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INTRODUCTION

When the Group of Eight met in Japan in July 2008, the leaders of major economies in the developed world recognized the role of market-based instruments in reducing greenhouse gas emissions:

Market mechanisms, such as emissions-trading within and between countries, tax incentives, performance-based regulation, fees or taxes and consumer labeling can provide

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pricing signals and have the potential to deliver economic incentives to the private sector. We also recognize that they help to achieve emissions reduction in a cost effective manner and to stimulate long-term innovation. We intend to promote such instruments in accordance with our national circumstances and share experience on the effectiveness of the different instruments.1

Although the George W. Bush Administration has not been sympathetic to climate change measures that will increase the price of energy,2 the national debate about how to reduce greenhouse gas emissions will continue under a different president and a new Congress in 2009. They will determine whether energy taxes or emissions trading regimes are “in accordance with our national circumstances.”

Four decades ago, the United States was a leader in considering the use of taxes to reduce pollution. In 1970, President Nixon proposed a tax on lead additives to gasoline and in 1972 a tax on sulfur dioxide emissions.3 Although these proposals were not enacted, a tax on gas-guzzling cars went into law in 1978,4 followed in 1980 by a tax on chemicals to finance the Superfund, a fund dedicated to cleaning up hazardous waste sites.5 The United States was also a pioneer in permit-trading regimes, using them to implement the regulation of lead in gasoline in the early 1980s, ozone depleting chemicals in 1988, and sulfur dioxide in 1990.6 In recent years, however, European countries have seized the initiative in using environmental taxes and trading regimes. As detailed in other articles in this volume, a number of European countries have enacted significant,

2. See, e.g., Statement of the White House Press Secretary (July 11, 2008), http://www.whitehouse.gov/news/releases/2008/07/print/20080711-7.html (“The wrong way [to deal with climate change] is to sharply increase gasoline prices, home heating bills and the cost of energy for American businesses . . . .”).
4. 26 U.S.C. § 4064 (2000). The tax starts at $1,000, increasing to $7,700 for vehicles with fuel economy less than 12.5 miles per gallon, but the tax has been eviscerated by its exemption for “non-passenger” vehicles which, with changes to vehicle design, now applies to SUVs. Id. § 4064(b)(1)(B).
5. Id. §§ 4661–4662. The tax remained in effect until 1996. See also id. §§ 4681–4682 (imposing a tax on ozone depleting chemicals effective in 1990).
broad-based energy taxes or carbon taxes. In addition, the European Union has put into place the Emissions Trading Scheme for carbon emissions from 11,500 facilities, and it may expand the Scheme in the future to include other facilities and greenhouse gases.

This article provides background and context for considering the use of broad-based energy taxes to reduce greenhouse gas emissions at the federal level in the United States. After a brief introduction in Part I to the concept of energy taxes and their design alternatives, Part II reviews the United States’ most significant experience with enacting broad-based energy taxes—President Clinton’s proposal to tax energy based on its energy content as measured by British thermal units (Btus)—and the possible implications of that experience for today’s debate over carbon taxes and permit trading. Part III sets pending carbon tax alternatives and actions in the context of the current proposals and programs for using tradable permits for greenhouse gas emissions. While it does not undertake to analyze the pros and cons of tax instruments versus other instruments, an exercise that would require many more pages than allowed here, it highlights analytical issues that are key when comparing carbon taxes and cap-and-trade regimes. The article concludes by suggesting that policymakers and advocates should not dismiss the possibility of using taxes to reduce greenhouse gas emissions despite the political volatility of tax proposals. If held to the same analytical standards, taxes and trading regimes bear many similarities and involve some of the same politically difficult choices.

I. A BRIEF INTRODUCTION TO THE VOCABULARY AND CONCEPTS OF ENERGY-RELATED TAXES

The basic formula for taxation is universal and relatively simple, building on three fundamental components and a very straightforward mathematical formula. The tax base multiplied by the tax rate equals the tax revenue:


Energy-related taxes are defined by the fact that the tax base (the commodity being taxed) is some form of energy. The specific tax base can vary significantly depending on the design of the tax. In the case of a carbon tax, the tax base is either the carbon content of fuels or the carbon dioxide (CO₂) they produce when combusted, usually measured in tons. By defining the tax base as carbon or CO₂, the tax is limited to fossil fuels. If the tax base also draws in non-fossil forms of energy, such as nuclear power or hydropower, it is often called a broad-based energy tax. A classic broad-based energy tax would define the tax base in terms of the energy content of the identified range of energy sources. However, the tax base for a broad-based energy tax could also be defined in terms of the market price per unit of energy (often called an ad valorem tax) or in terms of the volume of the fuel (such as a tax per barrel of oil). The dominant federal energy tax in the United States—18.4 cents per gallon of gasoline—is a volume-based energy tax but not a broad-based energy tax because the tax base is limited to gasoline.

In the climate change context, using either carbon or CO₂ as a tax base would be preferable because the tax base provides the most direct link to the environmental problem—the emission of CO₂. However, greenhouse gas emissions more broadly might also serve as a tax base. Although carbon dioxide emissions account for 85% of U.S. greenhouse gas emissions, most of which come from combustion of fossil fuels, other types of greenhouse gases contribute to global warming: methane (8% of U.S. greenhouse gas emissions), nitrous oxide (5%), hydrofluorocarbons (2%), and perfluorocarbons and sulfur hexafluoride (less than 1%). A classic greenhouse gas tax would define the tax base in terms of tons of emissions, adjusted for their global warming potential based on CO₂ equivalents.

Identifying the tax base also involves determining what commodities or emissions are exempt from the tax or should qualify for refund after the tax has been imposed. For example, a carbon tax that uses carbon content as a surrogate for eventual emissions presumably would exempt fossil fuels that are consumed in manufacturing processes for non-fuel purposes as “feedstocks;” not combusted, they will not yield emissions.


Although often tempered by political considerations, the tax rate of an environmentally related energy or greenhouse gas tax may reflect an environmental theory, such as the internalization of the external costs of emissions or the need to attain a certain degree of behavioral change. In the former instance, the tax rate would be defined by the external costs, and in the latter instance by the level necessary to achieve the specific behavioral effect. Alternatively, the environmental benefit may come primarily from the way in which government will use the revenue, with the rate set to generate the targeted amount. If the tax signal itself is strong enough to achieve some or all of the desired environmental result, however, revenue from the tax can be used to address non-environmental goals, such as measures that might mitigate regressive effects of the tax, fund unrelated programs, reduce the deficit, or reduce the burden of other tax rates in ways that will stimulate the economy.\footnote{See generally Janet Milne, \textit{Environmental Taxation: Why Theory Matters, in 1 CRITICAL ISSUES IN ENVIRONMENTAL TAXATION: INTERNATIONAL AND COMPARATIVE PERSPECTIVES} 1, 19–24 (Janet Milne et al. eds., 2003) (discussing theories underlying environmental taxes and their implications for the use of revenue).} If all of the revenue from the tax is used to provide tax relief of some form, the tax is “revenue neutral.” The new revenue offsets the revenue loss from the tax cuts, rendering the tax package as a whole revenue neutral.

Finally, an important design question is determining who will pay the tax. From an environmental perspective, the tax or ultimate incidence of the tax should fall on taxpayers who are most able to change their behavior in ways that will achieve the environmental goal. Political, economic, and administrative considerations, however, may come into play. For example, although consumers are often aware of the federal gas tax at the pump, the tax is actually paid when the fuel is removed from the refinery or terminal, thereby facilitating the collection of the tax.\footnote{26 U.S.C. § 4081(a)(1)(A) (2000).}
II. THE CLINTON BTU TAX AND ITS LESSONS

A. The Clinton Btu Tax

The experience with the Clinton Btu tax illustrates how environmental, economic, equity, and political factors influence the basic choices governing which type of tax to use, its design features, and its fate. Just four weeks after taking office in January 1993, President Bill Clinton announced to a joint session of Congress that a tax on energy would be part of his five-year, deficit-reduction package.14 He proposed an energy tax based on energy content as a way to reduce the deficit “because it also combats pollution, promotes energy efficiency, [and] promotes the independence economically of the country . . . .”15 Although the proposed Btu tax was ultimately replaced by a 4.3-cent increase in the gas tax and

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15. Id.
other measures, the experience with the Btu tax provides some useful lessons for considering the design and role of energy taxes today.

The tax base of Clinton’s proposed excise tax covered an extraordinarily broad range of energy sources—fossil fuels, ethanol and methanol used as fuel, and domestic and imported electricity produced from nuclear or hydro power. Although the tax excluded renewable sources of energy, such as wind, solar, geothermal, and biomass, it was essentially an economy-wide energy tax. To provide a present-day context, Figure 2 summarizes the United States’ fuel consumption patterns in 2006:

Figure 2: U.S. Consumption by Type of Fuel

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Percent of Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid fuels</td>
<td>40.1</td>
</tr>
<tr>
<td>Natural gas</td>
<td>22.3</td>
</tr>
<tr>
<td>Coal</td>
<td>22.5</td>
</tr>
<tr>
<td>Nuclear electricity</td>
<td>8.2</td>
</tr>
<tr>
<td>Hydroelectricity</td>
<td>2.9</td>
</tr>
<tr>
<td>Biomass</td>
<td>2.5</td>
</tr>
<tr>
<td>Other renewables</td>
<td>0.9</td>
</tr>
</tbody>
</table>

The basic rate for the Btu tax, to be phased in over three years, was 25.7 cents per million Btus, with a supplemental tax of 34.2 cents per million Btus for refined petroleum products; each rate was indexed for inflation after 1997. Without the supplemental tax on petroleum, the tax on natural gas would have been higher as a percentage of market price than on oil, potentially discouraging the use of natural gas, which is a cleaner fuel. These rates translated into an average of $3.24 per barrel of oil (or 7.5 cents per gallon of gasoline), $0.26 per million cubic feet of natural gas, $5.57 per short ton of coal, and $2.66 per thousand kilowatt hours for

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17. Staff of the J. Comm. on Taxation, 103d Cong., Summary of the President’s Revenue Proposals 61 (Comm. Print 1993).
19. Staff of the J. Comm. on Taxation, supra note 17, at 61. The Btu content was based on a national average for alcohol fuels and for all fossil fuels except coal, which was based on actual Btu content. Id.
electricity from hydro and nuclear power (based on the national average of Btus required to produce electricity from fossil fuels).\textsuperscript{21} Estimated to raise $22 billion per year when fully phased in and over $70 billion during the five-year budget period from 1994 to 1998,\textsuperscript{22} the proposed broad-based tax represented a significant addition to the relatively limited portfolio of existing federal fuel taxes.

The revenue from the tax contributed to the budget package’s deficit reduction goal of $500 billion over five years, achieved through a combination of tax increases and spending cuts. Thus, deficit reduction was the primary use of the revenue. Nevertheless, the budget package as a whole contained other revenue-losing or increased-spending provisions that related to the Btu tax, in particular an increase in the earned income tax credit that would offer greater relief to lower income taxpayers\textsuperscript{23} and expansion of the food stamp program and the Low Income Home Energy Assistance Program.\textsuperscript{24} Thus, although new dollars from the Btu tax were not explicitly dedicated to offsetting relief, the total budget proposal provided some compensating measures to address the potential regressivity of the Btu tax.

The Btu tax proposal had a short but dramatic life. In a party-line vote, the House Ways and Means Committee approved it in May 1993 with relatively minor changes.\textsuperscript{25} The committee’s statement in support reads much like a present-day manifesto for carbon reduction:

\begin{quote}
In addition to deficit reduction, imposition of an energy tax will foster several worthwhile goals. First, the United States is one of the developed world’s most intensive energy consumers. Most of the nation’s energy is derived from non-renewable resources. Increasing the cost of non-renewable energy resources to individuals and businesses
\end{quote}


\textsuperscript{22} Staff of J. Comm. on Taxation, 103d Cong., Estimated Budget Effects of the Administration’s Revenue Proposals Contained in the Fiscal Year 1994 Budget, JCX-2-93 2 (1993).

\textsuperscript{23} 139 Cong. Rec. H674, H678 (1993) (State of the Union Address by President Clinton).

\textsuperscript{24} Administration’s Energy Tax Proposals: Hearings Before the Comm. on Finance, 103d Cong. 7 (1993) [hereinafter Senate Finance Energy Tax Hearing] (prepared statement of Hon. Lloyd Bentsen, Secretary, Dep’t of Treasury).

will provide an economic incentive to conserve these irreplaceable resources.

Second, the burning of fossil fuels contributes to atmospheric pollution and increases the potential for global warming. Consumers of fossil fuels do not directly bear the cost of the environmental damage pollution creates. Imposing an energy tax on the consumer of fossil fuels will give consumers a financial incentive to reduce energy use. The committee believes that providing an economic incentive to conserve energy use, while also providing an incentive to use renewable resources, will lead to a cleaner environment.  

The House of Representatives passed the budget proposal, including the politically sensitive Btu tax, by a margin of six votes in late May after President Clinton and the House leadership struggled to win the necessary last minute votes. Even with the passage of the bill in the House, however, support for the Btu tax was eroding in the Senate. The Finance Committee, which has jurisdiction over tax matters in the Senate, could not hold together its slim, two-vote Democratic majority when Oklahoma Senator David Boren and Louisiana Senator John Breaux signaled that they would not support the tax. With the President’s agreement, the committee replaced the Btu tax with a 4.3-cent increase in the gasoline tax and other measures, including controversial increased spending cuts, to make up the difference in lost revenue. This modified plan passed the Senate in June as part of the budget package, with Vice President Gore voting to break the deadlock, and the gas tax increase prevailed over the Btu tax when the Senate and House went to conference to negotiate differences between the

26. WAYS & MEANS RECOMMENDATIONS, supra note 25, at 293.


30. STAFF OF J. COMM. ON TAXATION, 103D CONG., DESCRIPTION OF CHAIRMAN’S MARK ON REVENUE RECONCILIATION PROPOSALS SCHEDULED FOR MARKUP BY THE SEN. COMM. ON FINANCE, JCX-6-93, at 80 (1993).

House and Senate bills. The final $500 billion deficit-reduction plan, containing the gas tax increase but no Btu tax, passed both the House and Senate by the narrowest of margins in early August and was signed into law by President Clinton.

B. Lessons from the Btu Tax Experience

1. The Fundamental Choice of Tax Base: The Significance of Regional Burden-Sharing and Political Postures

If the Clinton Administration’s only consideration had been climate change, it presumably would have proposed a carbon tax. However, as the Administration considered its alternatives—an increase in the gas tax, a carbon tax, an energy tax, or a sales tax on energy—and presented its decision to pursue the Btu energy tax, it became clear that regional burden-sharing played a decisive role in defining the tax base. A significant increase in the gas tax would have disproportionately affected regions where people have to drive longer distances, particularly where public transit is not available. A carbon tax would have placed the greatest tax burden on coal, which has a higher carbon content than oil or natural gas, thereby impacting coal-producing states and states dependent on coal for electricity more than states that rely primarily on nuclear power or hydropower. Significant regional differences would have generated

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33. See 139 CONG. REC. H6271 (1993) (Roll call Vote No. 406) (passing the House by a vote of 218 to 216); 139 CONG. REC. S10763 (1993) (Roll call Vote No. 247) (passing the Senate by a vote of 50 to 50, with the Vice President casting the deciding vote); see generally David Rosenbaum, CLINTON WINS APPROVAL OF HIS BUDGET PLAN AS GORE VOTES TO BREAK SENATE DEADLOCK, N.Y. TIMES, Aug. 7, 1993, at A1 (reporting on the tie-breaking vote).
35. See 139 CONG. REC. H674, H678 (1993) (State of the Union Address by President Clinton); Keith Bradsher, LESS FOR ENVIRONMENT THAN ENERGY IN TAX BILL, N.Y. TIMES, Mar. 18, 1993 (discussing the impact of a gas tax on southern, oil-producing states); Steven Pearlstein & Thomas Lippman, INDUSTRY ANALYSTS SEE BROAD-BASED ENERGY TAX IN CLINTON’S FUTURE, WASH. POST, Jan. 1, 1993, at A4 (noting the political unpopularity of a gas tax in western states with limited mass transit); David Wessel, BENTSEN SEE'S HIGHER TAXES ON CONSUMING, WALL ST. J., Jan. 25, 1993, at A2 (reporting on Secretary of Treasury Bentsen’s concerns about regional impacts of a gas tax).
36. Senate Finance Energy Tax Hearing, supra note 24, at 7 (prepared statement of Hon. Lloyd Bentsen, Secretary, Department of Treasury). See also Dawn Erlandson, THE BTU TAX EXPERIENCE: WHAT HAPPENED AND WHY IT HAPPENED, 12 PAC. ENVT. L. REV. 173, 175–76 (1994) (stating that Senator Robert Byrd from the coal-rich state of West Virginia single-handedly caused the carbon tax to be rejected); Thomas W. Lippman, ENERGY TAX HAS ‘GREEN’ TINT; ENVIRONMENTALISTS BACK PLAN THEY HELPED DRAFT, WASH. POST, Mar. 2, 1993, at D1, available at http://www.washingtonpost.com (explaining that a carbon tax was politically impossible given Senator Byrd’s position as Chairman of the Appropriations
questions of equity, economic impact, and the political opposition that comes with each. According to the Administration, the Btu tax’s broad tax base would treat states relatively equally, while the higher energy cost and the exemption for renewable energy would still serve environmental goals. The Administration estimated that the tax would range by region from 0.54% to 0.67% of taxpayers’ disposable personal income, a variation of only 0.13%.  

Even so, as indicated above, the tax was not an easy sell. Thus, the Clinton Btu tax experience in 1993 underscores the political and economic challenges of proposing a tax that targets only fossil fuels and generates regional disparities. Perhaps the argument that polluters should pay despite regional differences might be more persuasive now with the increased awareness of the risks of climate change. But the 1993 events also serve as a reminder that cap-and-trade regimes for greenhouse gases may have similar regional impacts because they target the same base as a carbon tax or greenhouse gas tax. Despite the relative political opaqueness of cap-and-trade regimes, the same policy choice underlies broad-based carbon trading regimes that will place the financial burden disproportionately on some regions.

The political landscape of the moment influenced the choice of tax base as well. President Clinton would have had difficulty defending a significant gas tax increase after opposing, during the presidential race, Ross Perot’s campaign proposal to increase the gas tax by fifty cents. In addition, a carbon tax would have run counter to the interests of the powerful Senator Robert Byrd from coal-producing West Virginia, Chair of the Senate Appropriations Committee—a potentially lethal flaw. The choice of tax base reflected the realities of political postures.

37. Senate Finance Energy Tax Hearing, supra note 24, at 120 (prepared statement of Hon. Lloyd Bentsen, Secretary, Department of Treasury). The Administration chose to define the tax base as the Btu energy content of these sources, rather than the price of the energy as with an ad valorem or sales tax, so that the tax burden would not vary with the price of energy. 139 Cong. Rec. H674, H678 (1993) (State of the Union Address by President Clinton).

38. See generally WORKING GROUP II CONTRIBUTION, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION, AND VULNERABILITY 7–18 (Martin Parry et al., eds. 2007) (chronicling current knowledge about worldwide impacts of climate change).


40. Erlandson, supra note 36, at 175; Lippman, supra note 36; Wald, supra note 36. See also Senate Finance Energy Tax Hearing, supra note 24, at 7 (statement of Hon. Lloyd Bentsen, Secretary, Department of Treasury) (noting disproportionate impact of a carbon tax on coal-producing states).
2. Refining the Tax Base: The Significance of International Competitiveness and Political Strategy

The Clinton Administration recognized the need to put imports on equal tax footing with domestic products in order to preserve the competitive position of domestic activities. The initial proposal provided that “imported taxable products” would be subject to tax at a level equivalent to domestic products. The Ways and Means Committee’s version of the Btu tax imposed a tax on imported energy-intensive products, defined as those with two percent of their value attributable to energy that would have been taxable if the products had been manufactured in the United States. Conversely, exported energy sources were exempt from the tax. Although always subject to compliance with the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization trade rules, a border tax adjustment can mitigate concerns about the economic impact of the tax. While imposition of a tax on imports is consistent with the environmental goal of reducing carbon emissions, which are transboundary in nature, exempting exports is less justifiable on global environmental grounds.

Refinements to the tax base also illustrate the significance of strategic decisions once a tax is proposed. Not long after the Clinton Administration announced the proposed Btu tax, it signaled that it would revise some of the elements of the tax, in particular by broadening the list of exemptions. For example, faced with objections from states highly dependent on home heating oil, the Administration indicated it would exempt home heating oil from the supplemental tax on refined petroleum products. In addition, proponents of ethanol argued that it should receive the same tax-exempt treatment as other renewable energy, such as solar and wind. The
Administration’s modified proposal, released in April, acquiesced. 48 Although the House Ways and Means Committee rejected the ethanol change, 49 the Administration’s willingness to modify helped open the door to other changes in the tax proposal and the budget plan and emboldened the opposition. 50 “The opponents of the energy tax smelled blood.” 51 The controversial Btu tax was defeated at least in part because of the way the Administration played its hand. 52 Strategic decisions for any tax bill will turn on the particular political landscape of the time, but the Clinton experience illustrates how flexibility with exemptions after the proposal is released can erode the strategic momentum of the plan and its perceived or real integrity.

3. The Taxpayer/Collection Point: A Technical Issue with Non-technical Consequences

The Clinton Administration originally intended to collect the tax as far upstream as possible, a logical standpoint considering administrative feasibility and the benefits of influencing upstream choices. 53 It fell sway, however, to industry pressures and agreed to allow the tax to be paid by end users of coal, 54 natural gas, and electricity, although the tax would still be collected by the natural gas or electric utility. 55 Not only did this contribute to the sense that the tax plan was negotiable, but it also undercut support for the tax among environmental groups, which argued that imposing the tax on

47. See Lippman, supra note 36 (reporting that Iowa Senator Tom Larkin complained to Treasury Secretary Bentsen about ethanol’s inclusion in the Btu tax while other renewable sources were exempt).


49. WAYS & MEANS RECOMMENDATIONS, supra note 25, at 295.


51. Erlandson, supra note 36, at 178.


54. Compare DEPT OF TREASURY, SUMMARY OF THE ADMINISTRATION’S REVENUE PROPOSALS 65 (1993) (proposing that the tax on coal be imposed at the minemouth), with OFFICE OF TAX POLICY, DEPARTMENT OF TREASURY, DESCRIPTION OF MODIFIED BTU TAX 2 (1993) (indicating that the tax on coal would be imposed on the end user).

electric utilities would give utilities a greater incentive to use cleaner energy. In addition, it heightened the political visibility of the tax to voting end users, leading a representative of utility regulators to comment that the Clinton administration did not want reminders that “this isn’t the ‘BTU tax,’ it’s ‘the Bill-is-taxing-you tax.’” In finding the right collection point, a tax proponent needs to balance the administrative considerations, the environmental impacts, and the political repercussions—a choice perhaps less likely to occur with permit trading regimes where upstream trading is more feasible than downstream.

4. The Tax Rate: Balancing the Multiple Driving Factors of Deficits, Environmental Protection, and Economic Impact

The political impetus for the Clinton BTU tax sprang from the need to reduce the deficit. Although discussions about using some form of energy tax appeared on the table a month after President Clinton’s election in November 1992, the concept was quickly wrapped into the question of how to reduce the deficit. Consequently, the BTU tax’s relatively low tax rate—only $3.24 per barrel of oil even with the supplemental rate on petroleum—generated the $70 billion over five years needed as a key part of the deficit-reduction package. However, the tax rate did not appear to be grounded on an explicit environmental calculation, such as a refined notion of cost internalization or behavioral impact. The environmental aspect of the tax rate’s effect was real, but modest; the Administration estimated it would reduce the anticipated growth in energy consumption by seven percent.

57. Calmes & Wessel, supra note 55. Before this concession, the Clinton proposal would have required utilities to pass the cost of the tax on to consumers in order to encourage conservation, but the utilities would have paid the tax so that it would not have appeared as a line item on consumers’ bills. OFFICE OF TAX POLICY, DEP’T OF TREASURY, THE ADMINISTRATION’S MODIFIED BTU ENERGY TAX PROPOSAL 2 (1993).
59. See Jeffrey Birnbaum & Michael Frisby, Clinton Puts Emphasis On Deficit Reduction Goals as He Maps Economic Plans, WALL ST. J., Dec. 18, 1992, at A1 (explaining that deficit reduction was President Clinton’s highest priority and specifying where the energy tax fit into his plan); David Wessell & Rick Wartzman, Clinton’s Options: Tax Increases Seem Inevitable, Including Some on Middle Class, WALL ST. J., Jan. 22, 1993, at A1 (discussing the President’s concerns about the deficit and his advisors’ interest in using an energy tax to reduce the deficit).
60. OFFICE OF TAX POLICY, supra note 45, at 1. See CONG. BUDGET OFFICE, AN ANALYSIS OF THE PRESIDENT’S FEBRUARY BUDGETARY PROPOSTALS III-6 (1993), available at http://www.cbo.gov/fpdocs/75xx/doc7531/93doc10.pdf (concluding that the environmental and national security benefits of the tax were likely to be real but minimal).
The tax rate presumably also reflected a desire to limit the financial burden on individuals and industry. The Administration estimated that the tax, when fully phased in, would impose a direct cost of $9.50 per month on a family of four with an income of $40,000 and would increase manufacturing costs on average by 0.1%\(^{61}\) while still generating $22 billion per year. Yet even that level of relatively modest additional cost met with immediate opposition from industry.\(^ {62}\)

The relatively low tax rate, combined with a broad tax base extending beyond fossil fuels, suggests that while the Btu tax had environmental characteristics, its environmental features were muted by other considerations. This result was not inconsistent with the need of traditional tax policy to consider issues of economic impact and equity. At the same time, the Clinton experience dramatically underscores how the need for revenue can provide an opportunity to introduce a new type of environmental tax. Political opportunities in the future may come from the environmental side of the equation, or they may come from the revenue side, or both, but it will require delicate compromise to take advantage of a revenue-driven opportunity while maintaining the environmental features of the tax itself, in particular, the tax rate.

5. The Use of the Revenue: A Crucial Part of the Picture

As mentioned above, revenue demands can create a motive and an opportunity for a tax. In addition, the revenue from the tax can help build a package that reduces the regressivity of the tax itself and may produce broader benefits that can have significant political and policy implications. The Clinton Administration was aware of the regressivity issue from the start. In presenting the budget proposal to Congress, President Clinton announced that the Btu tax would “cost American families with incomes under $30,000 nothing,”\(^ {63}\) given the budget proposal’s increases in the earned income tax credit and programs for food stamps, home energy assistance, and home weatherization that would reduce the burden on low-
Although the revenue from the Btu tax was not specifically dedicated to these forms of relief, the total package, which included the new revenue, allowed the Administration to argue that it was protecting low income households—an issue that must be confronted for any energy-related tax.

President Clinton promoted the Btu tax as serving environmental, energy security, and deficit-reduction goals. The implementation of the tax itself would serve the first two goals, and deficit reduction would be achieved by the use of its revenue. The placement of the $70 billion tax within a $500 billion deficit-reduction package allowed the Clinton Administration to present the tax in a broader light and to cite the economic advantages of deficit reduction as reasons to support the tax. The Administration pointed to benefits such as lower interest rates, which would reduce capital costs for industry and mortgage interest costs for homeowners, providing benefits to a broad range of taxpayers and constituents. The President argued that lower interest rates would “more than offset” the additional cost of the tax to middle income people. The President’s campaign promises not to raise taxes politically tarnished this net-benefit argument, but the proposal nonetheless illustrates how the use of the revenue and the combined package can generate reasons to support a tax and potentially alleviate concerns. Different decisions about how to use new revenue from a climate change tax could be made at other times—such as whether to use all the revenue for offsetting tax relief on a revenue-neutral basis in order to strengthen the economy, or whether to dedicate some or all of the revenue to the environmental problem, which in turn may strengthen the economy. The point remains, however, that an assessment of the feasibility and merit of a tax is bound to the question of the use of its revenue.

66. Id.
67. Senate Finance Energy Tax Hearing, supra note 24, at 6–7 (statement of Hon. Lloyd Bentsen, Secretary, Department of Treasury).
69. See David Hilzenrath, Politics Overtakes Policy in Energy Tax Debate, Wash. Post, July 20, 1993, at C1 (noting that the energy tax proposal reversed President Clinton’s campaign promises). Es Risen, Energy Tax Hits Consumer More than Oil Firms, L.A. Times, May 27, 1993 (citing legislators’ perception of energy tax as a repudiation of the President’s campaign promises).
6. A Viable Concept?

In sum, the Clinton Btu tax shows how an environmental tax proposal is inevitably shaped by issues of economic impact, equity, and politics. The challenge is to ensure that, if it is truly an environmental instrument, it maintains sufficient environmental integrity while also guarding against unacceptable impacts on the economy and taxpayers. This is not an easy challenge, and the Clinton Btu tax shows how the environmental features, while present, probably did not dominate design decisions. Nonetheless, it offered a creative compromise with its broad tax base, relatively low tax rate (which could have been susceptible to subsequent increases), and equity and economic benefits through the use of the revenue.

The fate of the Clinton Btu tax need not necessarily ring the death knell for a federal carbon tax in the United States. There is no doubting the visceral reaction a new tax seems to inspire and the difficulty of adding additional costs to energy when the price of oil is high or the economy weak. Political prognostication is risky at best, but certain factors might help generate a more positive reaction in the future. For example:

- A wider majority in Congress would leave less political power in the hands of a few players, unlike the two-Senator margin President Clinton faced with the Senate Finance Committee.
- A stronger national commitment to address climate change could create greater political will to pursue a carbon tax.
- A strong need for revenue that can finance increased spending, reduce the deficit, or provide tax relief could add a second set of forces to propel a tax proposal. For example, as former Vice President Al Gore said in July 2008 when he reiterated his support for reducing payroll taxes by using carbon tax revenues, “[w]e should tax what we burn, not what we earn.”
- A heightened awareness of how increases in the price of fuel can change behavior could build support for price signals that economic instruments can maintain over time. Although economically painful, higher gas prices in 2008 are starting to change behavior and provide evidence that price signals can work.
- A more thorough discussion of the economic benefits of addressing climate change, with more active support from the

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industries that will benefit, would help build the factual case and political support for long-term price signals.

- A sophisticated political understanding about the economic costs of alternative solutions to climate change would put carbon or greenhouse gas taxes on more equal footing with instruments that have less politically visible profiles. The negative impact of alternatives also can generate strange bedfellows for support, just as Ford, General Motors, and Chrysler supported the Clinton Btu tax in hopes of avoiding more stringent fuel economy regulations.\textsuperscript{71}

- Campaign rhetoric would need to leave sufficient flexibility for considering a carbon tax unless unforeseen circumstances subsequently diminish the significance of campaign promises.

In the ever-changing kaleidoscope of facts and circumstances, it is difficult to predict which combinations might generate more favorable opportunities for a carbon tax. Nevertheless, the fact of one defeat should not preclude the possibility of a carbon tax—particularly if Congress or a president takes off the table cap-and-trade regimes that do not auction allowances to emit greenhouse gases.

### III. THE PRESENT CONTEXT FOR CARBON TAXES

The United States has a number of laws that address greenhouse gas emissions, but it does not have a comprehensive, integrated, nationwide legal regime for reducing its contribution to global carbon dioxide or other greenhouse gases.\textsuperscript{72} Although the Environmental Protection Agency (EPA) has solicited comments on the ways in which it might use its authority under the Clean Air Act to regulate greenhouse gases,\textsuperscript{73} the EPA Administrator stated his belief that “the Clean Air Act . . . is ill-suited for the task of regulating global greenhouse gases.”\textsuperscript{74} This view was shared by the Office of Management and Budget in the Executive Office of the President and numerous Cabinet members in the Bush Administration.\textsuperscript{75} A


\textsuperscript{72} For an overview of a number of federal programs related to greenhouse gas emissions, see Regulating Greenhouse Gas Emissions under the Clean Air Act, 73 Fed. Reg. 44,354 (proposed July 11, 2008).

\textsuperscript{73} Id. at 44,354.

\textsuperscript{74} Id. at 44,355.

\textsuperscript{75} Id. at 44,356–44,361.
comprehensive program is likely to require federal legislation, and a number of proposals are pending in Congress, including carbon tax bills and more prominent cap-and-trade bills. In addition, states are starting to implement market-based measures. In order to place carbon taxes in the current context, the discussion below briefly describes proposed and actual carbon taxes and cap-and-trade regimes in the United States, focusing on major actions that can illustrate the current state of play. It does not address the range of tax expenditures for environmentally positive activities already in the federal tax code, such as tax incentives for renewable energy or, conversely, tax subsidies that may be environmentally damaging, such as tax benefits for oil and gas. Although beyond the scope of this article, they are significant market-based instruments that should be kept in mind when considering the portfolio of market-based approaches.

