatement. While taxes are often politically unfavorable, especially in the United States, our discussion should not stop there. If sound policy reasons in favor of a carbon tax cannot win over politicians and voters perhaps the U.S. and other countries could follow in the footsteps of the U.K.—simply change the name. "Levy," for some reason, has a better political ring than "tax."