A. Carbon Taxes

Two carbon tax bills are currently pending in Congress. These bills differ from the Clinton Btu tax in that they focus on fossil fuels and do not tax nuclear power and hydropower. The “Save Our Climate Act of 2007,” H.R. 2069, introduced by Congressmen Fortney “Pete” Stark and Jim McDermott, proposes to tax fossil fuels at a rate of $10 per ton of carbon content of coal, petroleum and petroleum products, and natural gas, increasing by $10 per year until carbon dioxide emissions from the United States are reduced to eighty percent below their 1990 level.\(^76\) The tax would be paid by the manufacturer, producer, or importer of the fuel, but the tax may be refunded if the fuel is used in a way that embeds or sequesters carbon,\(^77\) and exports are exempt from the tax.\(^78\) The bill suggests, but does not require, that the revenue from the tax could be used for tax relief for low- or middle-income taxpayers, funding for developing alternative energy, or other social goals.\(^79\) It also calls for studies every five years of the environmental, economic, and fiscal impacts of the tax.\(^80\)

The second bill, “America’s Energy Security Trust Fund Act of 2007,” H.R. 3416, introduced by Congressman John Larson, would tax the CO\(_2\) content of the same fossil fuels, and would be paid by the same classes of taxpayers as the Stark-McDermott bill.\(^81\) The proposed tax rate is $15 per

\(^{76}\) H.R. 2069, 110th Cong. § 3(a) (2007). The taxable fuels exclude fuel placed in the Strategic Petroleum Reserve. \(id\).
\(^{77}\) Id.
\(^{78}\) Id.
\(^{79}\) Id. § 2(7).
\(^{80}\) Id. § 3(b).
\(^{81}\) H.R. 3416, 110th Cong. § 2(a) (2007).
ton, increasing by ten percent plus one percent more than the cost of living adjustment each year.\textsuperscript{82} Fuel used as feedstocks and exports are exempt, and taxpayers that carry out offset projects, sequester greenhouse gases, or destroy hydrofluorocarbons in the United States may qualify for a refund or tax credit for taxes paid.\textsuperscript{83} According to one estimate, the $15 per ton tax rate on carbon dioxide would translate into $55 per ton of carbon, and by 2017 the tax rate (without inflation adjustment) would be approximately $130 per ton of carbon, compared with $100 per ton of carbon for the Stark-McDermott carbon tax.\textsuperscript{84}

Unlike the Stark-McDermott bill, the Larson bill would dedicate the revenue from the tax to a trust fund. The fund would finance a tax credit for clean energy technology (the lesser of $10 billion per year or one-sixth of the fund each year), transition assistance for industries adversely affected by the carbon tax (starting at one-twelfth of the revenue into the trust fund in the first year and phasing down to zero over ten years),\textsuperscript{85} and a “carbon tax rebate” in the form of an income tax credit for individual taxpayers (the remainder of the revenue).\textsuperscript{86} The income tax credit would equal the taxpayer’s per capita share of this portion of the trust fund’s revenue, capped at the level of federal payroll taxes paid with respect to that taxpayer or ten percent of the social security benefits the taxpayer received that year.\textsuperscript{87} The bill also calls for a study of ways to assess a comparable tax on non-carbon greenhouse gases.\textsuperscript{88}

The carbon tax concept is not limited to the federal government. Two local areas have chosen to enact modest carbon-related energy taxes. In 2006, the voters of Boulder, Colorado approved a Climate Action Plan Tax, which imposed a tax on the end users of electricity collected by the utility.\textsuperscript{89} The tax rates were set for 2007, but the city council has the ability to raise the rates up to specified caps in subsequent years. The maximum rates are 0.49 cents per kilowatt hour for residential users, 0.09 cents per kilowatt

\begin{itemize}
\item \textsuperscript{82} \textit{Id.}
\item \textsuperscript{83} \textit{Id.}
\item \textsuperscript{84} Carbon Tax Center, Bills, http://www.carbontax.org/progress/carbon-tax-bills (last visited July 10, 2008).
\item \textsuperscript{85} H.R. 3416, 110th Cong. §§ 2(b), 3 (2007).
\item \textsuperscript{86} \textit{Id.}
\item \textsuperscript{87} \textit{Id.} § 3. See also GILBERT E. METCALF, BROOKINGS INSTITUTION, A PROPOSAL FOR U.S. CARBON TAX SWAP 11 (2007) (proposing a tax on greenhouse gas emissions at the starting rate of $15 per ton of carbon dioxide equivalent, with revenue used for a refundable earned income tax credit, linked to payroll taxes, that would reduce the regressivity of the tax).
\item \textsuperscript{88} H.R. 3416, 110th Cong. § 4 (2007).
\end{itemize}
hour for commercial users, and 0.03 cents per kilowatt hour for industrial users.\footnote{Boulder Rev. Code § 3-12-2, available at http://www.colocode.com/boulder2/chapter3-12.htm.} The revenue is used to finance the city's climate action program, which aims to reduce the local greenhouse gas emissions to seven percent below 1990 levels by 2012,\footnote{Id. § 3-12-1.} and tax rates are based on the amount each sector will receive for programs under the climate action plan.\footnote{Brouillard & Van Pelt, supra note 89, at 9–10.}

In the region surrounding San Francisco, California, the Bay Area Air Quality Management District has imposed a fee that has more of the features of a traditional carbon tax. The tax base is explicitly defined in terms of emissions, but it also covers greenhouse gas emissions beyond carbon dioxide.\footnote{Bay Area Quality Management District, Reg. 3, sched. T (May 21, 2008), available at http://www.baaqmd.gov/dst/regulations/rg0300.pdf.} Starting in 2008, industrial facilities and businesses that are subject to air quality permit requirements must pay a fee of 4.4 cents per ton of greenhouse gas emissions.\footnote{Id.} The fee is estimated to generate $1.3 million annually which the District will use for its climate programs.\footnote{Press Release, Bay Area Air Quality Management District, Air District Implements Greenhouse Gas Fee (May 21, 2008), available at http://www.baaqmd.gov/pio/news/2008/climate_fee080521.pdf.} In early 2008, San Francisco Mayor Gavin Newsom announced his intention to put a city carbon tax before voters,\footnote{Associated Press, San Francisco to Vote on Business Carbon Tax: Mayor Promises Businesses Would Also See Cut in Payroll Tax, Dec. 6, 2007, http://www.msnbc.msn.com/id/22132812; San Francisco Mayor Gavin Newsom, Inaugural Address 2 (Jan. 8, 2008).} and the Department of the Environment was instructed to prepare options.\footnote{Commission on the Environment, San Francisco City Government, Resolution No. 00208 COE, at 2 (2008), available at http://www.sfenvironment.org/downloads/library/res00208coe_carbontax.pdf.} Under the Mayor’s revenue-neutral proposal, revenue would be used to reduce the payroll tax.\footnote{Associated Press, supra note 96. See also City and County of San Francisco Small Bus. Comm’n, Minutes, Item 9, Jan. 14, 2008, available at http://www.sfgov.org/site/sbc_page.asp?id=75330&mode=text (stating the goal of revenue neutrality for a carbon tax).}

Thus, while carbon tax proposals have received relatively little political attention, they have been introduced in Congress, and local governmental bodies are using carbon-related tax bases to generate revenue to finance climate programs. Figure 3 summarizes the key features of the various tax regimes, as well as the features of the cap-and-trade systems described below, highlighting differences and similarities.
Figure 3: Comparison of Elements of Tax and Cap-and-Trade Instruments

<table>
<thead>
<tr>
<th>Tax</th>
<th>Tax Base</th>
<th>Tax Rate</th>
<th>Taxpayer</th>
<th>Use of Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal gas tax now in effect (not including taxes on diesel, aviation fuel)</td>
<td>Gasoline</td>
<td>18.4 cents per gallon</td>
<td>Oil refiner; Position holder of fuel in terminal; Importer</td>
<td>Highway Trust Fund; Leaking Underground Storage Tank Trust Fund</td>
</tr>
<tr>
<td>Clinton Btu tax proposal in 1993</td>
<td>Fossil fuels; Hydropower; Nuclear; Ethanol (in original proposal)</td>
<td>25.7 cents per million Btus, with 34.2 cents per million Btus supplemental rate for oil</td>
<td>Oil refiner; End user of coal, electricity; Importer</td>
<td>Deficit reduction; Regressivity offsets in budget package</td>
</tr>
<tr>
<td>H.R. 2069 Save Our Climate Act of 2007 (Stark-McDermott)</td>
<td>Coal; Petroleum and petroleum products; Natural gas</td>
<td>$10 per ton of carbon, increased by $10 per year until emissions 80% below 1990 level</td>
<td>Manufacturer Producer Importer</td>
<td>Not mandated</td>
</tr>
<tr>
<td>H.R. 3416 America’s Energy Security Trust Fund Act of 2007 (Larson)</td>
<td>Coal; Petroleum and petroleum products; Natural gas</td>
<td>$15 per ton of carbon dioxide, increased each year by 10% plus cost of living adjustment</td>
<td>Manufacturer Producer Importer</td>
<td>Dedicated to: Tax credit for clean energy technology; Transitional industry assistance; Carbon tax rebate</td>
</tr>
<tr>
<td>Boulder, Colorado, Climate Action Plan Tax</td>
<td>Electricity</td>
<td>Capped per kilowatt hour at: 0.49 cents (residential) 0.09 cents (commercial) 0.03 cent (industrial)</td>
<td>End user (collected by electric utility)</td>
<td>Climate action program</td>
</tr>
<tr>
<td>San Francisco, Bay Area Air Quality Management District Fee</td>
<td>Greenhouse gas emissions</td>
<td>4.4 cents per ton of greenhouse gas emissions</td>
<td>Industry, businesses subject to air quality permits</td>
<td>Climate protection programs</td>
</tr>
</tbody>
</table>
Carbon Taxes in the United States

B. Cap-and-Trade Regimes

The context for carbon taxes in the United States inevitably involves the question of the role of cap-and-trade regimes, which have been gaining momentum. As indicated at the start, this article does not serve as a critique of the relative merits of taxation versus cap-and-trade instruments. Rather, it can only briefly identify some of the relevant proposals or actions in order to put carbon taxes in context and to illustrate how many of the issues
that arise with carbon taxes also exist in cap-and-trade regimes. These issues include deciding which energy sources or emissions should be covered, at what point in the supply chain the price signal should be imposed, how to treat imports, and how to use any revenue (see Figure 3).

At the federal level, a number of proposals for cap-and-trade regimes for greenhouse gases were introduced in the 110th Congress spanning 2007 and 2008. The most recent legislative activity of note centered on an amendment to the Lieberman-Warner Climate Security Act of 2008, S. 3036. The amendment, submitted by Senator Barbara Boxer on behalf of Senators Joseph Lieberman and John Warner as a replacement for the original language of S. 3036, proposes an economy-wide cap-and-trade program. The amendment was designed to reduce greenhouse emissions to 19% below 2005 levels by 2020 and 71% below 2005 levels by 2050. Although the amendment only received forty-eight of the sixty votes it needed to close debate, it illustrates the type of cap-and-trade program receiving serious legislative attention.

The Lieberman-Warner bill, as described in the amendment, focuses on upstream producers or users and greenhouse gases beyond carbon dioxide. The proposed cap-and-trade system applies to entities that: use more than 5,000 tons of coal each year; process or import natural gas or produce natural gas in Alaska; manufacture or import petroleum or coal-based liquid or gaseous fuels; manufacture or import more than 10,000 tons of CO2-equivalents of CO2, methane, nitrous oxide, sulfur hexafluoride, or per fluorocarbons; or manufacture hydrochlorofluorocarbons. Starting in


2012, these entities would need one allowance for each ton of CO₂-equivalent emissions or downstream emissions potential.\textsuperscript{104} The bill establishes a declining number of allowances from 2012 to 2050\textsuperscript{105} and tightly circumscribes the use of domestic offset projects or allowances from foreign trading programs.\textsuperscript{106} Limited relief measures could be available, such as increased borrowing against future years’ allowances.\textsuperscript{107} To protect competitiveness, importers of products that generated substantial amounts of greenhouse gases during manufacture would have to purchase allowances if the country of origin has not taken comparable climate change actions,\textsuperscript{108} somewhat akin to a border tax adjustment for a carbon or broad-based energy tax.

Over time, an increasing percentage of the allowances would be auctioned,\textsuperscript{109} with proceeds going toward a variety of uses such as workers’ transition assistance,\textsuperscript{110} suggested tax relief for consumers hardest hit with cost increases,\textsuperscript{111} mass transit,\textsuperscript{112} energy efficiency,\textsuperscript{113} low- or no-carbon electricity,\textsuperscript{114} research,\textsuperscript{115} wildlife and land conservation,\textsuperscript{116} firefighting,\textsuperscript{117} reducing greenhouse gas emissions from activities not covered by the cap-and-trade program,\textsuperscript{118} international programs,\textsuperscript{119} and deficit reduction.\textsuperscript{120} In addition, allowances would be allocated, without charge, to industries dependent on fossil fuels (carbon-intensive manufacturers,\textsuperscript{121} electricity generators that use fossil fuels,\textsuperscript{122} and petroleum refiners\textsuperscript{123}) as well as to a variety of entities that would use the allowances to provide relief to consumers, encourage the transition to a lower-emission economy,\textsuperscript{124}

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{104} Id. § 202(a).
\item \textsuperscript{105} Id. § 201(a).
\item \textsuperscript{106} Id. §§ 302(b)(1), (2) (each limited to 15\% of the covered facilities allowances).
\item \textsuperscript{107} Id. § 521.
\item \textsuperscript{108} Id. §§ 1301–1306.
\item \textsuperscript{109} Id. §§ 532(c), 582(c), 611(d), 631(c), 1202(c), 1331(c), 1402(c).
\item \textsuperscript{110} Id. §§ 533–535.
\item \textsuperscript{111} Id. §§ 583–585.
\item \textsuperscript{112} Id. §§ 611(f)–(i).
\item \textsuperscript{113} Id. § 613.
\item \textsuperscript{114} Id. §§ 903, 905–906.
\item \textsuperscript{115} Id. §§ 911–912.
\item \textsuperscript{116} Id. §§ 631(d), (c), 1201(a)(1)(C).
\item \textsuperscript{117} Id. §§ 1211(b), 1212(b).
\item \textsuperscript{118} Id. § 527.
\item \textsuperscript{119} Id. §§ 1331(b), 1332.
\item \textsuperscript{120} Id. § 1403.
\item \textsuperscript{121} Id. § 541.
\item \textsuperscript{122} Id. § 551.
\item \textsuperscript{123} Id. § 561.
\item \textsuperscript{124} See, e.g., id. § 601 (allocating to local distribution companies for electricity and natural gas for relief to lower-income consumers and small business); id. § 602 (allocating to states dependent on coal and manufacturing for reducing greenhouse gas emissions and encouraging energy efficiency); id. §
\end{itemize}
\end{footnotesize}
address adaptation on an ongoing basis, and reward early action. In addition, the proposed legislation contains a separate cap-and-trade program for hydrofluorocarbon emissions.

In the absence of a federal cap-and-trade regime to date, ten states in the Northeast and Mid-Atlantic (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont) have joined together to create a narrower cap-and-trade regime targeting the electricity sector, the Regional Greenhouse Gas Initiative (RGGI). The RGGI cap-and-trade program applies to carbon dioxide emissions from entities that generate at least twenty-five megawatts of electricity with the goal of stabilizing emissions at current levels by 2014 and gradually reducing them to ten percent below 2009 levels by 2018. Although implementation details vary from state to state, the program allows offset projects for up to 3.3% of the emissions and provides more liberal offsets if the price of permits rises to seven dollars per ton or above. The permits will be distributed primarily by auction, and the first auction by six states was held in late September 2008.

Another regional program, the Western Climate Initiative (WCI), is taking shape with efforts by seven western states (Arizona, California, Montana, New Mexico, Oregon, Utah, and Washington) and four Canadian
provinces (British Columbia, Manitoba, Ontario, and Quebec). WCI’s goal is to reduce greenhouse gas emissions to fifteen percent below 2005 levels by 2020, and it issued recommendations for the design of a regional cap-and-trade system in September 2008. The recommendations propose a broad-based regime for a range of greenhouse gases similar to those covered by the Lieberman-Warner bill described above. They also specifically recognize that the cap-and-trade program can “work in concert” with carbon taxes and that WCI jurisdictions will determine how to integrate British Columbia’s carbon tax (described in another article in this volume) with the cap-and-trade system. The WCI program has been evolving in tandem with California’s efforts to develop programs to meet its statutory commitment to reduce greenhouse gas emissions to 1990 levels by 2020, and the California Air Resources Board has recommended a cap-and-trade system link with the WCI trading program.

C. Carbon Tax Issues in the Cap-and-Trade Context

If the federal government seriously tackles the issue of climate change, it will have to decide whether to create a broad-based, market-based regime for reducing greenhouse gas emissions. Either a carbon tax or an economy-wide cap-and-trade system would create the backbone for a comprehensive program, although neither would necessarily supplant policies targeted toward specific issues, such as fuel economy requirements for vehicles. The Bay Area Air Quality Management District’s fee on greenhouse gas emissions and RGGI show conversely that tax and cap-and-trade regimes can also be tailored more narrowly, and the Western Climate Initiative is exploring how a tax may work in concert with a cap-and-trade regime. Policymakers can choose combinations from a large portfolio of options.
but the fundamental question remains whether the United States will pursue an aggressive tax or cap-and-trade regime at the federal level.

If the government chooses a relatively comprehensive, market-based approach, a fundamental design issue is whether to target only carbon, all greenhouse gases, or other energy sources as well even if they do not directly produce greenhouse gases. In other words, what is the tax base for the tax, or which emissions will define the trading regime? Carbon taxes, greenhouse gas taxes, and cap-and-trade regimes all focus directly on emissions in proportion to their global warming potential. In this respect, they are quite similar. By contrast, the Clinton Btu tax included nuclear power and hydroelectricity and did not tie even the tax on fossil fuels to their global warming potential. As discussed above, this choice was driven in large part by wanting to distribute the burden more evenly around the country. It remains to be seen whether carbon tax and cap-and-trade regimes ultimately will fall prey to the arguments about regional impacts that the Clinton Administration tried to avoid with its choice of the Btu tax—or whether the political will to address climate change will be strong enough to counter those arguments and maintain the focus on greenhouse gases. The fact that ten states are implementing the RGGI cap-and-trade program may not necessarily serve as a bellwether for federal assessment of the tradeoffs between targeting fossil fuels and looking more broadly, since RGGI involves only the electricity-generating sector and states within a region may have more similar interests or profiles.

Taxes and emissions allowances each impose costs. The cost for the tax will be based on the tax rate; the cost of the allowances will depend upon the market. Consequently, both types of market-based regimes will have economic effects and pose regressivity issues. Taxes offer the benefit of a known cost, which may make the calculation of their projected economic effects and regressivity more reliable, though perhaps at the risk that policymakers will then dilute the tax rate below environmentally sound levels to reduce economic impacts. By not starting with a price, a cap-and-trade system may potentially postpone that moment of political reckoning.

140. One could argue that it is more important to distribute the burden for reducing the federal deficit equally around the country than the burden for reducing greenhouse gas emissions, which may be more allocable to one region than another. Such an argument again illustrates how revenue use is relevant to the policies and politics governing the design of the tax.

Nonetheless, either type of instrument will have real costs that warrant full and comparative attention at the start.

Distributing allowances at no cost, without auction, may not provide a sound, easy answer to cost issues. Based on experience with the European Trading Scheme and economists’ analyses, entities that receive allowances at no cost may still pass some or all of the value of the allowances on to consumers in the price of their products, using the windfall to increase their profits. Consumers will not necessarily see the savings. This counterintuitive result of free distribution means that awarding cap-and-trade allowances at no cost does not provide a simple way of mitigating the economic effect, regressivity, or regional disparity of a cap-and-trade system. In addition, a cap-and-trade program with free distribution would not create as strong an incentive to reduce aggregate emissions below the capped threshold.

The revenue side of the equation is also important when putting carbon taxes and cap-and-trade regimes in context. Placing a price on emissions through taxes or auctioned allowances will produce revenue for the government. As seen in the examples of proposals above, the revenue can be used to enhance the environmental impact by financing climate change programs, to address regressivity, to assist in economic transitions, or to provide for deficit reduction or tax relief. As with the Clinton Btu tax, the need for new revenue may provide political motivation for the new instrument.

Thus, as Figure 3 illustrates, tax regimes and auctioned cap-and-trade regimes are fundamentally similar in their basic components—targeted fuels or emissions, cost imposed per unit, an identified party responsible for paying that cost, and revenue that can be put to use if the allowances are auctioned. Policymakers must make similar decisions for each. But the two regimes also have their known differences, often shorthanded into certain cost (the fixed tax rate) versus uncertain cost (the market price), and uncertain environmental results (based on the behavioral effect of the tax) versus relatively certain environmental results (based on the cap). Predictability of cost and efficiency lend heft to the carbon tax side, and


143. Nevertheless, the distribution of allowances at no cost to entities required to use them for specific purposes can provide an indirect means of funding programs. Recipients can sell the allowances and use the proceeds for their programs. For examples of this approach, see supra notes 124–26 and accompanying text.
certainty of result weigh in on the cap-and-trade side, but the issue should not be overstated—the Intergovernmental Panel on Climate Change has found taxes to be both cost effective and environmentally effective.144

Taxes and cap-and-trade regimes are also very different in their administration, with the Internal Revenue Service responsible for taxes and private-sector and nonprofit entities playing significant roles in the implementation of trading regimes. Importantly, they are also within different committees’ jurisdictions during the legislative process: the tax-writing committees control taxes and the environmental or energy committees control the cap-and-trade regimes. Different players will have the first voice for each, and their preferences and familiarities will influence choices. The ultimate decisions will be based on the intersection of policy and politics, as evidenced by the Btu tax proposal in 1993.

CONCLUSION

Climate-related taxes should receive serious attention as a new administration and Congress take shape following the November 2008 elections. The spotlight has been on cap-and-trade regimes, but tax regimes share many of the same characteristics. Although taxes seem more politically volatile, carbon taxes and cap-and-trade regimes should be subjected to the same calculations of economic impact, equity, administrative feasibility, and environmental effect, and the political calculation for each should not rest on a cursory dismissal of the viability of taxes. As detailed elsewhere in this volume, the experience in Europe demonstrates that climate-related taxes can be enacted in a variety of forms. The Clinton Administration’s experience with the Btu tax should not toll the bell for climate change taxes, but rather serve as an indicator of sensitive issues that price-based mechanisms must address as the United States considers whether climate change taxes, or cap-and-trade regimes, might be “in accordance with our national circumstances.”145

144. See, e.g., WORKING GROUP III CONTRIBUTION, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: MITIGATION OF CLIMATE CHANGE 756 (Bert Metz et al. eds., 2007); see also Approaches to Reducing Carbon Dioxide Emissions, House Comm. on the Budget, 110th Cong. (2008) (statement of Peter R. Orszag, Director, Congressional Budget Office). The inflexibility of the cap that makes cap-and-trade regimes less efficient could be mitigated through a variety of means. See generally CONG. BUDGET OFFICE, POLICY OPTIONS FOR REDUCING CO2 EMISSIONS (2008).
145. See Hokkaido Toyako, supra note 1.
THE DESIGN OF CARBON AND BROAD-BASED ENERGY TAXES IN EUROPEAN COUNTRIES

Stefan Speck

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INTRODUCTION

Since the early 1990s, economic instruments in environmental policy have become an increasingly widespread trend in Europe. These policies began in the Scandinavian states and soon moved to other European countries. An increase in environmental awareness and mounting pressure on the environment culminated in the adoption of new economic instruments and tools, specifically energy and carbon taxes. This development came together with the understanding that economic instruments should be seen as complements to the traditional command-and-control measures.

Part I of this article discusses that, contrary to popular belief, energy taxes have been used for almost a century and are far from a new phenomenon. This section also reviews the most recent development of the
European Union (EU) policy regarding the use of economic instruments for environmental policy. Part II highlights the underlying reasons and principles for using energy and carbon taxes in environmental policy. However, a more complicated and complex taxation scheme, driven by the fear that domestic industries would lose competitiveness, accompanied a more widespread use of energy and carbon taxes in case economic intervention was carried unilaterally. Part III compares tax rates on transport fuels in four EU member states—Denmark, Germany, Sweden, and the United Kingdom (U.K.)—and the United States (U.S.). Part IV reviews the schemes implemented by the EU member states, provides assessment of energy and carbon taxation schemes levied on other energy products, and reveals differences in coverage, scope, tax rates, and their development over time.

I. THE HISTORY OF ENERGY TAXATION IN EUROPE

Energy taxes in Europe are not a recent development. European countries have utilized energy taxes for nearly ninety years. For example, Denmark and Sweden levied taxes on transport fuels, such as gasoline, as early as 1917 and 1924 respectively. Sweden later instituted energy taxes on other non-transport energy products like mineral oils and coal beginning in 1957.

The rationale behind these energy taxes was not based on environmental issues, but rather on fiscal issues. The taxes were seen as a means to raise revenues for the national budget and to control oil imports. However, during the 1980s, a change in the underlying principle for energy taxation emerged when European governments began using gasoline taxes


3. See id. at 192 (discussing the implementation of energy taxes on fossil fuels beginning in the late 1950s).

4. See Speck, supra note 2, at 66-67 (discussing the fiscal basis for the introduction of taxes on transport fuel).

5. See id. (discussing the fiscal basis for the introduction of taxes on transport fuel).
to achieve environmental objectives.\textsuperscript{6} Gasoline taxes were designed in a way that favored unleaded gasoline, which received a tax rebate based on environmental considerations and the recognition of lead's harmful effects.\textsuperscript{7}

The following decade saw even more widespread application of energy and carbon taxes driven by environmental policy objectives and by their revenue-raising potential. The forerunner countries, Denmark and Sweden, started to revise their overall energy taxation schemes in the early 1990s and implemented carbon dioxide (CO\textsubscript{2}) taxes in response to the increased attention towards climate change.\textsuperscript{8} Other countries, including the Netherlands, Germany, and the U.K., soon followed by using energy and carbon taxes as policy instruments for climate change action.

The European Commission promoted the use of energy taxation schemes for climate change policy and proposed the first EU-wide energy and carbon tax in 1992.\textsuperscript{9} However, this proposal, and an amended version presented by the European Commission (EC) in 1994, was rejected by several EU member states.\textsuperscript{10} Shortly after, the European Commission made another attempt for energy taxation by submitting the 1997 energy products taxation proposal.\textsuperscript{11} Unlike the 1992 proposal, which was primarily based on environmental considerations, the 1997 proposal was born more as an internal market and taxation one. The aim was now no longer to introduce a new totally harmonized EU CO\textsubscript{2}/energy tax, but, more pragmatically, to extend and improve the existing framework for the


\textsuperscript{7} See id. (discussing how unleaded gasoline was preferred over leaded gasoline for its lessened environmental impact).

\textsuperscript{8} See SPECK, supra note 2, at 62 (noting that the Danish Parliament passed the carbon tax bill as a reaction to the increased attention on climate change).


Member States taxation of mineral oils to cover all energy products sold on the Internal Market.\footnote{12}{Klok, supra note 10, at 10–11.}


The 2003 Energy Taxation Directive was of great significance for EU member states as it articulated the fiscal framework and structure for the taxation of energy products and electricity.\footnote{15}{See generally id.} The Directive widened the coverage of the Community framework, which had previously been limited to mineral oil products, to other energy products such as natural gas, coal, and electricity.\footnote{16}{The taxation scheme based on this Directive can be described as a broad-based energy tax and the tax base is defined in terms of the volume of the energy.} In addition, it increased the minimum rates of taxation for mineral oils and introduced new minimum rates for other energy products. These new rates differentiated between business and non-business uses, and set the minimum rate for business use lower than the rate for non-business use.\footnote{17}{See Council Directive 2003/96/EC, supra note 14, art. 5, at 54 (allowing member states to apply differentiated rates of taxation for business and non-business use).} All EU member states are legally obligated to set national tax rates in accordance with the requirements of the Directive, which has to be transposed into national law.\footnote{18}{See id. art. 4, at 54 (prohibiting levels of taxation for specified energy products and electricity from being below prescribed minimum levels of taxation).}

One of the reasons behind the slow progress in establishing a common EU structure of energy taxation is the EC’s unanimity requirement on taxation issues. A single EU Member State can block any decision with respect to taxation.\footnote{19}{See Environmental Taxes and Charges, supra note 6, at 69 (discussing that progress is slow because all taxation decisions require unanimity).} In 2001, a proposal was brought forward to revise the unanimity rule for certain tax issues and replace it with a qualified majority vote based on the “enhanced co-operation” mechanism.\footnote{20}{See EEA, Market-based Instruments for Environmental Policy in Europe, 69, No. 8 (2005) http://reports.eea.europa.eu/technical_report_2005_8/en/EEA_technical_report_8_2005.pdf (offering an expanded discussion on enhanced cooperation in the EU), see also Environmental Taxes and Charges, supra note 6 (explaining that the European Commission proposed...
was introduced by the Amsterdam Treaty, developed further by the Nice Treaty, and entered into effect on February 1, 2003.21

In 2005, the interest in energy and carbon taxes lost its momentum at the EU level and within EU member states with the adoption of the EU Emission Trading Scheme (EU ETS).22 The EU ETS can be described as the cornerstone in the fight against climate change at the EU level because it helps EU member states comply with their emission reduction commitments under the Kyoto Protocol. The scheme covers energy-intensive installations including combustion plants, oil refineries, coke ovens, iron and steel plants, and factories producing cement, glass, and other commodities.23 These installations are emitting around fifty percent of the EU’s CO₂ and are subject to energy taxation articulated in the Directive.24

The adoption and implementation of the EU ETS, in combination with the recent sharp increase in world oil prices, lead any discussion of further increases in the energy tax level ad absurdum since consumers and producers are facing higher energy prices. This has led to calls for the reduction of energy tax rates in many European countries during the spring and summer of 2008.25

Although the structure and minimum tax levels were laid down in the Directive, the actual design of the energy/carbon taxation regimes implemented by the EU member states are quite different, particularly with regard to energy and carbon taxes levied on industry. The reasons for these differences were manifold, but were generally introduced by national

that environmental taxation should in the future be decided under qualified majority rules as a fix to the slow progress resulting from the unanimity requirement).


23. See id. at 42 (listing categories of activities covered by the EU ETS).


governments in order to protect the competitiveness of their domestic industries.  

II. THE USE OF ENERGY AND CARBON TAXES FOR ENVIRONMENTAL POLICY

The application of environmental taxes, including energy and carbon taxes, as a means aimed to achieve environmental protection can be traced back to the scholars Pigou, Baumol, and Oates. In 1932, Pigou developed the rationale for environmental taxation, and in 1971 Baumol and Oates analyzed how taxes could be applied to reach environmental standards cost effectively. Although their approaches and promoted rationales differ slightly, all three scholars postulate a uniform tax rate for both polluters and energy products, thereby equalizing marginal costs so that the total cost of abatement would be minimized. Furthermore, environmental taxes would be an appropriate tool for implementing the polluter pays principle (PPP) which, in addition to the precautionary principle, is a foundation of European environmental polices. The rationale behind the PPP is to


27. See ARTHUR PIGOU, THE ECONOMICS OF WELFARE 113–14 (Macmillan 4th ed. 1932) (noting that environmental prudence from sound education can produce lasting effects because future generations inherit these new ideas and build upon them for further, generational, environmental advancements). See also id. at 236 (discussing price caps on commodities including coal).


29. See Market-based Instruments for Environmental Policy in Europe, supra note 20, at 45 (explaining that taxes should be set at a level that internalizes environmental damage); see also National Environmental Research Institute [NERI], Working Paper: Overview of Environmental Tax Reforms in EU Member States, in Competitiveness Effects of Environmental Tax Reforms, 22, WP. 1 (2007) (prepared by Stefan Speck, http://www2.dmu.dk/COMETR/COMETR_Final_Report.pdf [hereinafter Environmental Tax Reform in Member States] (discussing that while the scholars disagree in approach, all three agree that the cheapest way to achieve political environmental objectives is through a uniform tax).

30. See Consolidated Version of the Treaty Establishing the European Community, Dec. 29, 2006, 2006 O.J. (C 321) 174 (stating that the community policy on the environment shall be based on the precautionary principle and as such polluters should pay).
internalize environmental costs—externalities—which accrue through environmental pollution.

However, current political practice differs from its theoretically-principled basis. Energy and carbon taxes implemented by EU member states generally discriminate between energy users. The taxation schemes differentiate between energy products by setting tax rates that are not in accordance with the fuels' energy content. Furthermore, special tax provisions, including reduced rates for specific energy products, tax rebates for the industry as a whole, or rebates for individual industry sectors, are often the rule and not the exception (discussed in Part III below). The legal framework for granting special tax provisions, which are regarded as a form of state aid, is outlined in the Community Guidelines on State Aid for Environmental Protection (Environmental Guidelines). These Environmental Guidelines, combined with the Energy Taxation Directive, set rules for determining which tax provisions may be granted by EU member states. For example, they allow for reduction of energy tax rates if the reduced rates are still above the minimum excise rates established under the Energy Taxation Directive. Further reductions are also possible if member states consider special rules, including agreements for introducing energy-saving measures under the Environmental Guidelines.

It is important to recognize that the current developments in the energy and carbon taxation schemes in the four EU member states are part of a policy reform process within the concept of environmental tax reform (ETR). The underlying principle of an ETR is to reform the national tax system by shifting the tax burden from conventional market areas, such as production labor and capital, to environmentally related fields, such as environmental pollution or natural resource use.

The original idea emanates from levying a tax on energy consumption and using these revenues to reduce the taxes and charges levied on labor,

31. See Energy Tax Rates and Competitiveness, supra note 26, at 78 (discussing European tax rebates and exemptions in different sectors, especially industry sectors).
33. See id. at 25, ¶ 153 (allowing for a reduction of tax rates as long as the new rates are above the minimum level set by the 2003 Energy Tax Directive).
34. See Council Directive 2003/96/EC, supra note 14, art. 15, at 56 (allowing member states to apply full or partial exemptions for reductions involving environmentally-friendly products and energy from renewable resources).
35. See Market-based Instruments for Environmental Policy in Europe, supra note 20, at 83–84 (outlining environmental tax reforms in the EU).
36. See id. (outlining environmental tax reforms in the EU).
particularly on social security and/or pension contributions.\textsuperscript{37} Therefore, the general strategy behind an ETR—also known as environmental fiscal reform, ecological tax reform, or green tax reform—is to address and achieve multiple policy objectives simultaneously. It is not surprising that the revenue generating effect of environmental taxes—particularly energy taxes, as they generate the biggest share of revenues from all environmental taxes by far—must be the first part of an ETR to be analyzed. Otherwise, the economic policy objective of the reform process, i.e., the reduction of taxes and charges levied on labor, cannot be reached satisfactorily because taxes and charges levied on labor generate the highest amount of revenues for national budgets in Europe. It is worthwhile to state that the high tax burden on labor was a perceived cause of high rates of unemployment in several European countries during the 1990s, as well as an impediment for hiring additional workers during periods of low economic growth and when economies were depressed.\textsuperscript{38} Revenues from taxes and charges levied on the factory production labor were increased during these decades and were seen as too high, especially in the Scandinavian countries with rather high marginal income tax rates.

The concept of an ETR has been introduced in all four EU member states analyzed in this paper. At the time of the ETR implementation, energy and carbon taxes were significant in all of these countries. However, these countries have adopted varying strategies regarding both the introduction of new energy and carbon taxes and the revision of already existing ones.\textsuperscript{40} The following sections of the article assess the different designs of energy and carbon taxes.

III. TAXATION OF TRANSPORT FUELS IN EU MEMBER STATES

The taxation of transport fuels has a long history and, as mentioned above, was often implemented as a means of generating revenues for national budgets. Therefore, it is not surprising that transport fuel taxes


\textsuperscript{38} See \textit{Environmental Tax Reform in Member States}, supra note 29, at 21 (suggesting high taxes on labor are perceived to be a cause for high unemployment).

\textsuperscript{39} Id.

\textsuperscript{40} See \textit{Speck}, supra note 2, at 41 (discussing different strategies of EU member states regarding the increase of existing energy and carbon taxes, as well as, the introduction of new ones). \textit{See also Environmental Tax Reform in Member States}, supra note 29, at 27 (discussing the launch of new environmental taxes and the revision of existing ones by Nordic governments).
also have some significance in the context of the ETR packages, particularly in the German ETR as discussed in the "Germany" section.\textsuperscript{41} Table 1 shows the development of gasoline taxes since 1990 in the four EU member states and the U.S. The tax rates in national currencies are converted into Euros, which can lead to some distortions because of the recent exchange variations. This is particularly visible in the case of the U.S., as the respective federal and state average tax rates are expressed in dollars per 1,000 liters as well as in Euros per 1,000 liters. Exchange rate variations also affect Denmark, Sweden, and the U.K. since these EU member states have not adopted the Euro.

\textsuperscript{41} See \textit{Environmental Taxes and Charges}, supra note 6, at 50–51 (discussing how environmental tax reforms in Germany have included raising fuel taxes).
Table 1: Overview of development on tax rates on gasoline unleaded.\textsuperscript{42}

<table>
<thead>
<tr>
<th>Year</th>
<th>Denmark €/1,000L</th>
<th>Germany €/1,000L</th>
<th>Sweden €/1,000L</th>
<th>U.K. €/1,000L</th>
<th>U.S. $/1,000L</th>
<th>U.S. €/1,000L</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>286.4</td>
<td>291.0</td>
<td>388.2</td>
<td>268.8</td>
<td>82</td>
<td>64.4</td>
</tr>
<tr>
<td>1991</td>
<td>284.5</td>
<td>307.0</td>
<td>398.4</td>
<td>312.7</td>
<td>99</td>
<td>79.9</td>
</tr>
<tr>
<td>1992</td>
<td>288.1</td>
<td>419.0</td>
<td>391.6</td>
<td>315.1</td>
<td>101</td>
<td>77.8</td>
</tr>
<tr>
<td>1993</td>
<td>296.3</td>
<td>419.0</td>
<td>425.3</td>
<td>328.0</td>
<td>90</td>
<td>76.9</td>
</tr>
<tr>
<td>1994</td>
<td>324.8</td>
<td>501.0</td>
<td>426.7</td>
<td>367.2</td>
<td>101</td>
<td>84.9</td>
</tr>
<tr>
<td>1995</td>
<td>412.1</td>
<td>501.0</td>
<td>429.7</td>
<td>380.9</td>
<td>101</td>
<td>77.2</td>
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<td>1996</td>
<td>444.3</td>
<td>501.0</td>
<td>488.6</td>
<td>423.9</td>
<td>101</td>
<td>79.5</td>
</tr>
<tr>
<td>1997</td>
<td>443.6</td>
<td>501.0</td>
<td>493.6</td>
<td>555.8</td>
<td>101</td>
<td>89.1</td>
</tr>
<tr>
<td>1998</td>
<td>449.4</td>
<td>501.0</td>
<td>501.3</td>
<td>636.6</td>
<td>101</td>
<td>90.1</td>
</tr>
<tr>
<td>1999</td>
<td>507.0</td>
<td>531.7</td>
<td>503.0</td>
<td>708.5</td>
<td>101</td>
<td>94.7</td>
</tr>
<tr>
<td>2000</td>
<td>519.2</td>
<td>562.4</td>
<td>529.3</td>
<td>796.6</td>
<td>101</td>
<td>109.3</td>
</tr>
<tr>
<td>2001</td>
<td>532.7</td>
<td>593.1</td>
<td>486.2</td>
<td>771.7</td>
<td>101</td>
<td>112.7</td>
</tr>
<tr>
<td>2002</td>
<td>547.7</td>
<td>623.8</td>
<td>504.3</td>
<td>776.4</td>
<td>101</td>
<td>106.8</td>
</tr>
<tr>
<td>2003</td>
<td>547.7</td>
<td>654.5</td>
<td>516.2</td>
<td>710.5</td>
<td>102</td>
<td>90.2</td>
</tr>
<tr>
<td>2004</td>
<td>547.1</td>
<td>654.5</td>
<td>525.0</td>
<td>739.5</td>
<td>103</td>
<td>82.8</td>
</tr>
<tr>
<td>2005</td>
<td>546.2</td>
<td>654.5</td>
<td>534.4</td>
<td>740.1</td>
<td>104</td>
<td>83.6</td>
</tr>
<tr>
<td>2006</td>
<td>545.6</td>
<td>654.5</td>
<td>539.2</td>
<td>736.4</td>
<td>105</td>
<td>83.6</td>
</tr>
<tr>
<td>2007</td>
<td>546.3</td>
<td>654.5</td>
<td>547.0</td>
<td>752.8</td>
<td>105</td>
<td>76.6</td>
</tr>
</tbody>
</table>

The pattern of development of the national tax rates levied on diesel fuel for transport is similar to that of gasoline. Between 1990 and 2008, tax rates increased in the four EU member states. The smallest increase was in Denmark where rates rose approximately eighty percent. In contrast, Sweden's tax rate quadrupled during the same time period. The U.K. also experienced a dramatic tax rate increase during the 1990s, which can be attributed to the road fuel duty escalator.\textsuperscript{43}

\textsuperscript{42} The U.S. tax rate data has been converted into Euro for comparison reasons using the exchange rates published by Eurostat (the Statistical Office of the European Communities) for the years 1990–2007. The U.S. data is the sum of the federal average rate and the state average rate. Environmental Tax Reform in Member States, supra note 29, at 134; EUROPEAN COMMISSION DIRECTORATE GENERAL TAXATION AND CUSTOMS UNION Excise Duty Tables, July, 2008; OECD International Energy Agency [IEA], ENERGY PRICES & TAXES Q. STAT., First Quarter 2008, at 114, 141, 258, 284, 292 [hereinafter IEA 2008]; International Energy Agency [IEA], ENERGY PRICES & TAXES Q. STAT., Third Quarter 1999, at 135, 279 [hereinafter IEA 1999].

\textsuperscript{43} See Paul Ekins & Stefan Speck, Proposal of Environmental Fiscal Reforms and the Obstacles to Their Implementations, 2 J. OF ENVT'L POL'Y AND PLAN. 93, 102 (2000) (discussing this increase in "road fuel duty [as] . . . a major innovation compared with other European countries").
Table 2: Overview of tax rates levied on diesel for transport.\(^{44}\)

<table>
<thead>
<tr>
<th>Year</th>
<th>Denmark (€/1,000L)</th>
<th>Germany (€/1,000L)</th>
<th>Sweden (€/1,000L)</th>
<th>U.K. (€/1,000L)</th>
<th>U.S. (€/1,000L)</th>
<th>U.S. ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>224.0</td>
<td>230.0</td>
<td>127.6</td>
<td>290.3</td>
<td>87</td>
<td>68.3</td>
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<tr>
<td>1991</td>
<td>222.5</td>
<td>230.0</td>
<td>121.7</td>
<td>312.0</td>
<td>102</td>
<td>82.3</td>
</tr>
<tr>
<td>1992</td>
<td>225.4</td>
<td>280.0</td>
<td>107.5</td>
<td>307.4</td>
<td>105</td>
<td>80.9</td>
</tr>
<tr>
<td>1993</td>
<td>231.8</td>
<td>280.0</td>
<td>110.7</td>
<td>317.7</td>
<td>105</td>
<td>89.7</td>
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<tr>
<td>1994</td>
<td>270.4</td>
<td>317.0</td>
<td>246.6</td>
<td>359.9</td>
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<td>97.5</td>
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<td>1995</td>
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<td>317.0</td>
<td>259.8</td>
<td>380.9</td>
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<td>88.7</td>
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<td>297.1</td>
<td>424.1</td>
<td>116</td>
<td>91.3</td>
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<tr>
<td>1997</td>
<td>319.4</td>
<td>317.0</td>
<td>297.5</td>
<td>557.2</td>
<td>116</td>
<td>102.3</td>
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<tr>
<td>1998</td>
<td>318.7</td>
<td>317.0</td>
<td>299.7</td>
<td>647.7</td>
<td>116</td>
<td>103.5</td>
</tr>
<tr>
<td>1999</td>
<td>352.4</td>
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<td>300.8</td>
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<td>108.8</td>
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<td>2000</td>
<td>382.4</td>
<td>378.4</td>
<td>346.0</td>
<td>845.8</td>
<td>117</td>
<td>126.6</td>
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<tr>
<td>2001</td>
<td>406.6</td>
<td>409.1</td>
<td>328.4</td>
<td>833.3</td>
<td>118</td>
<td>131.7</td>
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<tr>
<td>2002</td>
<td>407.8</td>
<td>439.8</td>
<td>340.7</td>
<td>824.1</td>
<td>118</td>
<td>124.7</td>
</tr>
<tr>
<td>2003</td>
<td>407.8</td>
<td>470.4</td>
<td>348.3</td>
<td>754.1</td>
<td>119</td>
<td>105.2</td>
</tr>
<tr>
<td>2004</td>
<td>407.3</td>
<td>470.4</td>
<td>365.1</td>
<td>784.9</td>
<td>120</td>
<td>96.5</td>
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<tr>
<td>2005</td>
<td>406.6</td>
<td>470.4</td>
<td>392.7</td>
<td>785.5</td>
<td>121</td>
<td>97.3</td>
</tr>
<tr>
<td>2006</td>
<td>406.2</td>
<td>470.4</td>
<td>396.0</td>
<td>781.4</td>
<td>122</td>
<td>97.2</td>
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<td>2007</td>
<td>406.7</td>
<td>470.4</td>
<td>402.2</td>
<td>799.0</td>
<td>128</td>
<td>93.4</td>
</tr>
</tbody>
</table>

These large increases took place mainly during the 1990s. Since 2000, the tax rates have been more or less frozen with the exception of Sweden. Sweden is one of the few European countries which indexes its energy and carbon tax rates; the nominal tax rates are adjusted with inflation annually so that the real value of the tax rates is kept constant.\(^{45}\) This is in clear contrast to Germany where the transport fuel tax rates have been frozen since 2003 so that the real tax rates—tax rates with constant prices—have been reduced.\(^{46}\) The increase in U.S. tax rates can best be described as meager during this period given that the nominal average tax rates for gasoline and diesel have been increased by around twenty-eight percent and forty-seven percent respectively.\(^{47}\) It is interesting to note that the tax rates levied on diesel fuel are higher only in the U.K. and the U.S., as opposed to

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\(^{44}\) See Environmental Tax Reform in Member States, supra note 29 (giving an overview of the history of diesel taxes); IEA 2008, supra note 42, at 113, 140, 257, 283, 291; see also IEA 1999, supra note 42, at 116, 134, 243, 269, 278.

\(^{45}\) See SPECK, supra note 2, at 35, 171 (stating that the real value of energy related taxes in Norway remains constant due to the fact that environmental taxes have been increased annually according to the inflation rate).

\(^{46}\) See IEA 2008, supra note 42, at 140–41 (showing identical tax rates since 2003).

\(^{47}\) See id. at 291–92 (listing tax rates for diesel and gasoline in the U.S.).
Denmark, Germany, and Sweden where taxes levied on gasoline are higher.\textsuperscript{48}

IV. HOW HAVE THE ENERGY AND CARBON TAXES LEVIED ON NON-TRANSPORT ENERGY PRODUCTS DEVELOPED OVER TIME?

The current energy tax policies introduced in EU member states, as well as those adopted at the EU level in the form of the 2003 Energy Taxation Directive discussed above, are far from the theoretical rationale. Taxes are generally set at different rates for different energy users and products. The taxation of transport fuels is probably the closest to the theoretical rationale because only certain industries, such as the agriculture and fishing, are regularly eligible for special tax provisions in the form of reduced tax rates for gasoline and diesel.\textsuperscript{49}

In contrast to the taxation of transport fuels are the energy and carbon taxes levied on non-transport energy products. EU member states, including the four examined in this article, adopted disparate and complex taxation strategies aimed at lowering the effective tax burden for their domestic industries. National policies in all of these countries share the same objective, protecting the competitiveness of domestic industries. The rationale for implementing these strategies is simple. Environmental taxes, emission trading schemes (when emission allowances are being auctioned), and stricter regulations are leading to higher costs for the industries. Additionally, if these taxes are introduced unilaterally, the international competitiveness of the domestic industry can be impaired.\textsuperscript{50}

The policy of providing special tax provisions to industries is also underpinned by the argument that high uniform energy and carbon taxes would reduce environmental pollution in the countries levying these taxes while increasing environmental pollution in countries without the taxes.\textsuperscript{51} Furthermore, these high, uniform energy and carbon taxes could lead

\textsuperscript{48} See id. at 113–14, 140–41, 257–58, 283–84, 291–92 (listing tax rates for diesel and gasoline in Denmark, Germany, Sweden, the U.S., and the U.K.).

\textsuperscript{49} See Environmental Tax Reform in Member States, supra note 29 (explaining that a tax levied on transport fuels follows the theoretical rationale because there is a uniform effect across society).

\textsuperscript{50} See Ekins and Speck, supra note 26, at 386 (stating that where environmental taxes are imposed only in one country, the international competitiveness of industries in that country may be impaired); See also ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, THE POLITICAL ECONOMY OF ENVIRONMENTALLY RELATED TAXES 75 (2006) (discussing the negative impacts of unilateral taxes on international competitiveness).

\textsuperscript{51} See Environmental Tax Reform in Member States, supra note 29, at 23 (discussing the effects of special tax provisions on environmental pollution).
industries to relocate to those countries with lower energy tax burdens. Relocation of industrial production due to stricter environmental regulation has been widely discussed in the economic literature and is often linked to the Porter hypothesis.

There are also arguments against granting special tax provisions to industries. One of main reasons for implementing environmental taxes instead of traditional regulatory measures is the belief that distributing these taxes equally across all polluters will produce more efficient results. Furthermore, tax provisions can impede the utilization of cheap emission abatement efforts in the production sector. These increased emissions must be offset by more costly emission abatement options in the household sector to reach a given target. This situation can lead to "substantial excess costs" as discussed in the economic literature.


53. Harvard economist Porter stated that the setting of environmental standards would actually be promoting innovations. The gains from innovations would then offset the increased costs of the environmental standards. See Michael E. Porter & Claas van der Linde, Toward a New Conception of the Environment-Competitiveness Relationship, J. ECON. PERSP. 97, 98 (1995) (arguing that environmental standards lead to innovations that will partially or totally offset compliance costs of environmental regulations); see generally Mikael Skou Andersen, An Introduction to Environmental Tax Reform and The Competitiveness Issue, in COMPETITIVENESS EFFECTS OF ENVIRONMENTAL TAX REFORMS, supra note 52 (discussing the relationship between environmental regulations and competitiveness); Adam B. Jaffe et al., Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?, 33 J. ECON. LITERATURE 132, 132–63 (1995) (discussing that the proponents of the Porter hypothesis suggest that the competitiveness of the U.S. as a whole can be enhanced by more stringent environmental regulations); Rhys Jenkins, Environmental Regulation and International Competitiveness: A Review of Literature and Some European Evidence (The United Nations University, Institute for New Technologies, Discussion Paper No. 9801, 1998), available at http://www.intech.unu.edu/publications/discussion-papers/9801.pdf (discussing the effects of stricter environmental regulations on competitiveness at the industry level).


Having briefly discussed the pros and cons for granting special tax provisions in EU member states, the following sections explore the actual designs of energy and carbon taxation schemes in Denmark, Germany, Sweden, and the U.K. The final section compares the schemes of these four countries.

A. Denmark

The Danish energy/carbon tax regime consists of three individual taxes: the energy tax, the CO₂ tax, and the sulfur tax. The energy tax, which is based on the energy content of the fuel, is levied on fossil fuels, oil products, and coal. Natural gas is the exception because the energy content is not taken into account.¹⁷ The carbon dioxide tax was introduced in 1992 at a rate of approximately thirteen Euros per ton of CO₂.¹⁸ In 2005, the CO₂ tax rate was slightly reduced to twelve Euros per ton of CO₂.¹⁹ This reduction corresponded with an energy tax increase so that the overall tax burden remained constant.²⁰

The sulfur tax was introduced in 1996 and is levied on all fossil fuels with a sulfur content exceeding 0.05% (based on weight).²¹ Since its introduction, the rate has been set at 2.7 Euros per kilogram of sulfur in energy products, or at about 1.3 Euros per kilogram of sulfur dioxide (SO₂) emissions. The tax design provides an incentive to consume energy more efficiently, with the goods and materials sector paying reduced taxes as compared to private households which pay the full tax rate); Michael Kohlhaas, Deutsches Institut für Wirtschaftsforschung [DIW], Gesamtwirtschaftliche Effekte der ökologischen Steuerreform, in Quantifizierung der Effekte der Ökologischen Steuerreform auf Umwelt, Beschäftigung und Innovation 2 (2005), available at http://www.umweltdaten.de/publikationen/pf/pdf-l/2961.pdf; see also Christoph Böhrringer & Thomas F. Rutherford, In Search of a Rationale for Differentiated Environmental Taxes 1 (Zentrum Führ Europäische Wirtschaftsforschung GmbH [Center for European Econ. Res.], Discussion Paper No. 02-30, 2002), available at http://opus.zbw-kiel.de/volltexte/2003/ 867/pdf/dp0230.pdf (discussing how deviation from uniform taxation results in excess costs and the fact that lowering taxes on certain sectors of the economy requires increased taxes in other sectors).

56. See Christoph Böhrringer, Environmental Tax Differentiation Between Industries and Households—Implications for Efficiency and Employment, 2 (Center for European Economic Research [ZEW], Discussion Paper No. 02-08, 2008), available at ftp://ftp.zew.de/pub/zew-docs/dp/dp0208.pdf (stating that as tax differentiation comes close to exempting the productions sector, substantial excess costs result).

57. See SPECK, supra note 2, at 61 (discussing the energy taxes levied on fossil fuels).

58. The tax is differentiated on the basis of the carbon content of the different fuels so that the CO₂ tax rate for light fuel oil is about 0.036 Euro per liter, for heavy fuel oil 0.043 Euro per liter, and for coal 0.032 Euro per kg.

59. See SPECK, supra note 2, at 64 tbl.2.2 (illustrating the overall principles in the Danish CO₂ tax).

60. Id.

61. See SPECK, supra note 2, at 62 (discussing the introduction of the Danish sulfur tax).
products with low sulfur content or to abate SO\textsubscript{2} emissions by using pollution reducing technologies, i.e., scrubbers.

A rather complex system of energy and carbon tax differentiation for industry has been in place since the 1996 tax reform. This replaced a regime in which all VAT registered companies had been exempt from virtually all energy tax burden.\textsuperscript{62} Industries are eligible for a full energy tax refund for the energy used for process purposes and which still applies nowadays. However, since 1998, industries have had to pay the full energy tax for the energy used for space heating purposes.\textsuperscript{63}

An even more complicated exemption regime applies to the CO\textsubscript{2} tax. When the CO\textsubscript{2} tax was introduced in 1992, industries were completely exempt from any CO\textsubscript{2} tax payments. From 1993 to 1995, non-energy intensive industries were subject to a CO\textsubscript{2} tax equivalent to fifty percent of the total CO\textsubscript{2} tax. Energy-intensive industries were subject to a more generous refund amounting to about ninety percent of the CO\textsubscript{2} tax burden.\textsuperscript{64}

The 1996 tax reform led to a change in the special tax provisions granted to industry. Since then, industry has been paying CO\textsubscript{2} taxes according to different types of usage. The full CO\textsubscript{2} tax rate applies to space heating while differentiation between heavy and light processes has been established to determine the effective tax burden. Companies can further reduce the CO\textsubscript{2} tax burden for these processes if they enter into voluntary agreements with the government.\textsuperscript{65} Table 3 provides an overview of the development of energy and CO\textsubscript{2} tax rates for different energy users and usages.


\textsuperscript{63} SPECK, supra note 2, at 63.

\textsuperscript{64} See Environmental Tax Reform in Member States, supra note 29, at 34 (discussing the three-tiered reimbursement scheme for the Danish CO\textsubscript{2} tax).

\textsuperscript{65} For a more detailed discussion of the Danish system including the development of energy tax rates over time, see Environmental Tax Reform in Member States, supra note 29, at 38 (discussing eligibility for a reduction in the Carbon tax rate by entering agreements with the Danish energy authority to increase energy efficiency); SPECK, supra note 2, at 65 (discussing how companies can reduce their tax burden by improving energy efficiency).
Table 3: Development of energy and CO₂ tax rates for different users and usages.⁶⁶

<table>
<thead>
<tr>
<th></th>
<th>Household and service sector</th>
<th>Industry–space heating</th>
<th>Industry–light process</th>
<th>Industry–heavy process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light fuel oil</td>
<td>€/1,000L</td>
<td>€/1,000L</td>
<td>€/1,000L</td>
<td>€/1,000L</td>
</tr>
<tr>
<td>1996</td>
<td>239.2</td>
<td>239.2</td>
<td>18.3</td>
<td>1.1</td>
</tr>
<tr>
<td>2000</td>
<td>268.3</td>
<td>268.3</td>
<td>24.6</td>
<td>1.1</td>
</tr>
<tr>
<td>2007</td>
<td>286.5</td>
<td>286.5</td>
<td>24.6</td>
<td>1.1</td>
</tr>
<tr>
<td>Heavy fuel oil</td>
<td>€/ton</td>
<td>€/ton</td>
<td>€/ton</td>
<td>€/ton</td>
</tr>
<tr>
<td>1996</td>
<td>269.0</td>
<td>269.0</td>
<td>21.7</td>
<td>1.3</td>
</tr>
<tr>
<td>2000</td>
<td>304.5</td>
<td>304.5</td>
<td>29.2</td>
<td>1.3</td>
</tr>
<tr>
<td>2007</td>
<td>324.8</td>
<td>324.8</td>
<td>29.2</td>
<td>1.3</td>
</tr>
<tr>
<td>Natural gas</td>
<td>€/1,000m³</td>
<td>€/1,000m³</td>
<td>€/1,000m³</td>
<td>€/1,000m³</td>
</tr>
<tr>
<td>1996</td>
<td>31.3</td>
<td>31.3</td>
<td>14.9</td>
<td>0.9</td>
</tr>
<tr>
<td>2000</td>
<td>244.2</td>
<td>244.2</td>
<td>20.1</td>
<td>0.9</td>
</tr>
<tr>
<td>2007</td>
<td>305.8</td>
<td>305.8</td>
<td>20.1</td>
<td>0.9</td>
</tr>
</tbody>
</table>

A different taxation regime applies to electricity consumption and consists of two components: an energy tax and a CO₂ tax. Since 1977, the energy tax has been levied on electricity consumption regardless of where or how electricity is generated. For example, the energy tax is the same if the electricity is generated abroad or domestically, and whether or not it is produced by power plants or renewable energy sources. However, fossil fuels used for electricity production are exempt from the energy and CO₂ tax. Since 1992, a CO₂ tax has been levied on electricity consumption in addition to the energy tax.⁶⁷

Table 4 illustrates how the electricity tax regime distinguishes between three categories of use: electricity used for heating purposes, for other purposes and for industry.

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⁶⁶. *Environmental Tax Reform in Member States, supra* note 29; SPECK, *supra* note 2, at 64.
⁶⁷. See Speck, *supra* note 29, at 33–34 (discussing the introduction of the CO₂ tax in addition to the existing energy tax on electrical consumption).
Table 4: Energy and CO₂ taxes levied on electricity.⁶８

<table>
<thead>
<tr>
<th></th>
<th>Heating purposes</th>
<th>Other purposes</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>€/MWh</td>
<td>€/MWh</td>
<td>€/MWh</td>
</tr>
<tr>
<td>1996</td>
<td>57.8</td>
<td>62.5</td>
<td>8.2</td>
</tr>
<tr>
<td>2000</td>
<td>76.6</td>
<td>85.3</td>
<td>13.4</td>
</tr>
<tr>
<td>2005</td>
<td>80.8</td>
<td>89.5</td>
<td>8.6</td>
</tr>
</tbody>
</table>

A portion of the revenues raised by the energy and CO₂ taxes were earmarked for the Danish ETR programs which can be divided into three distinct packages.⁶⁹ The 1993 tax reform package was implemented between 1994 and 1998. This tax shifting program amounted to approximately six billion Euros, corresponding to 1.2% of the GDP at that time.⁷⁰ The scope of the 1995 tax reform package, implemented between 1996 and 2000, was smaller than the 1993 ETR. The revenues generated by the CO₂ tax and sulfur tax levied on industrial energy consumption totaled about 0.2% of the GDP in 2000.⁷¹ Finally, the 1998 tax reform package, implemented between 1999 and 2002, generated revenues by increasing the energy and CO₂ tax rates. The revenues were then recycled back into the economy.

There are similarities in the recycling mechanisms utilized in the three ETRs; the taxes and charges levied on labor were reduced and part of the revenues were used to provide investment grants for energy-saving measures.⁷²

B. Germany

The German energy tax regime is not a new development and taxes have been levied on the consumption of mineral oils, particularly transport fuels, since the 1950s.⁷³ The scope of energy taxes broadened in 1989 with the introduction of a tax on natural gas.⁷⁴ Nevertheless, coal was not

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⁶⁸ For purposes of comparison, the values have been converted from kilowatt hours to megawatt hours. SPECK, supra note 2, at 66.
⁶⁹ See Environmental Tax Reform in Member States, supra note 29, at 35–37 (discussing each phase more thoroughly).
⁷⁰ See id. at 34 (evaluating the 1993 tax reform package).
⁷¹ Id. at 34 (discussing the 1994 tax reform package).
⁷² Id. at 36.
⁷³ BUNDESMINISTERIUM DER FINANZEN, ENTWICKLUNG DER MINERALÖL- UND STROMSTEUERSÄTZE IN DER BUNDESREPUBLIK DEUTSCHLAND 1–10 (2005).
⁷⁴ Environmental Tax Reform in Member States, supra note 29, at 40.
subject to energy taxes until 2007. This is because prior to the abolishment of the electricity taxation scheme in 1995, the coal industry in Germany had been heavily subsidized.\textsuperscript{75} This tax scheme was known as \textit{Kohlepfennig} and was an \textit{ad-valorem} tax, its rates differentiating between industry and households.\textsuperscript{76}

The energy tax regime experienced some major changes during the implementation of the ETR between 1999 and 2003.\textsuperscript{77} Accordingly, mineral oil taxes on transport fuels were gradually increased by 154 Euros per 1,000 liters for gasoline and diesel, amounting to a thirty-one percent increase on gasoline and forty-eight percent increase on diesel.\textsuperscript{78} The taxes on light heating fuels were increased by fifty percent and the tax on natural gas was increased twofold during the same time period.\textsuperscript{79} Taxes on heavy fuel oil increased in 2000 and again in 2003. Also, it is interesting to mention that heavy fuel oil used for electricity generation in Germany is still subject to an energy tax, unlike Denmark where all energy products used for electricity generation are tax exempt.\textsuperscript{80} Furthermore, an electricity tax was introduced in 1999, increasing gradually in five annual steps.

When analyzing the German energy taxation scheme, it is important to distinguish between pre-1999 tax rates and the post-1999 tax rates. This is because the revenues raised through increasing energy tax rates from the 1999 ETR were earmarked for the tax shifting program; they were recycled back to the taxpayers by reducing employers’ and employees’ pension contributions. The revenue generated from the electricity tax is completely earmarked for the tax shifting program and amounts to approximately thirty-two percent of the total revenues used for the tax shifting program.\textsuperscript{51} The biggest share is generated from the energy taxes levied on transport fuels, gasoline and diesel, accounting for more than fifty percent of the revenues. “The total volume of the tax shifting program was 18.6 billion Euro in 2003,” amounting to around 0.9% of the GDP.\textsuperscript{82}
These changes in the energy taxation regime were also accompanied by a special energy tax provision for energy products other than transport fuels. The industries included in this provision were manufacturing, agriculture, forestry, and fishing, and their tax provisions are set out below.  

All companies in manufacturing, agriculture, fishing, and forestry are granted a tax relief of "40 percent of the standard energy tax rates for electricity, heating oil and natural gas; . . . an effective tax rate of sixty percent of the standard rate." This tax relief program only applies for the energy consumption exceeding the base amount of 512.5 Euros annually—referred to as Sockelbelastung. In other words, the full energy tax rates have to be paid until the energy tax burden exceeds 512.5 Euros annually, and only then does the tax relief package apply.

Moreover, there is an additional tax option—Spitzenausgleich—applicable to the manufacturing industry. Under this rule, "a company is eligible for a refund if the energy tax burden is greater than its tax relief from the reduction in the pension contributions payable by the company." However, the refund currently amounts to only ninety-five percent of the difference.

The following example reveals how the manufacturing industry faces considerable tax relief. In 2004, "the standard electricity tax rate . . . was 20.5 EUR/MWh [Euros per megawatt hour]." Companies which were statistically classified as manufacturing industries, agriculture, fishing, and forestry businesses were facing an effective tax rate of sixty percent of the standard rate, amounting to a tax rate of 12.3 Euros/MWh. The manufacturing industry faced an even lower effective tax rate of 0.62 Euros/MWh—three percent of the standard rate—"but only when they qualify for the 'Spitzenausgleich' regulations."

In 2007, the taxation regime for industry underwent a slight revision. By extending the tax rate to the full tax rate, the tax reduction meant that the sixty percent rule was also valid for the pre-1999 tax rate—the rate prior to the implementation of the ETR. An overview of the development of the energy tax rates of selected energy products can be found in the Appendix.

83. See generally Stefan Bach, supra note 77.
84. Environmental Tax Reforms in Member States, supra note 29, at 42.
85. Id.
86. Id.
87. Id.
88. Id.
89. Id.
C. Sweden

The Swedish energy and carbon taxation regime is very comprehensive and consists of four different types of taxes.\textsuperscript{90} Energy taxes on transport fuels were introduced in 1924 for gasoline and extended to diesel in 1937.\textsuperscript{91} In 1957, Sweden introduced an energy tax on fossil fuels limited to mineral oils and coal. A further revision of the scheme extended the tax to liquified petroleum gas (LPG) in 1964 and to natural gas in 1985. The energy tax rates have been increased continuously since the tax was introduced.\textsuperscript{92}

The introduction of a CO\textsubscript{2} tax in 1991 marked a major revision in the energy and carbon tax mechanism. Notwithstanding the fact that the energy tax rates peaked in 1990, they were subsequently lowered, therebyoffsetting the increased tax burden caused by the implementation of the CO\textsubscript{2} tax.\textsuperscript{93} The CO\textsubscript{2} tax rates are set in accordance with the carbon content of the fossil fuel. In 1991, the CO\textsubscript{2} tax rate was around forty-three Euros per ton of CO\textsubscript{2}, and increased to around 100 Euros per ton in 2007 and to 106 Euros per ton in 2008.\textsuperscript{94}

A sulfur tax, introduced alongside the CO\textsubscript{2} tax in 1991, was the third element of Sweden's energy tax system. It is only levied on heavy fuel oil, coal, and peat fuels. Fuels with a sulfur content not exceeding 0.05% in weight are tax exempt. Nevertheless, the environmental effect of this tax can be questioned because these rates have not been revised since their introduction.\textsuperscript{95}

Finally, the nitrogen oxide (NO\textsubscript{x}) charge, Sweden's last addition to its tax regime, became effective in 1992. The NO\textsubscript{x} charge was originally levied on nitrogen oxide emissions from combustion plants generating at least fifty gigawatts per hour (GWh), but was extended to include plants

\textsuperscript{90} See Speck, supra note 2, at 192 (noting that the excise duties on fossil fuels in Sweden consist of an energy tax, a CO\textsubscript{2} tax, a sulfur tax, and a NO\textsubscript{x} tax); see generally Thomas Sterner, Policy Instruments for Environmental and Natural Resource Management, (2003) (reviewing environmental policies and theories); see also Patrik Söderholm, Extending the Environmental Tax Base: Prerequisites for Increased Taxation of Natural Resources and Chemical Compounds, Rep. No. 5416, at tbl.2.1 (2004) (showing changes in environmental taxes in Sweden regarding energy taxes, transport taxes, taxes on natural gravel, and taxes on certain other substances between 1994 and 2002).

\textsuperscript{91} SPECK, supra note 2, at 197.

\textsuperscript{92} Id. at 192.

\textsuperscript{93} See id. (discussing the CO\textsubscript{2} tax and subsequent lowering of energy taxes in Sweden).


\textsuperscript{95} See Speck, supra note 2, at 193 (discussing the sulfur tax in Sweden).
generating more than twenty-five GWh. This meant that around five percent of the total NOx emissions are covered by the charges.\textsuperscript{96}

Since 1995, energy taxes were indexed and linked to the Consumer Price Index in Sweden. This ensured a constant, real value of the tax rates. As mentioned above, this policy is the exception and not the rule in Europe.

The Swedish broad-based energy and carbon taxation regime is definitely one of the most interesting schemes developed and implemented in Europe. It reveals some appealing features from the last fifteen years as it underwent various revisions that were sometimes directly related to the fear that Swedish industries would lose competitiveness. One of its most striking features was the introduction of the CO\textsubscript{2} tax in 1991. Importantly, special tax provisions (i.e., reduced tax rates) have not been granted to Swedish industry, leading to a significant increase in the overall tax rate.\textsuperscript{97} This particularly affected energy products other than transport fuels.\textsuperscript{98} Consequently, industry was subject to the same tax rates as the rest of the economy which meant that the Swedish industry faced the highest energy and carbon taxes in Europe.\textsuperscript{99} However, the total energy and carbon tax burden had a ceiling; the energy and carbon tax bill of a company could not exceed 1.7\% of the sales value in 1991 and 1.2\% in 1992.\textsuperscript{100}

Another major revision of the energy and carbon taxation regime took place in 1993 when industry, agriculture, forestry, and fishing businesses were granted generous tax privileges.\textsuperscript{101} These sectors were, and still are, completely exempt from paying the energy tax, and also pay a reduced CO\textsubscript{2} tax.\textsuperscript{102} Table 5 shows the structure of the energy and carbon tax system and how it developed over time. The total energy tax burden consists of the energy tax and the CO\textsubscript{2} tax, which is levied on light fuel oil consumed by households and the service sector. The last column of Table 5 demonstrates how the industry energy and CO\textsubscript{2} tax rates developed since 1990. During 1990 and 1992, industry faced the same tax burden as households. However, since 1993, industry has been exempted from the energy tax and only a fraction—twenty-one percent in 2007—of the general CO\textsubscript{2} tax.\textsuperscript{103} The last column shows the effective tax burden on industry, while the first column reveals the total energy and carbon tax burden facing households and the service sector.

\textsuperscript{96} See id. (examining the introduction of the NOx tax).
\textsuperscript{97} See SPECK, supra note 2.
\textsuperscript{98} See tables in the Appendix.
\textsuperscript{99} Environmental Tax Reform in Member States, supra note 29, at 48.
\textsuperscript{100} Id.
\textsuperscript{101} SPECK, supra note 2, at 194.
\textsuperscript{102} Id.
\textsuperscript{103} Id.
Table 5: Development of the energy and CO₂ tax rates levied on light fuel oil.¹⁰⁴

<table>
<thead>
<tr>
<th>Year</th>
<th>Total energy and CO₂ tax</th>
<th>Energy tax</th>
<th>CO₂ tax</th>
<th>Energy and CO₂ tax burden—industry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>€/1,000L</td>
<td>€/1,000L</td>
<td>€/1,000L</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>143.3</td>
<td>127.6</td>
<td>0</td>
<td>143.3</td>
</tr>
<tr>
<td>1991</td>
<td>168.5</td>
<td>72.2</td>
<td>96.3</td>
<td>168.5</td>
</tr>
<tr>
<td>1992</td>
<td>167.3</td>
<td>71.7</td>
<td>95.6</td>
<td>167.3</td>
</tr>
<tr>
<td>1993</td>
<td>160.1</td>
<td>59.2</td>
<td>100.9</td>
<td>25.2</td>
</tr>
<tr>
<td>1994</td>
<td>165.8</td>
<td>61.3</td>
<td>104.4</td>
<td>26.1</td>
</tr>
<tr>
<td>1995</td>
<td>167.1</td>
<td>61.8</td>
<td>105.2</td>
<td>26.3</td>
</tr>
<tr>
<td>1996</td>
<td>193.1</td>
<td>69.3</td>
<td>123.8</td>
<td>31.0</td>
</tr>
<tr>
<td>1997</td>
<td>197.0</td>
<td>75.6</td>
<td>121.4</td>
<td>30.4</td>
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<tr>
<td>1998</td>
<td>202.0</td>
<td>83.3</td>
<td>118.7</td>
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<td>1999</td>
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<td>2001</td>
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<tr>
<td>2002</td>
<td>273.4</td>
<td>77.2</td>
<td>196.3</td>
<td>58.9</td>
</tr>
<tr>
<td>2003</td>
<td>317.2</td>
<td>78.9</td>
<td>238.3</td>
<td>59.6</td>
</tr>
<tr>
<td>2004</td>
<td>365.0</td>
<td>80.2</td>
<td>284.7</td>
<td>59.8</td>
</tr>
<tr>
<td>2005</td>
<td>360.3</td>
<td>79.2</td>
<td>281.1</td>
<td>59.0</td>
</tr>
<tr>
<td>2006</td>
<td>363.3</td>
<td>79.9</td>
<td>283.4</td>
<td>59.5</td>
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<tr>
<td>2007</td>
<td>369.0</td>
<td>81.1</td>
<td>287.9</td>
<td>60.5</td>
</tr>
</tbody>
</table>

When discussing the Swedish taxation regime, it is important to draw attention to how the electricity tax on industry developed.¹⁰⁵ The 1993 ETR completely exempted Swedish industry from the electricity tax. Later, in 2004, the industry's exemption status changed when a reduced electricity tax rate was set, corresponding with the minimum tax rate laid down in the 2003 Energy Taxation Directive discussed above. However, energy intensive industries are still eligible to receive a full exemption of the electricity tax if they participate in projects to increase their electrical efficiency, which has the same effect as the tax would have had.¹⁰⁶

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¹⁰⁵. Shown in Table A.3 in the Appendix.

The Design of Carbon and Broad-based Energy Taxes

policy is consistent with the regulations of the 2003 Energy Taxation Directive.\textsuperscript{107}

In addition to the provision granting generous tax rebates, energy intensive companies are still eligible for a refund scheme if their CO\textsubscript{2} tax liability exceeds 0.8\% of their sales value. This refund scheme has remained intact since its introduction in 1997.\textsuperscript{108}

The introduction of the CO\textsubscript{2} tax in 1991 was part of a major fiscal reform process primarily aimed at cutting high income taxes. The reduction in income taxes amounted to a loss equivalent to approximately 4.6\% of the GDP in that year, which was partially offset by revenues equivalent to 1.2\% of the GDP generated from the CO\textsubscript{2} and SO\textsubscript{2} taxes.\textsuperscript{109}

\textbf{D. The United Kingdom}

The U.K. energy tax structure is rather simple when compared to the schemes implemented in the Scandinavian countries. The U.K. scheme relies heavily on revenues generated by energy taxes levied on transport fuels. Unlike the Scandinavian countries, the U.K. does not have a general scheme of energy taxes for energy products, such as natural gas, coal, and electricity.

The U.K. government introduced a tax for all consumers in 1990, the Fossil Fuel Levy (FFL), which was imposed on the purchase of taxable electricity.\textsuperscript{110} The tax was designed as an \textit{ad valorem}, similar to Germany’s electricity taxation scheme of the early 1990s. Initially, the majority of the revenues raised by the FFL were used to subsidize nuclear power with only a small fraction earmarked to support renewable energy.\textsuperscript{111} After 1998, the nuclear industry no longer received subsidies raised by the FFL. Instead, the FFL revenues were utilized to support renewable energy projects under the Non-Fossil Fuel Obligation. The levy peaked in 1992 at eleven percent of the end-user electricity price (exclusive value added tax) and was set to zero in 2003.\textsuperscript{112} This zero percent rate is still in place and as a result, the FFL has not been abolished.\textsuperscript{113}

\begin{flushright}
\textsuperscript{107} Id. \\
\textsuperscript{108} Environmental Tax Reform in Member States, supra note 29, at 49; see also Competitiveness and Exemptions, supra note 25, at 376-77 (discussing the context in which this refund scheme was introduced). \\
\textsuperscript{109} See Environmental Tax Reform in Member States, supra note 29, at 47. (discussing the fiscal reform process in Sweden in 1991). \\
\textsuperscript{110} See id. at 49 (explaining the introduction of the FFL). \\
\textsuperscript{111} Id. \\
\textsuperscript{112} Id. \\
\textsuperscript{113} Id.
\end{flushright}
In April 2001, the U.K. government introduced a new economic instrument, the Climate Change Levy (CCL). It applied only to non-domestic energy use—commercial and industrial use—and exempted household use. Since 2001, the consumption of natural gas, electricity, and coal has been subject to the CCL and the consumption of LPG is subject to both the CCL and the existing energy tax. The revenues generated by the CCL are used for a tax shifting program, the ETR, in the U.K. Between 2001 and 2007, the CCL rates remained constant implying that the alterations in the rates presented in these tables are caused by variations in exchange rates.

The U.K. approach regarding the grant of special tax provisions was drawn from the three previously analyzed EU member states, evidenced by the fact that tax provisions reducing the CCL rates are also part of the CCL. Energy intensive companies are eligible for an eighty percent tax discount if they agree to stringent energy efficiency improvement targets. These regulations have been introduced due to concerns over the loss of the U.K. industry's international competitiveness. The government's policy approach was to give conditional tax exemptions to energy intensive companies. The concept behind this approach is that companies benefit from reduced tax liability when they enter into legally binding Climate Change Agreements, requiring adoption of an energy saving reduction program. In the U.K., the definition of energy intensive industries is crucial since only those industries deemed to be energy intensive are eligible for the CCL reduction. In contrast, German industries are eligible for special tax treatment based on statistical classification. The German approach must be challenged because the use of statistical categories as the

114. Id.
115. Id.
116. See id. at 49–50 (discussing three tax shifting programs that directly target businesses households).
119. See id. at 92 (offering conditional exemptions to energy-intensive industries as an approach to economic concerns generated by the CCL).
120. See id. ("Any sector within this legal ambit can then enter into a Climate Change Agreement (CCA) which requires them to adopt and implement an energy saving or carbon emission reduction program[]. The CCA is legally binding. In return, the sector will be exempt from eighty percent of the CCL").
121. See Environmental Tax Reform in Member States, supra note 29, at 50–51 (explaining the difference between U.K. and German selection process for special tax treatment).
basis for providing tax relief does not take into account the issue of energy intensity.

The introduction of the CCL generated small revenues (approximately 0.1% of the GDP) that were recycled back to U.K. industries via reduction in the rate of employers’ social security contribution. This policy guarantees that the total tax burden remains the same while various industrial sectors are affected differently. For example, some sectors are benefitting from the recycling measures, in particular those which are labor-intensive as opposed to energy-intensive. Others are net losers, in that their net tax burden is higher than before the CCL was implemented. The recycling mechanism adopted in the U.K. only affects industries, which is logical because only this sector is subject to CCL payments. In Germany, however, the ETR policies are levied on the energy consumption of the whole economy resulting in a reduction of employers’ and employees’ pension contribution.

**SUMMARY AND CONCLUSION**

This article analyzes the main features of the energy and carbon taxation regimes in four EU member states. This discussion can only be described as a starting point for such analysis as the national designs are complicated and complex. This article reveals some of the differences between the four countries, particularly whether they have implemented broad-based energy taxation schemes or if their energy taxation regime is only applicable to industry.

As discussed throughout the article, special tax provisions for industries are implemented widely in the four EU member states. However, tax provisions vary between the countries, making it difficult to provide an overview of effective tax rates that affect industries. Depending on the country and its particular industry-specific tax provisions, reduced tax rates either affect specific industrial sectors or the whole industry. Additionally, some countries—Germany and Sweden—have placed ceilings on the total energy tax burden for individual companies. However, all of these policies aim to protect the competitiveness of domestic industries, since energy and carbon taxes are often blamed for industrial relocation.

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122. *See OECD, supra note 118, ¶ 83 ("In the case of the CCL, recycling involves a reduction in employers' social security contributions . . . .").*

123. *See id. ¶ 86 ("While the CCL was designed as part of a revenue-neutral reform, this does not mean that each and every industry would find itself in a tax-neutral position.").*

124. For further discussion, see Mikael Andersen’s article, also published in this volume.
The Scandinavian countries, Denmark and Sweden, have been the forerunners in implementing broad-based energy and carbon taxes. They are regularly described as high energy tax countries when assessing the standard rate, i.e., the energy and carbon rate which particular households are facing. Denmark and Sweden have also implemented wide-ranging tax provisions so that the energy and carbon tax rates faced by industries are only a fraction of what households have to pay. It is therefore necessary to distinguish between different types of energy consumers when applying the "high energy and carbon tax" label. Currently, the interest in the application of economic instruments has shifted away from environmental taxes—specifically energy and carbon taxes—more to the EU ETS at the EU energy and climate policy level, which started to be operational in the pilot phase from 2005 to 2007 inclusive and from 2008 to 2012 during the first commitment period of the Kyoto Protocol.\footnote{125}

As highlighted above, the energy sector, as well as energy-intensive sectors, are covered by the EU ETS. This is in contrast to the coverage of the 2003 Energy Taxation Directive, as it does not extend to all energy products consumed in both sectors. The Energy Taxation Directive does not apply to energy products used for purposes other than motor fuels and heating fuel.\footnote{126} For example, energy products used for chemical reduction and electrolytic and metallurgical processes and the ones used in mineralogical processes are not covered in the Energy Taxation Directive. Nevertheless, double regulations do exist, meaning that the consumption of energy products can be subject to energy and carbon taxes as well as covered by the EU ETS\footnote{127} resulting in calls by industries for a complete tax exemption of fuels, i.e., a zero level of taxation, covered by the EU ETS.\footnote{128} This discussion is still ongoing at the EU level as well as the national hampering of the further development of energy and carbon taxation regimes.\footnote{129}

\footnote{125. See Claudia Dias Soares, Coordinating Energy Taxes With the EU Emission Trading System, in 5 CRITICAL ISSUES IN ENVIRONMENTAL TAXATION, INTERNATIONAL AND COMPARATIVE PERSPECTIVES 209–10 (Nathalie J. Chlaifour et al. eds., 2008) (discussing the impacts of the EU ETS directive).}

\footnote{126. See id. at 211–12 (discussing the application of the EU ETS directive).}

\footnote{127. See Kai Schlegelmilch & Maike Bunse, Ecological Tax Reform and Emissions Trading: Can They Work Together in Practice? An Empirical Analysis for Germany, in 5 CRITICAL ISSUES IN ENVIRONMENTAL TAXATION, supra note 125, at 183, 197 (discussing the dual burden resulting from electricity tax and high electricity prices).}

\footnote{128. The Energy Taxation Directive allows the possibility of a zero level of taxation in Article 17.4. Council Directive, supra note 14.}

### Table A.1: Development of the taxes levied on light fuel oil.

<table>
<thead>
<tr>
<th>Year</th>
<th>Denmark €/1000L</th>
<th>Germany €/1000L</th>
<th>Germany (Manf. Industry) €/1000L</th>
<th>Sweden €/1000L</th>
<th>Sweden (Manf. Industry) $/1000L</th>
<th>U.K. €/1000L</th>
</tr>
</thead>
<tbody>
<tr>
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<td>28.4</td>
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<td>143.3</td>
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<td>39.0</td>
<td>168.5</td>
<td>168.5</td>
<td>12.7</td>
</tr>
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<td>39.6</td>
<td>167.3</td>
<td>167.3</td>
<td>12.8</td>
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<td>41.2</td>
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<td>45.0</td>
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</tr>
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<td>61.4</td>
<td>45.0</td>
<td>369.0</td>
<td>60.5</td>
<td>135.8</td>
</tr>
</tbody>
</table>

Note: the standard tax rate payable is presented for the four EU member states, i.e., no special tax provisions are considered. In addition, the reduced rates for German and Swedish industries are shown.

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and other market-based instruments, such as the EU ETS. The intention of the green paper was to generate a discussion about what role market-based instruments can and should play in European Community policies).

130. See Environmental Tax Reform in Member States, supra note 29, at 79 tbl.A5-1 (displaying an overview taxes rates on light fuel oil in EU member states).
Table A.2: Development of the taxes levied on natural gas.

<table>
<thead>
<tr>
<th>Year</th>
<th>Denmark</th>
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<th>Germany (manufacturing industry)</th>
<th>Sweden</th>
<th>Sweden (industry)</th>
<th>U.K.</th>
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<td>€/1000m$^3$</td>
<td>€/1000m$^3$</td>
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<tr>
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<tr>
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<tr>
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<td>35.8</td>
<td>241.8</td>
<td>45.3</td>
<td>24.4</td>
</tr>
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</table>

Note: the standard tax rate is presented for the three EU member states (Denmark, Germany and Sweden), i.e., no special tax provisions are considered. In addition, the reduced rates for German and Swedish industries are shown. The situation in the U.K. is different as the rates of the climate change levy are reported. Discussed above, only industry is subject to this levy and households are exempt from these economic instruments.
Table A.3: Development of the taxes levied on electricity.

<table>
<thead>
<tr>
<th>Year</th>
<th>Denmark (other purposes) €/MWh</th>
<th>Germany (households) €/MWh</th>
<th>Germany (industry) €/MWh</th>
<th>Sweden (households) €/MWh</th>
<th>Sweden (industry) €/MWh</th>
<th>U.K. (CCL) (industry) €/MWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>42.0</td>
<td>8.6</td>
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<td>9.6</td>
<td>6.6</td>
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</tr>
<tr>
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</table>

Note: The standard tax rate is presented for the three EU member states (Denmark, Germany, and Sweden), i.e., no special tax provisions are considered. In addition, the reduced rates for German and Swedish industries are shown. The situation in the U.K. is different as the rates of the climate change levy are reported. Discussed above, only industry is subject to this levy and households are exempt from these economic instruments.
INTRODUCTION

When President of the European Commission Jose Manuel Barroso responded to questions about the European Union’s climate policy, he explained the significance of applying market-based instruments for creating a market for low-carbon technologies, stating: “The US and Japan are much better on technology than the EU, but technology and goodwill are not enough. We need a binding cap on emissions to put a real price on
carbon and give the right economic incentives to environmentally-friendly technologies.1

Developments in Europe are now greatly improving the market prospects for renewable energy technologies. The inception in 2008 of a second Kyoto commitment period with more stringent caps implies that allowances on the European carbon certificate market now trade for a significant price. The carbon allowance price adds to the impacts of recent increases in international oil prices. These changes greatly improve the economic advantages of substituting fossil fuels with renewable energy technologies, particularly biomass and wind energy.

Rising energy costs create pressures to relieve fossil fuel consumers from the politically determined price signals for carbon and energy. Nevertheless, market-based instruments are something quite different from energy prices increasing as a result of market fluctuations.

Experiences attained in member states that pioneered the use of market-based instruments provide evidence for this observation. These member states are, on average, more energy-efficient and competitive than the European Union (EU) as a whole.2 This difference is because the properties of market-based instruments can differ from those of energy market prices, as will be clear from this article.

Europe’s initial experience with market-based instruments dates back to the early 1970s when several countries introduced effluent charges on water pollutants.3 In 1972, the Dutch Central Planning Office warned of excessive costs from a proposed extension of sewage treatment for waste water, at an estimated three percent of national income.4 Macroeconomic modeling projected losses in industrial output, causing an overall decline in economic growth of close to four percent.5 Despite these gloomy forecasts, the Dutch Central Bureau of Statistics estimates that the entire public and private activity of waste water treatment today captures merely 0.6% of annual gross domestic product (GDP) in the Netherlands.6 The obtained efficiency is regarded as a result of the pioneering Dutch levy on emissions

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3. Id.
4. Id.
of waste water. The price signal has provided economic incentives to control pollution at the source, reducing the projected need for costly and passive investments in end-of-pipe treatment, especially for big dischargers. Costs for waste water services in other countries with some element of market-based instruments are also well below one percent of GDP. This low figure underlines that dire economic forecasts from macroeconomic models need not always materialize, especially if such models do not capture opportunities for technological innovation.

Following the Organization for Economic Co-operation and Development’s (OECD) appraisal of the efficiency of market-based policy instruments in the mid-1980s and the 1988 Toronto Conference on the Changing Atmosphere, which triggered political interest in addressing climate change, the four Nordic countries soon introduced taxes on the greenhouse gas carbon dioxide (CO₂). Finland (1990), Sweden (1990), Norway (1991), and Denmark (1992) were first to launch and gradually strengthen economic signals to curb emissions. Concerns regarding climate change coincided with priorities to reduce income taxation and combined to a tax shifting exercise. A few years later, the Netherlands (1996) and Slovenia (1997) followed suit. When at the end of the decade Germany (1998) and the United Kingdom (U.K.) (2000), two of the largest European economies, joined the club of carbon taxation, more weight and significance was added. This resulted in an annual bill of more than twenty-five billion Euro which were converted from other taxes to carbon-energy taxes. Details of these tax reforms are outlined in the article by Stefan Speck (this volume). Unilateral member state carbon and energy taxation initiatives were complemented by the EU Directive on Energy Taxation, which was finally agreed upon in 2003 after more than ten years of negotiations, and which establishes minimum tax rates for energy

7. Id. at 24.
8. Id. at 25.
10. Id.
12. Id.
products in all twenty-seven EU member states.\textsuperscript{15} With respect to carbon, the EU Directive on the Emissions Trading\textsuperscript{16} was also passed in 2003 and came into effect two years later, thereby capping member state emissions for designated sectors.\textsuperscript{17}

Quite a lot of research has been done already to figure out environmental and economic implications of applying market-based instruments. In contrast to the 1990s when theoretical ex-ante modelling studies largely prevailed, the literature in the last decade has been enriched with more empirically based ex-post studies. Using various analytical approaches and modelling techniques, these recent studies have focused on actual experiences attained in Europe with carbon-energy taxation. This article reviews what has been learned about the impact of taxes on energy consumption and carbon emissions: according to basic behavioural and economic theory carbon-energy taxes are expected to curb emissions and decouple energy consumption from economic growth. With some qualifications, ex-post evaluation studies have largely confirmed the existence of such patterns for Europe. More controversy surrounds the broader macro-economic implications of carbon-energy taxation, especially for competition and economic growth. However, as the review of theoretical literature below indicates, the misty character of this debate seems, to some extent, to be caused by the heat of vested interests, as there is relatively broad consensus about the properties of revenue-neutral environmental tax reforms. The final section of this article addresses the differences between taxing or trading carbon. Environmental and economic implications of the emissions trading system (ETS) established in EU are considered and possible complications of both trading and taxing carbon are discussed. Less quantitative data and evidence is available to allow for firm conclusions on Europe’s ETS experiences because the ETS carbon-trading system is relatively young. Due to apparent over-allocation, the system experienced a temporary collapse during the first commitment period (2005–2007).

\begin{itemize}
\item \textsuperscript{15} Id. \textsuperscript{16} Council Directive 2003/87, 3002 O.J. (L 275) 32 (EC) (establishing a scheme for greenhouse gas emission allowance trading within the Community). \textsuperscript{17} Emission Trading Scheme (EU ETS), http://ec.europa.eu/environment/climat/emission/index_en.htm (last visited Nov. 12, 2008).
\end{itemize}
I. IMPLICATIONS OF CARBON-ENERGY TAXATION FOR CO₂ EMISSIONS AND ENERGY CONSUMPTION

One expects carbon-energy taxes to provide incentives in two directions: a demand effect, whereby the demand for energy is reduced as a result of the price-increase caused by the tax; and a substitution effect, whereby carbon-fuels are substituted by low-carbon or carbon-neutral fuels to the extent that these are available at lower costs. While reduced energy demand may reflect either a lowering of output or actual energy savings, it is often more appropriate to monitor for energy intensity. In other words, we would expect to see changes in energy and carbon intensity as a result of carbon pricing.

The price at which CO₂ is traded under the cap of the second commitment period in the European ETS is presently twenty to twenty-five Euro per ton.18 Compared to these price levels, unilaterally applied carbon taxes in individual EU member states have been more modest and range generally from a low, and to some extent symbolic, level for the most energy-intensive industries and up to about twenty-five Euro per ton in the cases of Sweden and Finland (although Denmark taxes energy for heating purposes in households and industries at an effective rate of about eighty Euro per ton CO₂).19 In comparison, the Intergovernmental Panel on Climate Change (IPCC) projects that a global carbon price will require a level of thirty to forty Euro per ton CO₂ in 2020 to achieve stabilization of atmospheric greenhouse gas concentrations at 450–550 ppm.20

Evaluating the impact of carbon-energy taxes on CO₂ emissions is complicated because taxes in certain sectors have replaced pre-existing energy taxes, but now come under a different name and with a modified tax base—carbon content rather than gigajoules. Sweden is often mentioned as a pioneer with respect to carbon taxes, but it had taxes for industrial energy consumption already in place in 1974.21 These taxes were modified in 1990 towards a carbon-energy tax base.22 The actual increase in price signal depends somewhat on the fuel in question and its relative use in different sectors.

19. Andersen, supra note 9.
21. Andersen et al., supra note 11.
22. Id.
Carbon energy taxes have been in effect in the four Nordic countries and the Netherlands for more than a decade, providing the firmest basis for ex-post assessment. Similarly, Slovenia has operated on a longer timeline, but as a country in transition, with data and conversion difficulties. Similarly, Germany and the U.K. introduced carbon energy taxes at the end of the previous decade.

Carbon-energy taxes are not yet applied across-the-board with uniform rates for all emitters and fuels. Over time, member states have adjusted and extended tax rates and tax bases to achieve carbon-energy taxes in greater accordance with theoretical prescriptions. However, in the short run, pragmatic considerations have prevailed. For this reason effective fuel-tax rates vary considerably from sector to sector. While exemptions, liability caps, or special arrangements that specific industries or target groups have obtained are not always immediately transparent, these circumstances are of course crucial when proper evaluations of impacts and effectiveness have to be provided. For these reasons, statements about the effectiveness and impacts of carbon-energy taxes are in most evaluation studies, provided only on a sectoral basis.

The European research project, Competitiveness Effects of Environmental Tax Reforms (COMETR), has been the first comprehensive attempt to retroactively account for these implications by considering differences in sectoral tax burdens within a suitable macroeconomic framework capable of providing an overall assessment. The E3ME model of Cambridge Econometrics is a time-series estimated macroeconomic model of economy-energy-environment relations of EU-25. This model can also account for EU trade relations with the rest of the world. For the purposes of modeling changes in fuel consumption and CO₂ emissions as a result of relative price changes and feedbacks in the economy, the model has a high resolution featuring eleven different fuels and more than forty economic sectors. The COMETR project has compiled country-specific figures for carbon and energy taxes, including the relevant sector-specific

23. Id.
24. Id.
25. Id.
26. Id.
27. See COMETR, Competitiveness Effects of Environmental Tax Reforms, http://www2.dmu.dk/cometr (last visited Nov. 26, 2008) (COMETR is a research project under the European Union’s Sixth Framework Program for Research).
29. Id.
30. Id.
exemption arrangements for the purpose of modeling and disentangling the impacts in E3ME.31

Two scenarios were generated by the E3ME for the period 1994–2012. The Baseline Case (B Case) is an endogenous solution of E3ME over the period 1994–2012.32 This scenario includes the tax shift package in exchange for the carbon-energy taxes in each Member State, including exemptions or special treatment for the industries most affected and the compensating reduction in another tax.33 This scenario is calibrated closely to the observed outcome by using historical data, which includes the effects of environmental tax reform (ETR) implementation.34 The Reference Case (R Case), which is a counterfactual projection without the ETR, includes historical and expected developments in the EU economy, for example, the EU ETS.35

By subtracting the outcome of the counterfactual reference case from the baseline case, it becomes possible to disentangle the specific impact of the carbon-energy taxes introduced under the revenue-neutral ETR. Because the model has information for historical energy tax burdens prior to the introduction of the carbon-energy taxes, it becomes clear what impact the various tax reforms can be ascribed. In summary, this illustrates the difference between what actually happened and what would have happened had there been no ETR (with both cases projected to 2012). The exception to this is that revenue neutrality is assumed in each case through the revenue-recycling mechanisms. Exemptions, non-payments, and negotiated agreements are included as accurately as possible, subject to the total revenues matching the published figures in each case.

Six European countries that have implemented an ETR show a reduction in fuel demand (see Chart 1). The size of the reduction in fuel demand is dependent on: the tax rates imposed; how they are applied to the various fuels and fuel user groups; how easy it is for fuel users to substitute between the various fuel types and non-fuel inputs; and the scale of the secondary effects resulting from changes in economic activity. On average,

31. COMETR, supra note 27 (found under “The Project”).
34. Id.
35. Id.
the attained reduction in fuel demand in 2004 was 2.6%, although it was slightly larger in Finland than in the other countries.

A key feature of the results is the recovery in fuel demand due to higher world energy prices found in several of the examined countries in 2004 and 2005 in the B Case relative to the R Case. In most of the ETRs, the environmental taxes were not increased in line with fuel prices (and may have been reduced in some cases), so the relative change in fuel prices was less in 2004 and 2005.

With lower consumption we would expect to see a reduction in greenhouse gas emissions, but total emissions will also depend on the relative consumption levels of each fuel type. For example, a tax system that encourages the use of coal is likely to produce higher emissions than one which encourages the use of natural gas or bio-fuels. E3ME includes explicit equations for fuel shares of hard coal, heavy oil, natural gas, and electricity. Assumptions about the other fuel types link them to the closest modeled alternative (for example, other coal is linked to hard coal, crude oil to heavy oil). The demand for middle distillates (petrol, diesel) for transportation needs is linked to total fuel demand by that sector. These

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sectors do not generally use other fuels, so fuel-share equations are not required.

The scenario results show that there are reductions in greenhouse gases (GHGs) for six member states from the ETR (see Chart 2). The effects closely follow the results for total fuel consumption, with the largest reductions occurring in regions with the highest tax rates. For example, Finland and Sweden experienced the largest reductions in emissions, in most cases exceeding the decline in fuel demand and providing evidence for the efficiency of ETRs in reducing emissions. In contrast, the German ETR was not particularly efficient in reducing emissions because it did not include coal. By 2004, the European ETRs reduced greenhouse gas emissions by an average of 3.1% for the six member countries examined, with the largest reduction of 5.9% recorded for Finland.

Martin Enevoldsen has studied in detail the Danish and Dutch experiences with carbon-energy taxation and controlled outcomes against developments in Austria, which did not introduce market-based instruments or ETR. Denmark’s policy of ETR began in 1992, whereas the Netherlands introduced its ETR in 1996, after several years of promoting voluntary long-term agreements with industries. Between 1990 and 2000 industry in Denmark improved its energy intensity by nearly thirty percent. The Netherlands and Austria only obtained improvements in the range of ten to fifteen percent. A particular aspect of Denmark’s carbon-energy taxation program was the earmarking of twenty percent of the revenues to co-finance energy-efficiency measures and upgrade production technology. This feature of Denmark’s program is believed to have been responsible for the marked impacts on energy productivity. The funds from revenue were made available in a program supervised by the Danish Energy Agency. Auditors independently reviewed company energy practices and made recommendations for improvements and investments based on up to four years of return. Bjørner and Togeby have confirmed that companies

38. Id.
39. Id.
40. Id.
41. Id.
42. Id.
43. Id.
participating in this program received on average sixty percent greater energy savings than companies subject to the tax only.

II. IMPLICATIONS FOR COMPETITIVENESS AND ECONOMIC PERFORMANCE

A. The Theoretical Debate on Tax Shifts

Michael Porter, a Harvard economist, argued in The Competitive Advantage of Nations (1990) that, contrary to conventional wisdom, environmental policies may encourage process or product-oriented innovation and improve competition, particularly when anticipating requirements that will spread internationally. Porter cautioned that many environmental regulations presently violate competition principles because command-and-control requirements for specific pre-defined technologies, often end-of-pipe, do not leave room for adaptation, flexibility, and innovation. References to Porter’s hypothesis in the literature tend to neglect the premise that it is only by using market-based instruments for environmental policy implementation that competition can be improved.

In real company management the challenge remains to identify and harvest the low-hanging fruit despite the vigorous controversy in the 1990s over Porter’s claims that there was low hanging fruit not yet picked by businesses.

David Pearce framed the argument slightly differently. Pearce called attention to the possible double dividend feature of carbon-energy taxes, referring to the improvement in social welfare that could arise if taxation shifted from goods to bads, for example, i.e., from labor to carbon. Since environmental taxes serve to correct market failures, by definition they do not share the distorting properties of many other taxes. By adopting a fiscally neutral package that exchanges income taxes or corporate taxes for carbon-energy taxes, the opportunity arises to reap positive benefits in terms of higher employment; this increased employment rate may improve

46. Id.
49. Id.
short-term economic performance while the tax shift also delivers a long-
term environmental dividend. Pearce’s approach was adopted in the
famous European Commission Whitepaper, which argued for shifting
taxation to reap both dividends.50

Many economists have had difficulties with the “free lunch” implied in
the double dividend argument, as well as with the rhetoric on the win-win
options of environmental policy. Lawrence Goulder, Professor of
Environmental and Resource Economics at Stanford University,
differentiates between weak and strong versions of the double dividend
argument.51 The strong version claims that any environmental tax that
replaces another tax will, by definition, improve social welfare. The weak
version, on the other hand, merely focuses on the revenue-recycling aspect:
it claims uncontroversially that, once environmental taxes have been
introduced, using revenues to reduce distortionary taxes is preferable to
returning revenues as a lump-sum.52 However, Goulder presents an
intermediate version of the double dividend argument as well. The
intermediate version implies that context and circumstances dictate whether
overall social welfare will in fact be improved as a result of ETR and
depends on the specific properties of the distortionary tax that is being
replaced with an environmental tax.53

In a similar vein, Dutch economists A. Lans Bovenberg and Ruud A. de
Mooij have pointed to the existence of a possible “tax interaction effect,”
whereby the costs of environmental taxes increase commodity prices
consequently lowering the real value of after-tax income.54 If ETR provides
too little income tax relief to offset the increase in commodity prices,
employees will lower their labor supply, in turn, triggering a wage-spiral
and inflation. Typically, the negative tax interaction effect will exceed the
positive revenue-recycling effect, except under special circumstances where
highly distortionary taxes are replaced. The formal argument hinges on two
crucial assumptions: first, that income taxation a priori minimizes the
excess tax burden; and second, ETR is introduced on top of existing
environmental taxes or regulations that sufficiently internalize

51. See Lawrence H. Goulder, Environmental Taxation and the ‘Double Dividend’: A Reader’s
double dividend theories and examining the theoretical and empirical support for each).
52. Id.
53. Id.
54. See A. Lans Bovenberg & Ruud A. de Mooij, Environmental Levies and Distortionary
Taxation, 84 AM. ECON. REV. 1085, 1088 (1994) (arguing that environmental taxes may acerbate
preexisting tax distortions).
externalities. Despite these unrealistic restrictions, this argument appears to be widely accepted among tax experts.

Evidence suggests that many of the analyses which focus on the tax interaction effect are too stylized and restrictive. Bovenberg and de Mooij’s first article was based on a static model. In a second article where they explore the relationships in the context of a dynamic model, the findings are relaxed somewhat: if the ETR leads to lower regulatory pressure on companies, then a double dividend may arise. Bovenberg shows that unemployment will be reduced if a pollution tax is introduced. In this case, the tax interaction effect also influences the value of the unemployment benefit, causing more unemployed to enter the labor market. However, the overall effect on the rate of economic growth could still become negative. Eban Goodstein questions the basic assumption of the tax interaction effect that higher prices will reduce labor supply. Empirical studies based on micro-data have found this relationship to be ambiguous. When dual-earner families are considered, higher prices lead to an increase in labor supply, as workers seek to compensate the reduction in family income generated by the price increases.

Despite the controversy on the direction and magnitude of the tax interaction effect, a consensus in the literature remains—no tax interaction effect will occur when ETR lowers employers’ social security contributions

56. See generally A. Lans Bovenberg & Ruud A. de Mooij, Environmental Tax Reform and Endogenous Growth, 63 J. PUB. ECON. 207, 208 (1997) (analyzing new channels through which an environmental tax reform may yield a double dividend).
58. Bovenberg, supra note 56.
59. Id.
60. See Eban Goodstein, The Death of the Pigovian Tax? Policy Implications from the Double-Dividend Debate, 3 LAND ECON. 402, 408–11 (2003) (arguing that additional empirical and theoretical analysis is needed before concluding the double-dividend is incorrect).
61. Id.
resulting in no, or only marginal price changes. In this specific case, one would expect to obtain a double dividend.

B. Revenue Recycling Programs

In view of the theoretical debate, it is interesting that European countries have practiced different strategies for revenue recycling; Sweden and Finland have mainly recycled revenue by lowering income taxes. For Sweden, a long-standing tax policy aim has been to lower the pressure of income taxation on labor income. The tax reforms in these two countries aim to lower direct income taxes: carbon-energy taxes have contributed to securing alternative revenues for some, but not all, of these income tax reductions. This observation applies for Sweden’s early ETR in 1990 as well as for the most recent phase after 2001. It also applies to Finland for the more comprehensive tax shifts introduced since 1996; whereas, revenues were small and the recycling was not transparent in the phase prior to 1996. It would have been difficult for both countries to follow the recommendations from the fiscal literature to aim at lowering employers’ social security contributions, because such contributions are relatively small in both countries.

On the other hand, Denmark and the U.K. have more closely followed the recommendations from the fiscal conventionalists, predominantly directing revenues to lower employers’ social security contributions to avoid inflationary effects. However, because of the imbalance between energy consumption and employee numbers, lowering social security contributions at the company level does not necessarily lead to full compensation for the individual company. Denmark and the U.K. have mitigated the imbalance via the various mechanisms for energy-intensive industries such as agreements and reduced rates for heavy industries. The real purpose of these exemptions seems to have been to avoid the tax interaction effects. Finally, out of concern that incentives would otherwise

65. Andersen, supra note 11, at 523.
66. Id.
67. Id.
68. Id. at 524.
69. Id.
70. Id. at 525.
71. Id.
be too weak, both countries have earmarked between five and twenty percent of revenues for direct energy-efficiency subsidies via, for example, the Carbon Trust.72

The Netherlands and Germany have followed mixed approaches. In the initial phase, the Dutch reduced income taxation out of social concern.73 This led to the increase of the basic tax-free allowance for income and to using complicated formulas for exempting basic consumption of electricity and gas.74 In the second phase, the Dutch adhered more to the side of fiscal conventionalists and reduced the employers’ wage component and corporate taxes.75 In Germany, the ecological tax reform split the revenue recycling equally between a reduction of employers’ and employees’ social security contributions.76 This reform established a program of revenue recycling more concerned with political appeal than fiscal orthodoxy, taking into account that the eco-tax reform aimed equally at gasoline prices and other fuels.77

Slovenia mainly restructured its existing energy taxes into fuel taxes with a carbon-energy tax base.78 Therefore, the issue of revenue recycling did not seem to arise in the Slovenian context.

Hence, we can summarize the observations on the revenue recycling approaches by dividing the member states in question into three different groups: the fiscal conventionalists (U.K. and Denmark); the fiscal pragmatists (Sweden and Finland); and finally, the political pragmatists (Netherlands and Germany). The pragmatists are labeled as such because reforms were designed to accommodate pressing concerns with the tax systems and the electorate rather than with fiscal theory.79

72. Id.
73. See generally Willem Vermeend & Jacob Van Der Vaart, Greening Taxes: The Dutch Model, Kluwer Law International LTD (1998) (arguing the Dutch were able to reduce income taxation initially leading to an increase of the basic tax-free allowance for income).
74. Id.
75. Andersen, supra note 11, at 519.
76. Id. at 521.
77. Id.
78. Id. at 520.
79. Id. at 523.
CHART 2: THE EFFECT OF ETR ON GDP

Note(s): % difference is the difference between the base case and the counterfactual reference case.

Source(s): CE.
CHART 3: PRICE EFFECTS IN GERMANY

% difference

The Price Effect of Tax and Revenue Recycling

The Price Effect of Revenue Recycling on its own

Note(s) : % difference is the difference between base case and the counterfactual reference case for Tax and Revenue Recycling and is the difference between the no revenue recycling case and the base case for revenue recycling.

Source(s) : CE.

CHART 4: CONSUMER PRICE INDEX

Note(s) : % difference is the difference between the base case and the counterfactual reference case.

Source(s) : CE.
C. Macroeconomic Results

According to E3ME results, European countries that have implemented ETR did not experience a negative impact on economic growth in terms of GDP (see Chart 2). In Sweden, the effects take slightly longer to appear because the large increase in household electricity taxes depresses real incomes in the short run. Finland receives a short-term boost to GDP from the effects of the taxes on fuel demand, because a reduction in the demand for imported fuel improves the country’s trade balance.

Since the ETRs result in higher fuel prices, this will likely increase the overall price level. The degree of this increase will depend on the scale of the increase in fuel costs; how easy it is for industry and consumers to switch between fuels to cheaper alternatives and non-energy inputs, and how much of the cost is passed on by industry to consumers, dictated by the level of competition in the industry and estimated econometrically for each region and sector. Revenue recycling may have a deflationary effect when the revenues are recycled through reductions in employers’ social security contributions, lowering labor costs. This is demonstrated by Germany, where nearly half of the revenues were used for reducing employers’ contributions (see Chart 3). In Denmark and the U.K., there were no significant increases in the overall price index. In the U.K., this is because the tax is relatively small and was compensated with slightly cheaper labor costs. In Denmark, the tax was larger, but was again compensated with lower labor costs (see Chart 4).

The consumer price index, as the measure of inflation, will record a larger increase when taxes are levied on households rather than industry. The reason for this is that the consumer price index is a weighted average of the price of consumer products, including energy. When taxes are levied on households, the whole tax is reflected in the consumer price index, rather than just the share that is passed on by industry. Therefore, it is not unexpected that Sweden shows the largest increases in the consumer price index, followed by the Netherlands (see Chart 4).

Of the four countries with revenue recycling fully or partly over income taxation, the impact is negligible in the U.K. and Denmark. This is not the case in the Netherlands and Sweden. Although further analysis is required, the Swedish experience suggests that combining carbon-energy taxes on households with reductions in income taxes could cause inflation rates at a level that triggers a possible tax interaction effect. Inherent in the logic of ETRs implemented in the U.K. and Denmark is that the consumer price index will not be discernibly affected; this is primarily because of the revenue recycling via lowering social security contributions.
D. Energy-intensive Industries

A complication arises with energy-intensive companies because the compensation that they receive, via the reduction in social security contributions, does not fully match the additional energy costs. These companies may have a small labor stock yet consume large amounts of energy. Their sensitivity depends on the degree to which they use carbon-intensive fuels (see Figure 1). In member states such as Sweden, Finland, and Slovenia, the energy-intensive industries are less sensitive to carbon-based energy taxes because they benefit from the availability of hydropower and nuclear power. However, in most member states, complicated schemes have been designed to balance, cap, or reduce the tax burden of energy-intensive industries.

Exemptions not only distort the desired impacts of carbon-energy taxation, but also pose a threat to fair terms of competition. According to EU law, exemptions constitute state aid and must be approved by the European authorities. This requirement controls member state concessions to energy-intensive industries. The state aid guidelines offer certain opportunities for reducing the tax rates of energy-intensive industries, especially if these rates are higher than the EU’s minimum tax rates. These opportunities are to some extent modeled on the basis of the 1995 decision regarding the Danish CO2-taxation scheme. Denmark was the first member state to obtain explicit Commission approval of its carbon-energy taxation system. Because agreements between energy-intensive industries and the relevant authorities played a role in obtaining tax rate reductions in the Danish scheme, it was natural that the Commission’s state aid guidelines reflected the role of agreements vis-à-vis selective tax reductions.

Member states seek to obtain exemptions and special arrangements for particular sectors due to concerns about the impacts on competition. The Energy Taxation directive stipulates that exemptions should be limited to five or, at maximum, ten years; however, base exemptions exist for dual use of fuels and for certain uses of electricity in metallurgical and mineralogical

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80. Andersen, supra note 11, at 525.
81. Id.
83. Id.
84. Community Guidelines on State Aid for Environmental Protection, 2008/1–33, O.J. (C 82) 1.
86. Id.
industries. Member states make different use of these exemption mechanisms. From an environmental economic point of view it would be desirable to avoid numerous exemptions and to tax carbon-energy at a uniform rate.

The burden for energy-intensive industries remains negative but, due to many exemptions, the actual burden is rather modest. Company managers in energy-intensive industries often focus on the gross burden of ETR; unadjusted for the gains, this burden has amounted up to five percent of the gross operating surplus. However, detailed analysis in COMETR of revenue recycling and energy-efficiency gains indicates that the gross burden on industries is considerably less. While the net burden for cement and glass industries is actually below one percent of the gross operating surplus, in ferrous and non-ferrous metal industries, the burden has reached two percent in some cases. Even in the Swedish case, with no offsetting of employers’ social security contributions, the costs are estimated not to exceed four percent of gross operating surplus for cement and steel industries.

![Figure 1: Energy-intensive sectors in Germany: Tax burden, value of lowered employers’ social contributions (SSC) and value energy-savings](image)

88. Andersen, *supra* note 11, at 530.
89. *Id.*
90. *Id.* at 533.
induced by the tax as percent of gross operating surplus. Source: COMETR.

III. TRADING CARBON WHILE ALSO TAXING IT

A. Effective Carbon Price Signal as a result of the ETS Cap on Emissions

Implementing a CO₂ emissions trading system (ETS) in the European Union has created a more complex regulatory environment where member state carbon-energy taxation and EU minimum energy tax rates now coexist with the trading of grandfathered emission certificates for carbon.

The EU ETS covers large installations, such as power plants larger than twenty megawatts. It also covers refineries and most energy-intensive industries—notably ferrous metals, cement, glass, ceramic products, as well as pulp and paper. The ETS requires member states to limit emissions to the number of allowances that their ETS installations hold, while establishing a market for allowances across all twenty-seven member states and providing some linkage to the use of Clean Development Mechanism (CDM) credits and joint implementation projects.

Since emission certificates are grandfathered to industries, the carbon price signals run along two routes. Direct costs may arise as industries need to acquire certificates for additional production activities. Indirect costs arise as electricity producers factor the value of certificates into power prices for all electricity consumers (see Figure 2). In most cases, the national allocation plans have provided certificates matching the historical emissions to industries. Conversely, several member states have restricted allocating certificates to power plants substantially below historical emissions levels due to the pass-over ability of power producers. This implies that the pass-over on power prices is the main route along which the ETS will make an economic impact on industries.

91. Id. at 538.
92. Id.
93. Id.
95. Id.
96. Id.
Numerous studies have investigated the pass-over on power prices. The most pessimistic studies assume a 100% pass-over rate. For example, McKinsey comes to a figure of 10€/MWh for a 20€/tCO₂ allowance price. However, several studies show that the pass-over rate will only be 100% when power demand exceeds the base load and a coal or lignite plant that sets the marginal price. During periods where hydro-power or nuclear power sets the marginal price, it is not likely that power operators will be able to factor in the full value of the certificates. One study for Germany and the Netherlands hence comes to a pass-on rate of forty to sixty percent. The International Energy Agency (IEA) points out that large parts of the European electricity market are not yet fully liberalized and that price regulations will restrict pass-over. Nevertheless, the IEA points to the Nordic electricity market (Nordpool) as one region where electricity trade has been successfully liberalized and where pass-over of ETS costs should be expected. Due to the significance of hydro and nuclear power, one Finnish study concludes that the average pass-over rate on the Nordpool exchange should be in the range of forty percent, for example, 4€/MWh for a twenty Euro allowance price.

The studies mentioned above imply a cap-induced carbon price in the range of 4–10€/MWh for the power sector for a 20€/tCO₂ allocation price. This pass-over cost can be compared with CO₂ taxes on electricity in the range of 6–12€/MWh for smaller business users in the Netherlands, the U.K., Germany, and Denmark. In contrast, large energy-intensive industries with exemptions are generally liable only to the EU minimum energy tax rate of 0.5€/MWh (this rate applies not only in member states with environmental tax reforms, but across the EU as a whole).

These findings suggest that with effect from 2008 the ETS will effectively have increased the cost of CO₂/MWh for the affected energy-intensive industries to a carbon price level comparable to that of smaller business users in member states with carbon-energy taxes. This appears to

98. Id.
99. Id.
102. Reinaud, supra note 100.
103. Id.
be a significant increase. The ability to pass-over the value of grandfathered ETS allowances will reflect the carbon burden of the marginal power producer. Consequently, these pass-overs will likely create significant wind fall gains for electricity producers, unfortunately without providing the desired price signal distinguishing between electricity based on carbon and carbon-neutral power sources respectively. Significantly, there is no simple way to compensate energy-intensive industries for the imposed burden because there is no revenue available for recycling under the ETS-scheme.\textsuperscript{104} Therefore, one can expect more substantial inroads on energy-intensive industries’ gross operating surplus from ETS than from pre-existing ETR.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{electricity_tax_rate.png}
\caption{End-user electricity tax rates for industries 1988–2006 in the seven European countries with environmental tax reforms (Source: COMETR database).}
\end{figure}

\textsuperscript{104} Sijm, \textit{supra} note 94, at 11.
B. Double-Regulation Complexities

It is not surprising that the simultaneous taxing and trading of carbon has evoked concerns about perceived double-regulation. The ETS-system divides emitters into two sectors: ETS and non-ETS. The double-regulation argument states that as emissions from the ETS-sector are fully regulated from the trade with certificates, there is no further need for a regulatory tax.\footnote{Id. at 17.} The ETS sets a cap for emissions from the ETS-sector; additional allowances must be acquired on the market, possibly with the use of other flexible instruments, if emissions exceed this cap.\footnote{Id.}

Consequently, some governments are considering abandoning carbon-energy taxes for the ETS-covered installations. Due to EU state aid regulations, approval will be required from the European Commission for any measures that lift taxes selectively for certain emitters as would be the case if the ETS sector was excluded.\footnote{Andersen, supra note 11, at 526.} On one hand, the Energy Taxation Directive foresees that installations covered by tradable quotas can be fully exempted from the minimum energy tax rates.\footnote{Id. at 526–29.} On the other hand, the Energy Taxation Directive has a broader mandate than carbon taxation only; it also covers energy-supply and tax-rate harmonization.\footnote{Id.} The ETS-system has created a market with volatile prices and where pass-over rates are highly dependent on regional specificities of the power markets. Accordingly, the ETS-system as such cannot necessarily guarantee the level playing field as was the intention with the harmonizing minimum energy tax rates. The issue remains whether the grandfathered allowances under ETS can qualify as a fully-fledged scheme of tradable quotas in the context of the Energy Taxation Directive.

With respect to environmental implications, the present level of carbon-energy taxation has impacted CO$_2$ emissions. An increase in emissions can be expected if carbon costs are lowered by removing taxes. The additional domestic emissions would need to be offset by additional allowances, acquired on the European ETS-market or on the international market for flexible mechanisms. These allowances are only available at a cost. Changes in one member state might not affect the European ETS price, but if seven member states were to remove carbon-energy taxes, a perceivable impact on the ETS price can be expected and would offset the value of the tax relief.

\footnote{Id. at 17.} \footnote{Id.} \footnote{Andersen, supra note 11, at 526.} \footnote{Id. at 526–29.} \footnote{Id.}
Removing carbon-energy taxes will also inflict a loss of revenue because none is generated under the ETS-scheme. If the policy aim is to raise taxes with a minimum of excess burden, few other taxes can exhibit properties as attractive as those of carbon-energy taxes. Shifting the tax burden back to labor would not be preferable. Taxing other greenhouse gases not currently subject to taxation, or other external effects, is a more desirable method with less adverse effects. If revenue sources of such a similar nature cannot be identified, then the member state will face both the cost of the additional allowances as well as the distortionary costs related to the new tax base. Based on this observation, the new tax base actually needs to be better than the present one, which means that the alternative tax-base should provide sufficient extra benefits to compensate for the additional cost of allowances.

CONCLUSION

The European Commission has proposed in its Climate Policy Package that a post-2012 emissions trading system shall phase out grandfathering allowances and introduce auctioning. These changes would help solve many of the difficulties indicated here by generating revenue. Without this revenue recycling and its effect on lowering other taxes, carbon pricing will adversely affect the economies and competitiveness of the respective countries.

The experience in Europe with environmental tax reforms as summarized in this article has provided important insights to the macroeconomic implications of carbon-energy taxes. Macroeconomics has been largely neglected in much of the literature, which tends to take a microeconomic perspective on using market-based instruments. By introducing carbon-energy taxation while safeguarding a revenue-neutral tax shift, the negative economic impacts from taxing carbon can be avoided and a significant contribution to reducing greenhouse gases could be achieved. Reducing employers’ social security contributions appears to be the soundest approach to avoiding tax-interaction effects. A phased approach is needed whereby the cost of carbon is increased each year by 1–2€/tCO₂ from the present level in Europe. According to best estimates this would be sufficient to provide the kind of economic signal required to help reduce

110. Id.

greenhouse gas emissions and stabilize atmospheric emissions at a level sufficient to enabling attainment of the two degree target—provided that other major emitters impose policies of a similar stringency.
INTRODUCTION

Among alternative public policies to reduce emissions of carbon dioxide and other greenhouse gases (GHGs), environmental taxation represents a promising but often under-utilized approach—particularly in North America where the introduction of any new tax involves enormous political challenges. In Canada, however, British Columbia became the first North American jurisdiction to implement a consumption-based environmental tax specifically designed to reduce GHG emissions when the Provincial Government enacted a carbon tax effective July 1, 2008.¹

This paper provides a general overview and initial evaluation of British Columbia’s carbon tax, explaining the background to the announcement of

¹ Carbon Tax Act, 2008 S.B.C., ch. 40 § 157 (Can.). As explained later in this paper, the Province of Quebec became the first jurisdiction in North America to introduce a carbon tax when it imposed a duty on the bulk sale of specific fossil fuels (gasoline, diesel fuel, heating oil, propane, petroleum, and coke) effective October 1, 2007. See Regulation Respecting the Annual Duty Payable to the Green Fund, R.Q. ch. R-6.01, r.0.2.3.1 (2008).
the tax in the Provincial Government’s 2008 Budget, the structure of the legislation and its relation to other provincial initiatives to address climate change, and the possible implications of the tax for climate change policy in Canada. Part I provides a short background to the tax, summarizing the evolution of Canadian climate change policies up to the announcement of the tax in February 2008. Part II explains the structure of the carbon tax and its relation to other provincial climate change policies, reviewing the Provincial Budget and the specific tax implementing legislation. Part III discusses the implications of the tax for climate change policy in Canada, considering public reaction to the tax in British Columbia and subsequent developments at the federal level.

I. BACKGROUND

Canada ratified the Kyoto Protocol on December 17, 2002, legislatively affirming the commitment that it had made at the negotiating table five years earlier to reduce Canada’s GHG emissions by 6% from the 1990 level of 599 million tons of carbon dioxide equivalent (CO2e) emissions.2 Notwithstanding a series of Green Plans and Climate Change Action Plans, which have generally emphasized public education, voluntary initiatives, and fiscal incentives,3 GHG emissions in Canada increased substantially throughout the 1990s and early 2000s; reaching 747 million tons in 2005—over 25% higher than the 1990 level and almost 34% higher than Canada’s commitment under the Kyoto Protocol.4 Although population and economic growth have made it especially difficult for Canada to limit or even stabilize GHG emissions,5 particularly in the provinces of Alberta and Saskatchewan where increased oil and gas production from conventional sources as well as Alberta’s oil sands have been a major contributor to Canada’s rising GHG emissions,6 ineffective public policies have also played a significant role. The Federal Government has consistently failed to introduce measures that would put a

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2. On the unrealistic and highly political nature of this commitment, which was designed to ensure that promised emissions reductions in Canada would be slightly better than those promised by the United States, see JEFFREY SIMPSON ET AL., HOT AIR: MEETING CANADA’S CLIMATE CHANGE CHALLENGE 33–41 (2007).

3. For a discussion of these plans, see id. at 47–107.

4. Id. at 16.

5. See id. at 80–83 (explaining that Canada’s GHG emissions would have increased only 6% from 1990 to 2005 if the country had experienced the same rates of population and economic growth as European countries experienced during this period).

6. Id. at 24, 83–84.
market price on GHG emissions in order to discourage their occurrence.\(^7\) Offering little more than “pious hopes and good intentions,”\(^8\) the Federal Liberal Government, which had signed and ratified the Kyoto Accord, did little to ensure that Canada could meet its commitments under the agreement.

On January 23, 2006, Canadians elected a new federal government, giving the Conservative Party under Stephen Harper the largest number of seats in the House of Commons, though substantially short of a majority. Unlike the Liberal Party, which (despite its failure to contain rising GHG emissions) supported the Kyoto Protocol in principle, the Conservative Party was skeptical of the agreement,\(^9\) instead favoring a “made-in-Canada” approach to the reduction of GHG emissions.\(^10\) Although popular support for the Kyoto Accord dictated that the new government could not formally withdraw from the agreement,\(^11\) the Environment Minister declared in November 2006 that Canada would not meet its commitments under the Protocol.\(^12\)

In the months following this announcement, Canada experienced the second warmest winter on record, with temperatures averaging approximately three degrees Celsius above normal.\(^13\) For this reason, as well as increased media attention to the problem of global climate change, polls taken in January 2007 indicated that the environment had become Canadians’ primary concern, displacing Canadians’ usual concern about health care.\(^14\) In April 2007, the Conservative Government responded by introducing a “regulatory framework for air emissions” promising emissions regulations for large industrial facilities, mandatory emissions standards for passenger vehicles, strict efficiency regulations for household

\(^7\) See generally N ICHOLAS STERN, T HE ECONOMICS OF CLIMATE CHANGE 39–42 (2007) (discussing the need to price carbon in order to encourage emissions reductions).

\(^8\) SIMPSON ET AL., supra note 2, at 87.

\(^9\) Harper himself has characterized Kyoto as “essentially a socialist scheme to suck money out of wealth-producing nations.” Id. at 95.


\(^11\) SIMPSON ET AL., supra note 2, at 98.


\(^13\) See SIMPSON ET AL., supra note 2, at 7 (explaining that the previous winter had been the warmest on record, almost four degrees Celsius above normal, and above average temperatures had been experienced since 1996).

appliances, and an emissions trading system for large emitters. Instead of hard caps on GHG emissions, however, the Government’s plan proposed intensity-based emissions targets, which would limit emissions per unit of output but permit aggregate GHG emissions to increase. Nonetheless, the Government insisted the plan would achieve a total reduction in GHG emissions of 20% below the 2006 level by 2020.

In this context, as in the United States, where federal inaction on climate change policy appears to have stimulated state and local initiatives to address climate change, provincial governments have stepped forward introducing a variety of policies to promote renewable energy, encourage energy efficiency, and reduce the emission of GHGs. On July 1, 2007, the Province of Alberta introduced a cap-and-trade regime for large emitters, incorporating intensity-based limits on regulated facilities that can be satisfied through emissions reductions, the purchase of “emissions offsets” or “emissions performance credits” from other regulated facilities, or the payment of $15 per ton of CO₂e to a Climate Change and Emissions Management Fund. On October 1, 2007, the Province of Quebec introduced North America’s first carbon tax by introducing a duty of approximately $3 per ton of CO₂ on bulk sales of fossil fuels to be paid by roughly fifty large distributors in the Province. On February 19, 2008, the


16. GOVERNMENT OF CANADA, ECOACTION: ACTION ON CLIMATE CHANGE AND AIR POLLUTION 4 (2007), available at http://www.ec.gc.ca/doc/media/m_124/brochure/brochure_eng.pdf (“[A] company will have to cut its greenhouse gas emissions per unit of production by 18% by 2010 [and] a further 2% in each and every year after 2010”).

17. Id.


21. Regulation Respecting the Annual Duty Payable to the Green Fund, R.Q. ch. R-6.01, r.0.2.3.1 (2008) (requiring distributors of fossil fuels to pay approximately one cent per liter on the bulk sale of gasoline, heating oil, and diesel; half a cent per liter on the bulk sale of propane; and $8.00 per ton of coal sold). For a summary of this duty, the revenues from which are earmarked to a “Green Fund” used to support expenditures announced in the Province’s Climate Change Action Plan, see Meadows, supra note 20, at 20–21.
Government of British Columbia announced that it would introduce a consumption-based carbon tax of $10 per ton of CO2e, rising to $30 per ton by 2012—making the Province the most aggressive jurisdiction in Canada (and perhaps North America) when it comes to addressing climate change.

For several reasons, it is perhaps not surprising that British Columbia would be a leader in the development of public policies to reduce GHG emissions. With almost half the Province’s population concentrated in a metropolitan area (Vancouver) that enjoys a more moderate climate than the rest of Canada and almost 93% of its electricity currently generated from hydroelectric power, carbon emissions in British Columbia are among the lowest in Canada on a per capita basis at 15.5 tons in 2005 compared to 23.1 tons in the country as a whole. Despite low emissions per capita, however, total emissions increased by 30% between 1990 and 2005, with the greatest growth resulting from fossil fuel production and fugitive emissions from oil and natural gas, which almost doubled during this period. At the same time, British Columbia is particularly vulnerable to the effects of global climate change, having already lost half of its lodgepole pines to the ravages of the mountain pine beetle, experiencing summer droughts and severe winter storms, and facing a major risk of flooding from sea level increases.

In the Throne Speech in February 2007, in which it announced its legislative agenda for the year, the Provincial Government declared that it would “take concerted provincial action to halt and reverse the growth in
greenhouse gases,” pledging to reduce British Columbia’s greenhouse gas emissions “by at least 33 percent below current levels by 2020” or 10% below 1990 levels. Among other initiatives to encourage emissions reductions, the speech suggested that “our tax system should encourage responsible actions and individual choices” and that the Government would over the next year “look for new ways to encourage overall tax savings through shifts in [behavior] that reduce carbon consumption.”

In April 2007, the Provincial Government announced that it would join the Western Regional Climate Action Initiative (subsequently the Western Climate Initiative), a collaborative effort launched in February 2007 by the Governors of Arizona, California, New Mexico, Oregon, and Washington to develop regional strategies addressing climate change, including the design of a market-based cap-and-trade regime based on hard emissions targets. In November 2007, the Government enacted into law the emissions targets announced in the Throne Speech as part of a Greenhouse Gas Reduction Targets Act, which also established an emissions target for 2050 of 80% less than 2007 and mandated the Provincial Environment Minister to establish emissions targets for 2012 and 2016 and produce bi-annual reports on provincial progress in meeting these targets. In the Provincial Budget delivered on February 19, 2008, the Government announced that it would introduce a carbon tax based on GHG emissions from fossil fuel combustion effective July 1, 2008.

30. Id. at 14.
31. Id. at 23.
33. See Western Climate Initiative (WCI), http://www.westernclimateinitiative.org (last visited Nov. 17, 2008) (explaining that in addition to its founding states and British Columbia, the WCI now also includes as partners Utah and Montana, and the Canadian provinces of Manitoba, Ontario, and Quebec).
35. Id. § 2(1)(b).
36. Id. § 4.
II. THE CARBON TAX

As Janet Milne explains in her contribution to this volume, the design of a carbon tax involves four essential elements: the definition of the tax base, the identification of persons subject to the tax (the taxpayer/collection point), the specification of tax rates, and the use of the revenues generated by the tax.\textsuperscript{38} The 2008 Provincial Budget and the subsequent legislation implementing the British Columbia carbon tax address each of these features.

A. Tax Base

Although CO$_2$ is only one of several GHGs attributable to human activities,\textsuperscript{39} CO$_2$ emissions are the leading contributor to climate change both globally and in Canada, accounting for more than 60\% of anthropogenic GHG emissions globally and almost 80\% of GHG emissions in Canada.\textsuperscript{40} Likewise, in British Columbia, CO$_2$ accounts for almost 80\% of GHG emissions.\textsuperscript{41} Of this percentage, the vast majority results from the combustion of fossil fuels.\textsuperscript{42}

As its name suggests, the British Columbia carbon tax does not apply to all GHG emissions, but only to emissions from the combustion of fossil fuels and other specified combustibles in the Province, with rates based on CO$_2$e emissions associated with the various fuels and combustibles that are subject to the tax.\textsuperscript{43} As a result, while the tax applies to emissions of CO$_2$

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\textsuperscript{39} Other gases include methane (CH$_4$), most of which results from the anaerobic decomposition of solid wastes in landfills, the production and distribution of oil and natural gas, enteric fermentation in ruminants, coal mining, and manure management; nitrous oxide (N$_2$O), most of which is attributable to agricultural soil management (including the application of synthetic and organic fertilizers), the combustion of fossil fuels, the production of nitric acid for synthetic fertilizers, and manure management; and hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF$_6$), one or more of which is either used as a substitute for ozone depleting substances (ODS), attributable to the production of ODS substitutes, used in electrical transmission and distribution, or attributable to the production of aluminium, the manufacture of semiconductors, or the production of magnesium. Environment Canada, \textit{Information on Greenhouse Gas Sources and Sinks}, http://www.ec.gc.ca/pdb/ghg/about/gases_e.cfm (last visited Oct. 16, 2008).

\textsuperscript{40} \textsc{Org. for Econ. Co-operation and Dev., Environmentally Related Taxes in OECD Countries: Issues and Strategies} 117 (2001). For the Canadian figure, see \textit{Environment Canada, supra} note 24, at 41.

\textsuperscript{41} \textit{B.C. Ministry of the Env’t, supra} note 28, at 152.

\textsuperscript{42} \textit{Id.}

\textsuperscript{43} \textit{B.C. Budget 2008, supra} note 22, at 12.
and other GHGs from the combustion of fossil fuels,\textsuperscript{44} it does not apply to CO$_2$ emissions from industrial processes such as the production of oil, gas, aluminum, or cement; or to the emission of other GHGs such as methane and nitrous oxide from the disposal of solid waste and the agricultural sector.\textsuperscript{45} Nor does the tax apply to the combustion of biofuels such as firewood, woodwaste, ethanol, biodiesel, and bio-heating oil, which are arguably carbon-neutral.\textsuperscript{46} Instead, the Provincial Budget explains:

The tax base includes fossil fuels used for transportation by individuals and in all industries, including the combustion of natural gas to operate pipelines, as well as road, rail, marine and air transportation. As well, the tax base includes fuel used to create heat for households and industrial processes, such as producing cement and drying coal.\textsuperscript{47}

Additionally, since the tax applies only to the combustion of fossil fuels within the Province, it also excludes or specifically exempts fuels exported from British Columbia and fuels used for inter-jurisdictional commercial marine and aviation purposes.\textsuperscript{48} As a result, the budget explains, “neither the emissions released elsewhere to produce fuel imported to BC or the emissions released elsewhere from burning fuel exported from BC are included in the tax base.”\textsuperscript{49}

Although the British Columbia carbon tax does not apply to all GHG emissions, the substantial share of CO$_2$ in total GHG emissions and the equally substantial role of fossil fuel combustion as a cause of CO$_2$ emissions means that the tax base is quite broad, reaching approximately 70% of aggregate GHG emissions within the Province.\textsuperscript{50} While the exclusion of GHG emissions from industrial processes has been sharply criticized by the Opposition New Democratic Party (NDP),\textsuperscript{51} administrative

\textsuperscript{44} See id. (noting that the combustion of fossil fuels produces emissions of methane and nitrous oxide as well as CO$_2$, which are converted into CO$_2$ emissions in order to apply the tax).

\textsuperscript{45} Id. at 13.

\textsuperscript{46} Id. Fuels that include fossil fuel and biofuel, such as blended gasoline and ethanol, are subject to tax only on the fossil fuel content of the fuel. Carbon Tax Act, 2008 S.B.C., ch. 40 § 13 (Can.).

\textsuperscript{47} B.C. BUDGET 2008, supra note 22, at 13.

\textsuperscript{48} Id. at 12. The specific exemption for inter-jurisdictional commercial marine and aviation purposes appears in the Carbon Tax Act, S.B.C. 2008 S.B.C., ch. 40 § 14.

\textsuperscript{49} B.C. BUDGET 2008, supra note 22, at 13.

\textsuperscript{50} Id.

challenges to the measurement of these emissions—which depend on production processes and can vary from facility to facility—suggest that their initial exclusion from the carbon tax is reasonable. Additionally, it seems reasonable to exclude CO$_2$ emissions from industrial processes and other GHG emissions from waste disposal and agriculture from the carbon tax because, as the budget explains, “many of these emissions will be subject to the cap-and-trade system or other GHG reduction measures under development.”

The exclusion of fuels for export and fuels used for inter-jurisdictional commercial, marine, and aviation purposes may also be justified on the basis that the tax is intended to apply only to emissions from the combustion of fossil fuels within the Province. Although one might argue that British Columbia should take some responsibility for emissions resulting from inter-jurisdictional commercial, marine, and aviation operations within the Province, international agreements and competitiveness considerations suggest that these emissions should also be exempt pending broader inter-jurisdictional coordination on the taxation of emissions from these sources and their inclusion in an international emissions trading regime. Also, since Canada’s constitution limits provincial taxing jurisdiction to “Direct Taxation” imposed “within the Province,” it is possible that a carbon tax that applies to fossil fuels exported from the Province or used for inter-jurisdictional commercial, marine, and aviation purposes would exceed provincial jurisdiction.

**B. Taxpayer/Collection Point**

As the discussion of the tax base indicates, the British Columbia carbon tax is intended to apply to the combustion of fossil fuels within the Province, by individuals and by enterprises, for personal use and business purposes. As such, it is properly characterized as a destination-based consumption tax on the combustion of fossil fuels. Unlike a pure

consumers and average families the hardest as large industrial polluters get a pass and a handout. . . . This budget puts all of the burden on individuals instead of big polluters. Clearly, the industrial lobbyists won in the backrooms.” _Id._

53. _Id._
54. Constitution Act, 1867, 30 & 31 Vict. ch. 3 § 92(2) (U.K.).
destination-based carbon tax, however, the tax does not exempt embedded carbon taxes on the export of provincially-produced goods and services, nor apply to the import of goods and services from other jurisdictions.\textsuperscript{57} For this reason, the tax may be vulnerable to the same concerns about international competitiveness that motivated the Clinton Administration to favor a system of border tax adjustments for its proposed Btu tax.\textsuperscript{58} Indeed, certain sectors, such as the concrete and cement industry, have already complained about the tax’s impact on domestic competitiveness, arguing that the tax “will make B.C.’s three cement facilities vulnerable to plant closures” as consumers switch to Asian producers who are not subject to carbon taxation or emissions limits.\textsuperscript{59}

Although the tax is nominally applied to every person who either purchases taxable fuel for use in the Province or uses fuel that is imported into or produced within the Province,\textsuperscript{60} the tax is actually applied and collected at the wholesale level by the distributors of different fuels, rather than the retail level, in the same way that the Province applies and collects motor fuel taxes.\textsuperscript{61} According to the Provincial Budget, this arrangement “minimizes the cost of administration to [the] government and the compliance cost to those collecting the tax on [the] government’s behalf.”\textsuperscript{62} As Milne observes, collecting the tax upstream from actual consumers may also lessen the political visibility of the tax, improving its political viability.\textsuperscript{63} As popular opposition to British Columbia’s carbon tax has increased since its announcement in February,\textsuperscript{64} one might wonder whether it would have been more politically wise for the Government to impose the tax on fuel distributors (as in Quebec), rather than consumers—even if the economic burden of the tax ultimately falls on consumers in the form of

\textsuperscript{57} For a proposal along these lines, see Thomas J. Courchene & John R. Allan, \textit{Climate Change: The Case for a Carbon Tariff /Tax}, POL’Y OPTIONS, Mar. 2008, at 59–64 (proposing to require the carbon tax to be applied to all imports from all countries and to be applied to all domestically produced and consumed products).

\textsuperscript{58} Milne, supra note 38, at 12.


\textsuperscript{60} Carbon Tax Act, 2008 S.B.C., ch. 40, §§ 8(1), 10(1) (Can.).

\textsuperscript{61} Id. §§ 15(1), 17(1).

\textsuperscript{62} B.C. BUDGET 2008, supra note 22, at 12.

\textsuperscript{63} See Milne, supra note 38, at 14 (discussing the Clinton Administration’s plan for collecting the tax and the realities it faced).

\textsuperscript{64} See, e.g., Jonathan Fowlie, \textit{Most Oppose Carbon Tax: Anti-tax Sentiment a Potential Threat to Liberals Ahead of Election}, Pollster Says, VANCOUVER SUN, June 18, 2008, http://www.canada.com/vancouversun/news/story.html?id=0c50aa7d-d414-4eb6-8b86-843d2ef28cad (reporting that 59% of those responding to a poll conducted in early June were opposed to the tax, with roughly half of respondents saying that they oppose it “strongly”).
higher prices.65 Indeed, the Opposition NDP appears to have gained considerable popular support by arguing, among other things, that the tax should be applied to industrial polluters at the source rather than consumers.66

C. Tax Rates

As explained in the discussion of the tax base, the British Columbia carbon tax applies to the combustion of fossil fuels and other specified combustibles in the Province, with tax rates based on their respective CO₂e emissions. At an initial rate of $10 per ton of CO₂e emissions,67 the tax results in a levy of 2.41 cents per liter of gasoline, 2.76 cents per liter of diesel, 1.53 cents per liter of propane, 2.45 cents per liter of aviation fuel, 49.66 cents per gigajoule of natural gas, $17.72 per ton of low-heat-value coal, $20.79 per ton of high-heat-value coal, $24.87 per ton of coke, $10.22 per ton of peat, $23.91 per ton of shredded tires, and $20.80 per ton of whole tires.68

According to the Provincial Budget, the tax rate is scheduled to increase by $5 per ton on July 1 of each year until July 1, 2012,69 when the tax rate will be $30 per ton of CO₂e emissions. The resulting levies for each type of taxable fuel and combustible are three times the amount charged in 2008.70 The budget explains further changes in tax rates will depend on various factors including: whether British Columbia satisfies its emissions targets, the impact of other policies such as fuel standards and cap-and-trade regulations, actions taken by other governments to reduce GHG emissions and set a price on carbon,71 and the advice of a Climate Action Team established in November 2007 to advise the Provincial Government on emissions targets for 2012 and 2016 and on ways to reduce GHG emissions.72

65. See Meadows, supra note 20, at 21 (reporting that the actual result of the duty in Quebec is on the consumers instead of the distributors).
68. Carbon Tax Act, 2008 S.B.C., ch. 40, scheds.1–2 (Can.).
70. See Carbon Tax Act, scheds. 1–2 (calculating the average tax increase within four years).
Although the budget itself acknowledges that a price of even $30 per ton of CO₂e emissions may be insufficient to encourage significant changes in behavior, it also offers two reasons for introducing the tax at a relatively low rate and gradually increasing this rate over five years. First, it explains, this approach “gives individuals and businesses time to make adjustments and respects decisions made prior to the announcement of the tax.” Second, it notes, the phase-in also ensures “certainty about rates for the first five years.” This is a notable advantage over emissions trading regimes in which the price of GHG emissions is subject to market fluctuation.

In addition, a low initial rate followed by a gradual increase may reduce public opposition to the tax and increase its political viability. However, given increasing opposition to the tax in British Columbia it appears as though a gradual phase-in alone cannot ensure popular support or acceptance for the taxation of GHG emissions. On the contrary, the Organisation for Economic Cooperation and Development concluded that political viability of environmental taxes and other economic instruments, like emissions trading, ultimately depends on the public’s understanding of the environmental problem, the purpose of the economic instrument, and the perceived fairness of the instrument itself. The Provincial Government attempted to improve public understanding through an extended series of announcements and legislative measures, beginning with the Throne Speech in February 2007, along with using the revenues collected from the tax to enhance its perceived fairness.

**D. Use of Revenue**

According to the Provincial Budget, the British Columbia carbon tax is anticipated to raise $338 million in its first year, $631 million in 2009/10, and $880 million in 2010/11. Unlike the carbon tax in Quebec, which dedicates revenues to a Green Fund in support of spending initiatives

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74. Id. at 11.
75. Id.
78. Fowlie, supra note 64.
79. ORG. FOR ECON. CO-OPERATION AND DEV., supra note 77, at 21–22.
announced in the Province’s Climate Change Action Plan, the British Columbia carbon tax is intended to be “revenue neutral”—with all revenues from the tax “recycled” back to individuals and businesses in the form of personal and corporate income tax cuts, and a refundable Climate Action Tax Credit for low-income households. Through these measures and additional corporate income tax cuts scheduled for 2010 and 2011, the budget projects that revenue reductions for the fiscal years 2008/09 to 2010/11 will match the expected revenues raised by the carbon tax.

In order to ensure that the carbon tax remains revenue neutral, the implementing legislation includes provisions requiring the provincial Minister of Finance to prepare and submit annual plans to the provincial legislature, projecting over a three-year period both the revenues that the carbon tax is estimated to collect and the revenues that are expected to be returned to taxpayers through tax reductions, exemptions, or credits. If the Minister fails to ensure that carbon-tax revenues are fully recycled through these “revenue measures,” the legislation imposes a personal penalty in the form of a salary reduction of 15%. In addition to this revenue recycling the budget also announced a one-time Climate Action Dividend of $100 per person funded from the Province’s 2007/08 surplus and paid to all residents on December 31, 2007. According to the budget, this payment was “intended to help British Columbians make changes to reduce their use of fossil fuels.” More cynically, perhaps, the payment (which was distributed in the month of June, immediately before the tax came into effect on July 1, 2008) may have been intended to reduce public opposition to the tax by providing a “sweetener” to accompany its introduction. In practice, however, the

82. See B.C. BUDGET 2008, supra note 22, at 104–05 (announcing rate reductions of 2% in 2008 and 5% in 2009 for the lowest two brackets of provincial personal income tax, and reductions in the general and small business corporate income tax rates of 1% effective July 1, 2008).
83. See id. at 103 (announcing an annual refundable credit, “[t]o help low-income individuals and families with the carbon taxes they pay and as part of the government’s commitment that the carbon tax be revenue neutral,” of $100 per adult and $30 per child, reduced by 2% of net family income exceeding $30,000 for individuals and $35,000 for families).
84. See id. at 15 (proposing cuts in 2010 and 2011 for the general corporate tax rate and the small business corporate income tax rate).
85. Id.
86. Carbon Tax Act 2008, S.B.C. ch. 40, § 3(2) (Can.).
87. Id. § 5(3).
89. Id.
“dividend” may have heightened public awareness and hostility to the new tax—exemplified by the common complaint that the payment “barely covers an average fill-up at current gas prices.”

Whatever its political impact, the Climate Action Dividend has been rightly criticized on the grounds that the amount of the payment is insufficient to finance meaningful household expenditures on emissions reduction measures. Additionally, the surplus might have been better spent on public initiatives to reduce GHG emissions, such as improved public transit or a program to improve the energy efficiency of low-income housing. In contrast, the recycling of carbon tax revenues through personal and corporate income tax rate reductions and the introduction of a refundable tax credit for low-income households may be justified by economic efficiency, tax equity, and political reality. From an efficiency perspective, economists widely conclude that a shift from economically-distorting taxes on economic “goods,” like the production of income, to cost-internalizing taxes on environmental “bads,” like GHG emissions, should produce a so-called “double dividend” in the form of enhanced environmental protection and improved economic efficiency. From a tax-equity or fairness perspective, the introduction of a refundable tax credit for low-income households represents an attractive measure to offset the potential regressivity of a carbon tax, which is apt to impose a larger relative burden on low-income individuals and families who are likely to devote a larger share of their incomes to the consumption of goods and services. Politically, a firm commitment to revenue neutrality should lessen popular opposition to the tax as a new levy designed to increase


92. See e.g., ORG. FOR ECON. CO-OPERATION AND DEV., supra note 40, at 35 (asserting that a double dividend occurs with more effective environmental protection and a reduction in other distortionary taxes).

93. See ORG. FOR ECON. CO-OPERATION AND DEV., supra note 77, at 134–49 (explaining that energy taxes tend to be income regressive, and direct mitigation measures should be used to reduce the impact on household income in order to compensate for the larger burden on low-income families). A similar argument can be made in support of special measures to offset increased costs faced by residents of rural and Northern communities who may find it difficult to make adjustments to reduce transportation and heating costs. See, e.g., Official Report of Debates of the Legislative Assembly, 26 HANSARD 9, 9840 (afternoon sitting Feb. 20, 2008) (statement of Bob Simpson, Member of the Legis. Assemb., Cariboo North, B.C.), available at http://www.leg.bc.ca/hansard/38th4th/H0220pm-09.pdf (“Our lifestyles are fundamentally different, and putting an incremental tax on fuels adds additional burdens to people who live in rural B.C. . . . .”).
government revenues. In practice, however, recent polls suggest that most Canadians would prefer to see carbon tax revenues devoted to investments in renewable energy and energy efficiency, rather than cuts in income taxes.94

III. IMPLICATIONS

When British Columbia announced that it would introduce a carbon tax in February 2008, the Provincial Budget confidently proclaimed that “[a] rare consensus has formed in British Columbia among individuals, certain business interests, environmental organizations, and economists that a carbon tax is a key and necessary tool in the move to reduce GHG emissions . . . .”95 Indeed, although the tax was immediately condemned by some business organizations and at least one conservative policy institute,96 it was warmly welcomed by most environmental organizations,97 and continues to enjoy the support of several business interests in the Province.98 In May 2008, two polls indicated that Canadians supported the idea of a carbon tax at the national level. Sixty-one percent of respondents stated they supported a tax on businesses and people based on the carbon emissions that they generate,99 and 72% described the introduction of the British Columbia carbon tax as a positive step.100

As gasoline prices soared during the spring and early summer of 2008 and the Canadian economy began to experience the effects of an economic

94. See, e.g., Mike De Souza, Carbon Tax Gaining Support Across Canada: Poll, CANWEST NEWS SERVICE (Ottawa), May 25, 2008, http://www.canada.com/topics/news/story.html?id=ce28d5ed4-5404-4ade-a748-0352268d392e (reporting that 47% of respondents thought that “revenues should be spent on ‘renewable energy like wind and solar power’ and 16 per cent [sic] said they wanted to see more spending on ‘energy efficient technologies’”).
97. See id. (quoting representatives of the Suzuki Foundation and the Sierra Club of British Columbia).
100. See, De Souza, supra note 94 (noting that “72 per cent [sic] of those surveyed” in a poll discussing British Columbia’s recently introduced carbon tax on fossil fuels “said that it was a positive step”).
downturn, however, whatever consensus may have existed when the British Columbia carbon tax was first announced on February 19 appears to have disappeared by the time it became effective on July 1. In mid-June, the Leader of British Columbia’s Opposition NDP launched an “axe the tax” campaign,\textsuperscript{101} invoking an anti-tax slogan that sits uncomfortably with the party’s social-democratic orientation. By the end of August, polls showed that the New Democratic Party had more popular support than the governing Liberal Party for the first time in several years.\textsuperscript{102}

In the meantime, the Federal Liberal Party, under Leader Stéphane Dion, released a “Green Shift” tax plan on June 19\textsuperscript{103} proposing a revenue-neutral carbon tax modeled on the British Columbia tax that would commence at $10 per ton of CO\textsubscript{2}e emissions and rise to $40 per ton within four years.\textsuperscript{104} Incorporating scheduled reductions in personal and corporate income tax rates,\textsuperscript{105} new or enhanced refundable tax credits for low-income individuals and families,\textsuperscript{106} and tax incentives for green technologies,\textsuperscript{107} the Green Shift plan would also introduce a legislative requirement for revenue neutrality by mandating the Federal Auditor General to annually monitor carbon tax revenues and foregone revenues resulting from rate reductions, exemptions, and credits.\textsuperscript{108} Unlike the British Columbia carbon tax, however, the Green Shift plan would exempt gasoline on the basis that this category of fossil fuel is already subject to an effective tax rate of $42 per ton of CO\textsubscript{2}e emissions under the existing federal tax on motor fuels.\textsuperscript{109}

\textsuperscript{101} See New Democrat: Official Opposition, Axe the Gas Tax (June 16, 2008), http://www.bcndpcaucus.ca/en/axethegastax (contending that Gordon Campell’s new fuel tax targets consumers who already are suffering from high gas prices while being ineffective in combating climate change).


\textsuperscript{105} See id. at 6–9 (proposing to reduce the lowest rate of personal income tax as well as to reduce the general and small business corporate income tax rates).

\textsuperscript{106} See id. at 7–8 (proposing to introduce a new child tax benefit worth $350 per child, to replace the existing employment tax credit with a refundable credit targeted at individuals earning less than $50,000 per year, to enrich the Working Income Tax Benefit by eliminating a $3,000 income threshold below which the benefit is currently unavailable, and to make the Disability Tax Credit refundable).

\textsuperscript{107} See id. at 9 (proposing accelerated depreciation rates and refundable tax credits to encourage the development of green technologies).

\textsuperscript{108} Id. at 6.

\textsuperscript{109} Id.
plan would also create an annual “Green Rural Credit” of $150 for every Canadian residing in a rural area and an enhanced deduction for northern residents to lessen the impact of the tax on individuals who face higher transportation and heating expenses.\footnote{110}{Id. at 8.}

While the exemption for gasoline, the credit for rural residents, and the enhanced deduction for northern residents appear to have been designed primarily for political reasons, the tax measures for rural and northern residents also address an important fairness concern resulting from the prospect that the tax might fall more heavily on these individuals. To the extent that the existing motor fuel tax constitutes a form of benefit-taxation designed to finance public expenditures on roads and highways, however, it is more difficult to justify the exemption of gasoline from the proposed carbon tax.

Not surprisingly, given its libertarian predispositions and its unwillingness to adopt aggressive policies to limit GHG emissions, the governing Federal Conservative Party was quick to attack the Liberal Party’s Green Shift plan, characterizing it as a tax increase that “will not be revenue neutral,”\footnote{111}{Fitzpatrick, supra note 103 (quoting Prime Minister Stephen Harper).} and launching radio advertisements attacking the plan and Liberal Party Leader Stéphane Dion.\footnote{112}{David Akin, Tories Launch New Attack on Liberal Green Plan, NAT’L POST (Toronto), Aug. 4, 2008, \url{available at http://www.nationalpost.com/related/topics/story.html?id=700261}.} Denouncing the Green Shift plan as “crazy” and “insane,”\footnote{113}{Id. (“Prime Minister Stephen Harper’s denunciation of Mr. Dion’s plan as ‘crazy’ and ‘insane’”).} Prime Minister Stephen Harper labeled the plan a “‘green shaft’ that will stifle the Canadian economy” and “take this country back to the tax-and-spend policies of the past.”\footnote{114}{Chris Morris, Liberal Green Shift is ‘Green Shaft,’ Says Harper, TORONTO STAR, Aug. 14, 2008, \url{http://www.thestar.com/News/Canada/article/478887}.}

Although the Conservative Party’s characterization of the Green Shift plan as a tax increase to support larger government spending constitutes a deliberate misrepresentation of the proposal, opinion polls conducted during the summer of 2008 suggest that the Prime Minister’s denunciations and the Conservative Party’s attack ads had a significant impact on popular support for the plan as well as for the Federal Liberal and Conservative Parties. While a poll conducted in July found that 51% of respondents supported the Green Shift plan and 41% were opposed, a poll conducted at the end of August found that 52% opposed the plan and 45% were in
favor. More significantly from a political perspective, while polls conducted in early August suggested that the Conservative Party’s attacks on the Green Shift plan and the Liberal Leader had not had a noticeable effect on popular support for these federal political parties, a poll released in early September indicated that support for the Federal Conservative Party had pulled significantly ahead of the support for the Federal Liberals.

In this circumstance, the Prime Minister called a federal election on September 7, seeking to capitalize on its rise in the polls and secure the legislative majority that it was denied in January 2006. Campaigning against the Liberal Party’s Green Shift plan, the Conservative Party fell short of its majority when the election was held on October 14, but increased its share of the popular vote and obtained nineteen more seats in the House of Commons. In contrast, popular support for the Liberal Party fell by 4% and the Party lost twenty-seven seats in the House. A week after the election, Stéphane Dion resigned as Liberal Leader, blaming “the massive Conservative advertising onslaught against him personally and against his carbon-tax-based Green Shift environmental policy” for the disappointing election outcome.

In British Columbia, where the introduction of a provincial carbon tax appears to have cost the governing Liberal Party considerable political support, the next election is scheduled for May 12, 2009, giving the Government little time to reverse its sagging political fortunes. Although the provincial Premier has not backed away from the carbon tax, recent

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116. See Akin, supra note 112 (“Nationally, support for the Conservatives is at 34%, up two percentage points over the last six weeks, while the Liberals are at 30%, down two percentage points.”).


120. Id.


122. B.C. Poll Fires a Warning Shot for Federal and Provincial Liberals, supra note 102.

123. According to the British Columbia Constitution Act, provincial elections must be held on fixed dates, which are the second Tuesday in May every four years after May 17, 2005. Constitution Act, R.S.B.C. ch. 66, § 23(2) (Can.).
statements suggest that the Government has opted to downplay the carbon tax after the federal election, emphasizing instead infrastructure spending and accelerated income-tax cuts to combat the economic downturn. Whether the British Columbia carbon tax survives the provincial election next spring remains to be determined.

CONCLUSION

As an economic instrument to combat global climate change by placing a price on GHG emissions, there is much to favor in the use of environmental taxes like the British Columbia carbon tax. Nonetheless, as experience at the federal level and in British Columbia suggests, the introduction of a consumption-based tax on GHG emissions is likely to be politically difficult, irrespective of its merits in terms of environmental effectiveness, economic efficiency, and distributional fairness. Reflecting on this experience, however, a number of suggestions emerge regarding ways in which a carbon tax might be made politically more appealing.

First, as the New Democratic Party’s objection to the tax in British Columbia demonstrates, it is unwise to introduce a consumption-based tax on the combustion of fossil fuels without simultaneously announcing a comprehensive tax or emissions trading regime to address GHG emissions from industrial processes and other sources like waste disposal and agriculture. By leaving the regulation of these sectors to subsequent measures, such as the future emissions trading regime established under the Western Climate Initiative, the British Columbia Government opened itself to accusations that it was placing “all of the burden on individuals instead of big polluters.”

Second, in order to address fairness considerations concerning the distributional impact of the tax, the tax should be accompanied by other measures to compensate for increased and largely unavoidable tax burdens. Examples include the Climate Action Tax Credit for low-income households announced in British Columbia’s 2008 Provincial Budget and


125. See generally, STERN, supra note 7, at 351–67 (explaining that a tax-based approach will raise public revenues and can be used for short term flexibility as to how, where, and when emissions are reduced, while providing long term quantity goals to limit the risk of catastrophic environmental damage).

126. New Carbon Tax Receives Praise, Sparks Criticism, supra note 51.
the Green Rural Credit proposed in the Federal Liberal Party’s Green Shift plan.

Third, the political viability of a carbon tax may also be enhanced by legislative measures to ensure revenue neutrality—though these measures must be clearly explained and vigorously defended in order to prevent the deliberate mischaracterization of the tax as a tax increase. Alternatively, as at least one Canadian poll suggests, the political viability of a carbon tax may also be enhanced by dedicating the revenues that it yields to investments in renewable energy and energy efficiency, as was done in Quebec. While the revenue-recycling measures accompanying the British Columbia carbon tax likely improved its political acceptance, the payment of a Climate Action Dividend to all residents of the Province appears to have been a poorly-conceived attempt to lessen public opposition to the tax, which may have had the opposite effect by drawing public attention to the new tax at the same time as it came into effect.

Fourth, phasing in a carbon tax may enhance its political viability. By beginning with relatively low rates and gradually increasing them over time according to a schedule set out when the tax is first introduced, political opposition may be lessened. As British Columbia’s 2008 Provincial Budget explains, this approach “gives individuals and businesses time to make adjustments and respects decisions made prior to the announcement of the tax” and provides certainty about tax rates during this phase-in period.

Fifth, competitiveness concerns are best addressed by implementing border tax adjustments that would impose carbon taxes on the embedded-carbon content of goods imported into the jurisdiction and exempt embedded carbon taxes on goods and services that are exported from the jurisdiction. Although these kinds of border tax adjustments are difficult to devise for a broad-based carbon tax and would have to satisfy international trade rules, these kinds of arrangements are apt to be essential if jurisdictionally-specific carbon taxes are to have any hope of long-term viability.

Finally, as shifting public opinion in British Columbia and Canada demonstrates, popular support and acceptance of a carbon tax may depend on the timing of its introduction, considering prevailing fuel prices and

127. De Souza, supra note 94.
128. Regulation Respecting the Annual Duty Payable to the Green Fund, 2008 R.R.Q. ch. R-6.01, r.0.2.3.1 (Can.).
130. Courchene & Allan, supra note 57.
131. See generally, ORG. FOR ECON. CO-OPERATION AND DEV., supra note 77, at 89–106 (discussing border tax adjustments in environmentally related taxes).
economic conditions. While the introduction of a carbon tax appears to have been politically popular in British Columbia and Canada in the spring and early summer of 2008, opposition grew as gas prices increased and economic conditions deteriorated. Whether carbon taxes can garner support in tougher economic times remains to be determined.
THE “GIFT” THAT KEEPS ON GIVING: GLOBAL WARMING MEETS THE COMMON LAW

Robert H. Cutting∗ & Lawrence B. Cahoon ∗∗

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Global warming issues have captured an Oscar, a Nobel Prize and the mainstream media’s attention. There is significant consensus in the scientific community that global warming is real, most likely due to anthropogenic sources (traceable to the Industrial Revolution), and that it is likely to cost trillions of dollars in health effects; and loss of property, crops, and species; and adverse effects on national security, as described in great detail by the 2007 Intergovernmental Panel on Climate Change (IPCC) report. Greenhouse gas (GHG) emissions are a waste-disposal method for sectors such as power generation and transportation used to save the cost of waste containment at the expense of effects on ground receptors and the planet. In response to U.S. federal inactivity, states have initiated creative legislative schemes, but the federal government has actively resisted most of these efforts through litigation. States have now filed public nuisance actions utilizing federal and state common law claims to protect those who actually suffer damages. This article explores the revitalized use of the common law as a residual or default tool for public prosecutors and public entities when national policy and statutory remedies prove inadequate. The trial court decisions are on appeal and we argue that they erred on the key constitutional issue of justiciability. Reviewing courts may consider displacement of federal common law as well as preemption of state actions. These cases fuel the debate—even if they are ultimately unsuccessful in the courts, displaced by constructive legislative action, or preempted by disruptive legislation—by (1) providing public information; (2) identifying real costs, liabilities, and exposure for the regulated community, the public, politicians, investors, and regulators; and (3) forcing some action by the legislative or executive branches as a result. We offer trespass as an additional theory to compel the internalization of the real costs of pollution by focusing on all the effects of the invasion of public and private space (i.e. property) once pollutants exit generators’ property lines. Trespass may better reconcile the law with science and economics. Scientists understand that they do not know enough about the short and long-term effects of the materials commonly found in the environment. Thus, the current regulatory system permits waste disposal on public and private property without adequate knowledge about the effects of such materials and without provisions for their undetermined future harms. These external social costs constitute market failures that violate free market principles because production costs are passed on to the public (as test subjects) rather than borne by the generators’ customers. Public nuisance actions offer one method for efficient internalization of global warming’s true costs, while trespass offers yet another theory by accounting for waste at the property boundary. In addition, government may incur liability for a Fifth Amendment taking of receptors’ rights by permitting the trespassing emissions, a result that could encourage some governmental response.
INTRODUCTION

Global warming issues have captured an Oscar, the Nobel Prize, and the attention of mainstream media and main street America. There is significant consensus in the scientific community that global warming is real and due to anthropogenic sources traceable to the Industrial Revolution, and that it is likely to cost trillions of dollars in health effects; loss of property, crops, and species; and adverse effects on national security.\(^1\) Greenhouse gas (GHG) emissions are a waste-disposal method for sectors such as power generation and transportation used to save the costs of waste containment by passing the effects on to ground receptors and the planet.\(^2\) Although some may welcome a Northwest Passage and other consequences of warming, the net costs in disrupted lives, lost territory, and national security are staggering.\(^3\) States allege in court filings that tens of millions of dollars are already being spent to analyze and plan for the “phenomenon commonly known as global warming.”\(^4\) The United Nations’ figures document substantial mortality to date and into the future.\(^5\) Projected costs are so great that doing nothing is not a reasonable option—either we must reverse the process or, if the tipping point has been reached, we must prepare for the consequences.\(^6\) The evidence is so overwhelming

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2. For an excellent discussion of the scientific underpinnings of global warming and the need for increased research and development expenditures in power generation, see Frank Princiotta, The Role of Power Generation Technology in Mitigating Global Climate Change, 18 DUKE ENVTL. L. & POL’Y F. 251, 265–68, 274 (2008).

3. Currently, international trade routes are being threatened by melting sea caps in the Arctic. This is especially apparent in the Northwest Passage, a trans-Arctic shipping route serving as a fulcrum to international markets. For a discussion of the ecological, economical, and societal effects associated with the problems in the Northwest Passage, see Robert W. Corell, Challenges of Climate Change: An Arctic Perspective, 35 AMBIO: J. OF THE HUMAN ENV’T. 140, 150–53 (2006).


6. A former EPA official recently informed Congress about how the Bush Administration stifled testimony regarding the health hazards of global warming. See Andrew C. Revkin, Cheney’s Office Said to Edit Draft Testimony on Warming, N.Y. TIMES, July 9, 2008, at 12 (describing how former EPA official, Jason K. Burnett, was ordered to edit portions of the climate testimony).
that the U.S. Supreme Court held that the Environmental Protection Agency (EPA) must consider carbon dioxide (CO\textsubscript{2}) and other GHGs to be “pollutants” under the Clean Air Act (CAA)—but the Court also reaffirmed the discretion of a presidential administration to do little or nothing about it.\textsuperscript{7} The states recently returned to court, in \textit{Massachusetts v. Environmental Protection Agency} (\textit{Mass. v. EPA}), to compel the issuance of regulations.\textsuperscript{8} Further, the EPA recently issued an advance public notice of rulemaking soliciting comments on proposals to regulate GHGs under the CAA, but neither took a position on GHGs nor accepted that they pose any human health risk.\textsuperscript{9} The question now is how to reduce GHG emissions and address the effects—an inquiry made much more difficult because of vast data gaps and the limitations of current regulatory schemes.\textsuperscript{10}

If this cloud has any silver lining, it is that there are opportunities to implement transportation, energy, and even lifestyle changes\textsuperscript{11} that reduce GHG emissions and also benefit nearly every other sector of our environment. Thinking in long time-frames to calculate the full impact is essential, but its not something most Americans are used to. However, we


\textsuperscript{9} See Regulating Greenhouse Gas Emissions under the Clean Air Act, 40 C.F.R. 1 (proposed June 17, 2008) (questioning whether the EPA has the authority under the Clean Air Act to regulate greenhouse gas emissions); Advanced Notice of Proposed Rulemaking, http://www.epa.gov/epahome/pdf/anpr20080711.pdf.

\textsuperscript{10} See Robert H. Cutting & Lawrence B. Cahoon, \textit{Thinking Outside the Box: Property Rights as a Key to Environmental Protection}, 22 PACE ENVTL. L. REV. 55, 64–67 (2005) (addressing the impact of environmental externalities and the lack of regulatory enforcement against these externalities).

\textsuperscript{11} William Ruckelshaus, then Administrator of the EPA, called for Americans to modify their lifestyles when necessary to reclaim and preserve our resources:

\begin{quote}
Are we so accustomed to installment credit that we are willing to purchase our life-style affluence today at the expense of a better tomorrow? If it came to a choice, would we consciously squander our resources and foreclose our children's future? I don't believe we would. Up to now the average citizen hasn't had the foggiest notion of what choices were available, or indeed that there were any choices at all. Once people understand what is at stake and what's required, they will do what needs to be done. With persistence we can pay our debt to the past by reclaiming the purity of our air, water and land. With hard work and some sacrifice we can pass on to our children and grandchildren a world of beauty, order and serenity.
\end{quote}

must do so because a longer-term outlook reveals jeopardy to real assets, such as expensive beach and waterfront properties, as well as potentially devastating health impacts. Additional costs involve damage to infrastructure, real estate, financial institutions, and insurers (and with costs to the public for protection and maintenance as well as potential lost tax base).\textsuperscript{12} The problem is how to convince the American people that while global warming seems abstract and far away, it will likely dramatically affect their children and grandchildren.\textsuperscript{13}

Recognition by economists and the business sector that the world is nearly economically “flat” also makes it more difficult for economists to deny the transboundary effects of pollution.\textsuperscript{14} In his newest book, \textit{Hot, Flat and Crowded}, Thomas Friedman makes the connection: bad environmental policies can damage the global economy while good policies lead to economic opportunity, much as the Council on Environmental Quality concluded in 1972.\textsuperscript{15} However, the cost savings from avoiding GHG reductions are also enormous, a huge short-term incentive to pollute.\textsuperscript{16} We, along with others, have suggested that free trade agreements offer some leverage. At present, the World Trade Organization, the North American Free Trade Agreement, and Central America Free Trade Agreement

\begin{footnotes}
\item[12] See James L. Huffman, \textit{Environmental Protection and the Politics of Property Rights: The Public Interest in Private Property Rights}, 50 \textit{OKLA. L. REV.} 377, 387-88 (1997) (emphasizing the need to consider future generations in current resource allocation decisions in hope that it may lead to practices favoring conservation as opposed to consumption).
\item[13] The original Americans and legions of other societies take a generational view, even as the temptation of current consumption has proven too much for many. As previously suggested, perhaps we need a revision of the Golden Rule: “Do unto others as you would have them do to your children.” Robert H. Cutting, “\textit{One Man’s Ceiling is Another Man’s Floor}”: Property Rights as the Double-Edged Sword, 31 \textit{ENVTL. L.} 819, 883 (2001). See generally Jared Diamond, \textit{Collapse: How Societies Choose to Fail or Succeed} 419-85 (2005) (analyzing cultural adaptations to environmental changes); Jared Diamond, \textit{Guns, Germs & Steel: The Fates of Human Societies} 239–64 (1999) (evaluating the effects of technology on diverse cultures).
\item[14] Thomas Friedman, \textit{The World Is Flat: A Brief History of the Twenty-First Century} 411–12 (Farrar, Straus & Giroux eds., 2005) (finding that the transboundary effects of pollution result from the “Economy of Nature” where, for example, wind carries pollutants); see also Thomas Friedman, \textit{Hot, Flat, and Crowded—Why We Need a Green Revolution—and How It Can Renew America} (Farrar, Straus & Giroux eds., 2008) [hereinafter \textit{Hot, Flat, and Crowded}] (discussing the global environmental crisis).
\item[15] Council on Environmental Quality, \textit{The Economic Costs of Pollution Control: A Summary of Recent Studies} (1972) (a report by major accounting firms that concluded, sector by sector, that the net effect of pollution control would be positive); Environmental Pollution Panel, President’s Science Advisory Committee, \textit{Restoring the Quality of Our Environment} 197 (1965); \textit{Hot, Flat, and Crowded}, supra note 14.
\item[16] It would be interesting to compare the costs saved by generators during the Bush II Administration with the total amount spent in both elections by President Bush and a majority of Congress.
\end{footnotes}
(CAFTA) encourage migration to pollution-friendly economies.\textsuperscript{17} This actually exacerbates the GHG problem by providing an unfair competitive advantage to the interests that do not internalize the costs.\textsuperscript{18}

This article explores the revitalized use of the common law as a residual or default tool for public prosecutors and public entities when national policy and statutory remedies prove inadequate to prevent serious environmental consequences. Current cases by a consortium of states’ attorneys general, Native American groups, and non-governmental organizations (NGOs) focus on public nuisance as the legal vehicle. A case now pending in the Second Circuit involves power plant emissions from sources representing ten percent of the total worldwide emissions, and in the Ninth Circuit a case involves six motor vehicle manufacturers representing twenty percent of U.S. CO\textsubscript{2} emissions.\textsuperscript{19} There are several reasons why these cases should be successful, but even if they are unsuccessful, displaced by constructive legislative action or preempted by disruptive legislation, they remain useful for several reasons: (1) informing the public; (2) identifying real costs, liabilities, and exposure for the regulated community, the public, politicians, investors, and regulators; and (3) forcing some action by the legislative or executive branches as a result. Some commentators argue that damage claims in these and similar actions effectively implement a judicial “green tax,” which is arguably economically preferable to the relatively crude allocation of costs in cap-and-trade systems.\textsuperscript{20} We agree, but note that the tax must include the damage claims in the public nuisance actions and any other consequential damages.

Two federal district courts in \textit{Connecticut v. American Electric Power Co. (AEP)} and \textit{California v. General Motors Corp. (California v. GM)} declined jurisdiction based on the separation of powers doctrine.\textsuperscript{21} The Bush Administration has to date retained control of the issue and is running out the clock by denying California (and several other states) a waiver to set

\textsuperscript{17} Cutting & Cahoon, \textit{supra} note 10, at 88–90.

\textsuperscript{18} See Patti A. Goldman, \textit{Resolving the Trade and Environment Debate: In Search of a Neutral Forum and Neutral Principles}, 49 \textit{WASH. \\& LEE L. REV.} 1279, 1290–92 (1992) (arguing that the primary defect in the international trade system is the absence of a mandate requiring countries to internalize environmental impacts).


its own GHG emission standards. The Bush Administration also refuses to make a finding of “endangerment” or set federal standards, thus forcing the Mass. v. EPA parties to petition the EPA to take a more active regulatory role in curbing emissions.22

The recent political climate has seen decision makers reluctant to embrace the issue of global warming. For instance, the 110th Congress’s major GHG legislation was eliminated with the defeat of the Lieberman-Warner Climate Security Act in 2008.23 This may change completely following the 2008 presidential election, but it will take any new administration a good deal of time to attempt to rebuild the EPA and implement real GHG reduction plans even if enabling legislation is passed quickly. Even then, neither Congress nor the new administration is likely to seek redress for harms already suffered. Fortunately, the scientific community is well-armed, even if under-funded. The question is: Who has the political will to take on significant sources of emissions on behalf of those directly affected? That is where the common law litigation fits in.

We offer trespass as a complementary state law test based on objective property lines that may add a twist to the already formidable evidence from the nuisance cases. Trespass remedies might compel internalization of costs more directly by restricting transboundary emissions.24 And although legislatures may attempt to legalize a public nuisance, it is not likely that they can legalize a trespassory invasion.25

This is the constitutional dimension. When government authorizes a physical incursion, however small, there is U.S. Supreme Court precedent to support the position that it should be considered a Fifth Amendment taking.26 Thus, government may also be accountable for what it has already permitted to occur or the statute that authorized the intrusion might be


24. Cutting, supra note 13, at 879. See also Cutting & Cahoon, supra note 10, at 73 (stating that internalization of costs that are passed on to others is one factor state courts have considered in a nuisance claim).

25. See infra pp. 53–59 (discussing “takings” decisions, specifically Loretto, Causby, and Bormann).

26. Id.
voided.27 Trespass also offers some reconciliation of law and policy with our understanding of ecosystems and ecosystem management by requiring accountability for the effects of any trespass, including pollutants, beyond the source property.28 Ironically, trespass does so by protecting the property rights of public and private receptors of the trespassing materials.29 The nuisance and Fifth Amendment “takings” theories are not flawless and litigation will not solve all the problems associated with global warming. However, we argue that pressure from litigation could spur action among the public and the other branches of government.

Property rights have often been invoked as justification for pollutant generators’ actions on their own properties and to restrain the ability of government to limit pollution.30 As Professor Rose notes: “Landowners [are] accustomed to regarding their land as their property, but they simultaneously regard the adjacent air, water, and wildlife as goods that are free for the taking . . . ”31 We have previously argued that a return to traditional definitions and protections of property rights may be used to control pollution at its source.32 As illustrated in Figure 1 below, property rights are a three-dimensional concept, protecting subsurface, surface, and airspace rights.

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27. Id.
32. Cutting & Cahoon, supra note 10, at 58–59. A return to pre-Industrial Revolution property law should have some appeal for strict constructionists.
By definition, in the U.S., anything that moves outside generators’ property lines is inside the property lines of other private or public landowners, known as “receptors.” To protect the rest of us—receptors—the burden should be on the generator to identify, capture, and retain all discharges and thus eliminate any invasion or demonstrate the consent of the receptor. Otherwise, there is “market failure” because customers do not pay the full cost of the product, which should include environmental damage and health effects over both the short and long-term.

34. Cutting, supra note 13, at 819.
35. See Clifford Richtschaffen & David L. Markell, Reinventing Environmental Enforcement & the State/Federal Relationship 227 (2003) (noting the efficacy of internal industry regulatory procedures and its positive effect on governmental regulatory efforts); Alex, supra note 4, at 166 (discussing California’s lawsuit against the auto industry for damages for its contribution to global warming); Cutting & Cahoon, supra note 10, at 58–59 (“burden should be on the generator to identify, and contain or mitigate all transboundary effect”).
36. Environmental Pollution Panel, supra note 15, at 1–2, 5–7, 10–15. See also J.H. Dales, Pollution Property & Prices: An Essay in Policy-Making and Economics 7–8 (1970); Erik T. Verhoef, Externalities, in Handbook of Environmental and Resource Economics 197, 199 (Jeroen C.J.M. van den Bergh ed., 1999); Huffman, supra note 12, at 380 n.11, 383–84 (arguing that the rights attaching to private property and economic interests are not currently exercised in ways which take into consideration environmental consequences); William Simmons & Robert H. Cutting, Jr., A
Recent federal public nuisance actions by several state attorneys general and NGOs focus on protecting receptors’ property rights from the effects of generators’ GHG emissions. At this stage in history, given the forecasted stakes, the claims ought certainly to be verified and quantified, if necessary, through proof in court. The 2007 Intergovernmental Panel on Climate Change (IPCC) report reduces uncertainty about causality and consequences beyond a reasonable doubt threshold. The evidence-based forum of the courts could allow disposal of these issues should so-called “contrarians” seek to challenge this basic premise, much as trial courts have disposed of the claims of “scientific creationism” and “intelligent design.” If the Second and Ninth Circuits or the U.S. Supreme Court reverse and remand the cases for trial on the merits, the plaintiffs still face at least four balancing points subject to extensive trial court discretion before the remedy phase. Importantly, the courts must address the technical feasibility of potential remedies and any remedy’s relative economic hardship on the parties. Plaintiffs are ready to provide proof—
an admirable and formidable task in itself—and the alleged facts certainly project problems on a scale worthy of judicial fact-finding.44

I. THE OPPORTUNITY: THAT “BIG BLUE SKY”

A. The Science in a Nutshell

The claims that are at issue in the public nuisance cases are substantial and include harm to persons and property mediated through atmospheric, oceanic, and terrestrial processes.45 The basic greenhouse model holds that increases in radiative forcing by GHG pollution drive increases in the temperature of the Earth’s land, oceans, and atmosphere as well as changes in the circulation of the fluids (air and water) at Earth’s surface.46 Thus, the effects of global warming manifest as both direct temperature increases and less direct effects on weather patterns, including wind flow, precipitation, humidity, storm formation, and seasonality.47 Concededly, most of the damage from global warming is not directly inflicted by the trespassing GHGs themselves, but by the inherent heat-trapping properties of those trespassing particles.48 Note, however, that some GHGs are also directly toxic to people and cause other forms of damage; in some cases those effects have been well documented. For example, ozone is a GHG that is continually produced and destroyed in the atmosphere by chemical reactions.49 In the troposphere, human activities have increased ozone through the release of gases such as carbon monoxide, hydrocarbons, and nitrogen oxide, which chemically react to produce ozone, a gas listed by the EPA as a priority air pollutant and a dangerous component of


46. IPCC SYNTHESIS REPORT, supra note 38, at 37. For a more extensive discussion in lay terms, see HOT, FLAT, AND CROWDED, supra note 14, at 123–27.

47. Id. at 31–33.

48. Id. at 81–82.

49. Id. at 48, 85.
photochemical smog.50 Carbon monoxide is toxic and also acts as a GHG, albeit with much less radiative effect than CO₂.51 Halocarbon compounds, many of which were addressed by the Montreal Protocol52 as ozone-depleting agents, are also potent GHGs.53 Aerosols, although technically not gases because they are suspended and not dissolved in the air, include soot and other fine particulates that function as warming agents and also as toxicants to humans.54 Thus, while the major issue with GHG emissions is climate forcing, collateral damages and direct harm from GHG emissions are quite real.

The damages related to radiative forcing damages traceable to trespass by GHGs include, but are not limited to:

- Accelerated sea level rise and consequent coastal erosion, with losses of public and private coastal property and infrastructure (recent analyses show past and future sea level rise to be faster than thought even a few years ago),55
- Increased insurance uncertainty because of erosion, inundation, and new storm patterns.56 How long can the federal government subsidize flood insurance? Costs of repairs, replacement costs, loss of land, damage to infrastructure, and loss of tax base are all huge numbers. Funds for beach renourishment are already routinely zeroed out in the federal budget, shifting costs to states and coastal communities.57 Regulators are just now beginning to grapple with the projected landward shift of the oceans, although projections of the land likely to be affected have been available for some time;58

50. Id. at 37, 85, 88.
51. Id. at 143, 149
53. IPCC SYNTHESIS REPORT, supra note 38, at 82.
54. Id. at 39, 76.
55. B. F. Chao et al., Impact of Artificial Reservoir Water Impoundment on Global Sea Level Rise, 320 SCI. 212, 212–14 (2008) (adjusting estimates of sea level rise to account for water held in reservoirs).
• Losses of alpine glaciers as water sources and tourist attractions (consider Bolivia and Glacier National Park, respectively); 59
• Damages to private property and public infrastructure in boreal ecosystems because of melting of permafrost (consider Inuit and Inupiat villages and trans-Alaskan pipelines and roadways); 60
• Diminished precipitation in certain areas, creating drought and drier conditions than normal with effects on agriculture and risk of forest fires (consider Darfur and the Sahel regions in Africa and the western U.S.); 61
• Enhanced precipitation in some areas, with increased risk of flooding and increases in relative humidity forecast (consider north-central North America, with possible impacts on grain production by aflatoxins); 62
• Increased frequency of heat waves with consequent elevated mortality and morbidity in human populations (consider that heat waves are the leading environmental cause of death in the U.S., particularly in urban areas where the urban heat island effect magnifies increased background temperatures); 63
• Altered climate zones resulting from the synergistic effects of changing patterns of seasonal temperature and rainfall interacting with fixed day length patterns to produce “no-analog climate patterns” that yield regional scale climate zones unlike any seen before, or the elimination of climate zones we take for granted, 64 with effects on existing ecosystem services difficult to predict;
• Altered distributions of pathogens and disease vectors mediated by changes in climate patterns (consider spread of cholera and other water-borne diseases with changed rainfall patterns and resulting flooding, or spread of disease vectors); 65
• Damages to ecosystems with economic value to humans, notably agro-ecosystems, but also including coral reef ecosystems (via temperature-enhanced bleaching, enhanced ocean acidity, enhanced

59. Roger G. Barry, Alpine Climate Change and Cryospheric Responses: An Introduction, in CLIMATE AND HYDROLOGY IN MOUNTAIN AREAS 1, 3 (Carmen de Jong et al. eds., 2005).
62. IPCC SYNTHESIS REPORT, supra note 38, at 49.
63. Pawa, supra note 5, at 113.
64. Douglas Fox, Back to the No-Analog Future, 316 SCI. 823, 823 (2007).
65. IPCC SYNTHESIS REPORT, supra note 38, at 48.
precipitation, and runoff effects), temperate zone fisheries, and rain forest ecosystems;66

- Disruptions of global food supplies and trade prices owing to effects on agro-ecosystems and adverse effects on growing crops and animal production,67 including direct drought and flood damage effects, shifts in agricultural pathogen distributions under changing climate regimes, costs of adapting to altered growing conditions for major crops, and potentially disruptive “no-analog” climate shifts;68

- Enhanced frequency of severe weather, including but not limited to tropical cyclones, with concomitant enhanced damages to coastal property, infrastructure and economic interests;69

- Increased costs of civil planning, management, regulation, enforcement, insurance, and other responses to direct effects of global warming;70

- Increased costs of civil defense preparations, such as planning and response capacity for flooding, extreme weather, and other climate-related disasters;71

- Increased costs of military responses, including use of military resources in climate-related disaster relief operations and management of potential threats to national security caused or exacerbated by global warming (consider recent reports of national security challenges posed by impacts of global warming, including destabilization of governments in countries vulnerable to climate effects, conflicts over water and other natural resources, population displacement, disruption by climate-related natural disasters, and impacts on agricultural cash and subsistence cropping);72

- Increased mortality, morbidity, heat-related injuries, and health costs. Increased vector-borne disease transmission, medical and psychological casualties from severe weather incidents, and health

66. See John Costenbader, Michael L. Goo, Patrick A. Parenteau & Christopher A.G. Tulou, Climate Change and the Marine Environment, in OCEAN AND COASTAL LAW AND POLICY 571 (2008) (addressing the environmental affects of global warming on marine species); IPCC SYNTHESIS REPORT, supra note 38, at 33, 52.


68. Pawa, supra note 5, at 117.

69. IPCC SYNTHESIS REPORT, supra note 38, at 53.

70. Id. at 56–57.

71. Id.

72. See Alex Perry & Chad Iriba, How to Prevent the Next Darfur, TIME, May 7, 2007, at 38 (discussing the effects of global warming on African societies).
effects from increased wild fire incidents. These increased health-care costs will also likely result in substantial cost increases for government programs and private providers as well as workers and businesses;

- Increased costs as water becomes scarcer, especially given the IPCC’s regional forecasts, which predict steadily diminishing water supplies in the western U.S. and elsewhere and further reduction of the already diminished snow pack, which in California supplies thirty-five percent of its water. Subsequent increased costs on landscaping, parks, and open space, including needs for invasive species controls, irrigation, and water management practices, and management of endangered and threatened species.

- Increased electrical bills because of reduced hydroelectric generation and increased use of air conditioning;

- Increased response and rebuilding costs for disasters, such as flooding and fires. Property insurance costs have already climbed substantially in some areas, and some states have begun forming taxpayer-funded insurance pools that offer coverage when private insurers leave markets altogether or have sued private insurers to force them to provide coverage;

- Losses in tourism, a major force in the economies of most coastal states. Although, as cynics point out, there will always be a public beach, even if it is not where it once was;

- Increased costs for raw materials and utilities, including water, growing crops, mining, and timber.

By definition, GHGs enter the space of other property the moment they exit the generator’s property, hence if the pollutants were contained at the

73. IPCC SYNTHESIS REPORT, supra note 38, at 48, 51–54.
75. See Costenbader, Goo, Parenteau & Tulou, supra note 66, at 571–89 (describing the effects of global warming on the marine environment).
77. See Spencer S. Hsu, Insurers Retreat From Coasts; Katrina Losses May Force More Costs on Taxpayers, WASH. POST, Apr. 30, 2006, at A01 (describing how residents are using taxpayer-funded state insurance plans because private companies are shedding homeowners policies).
78. See OKMYUNG ET AL., supra note 67, at 10 (describing the impact of global warming on North Carolina beach recreation and tourism).
79. And enterprising counsel have already argued that coastal regulations should be relaxed since structures will be underwater in twenty to thirty years anyway!
80. IPCC SYNTHESIS REPORT, supra note 38, at 48.
border (something like the “Bubble Theory”), there would be no effects to other property and fewer effects to the “Economy of Nature.” Whether or not anthropogenic GHGs themselves cause damage (and some clearly do), eventually the invasion of private and public spaces produces results at the receptor properties. Science recognizes the resulting entry of heat, wind, fire, or moisture as second invasions, with differing effects depending on the character of the receptor property. Thus, an action by a public entity, such as an attorney general, would be ideal to intercept the problem at the generator’s boundaries.

B. The Opportunity

We have previously argued that transboundary pollution, such as GHG emissions, expose receptors, as “test subjects” of the pollution, to long-term and short-term damages that are external social costs, or “externalities.” This is a market failure because the customers do not pay all the production costs: those costs are borne by the receptors or the taxpayers (e.g., healthcare or cleanup costs). Consequently, GHG by-products adversely affect the “Economy of Nature” by adding pollutants to the natural systems and climate with unknown results and no mechanism


83. IPCC, supra note 38, at 31–33.

84. See Cutting & Cahoon, supra note 10, at 60 (advocating for a return of historic property rights in order to protect receptors); Cutting, supra note 13, at 819.

85. See Ruhl, supra note 28, at 65–66 (discussing societal costs of pollutants as externalities); see generally ENVIRONMENTAL POLLUTION PANEL, supra note 15 (discussing in part externalities as price system failures).

86. See Huffman, supra note 12, at 384 (“Many forms of pollution constitute external costs which are not easily internalized given the existing distribution and definition of property rights. This pollution will often have direct health effects on third parties, and will often have indirect effects for wildlife and ecosystems.”); see also DALES, supra note 36, at 7–8 (discussing how discharging untreated waste can be the most cost-effective way of disposing of unwanted materials, which allows producers to sell and consumers to purchase at lower prices); Cutting & Cahoon, supra note 10, at 64 nn.35–42, 65–67 (“When . . . costs are ‘externalized’ to third parties, there is a market failure in the sense that one of the assumed conditions of an efficient market is missing.”) (quoting Huffman, supra note 12, 377, 380 n.11, 383–84); Simmons & Cutting, supra note 36, at 112–13 (noting that critics of emission-control subsidies argue that industries should internalize the costs of their own polluting activities); Verhoef, supra note 36, at 199 (“[M]arket prices do not reflect full social costs (or benefits).”)

87. Joseph L. Sax, Property Rights and the Economy of Nature: Understanding Lucas v. South Carolina Coastal Council, 45 STAN. L. REV. 1433, 1442 (1993). See also Cutting, supra note 13, at 832–51 (discussing the view that property rights have been used to deplete natural resources); Plater, supra note 42, at 204–05 (describing human settlement on floodplains and the acceleration in
to impose responsibility for the potential consequences. The real costs are difficult to ascertain since there is generally a dearth of knowledge about even the common chemistry of toxicants, and there is a lack of legal authority to acquire that knowledge.\textsuperscript{88} Ironically, this means some generators are likely over-regulated. In addition, there is substantial evidence that the science of global warming has been subjected to political manipulation by attempts to suppress the views of top scientists; for example, National Aeronautics and Space Administration’s (NASA) James Hansen and the elimination of global warming’s human health effects from the EPA reports to Congress.\textsuperscript{89} Without knowing the true effects and costs, it is difficult to craft a regulatory framework that is “protective of human health with an adequate margin of safety” or to protect property.\textsuperscript{90}

Mechanisms currently used to confront the problem of GHGs and other pollutants are flawed because the public pays the short-term and long-term costs of the externalities. While the regulatory system has been relatively effective for many pollutants, it has effectively and intentionally permitted most GHGs, even though there is a consensus as to the cause and projected effects of GHGs. For example, the ubiquitous “Best Management Practices” and “Best Available Technology” standards both focus on the costs to the generator rather than the costs to receptors. Given the progress

\textsuperscript{88} See Cutting & Cahoon, \textit{supra} note 10, at 63–64 nn.30–34 (discussing the difficulty of studying harmful air pollutants under existing legislation and budgets). These costs are not included for at least three reasons: (1) data to quantify the costs is still lacking; (2) classical economics has also had serious difficulty quantifying the value of the environment: “Most environmental amenities cannot be adequately monetized, not because they are not valuable, but because they are not supplied through a market[;]” and (3) partly because lack of data, many environmental effects, such as long-term health effects and health care costs—and even crime by individuals exposed to toxins such as mercury are simply ignored. There is little incentive for a generator to calculate these costs, let alone to internalize them. But scientists remind us that the human species in general will be forced to pay these costs if generators neither prevent nor pay them—quite frequently that seems to mean the taxpayer. Cutting, \textit{supra} note 13, at 843 (quoting David B. Hunter, \textit{An Ecological Perspective on Property: A Call for Judicial Protection of the Public's Interest in Environmentally Critical Resources}, 12 \textsc{Harv. Envtl. L. Rev.} 311, 335–36 (1988)).

\textsuperscript{89} See Andrew C. Revkin, \textit{Climate Expert Says NASA Tried to Silence Him}, \textsc{N.Y. Times}, Jan. 29, 2006 (reporting James Hansen’s allegations that the Bush administration silenced his speaking out regarding the causes of GHGs and global warming); Revkin, \textit{supra} note 6 (suggesting that unnamed members of the Bush Administration ordered portions of the global warming testimony pertaining to human health be removed); \textit{see also} Cutting & Cahoon, \textit{supra} note 10, at 62–64 (criticizing Congress for not funding research on hazardous air pollutants); Oliver Houck, \textit{Tales from a Troubled Marriage: Science and Law in Environmental Policy}, 302 \textsc{Sci.} 1926–29 (arguing that scientific discovery has historically fallen victim to “scientific management”).

of the past forty years in reducing pollution and specific pollutants the regulatory framework has much to commend it.

Many of the framework’s systemic flaws could be remedied by more public science, as the President’s Science Advisory Council recommended in 1965, which would deter political manipulation and facilitate enforcement of existing laws. However, given the discretion permitted by the U.S. Supreme Court in *Mass. v. EPA*, an executive may command that little or no regulation occurs, as states allege in the sequel case. The playing field is wide: the U.S. Supreme Court has confirmed that both the legislative and executive branches have wide discretion to address matters of public health and, in particular, the environmental and property related issues. A new presidential administration and a filibuster-proof Congress will likely be required to accomplish effective regulation. Given the circumstances, common law actions have utility at this time.

91. Environmental Pollution Panel, *supra* note 15, at 29–33 (discussing the need for research to help abate and control pollution).


93. Podcast: Climate Change in the Courtroom, Patrick Parenteau, Professor of Law, Vermont Law School (June 17, 2008) (arguing that EPA continues to drag its feet on making the endangerment finding requirement under the Clean Air Act). A former EPA official in charge of implementing *Mass. v. EPA* has also made similar allegations. See Revkin, *supra* note 89 (discussing deliberate editing of climate testimony in effort to conceal heath effects of global warming).

Private actions for damages do face several drawbacks; for instance, their incredible transactional costs and their limited ability to capture externalities. However, the common law actions filed by the attorneys general and NGO’s fill a vacuum, working to achieve the reduction of GHG emissions as well as the recovery of damages that GHG-associated externalities cause.

Most 2008 GHG legislation (e.g., Lieberman-Warner) featured a cap and trade regulatory mechanism. It also illustrates the problem that common law actions address. States, of course, have been forming regional cap-and-trade systems in lieu of federal action, and states have been permitting emission offset trading for decades. Cap and trade is actually “regulatory plus,” since the “cap” must address a question similar to that in air quality and emission regulation decisions: what level of cumulative emissions yields the desired level of environmental quality? Once that determination is made, a market mechanism must be developed. Section 109 of the CAA mandates that human health be protected from a pollutant’s impacts with “an adequate margin of safety.” However, for political reasons, these “caps” may be set too high and result in regulatory failures, like the European Union’s (E.U.) failure to meet their air quality targets. There is no direct mechanism to provide redress if the regulatory scheme proves inadequate, and the public nuisance actions fill that void. Generators that achieve reductions can bank and trade credits in many creative ways, similar to the concepts used in land use for transferable

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95. See generally JONATHAN HARR, A CIVIL ACTION (1996) (highlighting the financial concerns lawyers face in assuming complex litigation).
96. See Cutting & Cahoon, supra note 10, at 86–87 (discussing how large transactional costs dissuade individuals from filing environmental claims).
97. See Pawa, supra note 5, at 132 (discussing the plaintiffs’ theory of the public nuisance doctrine).
99. Alex, supra note 4, at 166 n.6 (“[S]tates have recently begun aggressively to seek basic tort remedies against major sources of GHG emissions, in addition to undertaking their own legislative and regulatory initiatives.”).
101. Zasloff, supra note 20, at 1839–40. While the financial downturn of the the fall of 2008 has created pressure to roll back quotas, a majority are resisting.
development rights,\textsuperscript{102} and the concepts used to trade standard air quality offsets within air basins such as states and metropolitan areas like Los Angeles have been doing for decades.\textsuperscript{103} One version of Lieberman-Warner contains a requirement to reduce the total allotment over time, a “shrinking cap,” to a scientifically acceptable level.\textsuperscript{104} Theoretically, receptors and competitors can also purchase pollution rights and reduce emissions.

Because GHGs are a global problem, a national trading system makes more sense than trading other pollutants between air basins. This is especially true in the U.S., where the EPA must ensure air quality standards within air basins. Even offsets purchased outside the U.S. or for another GHG could therefore be acceptable. A national system would allow a larger scale market for the regulated community to sell pollution rights to entities that find the cost of pollution rights to be lower than the costs of compliance; this rewards economic and scientific efficiency. A national system might avoid some of the problems of state and local systems, such as those issues in Southern California where litigants contend that the air quality district cannot account for the “credits” themselves, thus new emissions may have exceeded reductions, resulting in more pollution.\textsuperscript{105}

Another fundamental question is: how are pollution rights to be allocated? The regulated community naturally tends to support any system in which: (1) there is no cost for the rights and (2) preference is accorded to those already emitting GHGs, thus rewarding polluters. President-Elect Barack Obama backs an initial auction.\textsuperscript{106}

Unless the cost of pollution rights reflect the total societal costs, as described in \textit{AEP} and \textit{California v. GM},\textsuperscript{107} no emissions trading system

\begin{thebibliography}{99}
\bibitem{103} See Cutting & Caho\textit{on, supra note, 10 at 85 (arguing that emissions trading is a system that sanctions externalities)}.
\bibitem{105} Natural Res. Def. Council v. S. Coast Air Quality Mgt. Dist., No. CV08-05403 (C.D. Cal filed Aug. 18, 2008).
\bibitem{107} See California v. Gen. Motors Corp., No. C06-05755 MJJ, 2007 U.S. Dist. LEXIS 68547, at *46 (N.D. Cal. Sept. 17, 2007) (the alleged damages include everything from the costs of analysis and preparation to the losses of crops and industry from diminished water supplies, loss of property and loss

fully internalizes the costs of that pollutant. The market price typically
tends to reflect the cost of avoiding emissions. The initial price, a reserve at
the auction, should therefore include conditions to account for future costs
by a combination of these mechanisms: (1) requirements for further
research, funded by the pool of rights-holders, similar to California’s
fishery-funded marine research;\textsuperscript{108} (2) requirements for bonding or
insurance to compensate costs or damages (as in the attorneys generals’
litigation);\textsuperscript{109} and (3) ensuring a process that compensates receptors who
incur costs or damages. Mathew Pawa and other scholars maintain deaths
have occurred and will continue, regardless of cap-and-trade, unless the
system has few transactional costs.\textsuperscript{110} However, the externalities are borne
disproportionately by those other than the generators’ customers who might
make other choices were the true costs included.\textsuperscript{111} In GHG cases, a
pooling and self-funded claims system appears far preferable to individual
or even class litigation, because the affected class is potentially so large and
the damages so great.

Therefore, uncertainty in the business community is twofold: first,
uncertainty about the direct effects of global warming on their own
companies, including potential increased costs and asset losses, and second,
uncertainty about their legal exposure for generating GHG emissions,
especially if any of the initial public nuisance actions prevail on appeal.
Both considerations have led some in the business community to support
GHG reduction legislation, such as the Lieberman-Warner bill, for the
relative certainty of a tolerable regulatory framework.\textsuperscript{112}

\textsuperscript{108} See Mark D. Ohman et al., \textit{CalCOFI in a Changing Ocean}, 16 J. OCEANOGRAPHY SOC’Y
6, 6–7 (2003) (describing how the California Cooperative Fisheries Investigations (CalCOFI) was
created in response to declining sardine populations, and how it is currently operated).
\textsuperscript{109} Pawa, supra note 5, at 107.
\textsuperscript{110} This would be true even were there is national health insurance of some type, because
although more could receive adequate medical care, the costs are borne by the taxpayers unless
apportioned somehow to the generators.
also Environmental Defense Fund, \textit{Top Firms Call for Climate Action}, Sept. 17, 2007,
hp://www.edf.org/article.cfm?contentID=5828 (discussing the U.S. Climate Action Partnership, and
alliance of corporations and environmental leaders).
II. STATES “CAN’T GET NO SATISFACTION”

States have turned to the courts to protect life and property and to recover damages. Thus far, however, the trial courts have refused to decide public nuisance cases, dismissing each on jurisdictional grounds.113

A. States’ Rights

States and localities have created solutions ranging from restrictions on motor vehicle emissions to taking the lead in conserving energy, utilizing transportation alternatives, and purchasing efficient equipment. California’s extensive activities include: (1) GHG emissions standards; (2) comprehensive air quality regulation as part of the California Greenhouse Gas Act,114 (3) fuel composition standards115 and corporation average fuel economy (CAFE) standards,116 as well as (4) cooperative efforts with other states to force the EPA to act.117

States have been the sources of great creativity, including comprehensive legislative air quality and transportation packages, formal and informal compacts, and partnerships with cities and NGOs, including implementing regional emissions trading programs.118 These state actions seem especially appropriate since the CAA holds the states (through State


118. See Alex, supra note 4, at 166 n.6 (“[S]tates have recently begun aggressively to seek basic tort remedies against major sources of GHG emissions, in addition to undertaking their own legislative and regulatory initiatives.”).
Implementation Plans (SIPs)) legally responsible for air quality at the risk of losing control (and Federal Highway Trust Funds) to the federal government.\textsuperscript{119} States have also begun to incur millions of dollars in expenses as they analyze and prepare for the consequences of global warming.\textsuperscript{120}

\textbf{B. Litigation}

Much of the litigation of the past few years focused on federal resistance both to the EPA’s regulation and to states’ efforts to regulate fuel composition, mileage, and GHG emissions. Results have been less than favorable to the states, and even \textit{Mass. v. EPA} is back in court because of the refusal of the Bush Administration to act.\textsuperscript{121} Now, attorneys general and NGOs have launched a major offensive in federal court. Using both federal and state public nuisance theories, they are trying to obtain extensive relief, seeking to force electrical power generators and automakers to reduce GHG emissions or bear the costs global warming imposes on our society and ecosystems.\textsuperscript{122}

These cases serve an important public information function. This, in turn puts pressure on a recalcitrant administration and legislature to enact more comprehensive but politically palatable solutions, such as cap-and-trade. Since consumer behavior, particularly energy use, can radically influence GHG volume, consumer awareness may spark consumer behavior modifications; though information for consumers and investors remains difficult to obtain.\textsuperscript{123} These cases also offer a chance for the responsibility of global warming related damages to shift from receptors onto generators.

\begin{itemize}
\item \textsuperscript{119} See, e.g., E. Donald Elliott et al., \textit{Recent Clean Air Act Developments–2006}, 37 ENVTL. L. REP. 10274, 10276 (2007) (discussing SIP compliance deadlines).
\item \textsuperscript{120} See, e.g., Alex, supra note 4, at 167 (“California now includes millions of dollars of expenditures in its annual budget for projects and actions related to global warming.”).
\item \textsuperscript{121} \textit{Justin R. Pidot, Global Warming in the Courts: An Overview of Current Litigation and Common Legal Issues} 1 (2006).
\item \textsuperscript{122} See \textit{California v. Gen. Motors Corp., No. C06-05755 MJJ, 2007 U.S. Dist. LEXIS 68547, at *4} (N.D. Cal. Sept. 17, 2007) (seeking monetary damages until harms arising from automobile emissions cease); \textit{Connecticut v. Am. Elec. Power Co., 406 F. Supp 2d 265, 270} (S.D.N.Y. 2005) (seeking injunctive relief to force defendants to decrease carbon dioxide emissions); see generally \textit{North Carolina v. Tenn. Valley Auth., 515 F.3d 344, 353} (4th Cir. 2008) (North Carolina filed a public nuisance claim against the Tennessee Valley Authority (TVA), which was recently tried after a TVA appeal, claiming immunity, was denied); \textit{Anne Paine, TVA Rejects Health Threats, The TENNESSEAN, July 25, 2008}, at 1 (reporting that an expert witness testified that reducing emissions could save some 1,400 lives annually from all direct and global warming related power plant pollutants, those direct and global warming related).
\item \textsuperscript{123} Robert Cutting, Lawrence B. Cahoon & Ryan C. Leggette, \textit{Enforcement Data: A Tool for Pollution Control}, 36 ENVTL. L. REP. 10060, 10064–65 (2006).
\end{itemize}
through efficient, effective, and creative equitable relief.\textsuperscript{124} In addition, the generators’ tremendous exposure to liability in these public nuisance cases may be just enough incentive to spur generators to develop their own creative solutions to the problems associated with GHG emissions.

The first case, \textit{AEP}, targets five electrical power generators that, combined, account for ten percent of the U.S.’s total CO\textsubscript{2} emissions.\textsuperscript{125} The second case, \textit{California v. GM}, is aimed at the U.S.’s six largest auto manufacturers whose vehicles emit more than twenty percent of the U.S.’s total CO\textsubscript{2} emission.\textsuperscript{126} The district courts dismissed the cases on the jurisdictional issue of justiciability.\textsuperscript{127} In both cases, the plaintiffs at the district level and now on appeal rely on a line of prominent transboundary nuisance suits.\textsuperscript{128} However, because the transboundary cases pre-date the \textit{Erie} Doctrine, modern courts are not bound by their decisions.\textsuperscript{129}

Future potential hearings will feature a stellar cast of expert scientific witnesses and extensive evidence on causation, including the nature and extent of damages to particular properties and victims.\textsuperscript{130} Some commentators think that presenting evidence related to causation and

\begin{itemize}
\item \textsuperscript{124} Ironically, of course, an administration that acts expansively might doom federal common law claims under the displacement theory. \textit{See Zasloff, infra note 20, at 1849} (arguing that the Clean Air Act, which possesses legal remedies for interstate pollution beyond conferences and mediation, undermines the vitality of federal common law for interstate air quality).
\item \textsuperscript{125} \textit{Am. Elec. Power Co., Inc.}, 406 F. Supp. 2d at 268.
\item \textsuperscript{126} \textit{California v. Gen. Motors Corp.}, 2007 U.S. Dist. LEXIS 68547, at *3. \textit{See also CAL. ENERGY COMM’N, INVENTORY OF CALIFORNIA GREENHOUSE GAS EMISSIONS AND SINKS: 1990 to 2004} (analyzing past and present trends in California’s GHG emissions); \textit{see generally Zasloff, supra note 20, at 1862} (suggesting that these cases chose the wrong defendants because focusing “upstream” on carbon producers would be more equitable and efficient and would potentially avoid some of the issues now causing difficulty, such as preemption in the automobile manufacturers’ case).
\item \textsuperscript{127} \textit{California v. Gen. Motors Corp.}, 2007 U.S. Dist. LEXIS 68547, at *47 (dismissing nuisance claim as a non-justiciable political question); \textit{Am. Elec. Power Co.}, 406 F. Supp. 2d at 273 (same). Another separation of powers argument, displacement of federal common law and preemption of the state law, was briefed and could be decided on appeal. Appellant’s Opening Brief in Ninth Circuit Court of Appeals at 44–59, \textit{California v. Gen. Motors Corp.} (on file with author).
\item \textsuperscript{128} \textit{See Illinois v. Milwaukee} (\textit{Milwaukee I}), 406 U.S. 91, 107–08 (1972) (upholding a claim for discharge of sewage into interstate waters); \textit{see also New Jersey v. New York}, 283 U.S. 473, 482 (1931) (upholding jurisdiction); \textit{Georgia v. Tenn. Copper Co.}, 206 U.S. 230, 238–39 (1907) (upholding claim for interstate air pollution of “sulphurous fumes”); \textit{Missouri v. Illinois}, 200 U.S. 496, 520–21 (1906) (upholding a claim for discharge of sewage containing concentrations of typhus bacillus into an interstate river; but the claim was ultimately denied on the question as to whether the bacillus survived); \textit{Missouri v. Illinois}, 180 U.S. 208, 241–42 (1901) (claim upheld for discharge of raw sewage into an interstate river).
\item \textsuperscript{129} \textit{See generally Erie R.R. Co. v. Tompkins}, 304 U.S. 64 (1938).
\item \textsuperscript{130} \textit{See e.g., Plaintiff’s Complaint in Intervention for Declaratory and Injunctive Relief at ¶¶ 24–34, California v. Gen. Motors Corp.}, 2007 U.S. Dist. LEXIS 68547 (identifying a host of factors associated with global warming, from increased risks of susceptibility to hurricanes and wildfires to health risks of asthma and other respiratory conditions).
\end{itemize}
damages will not be difficult because although the logistics may prove challenging, modern information technology has the ability to facilitate and handle complex cases. However, the courts face two undeniably formidable challenges: first, determining whether the receptors suffered an unreasonable interference with their enjoyment of their property, considering generators’ avoidance costs and technological limitations, and second, determining the nature of any remedies.

It is within this last challenge, determining the nature of the remedies, that we see a fundamental legal difference between AEP and California v. GM. In California v. GM, the plaintiffs are exclusively seeking monetary damages, while the AEP suit seeks equitable relief. Both the California v. GM legal team and commentators, such as Professor Zasloff, argue that seeking damages may offer a strategic advantage. However, we are a bit more skeptical that purely monetary damages can properly quantify the harms of global warming, such as loss of life and the loss of North Carolina’s Outer Banks. However, we do agree that the threat of money damages can lead to prevention and remediation, except that portion that is considered a cost of doing business. We assume that the California v. GM suit focuses on damages in part to avoid the AEP ruling, which held that the judicial discretion required for equitable relief would impermissibly interfere with legislative discretion.

Another fundamental difference between AEP and California v. GM is the choice of defendant. In AEP the defendants are generators, who create both the instrumentality (electrical power plants) and the polluting activity. In California v. GM, the defendants supplied the instrumentality (vehicles) but do not actually create the emissions by driving. Thus, in California v. GM you and I are the actors generating the actual GHG emissions.

Why federal court? The cases are in federal court for the national scope of federal common law and, strategically, so that the attorneys general may

131. Pawa, supra note 5, at 119–20; Zasloff, supra note 20, at 1868.
132. Alex, supra note 4, at 169.
133. Id.; Zasloff, supra note 20, at 1838–44.
134. Zasloff, supra note 20, at 1838–44.
135. The trial court in AEP focused on the breadth of discretionary relief sought by the plaintiffs as indicative, noting that “[t]he scope and magnitude of the [equitable] relief Plaintiffs seek reveals the transcendently legislative nature of this litigation.” Am. Elec. Power Co. Inc., 406 F. Supp. 2d at 270–73. Thus, the court concluded that the separation of powers doctrine barred the action. Id. If that was the intent of California, though, it did not work. See California v. Gen. Motors Corp., 2007 U.S. Dist. LEXIS 68547, at *11 (finding that the remedy sought made no difference).
136. California v. Gen. Motors Corp., 2007 U.S. Dist. LEXIS 68547. However, unlike the gun cases, most Americans have little choice in transportation and so we become the instrumentalities. Thus, provision of instrumentalities that ordinarily pollute is the errant behavior since the outcome is known, unlike the outcome of use of guns, almost all uses of which do not ordinarily result in harm.
argue that preemption is not involved. 137 The appeal of the theory is immediate: one federal nuisance standard for transboundary pollution, no matter how many source states, and a comprehensive set of remedies. However, even though there are centuries of case law that support the public nuisance claim, decisions from the last hundred years have eliminated strict liability and created subjective balancing points, 138 where the court weighs the economic value and social utility of the generators’ activities against receptors’ property rights. The authority to address air pollution through the states’ police power—through public nuisance actions—is without question. 139 However, public officials have seldom exercised this power.

Then, Congress began to address environmental issues through comprehensive legislation, and the courts seized upon these statutes to negate the ability of federal common law to address interstate nuisances. 140 However, the authority of attorneys general was not diminished by the passage of the CAA, as noted in California v. GM:

> The CAA provides that “[e]ach state shall have the primary responsibility for assuring air quality within the entire geographic area comprising such state,” 42 U.S.C. § 7407(a), and “[t]hat the prevention and control of air pollution at its source is the primary responsibility of states and local governments. 42 U.S.C. § 7401(a)(3).” 141

137. Instead, it is a separation of powers dispute between branches of the federal government.


139. See, e.g., Huron Portland Cement Co. v. Detroit (HPC), 362 U.S. 440, 442 (1960) (stating that states may exercise police powers concurrently with the federal government in cases of interstate commerce). In this case, Huron Portland Cement Company challenged a Detroit ordinance that declared certain air pollution from ships to be a public nuisance. The court, for example, focused on the fact that air pollution control is primarily a “state and local matter.” Hence, traditional remedies such as public nuisance applied. The same language was adopted in 42 U.S.C. §§ 7401(a)(3), 7407(a) (2000). The power to commence nuisance actions was still contemplated, as also evidenced by the SIPs approved following the passage of the Clean Air Act. Id. at 442–46.


The statutory framework focuses on generators in an attempt to eliminate, through regulation, potential public nuisances. Because more than twenty percent of GHGs originate in the U.S., the logical conclusion is that there is a gap between the regulatory framework and the emission of GHGs. Thus, the remedies of statutory law and public nuisance common law merge, approaching the problem from the differing perspectives of the receptors, generators, regulators, and the courts. States under the CAA have since its inception codified the longstanding rights of the attorneys general to initiate nuisance actions, and the EPA has approved the powers as part of the SIPs, which then gave those plans the force of federal law. In California, § 41509(b) of the Health & Safety Code preserves to the attorney general the specific authority to supplement statutory law with nuisance actions to address the effects of air pollution. The only open

142. E.g., G. MARLAND, T.A. BODEN, & R.J. ANDRES, CARBON DIOXIDE INFORMATION ANALYSIS CENTER, UNITED STATES OF AMERICA FOSSIL-FUEL CO2 EMISSIONS: TRENDS (2008), http://cdiac.esd.ornl.gov/trends/emit/tre_usa.html (last visited Dec. 3, 2008) (“The United States continues to be the largest single national source of fossil fuel-related CO2 emissions with emissions of 1577 million metric tons of carbon in 2005. . . . Emissions in 2005 rose slightly (0.8%) from 2004 but have doubled since the early 1960s, although the U.S. share of global emissions declined from 44% to 21% over the same interval because of higher growth rates in other countries.”).

143. The SIP is the key document on which delegation to the states to manage air quality programs rests. 40 C.F.R. §§ 51.230–51.232 (2000). The SIP consists of regulations and other materials designed by states to meet statutory requirements. If the EPA approves the SIP, then the state has been delegated the authority to implement the SIP. Thus EPA reviews the legal authority, which in most states had included public nuisance tools for many years before the first SIP submittal. The California SIP does not specifically mention nuisance, but the plan includes reference to the numerous enforcement tiers, all of which empower the attorney general to take civil and criminal actions, which in most jurisdictions, and California specifically, had always included nuisance. California Environmental Protection Agency, Air Resources Board 2, http://www.arb.ca.gov/planning/sip/2007sip/2007sip.htm. See Simmons & Cutting, supra note 36, at 144–45 (discussing the power of California’s attorney general to “enjoin any pollution of nuisance”); see also Nat’l Audubon Soc’y v. Dep’t of Water, 869 F.2d 1196, 1206–14 (9th Cir. 1989) (Reinhardt, J., dissenting) (discussing the rights of private parties and states to assert federal interests under the Clean Air Act).

144. In Her Majesty the Queen v. Detroit, a case involving a challenge to a Detroit incinerator, the court noted: “If a state implementation plan ("SIP") is approved by the EPA, its requirements become federal law and are fully enforceable in federal court.” Her Majesty the Queen v. Detroit, 874 F.2d 332, 335 (6th Cir. 1989). See 42 U.S.C. § 7604(a) (2000) (authorizing citizen suits against any person or government agency); see generally Conservation Law Found., Inc. v. Busey, 79 F.3d 1250, 1268–69 (1st Cir. 1996) (assuming the SIP to have the effect of federal law); United States v. Tenn. Air Pollution Control Bd., 967 F. Supp. 975, 981–82 (M.D. Tenn. 1997) (stating that a state or local administrative agency may bring a suit against the United States); Cate v. Transcon. Gas Pipe Line Corp., 904 F. Supp. 526, 536–38 (W.D. Va. 1995) (refusing to implement Virginia’s odor rule because both the state and EPA did not consider it to be part of the SIP); 1 W. RODGERS, ENVIRONMENTAL LAW: AIR AND WATER §§ 3.9–3.11 (1986) (describing the SIP development process and the EPA review process that precedes an SIP becoming effective).

145. CAL. HEALTH & SAFETY CODE § 41509(b) (West 1975). See Simmons & Cutting, supra note 36, at 144–45 (analyzing California’s air emission and performance standards). Other powers
question was whether the states could pursue federal facilities under the CAA as well as the Clean Water Act (CWA), so Congress clarified both statutes in 1977.\footnote{146} Section 7604(e) of the CAA, acknowledged the general power of public officers not only to initiate common law actions, but also to pursue federal facilities in both federal and state court:

\begin{quote}
(e) Nothing in this section shall restrict any right which any person (or class of persons) may have under any statute or common law to seek enforcement of any emission standard or limitation or to seek any other relief (including relief against the Administrator or a State agency). Nothing in this section or in any other law of the United States shall be construed to prohibit, exclude, or restrict any State, local, or interstate authority from—(1) bringing any enforcement action or obtaining any judicial remedy or sanction in any State or local court, or (2) bringing any administrative enforcement action or obtaining any administrative remedy or sanction in any State or local administrative agency, department or instrumentality, against the United States, any department, agency, or instrumentality thereof, or any officer, agent, or employee thereof under State or local law respecting control and abatement of air pollution.\footnote{147}
\end{quote}

In unambiguous terms, Congress confirmed the intent to include the traditional common law enforcement actions under the CAA and clarified that these enforcement powers even extended to federal facilities.\footnote{148} At that time, the federal common law available for environmental cases included interstate federal common law public nuisance as it predated \textit{Milwaukee v. Illinois} (\textit{Milwaukee II}), 451 U.S. 304 (1981). Section 7604(e) also clarifies that the common law enforcement preservation language prevails against “any other law of the United States”—a key distinction between the CAA and the CWA.\footnote{149} The CWA has similar common law reservations for citizen

given the states include: (1) what sources to regulate; (2) the right to set more restrictive standards for stationary sources; (3) the right to a waiver of preemption for additional and more stringent automobile emissions standards; and (4) discretion on how to enforce standards and a responsibility to do so under the SIP.

\footnote{149} 42 U.S.C. § 7604(e). The 1977 amendments also authorized actions in state court, rather than requiring filing in federal court, but do not limit the use of federal courts. The language also contemplates interstate disputes, which certainly existed at the time, thereby extending state court jurisdiction without limiting federal jurisdiction.
suits, but not for government enforcement actions. This distinction is important when considering justiciability, displacement, and even preemption.

C. The Trial Court Decisions

The Second Circuit has had AEP since 2005 and may be waiting for one or more of the following: (1) the EPA to act; (2) the supplemental briefs of the AEP parties addressing the implications of Mass. v. EPA; or (3) the fall 2008 appellate arguments of the California v. GM parties. The AEP and California v. GM trial courts dismissed the actions based on the jurisdictional issue of justiciability, rooted in the separation of powers between branches of the federal government. If the pragmatic inclination of the trial courts to escape this immense litigation is understandable, the reasoning is somewhat startling. Both courts found that the federal courts were relieved of the authority to decide public nuisance cases as a general proposition if any of the factors enunciated in Baker v. Carr, listed below, apply:

1. A textually demonstrable constitutional commitment of the issue to a coordinate political department;
2. A lack

150. Compare id. with 33 U.S.C. § 1365(e) (1988). The limitation to citizen suits per that section is a key reason why the Milwaukee II majority found that federal common law was not available to the states. For a discussion, see Milwaukee v. Illinois (Milwaukee II), 451 U.S. 304, 328–29 (1981).


152. See Baker v. Carr, 369 U.S. 186, 217 (1962) (“Unless one of these formulations is inextricable from the case at bar, there should be no dismissal for non-justiciability . . . .”); see also Pawa, supra note 5, at 142–43 (T]he district court proceeded to address the political question doctrine and dismissed the case precisely on that basis.”).

153. The California v. GM court found there has been a clear delegation of the power to determine federal common law nuisance issues to the executive and legislative branches based on two considerations: (1) the Interstate Commerce Clause (ICC) indicates that the legislative branch should have authority over all such controversies, and (2) the Executive Branch has primary jurisdiction in foreign policy issues. California v. GM, 2007 U.S. Dist. LEXIS 68547, at *38. The court first based its decision on the grounds that the ICC somehow deprives the federal judiciary of its role to resolve real cases. Id. The court confused the role of the court (true separation of powers) with the role of the state (unreasonable regulatory interference under the ICC). Without any authority whatsoever, the court declared: “The Court finds that the concerns raised by the potential ramifications of a judicial decision on global warming in this case would sufficiently encroach upon interstate commerce, to cause the
of judicially discoverable and manageable standards for resolving it;154 (3) the impossibility of deciding without an initial policy determination of a kind clearly for nonjudicial discretion; (4) the impossibility of a court’s undertaking independent resolution without expressing lack of the respect due coordinate branches of the government; (5) an unusual need for unquestioning adherence to a political decision already made; or (6) the potentiality of Court to pause before delving into such areas so constitutionally committed to Congress.” Id. at *42.

Not only is the conclusion unsupported and incorrect, but it also proves too much if accepted since it would eliminate any nuisance claim where there was any effect on interstate activity. The power over interstate federal common law nuisance cases was not delegated to Congress through the Interstate Commerce Clause; it has always remained in the Article III Courts. U.S. Const. art. III, § 2. cl. 1. Moreover, Congress has the power to authorize state action even where there is an unreasonable effect on interstate commerce. It used this power, for example, following U.S. Supreme Court decisions that involved the interstate transportation of hazardous waste. See Chem. Waste Mgmt., Inc. v. Hunt, 504 U.S. 334, 340 n.3 (1992) (“Just as Congress has power to regulate the interstate movement of these wastes, States are not free from constitutional scrutiny when they restrict that movement.”).

The courts also found that “the political branches have weighed in” on “foreign policy” questions, and determined that the issues are relegated to the executive branch. California v. GM, 2007 U.S. Dist. LEXIS 68547 at *42. But see Thomas W. Merrill, Global Warming as a Public Nuisance, 30 Colum. J. Envtl. L. 293, 319–28 (2005) (arguing that since there is clearly no direct conflict with actual foreign policy, any claim would have to be grounded on a general “dormant foreign policy” consideration; an argument that he finds unpersuasive since virtually any issue with international overtones would therefore be barred). The U.S. Supreme Court in Massachusetts v. EPA similarly gave short shrift to the foreign policy and national defense arguments raised in that case. Massachusetts v. Envtl. Prot. Agency, 127 S. Ct. 1438, 1463 (2007).

154. The application of this factor is a tortured denial of hundreds of years of the evolution of the law as well as the courts’ own experience fitting the law to facts in complex cases: the difference here is scale, not methodology or formula. The California v. GM court correctly stated the standard and then misapplied it. These cases are no more difficult than any other large transboundary nuisance case, and the U.S. Supreme Court has validated the continuation of large, complex, interstate nuisance cases even following the passage of complicated federal environmental quality statutes. Milwaukee II notes with approval that environmental agencies can continue to utilize federal common law. Milwaukee II, 451 U.S. 304, 313–14 (1981). That should be the end of the inquiry on the issue of separation of powers since the courts have hundreds of years of experience in both equitable and legal remedies, including the incorporation of radical new technologies. The court’s ruling was also premature because there is no theoretical problem with damages and no need to decide without the benefit of evidence and experts. The trial courts support their decisions by holding that the many interstate nuisance cases cited by the plaintiffs are distinguishable because the remedy is different. That is true only in the motor vehicle case, but it actually tends to prove that the court ought to accept the remedy of damages, just as actions for equitable remedies were validated by the cases cited by plaintiffs. Given hundreds of years of application of the damages formulae, the issue of damages should present much less of a problem than the issue of equitable remedies. The courts then concluded that the cases are factually distinguishable because the instant litigation involves more national and international issues. This distinction is debatable; the courts provided no authority to indicate support for the contention that the courts’ reluctance to hear the case should increase with the number of issues involved. Instead, the courts, perhaps unintentionally, focused on the admittedly widespread political effects of the case rather than on whether the court possessed the power to decide the issues that lead to those effects.
embarrassment from multifarious pronouncements by various departments on one question.\textsuperscript{155}

The trial courts selected options one, two, and three. The standards are both murky and subjective. The cases could quickly become Justice Kennedy’s call, as he will likely be the deciding vote in the U.S. Supreme Court. The question is what role Justice Kennedy sees for the courts and the states given the great discretion still accorded to the federal executive by the Court in \textit{Mass. v. EPA}, especially in view of the EPA’s refusal to regulate.\textsuperscript{156} The answer should be that the public nuisance cases represent a different and complementary vehicle that is necessary to protect life and property when the executive and legislative branches have not adequately done so.

The court in \textit{California v. GM} correctly noted that its inquiry should be restrained: “[b]ecause these claims touch on public policy, foreign policy, and political issues, it is tempting to jump to the conclusion that such claims are barred by the political question doctrine.”\textsuperscript{157} However, “it is error to suppose that every case or controversy which touches foreign relations lies beyond judicial cognizance.”\textsuperscript{158} The justiciability inquiry is limited to “‘political questions,’ not . . . ‘political cases,’”\textsuperscript{159} and should be made on a “case-by-case” basis.\textsuperscript{160} Thereafter, though, both courts, seemingly overwhelmed by the technical complexity of the cases, jumped to the wrong conclusion.

All of the bases for the decisions fail because (1) courts have traditionally decided complex transboundary nuisance cases for hundreds of years amid radically changing technologies,\textsuperscript{161} and (2) the statutory

\begin{itemize}
\item \textsuperscript{155} Baker v. Carr, 369 U.S. at 198.
\item \textsuperscript{157} \textit{California v. Gen. Motors Corp.}, 2007 U.S. Dist. LEXIS 68547, at *16 (quoting Alperin v. Vatican Bank, 410 F.3d 532, 537 (9th Cir. 2005)).
\item \textsuperscript{158} Baker v. Carr, 369 U.S. at 211.
\item \textsuperscript{159} \textit{Id.} at 217.
\item \textsuperscript{160} \textit{Id.} at 211.
\item \textsuperscript{161} “Long before the 1972 decision in \textit{Illinois v. Milwaukee}, federal common law enunciated by this Court assured each State the right to be free from unreasonable interference with its natural environment and resources when the interference stems from another State or its citizens.” Georgia v. Tenn. Copper Co., 206 U.S. 230, 238–39 (1907). \textit{See} New Jersey v. New York, 283 U.S. 473, 482 (1931) (upholding a claim for ocean dumping of garbage that then affected out-of-state property); Tenn. Copper Co., 206 U.S. at 238–39 (upholding a claim concerning interstate sulfur dioxide emissions); Missouri v. Illinois, 200 U.S. 496, 520–21 (1906) (upholding a claim concerning the discharge of raw sewage into an interstate river); \textit{see also Milwaukee II}, 451 U.S. at 335 (Blackmun, J., dissenting) (“The right to such federal protection is a consequence of each State’s entry into the Union and its commitment to the Constitution.”); \textit{see e.g.}, Huron Portland Cement Co. v. Detroit, 362 U.S. 440, 445 (1960) (holding that municipal pollution laws were constitutionally applied to federally licensed steamships);
framework plainly contemplates continued life for nuisance actions at both the federal and state level. The attorneys general argue persuasively that under *Georgia v. Tennessee Copper Co.*, the states retained all of their residual powers on joining the Union. For example, in *Milwaukee II*, the dissent noted that the EPA could utilize the federal common law of nuisance as a supplement to the statutory framework of the CWA. If the courts can continue to adjudicate federal common law nuisance claims brought by the federal government with the approval of the U.S. Supreme Court, the cases are justiciable. Justiciability is only a dispute between branches of the federal government, so once the power of the federal courts is validated for a class of cases (interstate public nuisance), the courts have the same powers for any litigants in interstate public nuisance cases, particularly multiple states. Moreover, as noted above, the state powers to pursue public nuisance have been approved and confirmed by the EPA through SIPs since the inception of the CAA in the early 1970’s and affirmed by Congress in the 1977 amendments. Since federal courts have decades of experience deciding these cases, there is no substantial reason that the federal courts should not be able to provide the superior federal common

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164. In the California Attorney General’s words:

> When the states by their union made the forcible abatement of outside nuisances impossible to each, they did not thereby agree to submit to whatever might be done. They did not renounce the possibility of making reasonable demands on the ground of their still remaining quasi-sovereign interests; and the alternative to force is a suit in this court.


165. [T]here can be no merit to the Court’s suggestion, ante, at 325, that the technical difficulty of the subject matter renders inappropriate any recourse to the common law. The complexity of a properly presented federal question is hardly a suitable basis for denying federal courts the power to adjudicate. Indeed, the expert agency charged with administering the Act has not hesitated to invoke this common-law jurisdiction where appropriate.


166. The issue of justiciability was not specifically raised in *Milwaukee II*, seemingly because the Court had no difficulty with continued EPA use of the federal common law, which shows that the courts can in fact manage such disputes.

167. *See supra* notes 144–47.
law remedies. This also seems circular since the court will presumably be faced with the same facts in the interstate nuisance cases approved in *International Paper Co. v. Oullette*. We agree with Professor Zasloff that the justiciability issue is bogus, or as Professor Parenteau has noted, the courts probably just thought the cases were way too much work and that legislative or executive action would eliminate need to decide the cases.

**D. To Displacement—and Beyond**

There remain real issues of displacement of federal common law. If state actions are limited by the preemption doctrine, or the complexity of the “source state law test” per *International Paper Co. v. Oulette*, or by the commerce clause, there would be no redress but for the federal common law. Two principal arguments against the continued existence of federal common law are (1) the statutory framework of the CAA itself admits to no need for federal common law nuisance and (2) the foreign policy implications of the case interfere with the control of foreign policy by the executive branch. As noted above, we do not find this latter argument compelling.

Reliance by defendants and the trial courts on CWA precedent, particularly *Milwaukee II*, is misplaced. The virtue of the common law as a complementary enforcement mechanism designed to address real injury as opposed to abstract regulation was extolled in *Milwaukee I* and the *Milwaukee II* dissent. The CWA was overhauled following *Milwaukee I*, and the Court shifted to hold that, given the new comprehensive legislation, there was no need for federal common law. This point was vigorously disputed in the *Milwaukee II* dissent.

*Milwaukee II* is readily distinguishable for two reasons. First, air is a qualitatively different medium from water because it affects an entire jurisdiction rather than a water body. Second, the design of the CAA and

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169. Id. at 499.
170. See supra note 154.
173. The *Milwaukee II* court rejected the state’s argument that the anti-preemption language that allowed states to set more stringent discharge standards could be stretched into an implied power to permit states to initiate federal common law nuisance claims. The Court held that the savings clause for “citizen suits” provisions (a) applied only to citizens’ suits and (b) did not add any rights but only preserved whatever might exist. Since the court had already found there was no longer any federal common law action, absent more specific statutory authorization it would be unavailing anyway. *Milwaukee II*, 451 U.S. at 327–29.
174. Id. at 335 (Blackmun, J., dissenting).
the CWA differ markedly in their breadth and depth of options for state activity.175 There is longstanding statutory and regulatory recognition of the need for states to supplement enforcement of the CAA through SIPs and public nuisance actions. Section 7604(e) of the CAA specifically confirms and extends these historic powers.176 The majority in Milwaukee II found that CWA common law preservation language is narrowly drawn and thereby limited to “citizens suits,” foreclosing state action.177 In contrast, Section 7604(e) is expansive and specifically contemplates both public and private supplemental actions. Thus, both the issues of displacement and preemption disappear with examination of the plain language of the governing statute. It follows that since EPA public nuisance actions utilize the federal common law, these federally authorized public nuisance actions should also utilize the federal common law, especially since the SIPs, which authorize these actions, are considered federal law.

There is also no sound policy reason the courts should reach to find that states have been foreclosed from a traditional tool, as Justice Blackmun cautioned in Milwaukee II.178 If federal common law is available for the federal government (as Milwaukee II confirms), and federal or state courts are available in general for nuisance actions, why should access to one of the most appropriate bodies of law for addressing interstate air pollution be denied to the state representatives who have primary responsibility for the resulting air quality in their jurisdictions, especially since that interpretation

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175. See the dissent in Nat’l Audubon Soc’y v. Dept. of Water and Power, 869 F.2d 1196, 1206–14 (9th Cir. 1988) and Simmons & Cutting, supra note 36, passim, for a discussion of the viability of a cause of action for air pollution under the federal common law. In the CWA Congress established uniform standards, with the principal powers of discretion to states limited to: (1) whether to impose more stringent standards in a given water body; and (2) whether to issue a discharge permit if the receiving waters are at capacity. 33 U.S.C. § 1313(d) (2000). In contrast, Congress set air quality standards for many pollutants, but delegated most of the creative process, including both coverage and enforcement, to the states. 42 U.S.C. § 7410 (2000). Discretionary areas include: (1) the right to determine what facilities to regulate; (2) the statutory right of attorneys general to bring nuisance actions in general; (3) the right to set more stringent state air quality standards; and (4) the flexibility to establish SIPs with widely varying coverage and emissions regulations keyed to the state’s air basins and ecosystems; and (5) the right to set emissions standards, a right recently upheld by two district courts: Cent. Valley Chrysler Jeep v. Goldstone, No. CV F 04-6663, 37 E.L.R. 20309 (E.D. Cal. Dec. 11, 2007), and Green Mountain Chrysler Plymouth, v. Crombie, 508 F. Supp. 2d 295 (D. Vt. 2007), but the EPA later denied the waiver.

176. 42 U.S.C. § 7604(e).

177. “Respondents argue that this evinces an intent to preserve the federal common law of nuisance. We, however, are inclined to view the quoted provision as meaning what it says: that nothing in § 505, the citizen-suit provision, should be read as limiting any other remedies which might exist.” Milwaukee II, 451 U.S. at 328–29 (1981). The majority held that the section did not really authorize any action. The dissenters, however, urged that the plain language of the savings clause preserved useful and longstanding remedies under the federal common law. Id. at 341–42 (Blackmun, J., dissenting).

178. Id. at 334 (Blackmun, J., dissenting).
would result in a multitude of uncoordinated state actions? Absent displacement, the federal common law of nuisance would be available.

Displacement in the context of the CAA is an open question. In New England Legal Foundation v. Costle, for example, the court of appeals held that private litigants could not rely on a nuisance cause of action because the EPA had issued a variance approving the very facility and the very pollutants that were the subject of the action. Absent displacement, the federal common law of nuisance would be available. Displacement in the context of the CAA is an open question. In "New England Legal Foundation v. Costle," for example, the court of appeals held that private litigants could not rely on a nuisance cause of action because the EPA had issued a variance approving the very facility and the very pollutants that were the subject of the action. The court had no difficulty finding displacement for specifically regulated facilities, but carefully limited the decision to the facts and avoided the question of whether all federal common law nuisance actions had been eliminated by the CAA. Professor Merrill proposes to refine this inquiry by borrowing the concept of “field” versus “conflict” preemption, although preemption is clearly a more stringent standard than displacement. We agree with Professor Merrill that the attorneys general have better arguments if a “conflict displacement” test is utilized because the remedies are truly complementary. We disagree with Professor Merrill’s argument that “field” displacement should occur based on any substantial legislative activity. We rely on the statutory construction and also agree with the dissenters in Milwaukee II, who argue that even under the CWA, the most harmonious interpretation would be to permit federal common law nuisance actions as a complementary remedy rather than encourage the inevitable patchwork of state actions that would result. Professor Zasloff suggests that there never really was any federal common law, or if there was, it was limited to interstate conflicts. However, Milwaukee I and Milwaukee II certainly seem to acknowledge that a federal common law action was available for the state and federal governments, given the variety of interstate wrongs that could be committed by a state or its citizens against another.

Noteworthy, however, is recognition in the attorneys generals’ briefs that at a certain point (more like the clear and distinct language from Congress) federal regulation may displace common law. Where does

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180. Id.
181. Merrill, supra note 153, at 311.
182. Id.
185. See supra note 161.
cap-and-trade regulation fall on the continuum? Professor Zasloff contends that cap-and-trade legislation can be harmonized with damages in public nuisance cases and notes that Professor Engel suggests bolting a “Clean Development Mechanism,” like the E.U.’s, as an equitable remedy. 187 We agree, as the cap-and-trade proposals as a rule do not offer redress for damages or a complementary enforcement mechanism.

Finally, arguments can be made that Milwaukee II is not sound law in water pollution either, and that the current U.S. Supreme Court might want to revisit Milwaukee II in light of the massive consequences alleged in the attorney general’s litigation and the inaction of the EPA. The U.S. Supreme Court could easily renew the balance of power by permitting complementary actions, allowing the legislative and executive branches to address generators proactively, and allowing courts to protect receptors from many consequences that still occur, as the Milwaukee I court found 188 and Justices Blackmun, Marshall, and Stevens argued in the Milwaukee II dissent:

The Court’s analysis of federal common-law displacement rests, I am convinced, on a faulty assumption. In contrasting congressional displacement of the common law with federal pre-emption of state law, the Court assumes that as soon as Congress “addresses a question previously governed” by federal common law, “the need for such an unusual exercise of lawmaking by federal courts disappears.” This “automatic displacement” approach is inadequate in two respects. It fails to reflect the unique role federal common law plays in resolving disputes between one State and the citizens or government of another. In addition, it ignores this Court’s frequent recognition that federal common law may complement congressional action in the fulfillment of federal policies. 189

The dissent argued that polluters could and should comply with both standards because one was permitted by statute, and the other was required by the common law to protect the receptors. To do otherwise provides a

188. The majority in Milwaukee I stated that public nuisance claims and statutory claims can be an effective combination to address air pollution. Illinois v. Milwaukee (Milwaukee I), 406 U.S. 91, 107 (1972).
shield that Congress did not intend. Thus, the convenient but mechanical test of the majority overrode the original purpose of the federal common law to protect receptors from any failures, or “gaps,” in the regulatory system.

Constructions of Milwaukee II that have the effect of imposing a nuisance (or trespass) without any remedy to private parties for special damages would conflict with the U.S. Supreme Court decision in Richards v. Washington Terminal Co. (Richards), as well as state court holdings such as Bormann v. Board of Supervisors and Gacke v. Pork Extra, Inc. Imposition of a nuisance constitutes a taking by nuisance in violation of the Fifth Amendment, an interpretation to be avoided. In Richards, a railroad built a tunnel on a route selected and authorized by Congress, immediately adjacent to plaintiff’s property. The court held that Congress could not immunize private railroads from suits for private nuisance even when the route was dictated by Congress and not by the railroad.

190. Thus, under the statutory scheme, any permit issued by the EPA or a qualifying state agency does not insulate a discharger from liability under other federal or state law. To the contrary, the permit granted pursuant to § 402(k), 33 U.S.C. § 1342(k), confers assurance with respect to certain specified sections of the Act, but the requirements under other provisions as well as separate legal obligations remain unaffected. Congress plainly anticipated that dischargers might be required to meet standards more stringent than the minimum effluent levels approved by the EPA. Those more stringent standards would necessarily be established by other statutes or by common law. Because the Act contemplates a shared authority between the Federal Government and the individual States, § 101 (b), 33 U. S. C. § 1251(b) (1976 ed., Supp. III), it is entirely understandable that Congress thought it neither imperative nor desirable to insist upon an exclusive approach to the improvement of water quality.

Milwaukee II, 451 U.S. at 341 (Blackmun, J., dissenting) (footnotes omitted) (citation omitted).

191. The Act provides no support for deviation from well-settled conflict-of-law principles. Under conflict-of-law rules, the affected State’s nuisance law may be applied when the purpose of the tort law is to ensure compensation of tort victims. “[I]t is beyond dispute” that affected States have “a significant interest in redressing injuries that actually occur within the State.” This traditional interest of the affected State, involving the health and safety of its citizens, is protected by providing for application the affected State’s own tort laws in suits against the source State’s polluters. The State’s interest in applying its own tort laws cannot be superseded by a federal act unless that was the clear and manifest purpose of Congress.


193. U.S. CONST. amend. V.

194. Richards, 233 U.S. at 548.

195. Id. at 557.
E. Fashioning the Remedy

We discuss remedies issues in more detail following the arguments for trespass as a companion theory. Public prosecutors’ actions seem superior to many other methods since their jurisdiction is statewide and they are charged with acting in the public interest. Public prosecutor actions would thus allow a limited number of entities to manage multiple micro-environments. However, as recognized in Boomer, therein lies a problem—limited judicial resources. While the facts alleged are complex, modern litigation tools make management of the cases brought by public officers more efficient, and public officers also have extensive experience managing extensive claims and remedies. Thus, the transactional costs could be less than in individually litigated cases and more claims could be processed.

F. The State Court Alternative

We agree with Professor Zasloff that the federal common law is not exclusive, although we agree with the plaintiffs that it is certainly more appropriate. Once there is a resolution on the further issue of state claims in federal court, the fallback position for the states is to take action in state court. On balance, we agree with the California position that the federal common law offers national uniformity and a ready forum for any affected state that is far superior to multiple state court actions. If it were necessary to forgo state court remedies because of preemption, to demonstrate the need for the federal common law, we think the states must be tempted to concede, though we also think that it is unnecessary to do so.

While multiple, multi-state litigation would be labor-intensive, presumably states can coordinate as they have in past anti-trust and tobacco cases. While both substantive and procedural laws may differ from state to state, the litigation process will certainly permit coordination of discovery. Professor Zasloff lists several advantages to state court: (1) a better basis in policy; (2) enhancement of state legislative efforts; and (3) enhancement by regional diversity. Advantages of state law may also include the following. First, state property-related law concepts include

196. See infra Part III. For an excellent discussion, see Alex, supra note 4 and Pawa, supra note 5.
199. Even if actions in each affected state were required or desirable, the workload is at least as great for the defendants, and the hometown venue might be more favorable in any event.
200. Zasloff, supra note 20, at 1830.
wide discretion to the states to modify state law through their legislatures and courts. Second, the use of state law may introduce additional causes of action, including trespass and unfair competition. These cumulative actions offer some alternative rights, theories, and remedies that might prove useful. To the extent equipment is modified, it may benefit all states. Finally, state law claims might be less susceptible to intervention by the U.S. Supreme Court.

However, there are also some disadvantages to state court actions, which include preemption defenses resulting in choice of law issues and interstate litigation in multiple state courts and in federal court (the problem envisioned by the Milwaukee II dissenters when they argued for continuation of federal common law nuisance). The Milwaukee II majority expressly noted that preemption is a higher standard than displacement. The recent case of Bates v. Dow Agrosciences, L.L.C. enunciated the test:

[B]ecause the States are independent sovereigns in our federal system, we have long presumed that Congress does not cavalierly pre-empt state-law causes of action. In areas of traditional state regulation, we assume that a federal statute has not supplanted state law unless Congress has made such an intention “clear and manifest.”

In AEP and California v. GM, the statutory and regulatory history validates the actions. As in Bates, the preemption language in the statute should be narrowly construed. There the Court held that the preemption


203. Id. at 316–17.


205. See supra text accompanying notes 178–83. Unlike the plaintiffs in AEP, the plaintiffs in California v. GM sought damages. In the automakers case, the court recognized “that any state that is dissatisfied with the federal government’s global warming policy determinations may exercise its ‘procedural right’ to advance its interests through administrative channels and, if necessary, to ‘challenge the rejection of its rulemaking petition as arbitrary and capricious.’” California v. Gen. Motors Corp., No. C06-05755 MJJ, 2007 U.S. Dist. LEXIS 68547, at *33–34 (N.D. Cal. Sept. 17, 2007) (citing Clean Air Act, 42 U.S.C. § 7607 (2000)).

clause for state labeling requirements within the Federal Insecticide, Rodenticide, and Fungicide Act (FIFRA) did not affect state tort claims that were not based on labeling requirements. 207 The preemption clause in the CAA is narrowly limited to standards applicable to motor vehicles per § 209. 208 Section 116 reserves the power to the states to impose more stringent standards in all areas other than the narrow class of preempted motor vehicle standards 209 and says nothing about common law actions by either public officers or private individuals. Section 7604(e) confirms that no provision of law restricts public and potentially private common law actions.210 In fact, these actions must be considered part of the scheme of the statute rather than at odds with it. In Bates, the Court acknowledged the value of parallel regulatory and common law actions to enforce a regulatory scheme, 211 and the majority included the key votes from Mass. v EPA: Stevens, Kennedy, Ginsburg, Souter, and Breyer (joined by Rehnquist and O’Connor). 212 The Court cautioned that courts should not search to find preemption and distinguished Cipollone v. Liggett Group 213 based on differences in statutory language. The Court also specifically rejected defense arguments that focused on speculative effects of the common law. 214 Defendants contended that they would have to modify their labels to comply with the requirements of the common law cases, much as defendants in the automakers case contend that the effects of the litigation might impact emissions or fuel economy, thus bootstrapping the preemption argument. 215 The special status accorded states in Mass. v. EPA, grounded on inherent rights of the states, 216 should bolster this argument in actions to protect the public.

The Bates Court also held that a common law case is not precluded by a “permit shield” (in that case, registration under FIFRA).217 The Bates Court reasoned that common law actions appropriately utilize state common law

207. Id. at 444.
209. Id. § 7418.
210. Id. § 7604(e).
212. Id. at 433, 447–48.
213. Id. at 451. This tobacco liability case held that state court actions are preempted by the very broad language of the preemption clause. Cipollone v. Liggett Group, 505 U.S. 504, 515 (1992).
215. Id. at 445, 448.
217. See Bates, 544 U.S. at 442, 444, 451 (stating that a pesticide manufacturer abiding by certain common-law rules that mirror the requirements codified in the federal statute, is acceptable and can give rise to common-law claims that are not pre-empted by the federal statute).
to protect state victims except as explicitly preempted by the governing act.\textsuperscript{218}  FIFRA is an extensive statute, yet the court saw the place of the common law action.\textsuperscript{219}  Moreover, the Bates Court emphasized that there was a history of litigation over toxics prior to the Act\textsuperscript{220} and that these actions provided complementary incentives for manufacturers to avoid injury; reasons that apply to the current actions.  The history of actions for nuisance (and trespass) by air pollutants spans several centuries.\textsuperscript{221}  

We also think that the reasoning of the dissent in Milwaukee II, by analogy, is persuasive if the court found any reason to go beyond the language of the CAA.\textsuperscript{222}  As noted earlier, the Milwaukee II dissent clearly saw value in a complementary system of accountability, as did the majority in Milwaukee I.\textsuperscript{223}  The case of International Paper Co. v. Ouellette validates state law actions in federal court based on interstate claims with the proviso that the source state law should be utilized.  Ouellette was a case where property owners (not the state), on Lake Champlain in Vermont, sued New York point sources on state common law grounds.\textsuperscript{224}  The Court unanimously found that even if the CWA did not preempt state common law suits, there was a curious and unwieldy condition that the source state law is to be applied.\textsuperscript{225}  Justice Brennan, joined by Justice Blackmun and Justice Marshall, concurring in part and dissenting in part, found that there was no reason to complicate the picture by the majority insistence that choice of law remain a significant issue, and would have simply found no preemption: “we have refused to pre-empt a State’s law, even when it is

\begin{thebibliography}{100}

\bibitem{218}  \textit{Id.}
\bibitem{220}  \textit{Bates}, 544 U.S. at 449–450.
\bibitem{222}  Milwaukee v. Illinois (Milwaukee II), 451 U.S. 304, 334 (1981) (Blackmun J., dissenting).  See also Justice Brennan’s dissent in \textit{Ouellette}:

\begin{quote}
As a threshold matter, the Court’s opinion assumes that in enacting the Act, Congress valued administrative efficiency more highly than effective elimination of water pollution.  Yet there is no evidence that Congress ever made such a choice.  Instead, the Act reflects Congress’ judgment that a rational permit system, operating in tandem with existing state common-law controls, would best achieve the Act’s primary goal of controlling water pollution.
\end{quote}

\bibitem{223}  Illinois v. Milwaukee (Milwaukee I), 406 U.S. 91, 103–05 (1972); Milwaukee II, 451 U.S. at 334.
\bibitem{225}  \textit{Id.} at 497.
\end{thebibliography}
contrary to subsidiary objectives concerning administration, if the State’s law furthers the federal statute’s primary purpose and is consistent with the Act’s saving of States’ authority in an area traditionally regulated by States.”

For example, a polluter could comply with the minimum standards of the Act yet still cause damage for which the common law may provide the only remedy. This reasoning appears to be in line with the decision of key members of the majority in Bates, who would determine the outcome in the public nuisance cases. We also agree with the dissent in Ouellette and with Professor Zasloff that state law of any affected state should be available, since the logic of “consolidating” state law actions is more harmonious with the national scope of the CWA (and by extension, here, the CAA), and so many sources are multi-state. Even locating the source state as a matter of fact may prove difficult, with business entities located within multiple jurisdictions. Whether the question turns on either the majority or the dissenting view, complex choice of law issues remain. This is why we think federal common law is preferable.

Courts should not find preemption under the CAA, even for the automakers suit. The “preemption clause” of § 209 is limited to “motor vehicle standards,” a term that is much more precise than the broad language of the tobacco cases (“regulations” and “requirements”), which was a key distinction (but different statute) noted by the Court in Bates.

Second, since the CAA expressly contemplates continued actions by the attorneys general, the question of whether litigation is even considered “standards” is not relevant. There is no limitation in § 7604(e) to cases involving stationary sources and it appears in the general provisions part of the CAA. This of course makes sense, because the effects to receptors and state air quality occur regardless of the source.
The arguments on CAFTA preemption are similarly unpersuasive because CAFTA specifically refers to the CAA; therefore, § 209 applies. The plain meaning is simple: a regulation under § 209 may have an effect on fuel economy, but that effect was always anticipated (up or down). The § 209 waiver and the correlative language in CAFTA would be superfluous if CAFTA meant that no effect on fuel economy could ever occur. As Justice Stevens wrote for the majority in *Mass. v. EPA*:

EPA has been charged with protecting the public’s “health” and “welfare,” 42 U.S.C. § 7521(a)(1), a statutory obligation wholly independent of DOT’s mandate to promote energy efficiency. See Energy Policy and Conservation Act, § 2(5), 89 Stat. 874, 42 U.S.C. § 6201(5). The two obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency.

The manufacturers in *California v. GM* are actually arguing the “effects test” rejected by the *Bates* Court. Manufacturers do not even have to adjust emissions (or fuel economy) in response to litigation for damages or injunction. Manufacturers can use any number of options, including: (1) limiting the mix of vehicles sold to reach the desired net results; (2) changing the number of vehicles sold in general; or (3) compensating via damages or offsets of emissions accomplished by carpools, mass transit, indirect source control, or other usual tools. Finally, any construction that eliminated at least a private nuisance claim (for special damages only) should run afoul of U.S. Supreme Court cases, such as *Richards*, and state cases like *Bormann* and *Gacke*. This conflict should trigger government liability, a result that can be avoided by permitting the common law actions.

Defendants in both cases argued that a state action would conflict with dormant commerce clause restrictions as in *B.M.W. of North America, Inc. v. Gore* (*Gore*). *Gore* was a case where the Court concluded that the

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237. *Id.*


plaintiff specifically sought to penalize B.M.W. for its lawful activities in other states and to change that behavior. The Court was concerned that the actions of one state that were designed to modify lawful behavior in another state would interfere with interstate commerce. Nevertheless, Congress can also authorize actions that would otherwise violate the dormant commerce clause and has done so, for example in the interstate compacts that were authorized following a line of cases that included *Chemical Waste Management v. Hunt.* These actions are authorized by SIPs and acknowledged by 42 U.S.C. § 7604(e). Even if this issue were to be reached, these cases still prevail, since lawful actions in State A that adversely impact lives or property in State B can still be prosecuted under *Gore:*

To avoid such encroachment, the economic penalties that a State such as Alabama inflicts on those who transgress its laws, whether the penalties take the form of legislatively authorized fines or judicially imposed punitive damages, must be supported by the State’s interest in protecting its own consumers and its own economy. Alabama may insist that BMW adhere to a particular disclosure policy in that State. Alabama does not have the power, however, to punish BMW for conduct that was lawful where it occurred and that had no impact on Alabama or its residents. Nor may Alabama impose sanctions on BMW in order to deter conduct that is lawful in other jurisdictions.

This latter phrase refers to the intent to change lawful behavior in other jurisdictions that, like those in the preceding sentence, have no effect in the state bringing the action, specifically State A’s regulation of State B’s conduct toward citizens of State A while they are in State B. The Court also specifically left open the question as to whether a state can attempt to deter unlawful conduct in another jurisdiction. Even under source state law, that conduct should constitute a public nuisance. But *California v. GM* is concerned with the settled categories of: (1) damages within the plaintiff’s jurisdiction, caused by defendants that are sometimes outside the

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241. *Id.* at 572–73.
242. *Id.* at 571–72.
246. *Id.* at 571 n.16.
247. *Id.* at 573, 574 n.20.
jurisdiction, and (2) claims that are for in-state damages even though the acts occurred elsewhere and not for civil penalties or punitive damages.\textsuperscript{248} This is precisely the logic of the federal common law interstate nuisance cases, such as \textit{Tennessee Copper}, relied upon by the attorneys general.\textsuperscript{249} A contrary result would effectively insulate a polluter from damage anywhere but in its source state. Combined with the difficulty of ascertaining the “source state” law under \textit{Ouellette}, this result argues for application of the most logical and efficient law: the federal common law of nuisance per \textit{Tennessee Copper} and related cases.\textsuperscript{250} Notably, the Court also expressly approved consideration of conduct elsewhere in determining the degree of culpability.\textsuperscript{251}

\textbf{G. Trespass as a Complementary Claim}

In the words of Robert Frost, “[g]ood fences make good neighbors.”\textsuperscript{252} The concept of trespass may offer some advantages to the thicket of obstructions noted in the nuisance cases. We have argued that visualizing the world as a series of physical spaces with clear boundaries can assist in understanding the movement of pollution through time and space, as well as the effects that might result on the receptor properties, whatever the pollutant may be (see Figure 1).\textsuperscript{253} Trespass is a true “bright-line” concept with property boundaries as “the line.” Proof requires only: (1) knowledge that emissions are occurring, and (2) invasion of the physical space of the plaintiff.\textsuperscript{254} While a legislature might constitutionally legalize a nuisance

\textsuperscript{249} Id. at *45 (citing Georgia v. Tenn. Copper Co., 206 U.S. 230 (1907)).
\textsuperscript{250} Int’l Paper Co. v. Ouellette, 479 U.S. 481 (1987); Georgia v. Tenn. Copper Co., 206 U.S. 230 (1907). The Court recognized the states’ interest in federal common law:
When the states by their union made the forcible abatement of outside nuisances impossible to each, they did not thereby agree to submit to whatever might be done. They did not renounce the possibility of making reasonable demands on the ground of their still remaining quasi-sovereign interests; and the alternative to force is a suit in this court.
\textit{Id.} at 237. The reach of state nuisance law includes instrumentalities engaged in interstate commerce, such as the ships in \textit{Huron-Portland Cement v. City of Detroit}. 
\textsuperscript{251} Gore, 517 U.S. at 574 n.21.
\textsuperscript{252} ROBERT FROST, NORTH OF BOSTON 12 (2d ed. 1917).
\textsuperscript{253} Cutting, \textit{supra} note 13. See also Cutting & Cahoon, \textit{supra} note 10, at 58–60 (arguing for property rights of receptors in order to remain free of pollution).
\textsuperscript{254} \textsc{Restatement (Second) of Torts} § 158–163 (1965).}
(under the federal Constitution) and thereby eliminate public (but not private) nuisance actions in some cases, government could incur liability for a “taking” under the Fifth Amendment if it authorizes a trespass.

Professor William Rodgers predicted in 2007:

As with nuisance, trespass will outlive its enemies. No lawmaking power on earth and no rumor-generating public relations campaign can long convince a human population that their bodies are fitting grounds for industrial experiments. With the bodies go the souls and in the two will be an army of determined skeptics.

The real goal of this worldview of containment (which would have the effect of internalizing costs of pollution directly), although it is suited to litigation, is to compel research and regulation that recognizes the real effects and costs on receptors rather than focusing on the costs to generators.

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255. Rodgers, supra note 144, §§ 2.8, 2.9 (“Nuisance law is always vulnerable to statutory ‘legalization’ campaigns that have taken on a new and ugly urgency in recent times. The worst nuisances can be quickly rescued by a legislative or administrative approval.”) (footnote omitted).

256. See, for example, the Court’s statement in Richards v. Washington Terminal Co., 233 U.S. 546 (1913):

We deem the true rule, under the Fifth Amendment, as under state constitutions containing a similar prohibition, to be that while the legislature may legalize what otherwise would be a public nuisance, it may not confer immunity from action for a private nuisance of such a character as to amount in effect to a taking of private property for public use.

Id. at 557. In Richards, the railroad built a tunnel on a route selected by Congress, immediately adjacent to plaintiff's property. The Court held that Congress could not immunize private railroads from suits for private nuisance even when the route was dictated by Congress and not by the railroad. Id. at 551.

257. Rodgers, supra note 144, at 90.

258. Cutting, supra note 13, at 851–56. The following list proposes some possible benefits. (1) The short-term and long-term effects: research is required of those who temporarily hold a right to pollute. This will provide necessary data. (2) The costs of controlling greenhouse gases, in contrast with the immense health and property costs now borne often by the least able to pay or to litigate (a significant social justice issue) would be placed on the generators’ ledgers and reflected in product cost, as the market economy demands, and as some views of green taxes require. Only in that way can demand be channeled to alternatives that are more efficient in reducing their carbon footprint. (3) The Precautionary Principle would be implemented in place of the following philosophy: using citizens as test subjects and making it increasingly difficult for them to get medical care and sue. (4) The historic integrity of property would be restored instead of the current de facto condemnation of receptors’ rights. (5) Equity and justice would be served for all communities and populations, since it is necessary to control far fewer sources than there are receptors in the population that are presently forced to endure the often-unknown risks. (6) Containing the collective trespasses is also consistent with the policies of many environmental acts, including the assertion of § 101 of the Clean Water Act that surface discharges should end by 1985, the Resource Conservation and Recovery Act’s “cradle to grave” accounting
Trespass describes the passage of GHGs through private and public airspace as well as the heat and other physical incursions that result. This is certainly an action so closely related to the facts of the nuisance, that a court might find it to be part of the fabric of federal common law public nuisance. There is little question of either pendent or diversity jurisdiction in federal court with the federal common law nuisance claim.

Historically, trespass was defined as any intentional physical invasion of private property to protect the sanctity of property rights (the \textit{res} itself), whereas nuisance was defined as any action that unreasonably interfered with the use and enjoyment of another’s property (conditions affecting the \textit{res}). Both trespass and nuisance were originally grounded in strict liability. Merely throwing a rock through the airspace of a property without damaging anything at all constitutes a trespass that entitles the owner to at least nominal damages. But the concept of trespass conflicted with the views of the Industrial Revolution that the air, surface waters, and groundwater were “free goods” for waste disposal. Courts accommodated this view by eviscerating the traditional property rights of receptors and the essence of trespass itself. The straightforward boundary inquiry of trespass was replaced by a reactive and superficial, “out of sight, out of mind” exception, based upon the assumption—without scientific basis—that when the invading material was an “invisible” agent, there was no physical incursion to trigger trespass, but rather only a “nuisance.” But “nuisance” allows judges to deny relief unless the invasion caused “unreasonable interference” with the receptor property. This test both increased the burden on the aggrieved receptor and provided numerous opportunities subjectively to “balance” the interests of the generator and the receptors. “Industrial progress” was routinely found to outweigh what the courts labeled “trifling inconveniences” of pollution to receptors, such

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system, and the Clean Air Act’s “Bubble Concept” that enables facilities to measure net emissions at the property lines instead of applying emissions standards to each individual stack. (7) If the Supreme Court did accept a global warming trespass case, there is precedent in \textit{Loretto v. Manhattan Teleprompter}, 458 U.S. 419, 441 (1982), that should be followed. Thus, government should also be accountable for the results of permitted pollution. (8) The popular and scientific support for accountability is likely to be substantial.

262. \textit{Id.} at 70.
as downstream owners.\textsuperscript{265} Any nuisance that affects more than a few receptors is typically labeled a “public nuisance.” This concept permits legislative protection and blocks private actions (except to the extent that the nuisance affects a given property differently). Until now, those public nuisance cases rarely interested the public officials who must initiate them.

This nullification of venerated property law also violates the basic free market principles of internalization, noted earlier, that require all costs of production to be passed on to the consumer of that product.\textsuperscript{266} By the late twentieth century, U.S. courts were naturally forced to recognize that invisible pollutants, such as radioactivity or toxic gases, do physically enter the “space” of other property.\textsuperscript{267} The Alabama Supreme Court noted that given modern knowledge of the conservation and transformation of matter and energy, “we may define trespass as an intrusion which invades the possessor’s protected interest in exclusive possession, whether that intrusion is by visible or invisible pieces of matter or by energy which can be measured only by the mathematical language of the physicist.”\textsuperscript{268}

That finding should have restored the historic rule of trespass and thus halted GHGs and other pollution at the property boundary. If the trespass is visible, no damage at all is required to justify relief. If invisible pollutants are involved, the courts have added an additional requirement that the plaintiff must prove substantial damage to the property itself or persons on the property—even damage to the value of the property was not enough to permit an action. The concept of preferential treatment for the seemingly discredited distinction of visibility thus did not disappear! The comments of the \textit{Borland} court are illuminating:

It might appear, at first blush, from our holding today that every property owner in this State would have a cause of action against any neighboring industry which emitted particulate matter into the atmosphere, or even a passing motorist, whose exhaust emissions come to rest upon another’s property. But we hasten to point out that there is a point where the entry is so lacking in substance that the

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\item \textsuperscript{265} \textit{E.g.}, Pa. Coal Co. v. Sanderson, 6 A. 453, 464–65 (Pa. 1886) (“Trifling inconveniences to particular persons must give way to the necessities of a great community”); \textit{see also} James M. McElfish, Jr., \textit{Property Rights, Property Roots: Rediscovering the Basis for Legal Protection of the Environment}, 24 E.L.R. 10231, 10248–49 (1994) (discussing the relationship between property rights and environmental protection).
\item \textsuperscript{266} \textit{DALES, supra} note 36, at 7–8. \textit{See also} Huffman, \textit{supra} note 12, at 386 (advocating for the “refinement” of property rights as a means to avoid external costs as opposed to regulation).
\item \textsuperscript{267} \textit{Cutting, supra} note 13, at 825; \textit{RESTATEMENT (SECOND) OF TORTS} \textsection 158–163 (1965).
\item \textsuperscript{268} \textit{Borland v. Sanders Lead Co., Inc.}, 369 So. 2d 523, 528 (Ala. 1979) (quoting Martin v. Reynolds Metals Co., 342 P.2d 790, 794 (Ok. 1959)).
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law will refuse to recognize it, applying the maxim de minimis non curat lex—the law does not concern itself with trifles. In the present case, however, we are not faced with a trifling complaint. The Plaintiffs in this case have suffered, if the evidence is believed, a real and substantial invasion of a protected interest.269

The Bradley court returned to Professor Rodgers to justify limiting the remedy for trespass:

While the strict liability origins of trespass encourage courts to eschew a balancing test in name, there is authority for denying injunctive relief if defendant has exhausted his technological opportunities for control. If adopted generally, this principle would result substantially in a coalescence of nuisance and trespass law. Acknowledging technological or economic justifications for trespassory invasions does away with the historically harsh treatment of conduct interfering with another’s possessory interests.270

Historically the only unilateral justification was “necessity,” as when a boater, threatened by a thunderstorm, takes refuge on private property.271 There was no de minimis defense, regardless of the weight accorded the maxim by the Borland court. The “modern” view thus elevates the economic interest of the trespasser above the property rights of the receptors, partly because it does not account for the effects that are unknown.272 Thus, some branch of government authorizes an easement for passage of pollutants over both public and private interests.

One might ask instead, whether it is harsher to permit these invasions based on the claimed technological and economic limitations of the generators without adequate scientific knowledge of the effects or a mechanism to account for future harm? The Bradley court simply created its own science when it found that “airborne particles [that] are transitory or quickly dissipate, do not interfere with a property owner’s possessory rights..."

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269. Borland, 369 So. 2d at 529.
271. See, e.g., Tuders v. Kell, 739 So. 2d 1069, 1073–74 (Ala. 1999) (stating that the doctrine of necessity may be a justifiable defense in an emergency situation).
272. See, e.g., San Diego Gas & Elec. Co. v. Superior Court, 920 P.2d 669, 695 (Cal. 1996) (holding that the intangible nature of electric and magnetic fields are better dealt with in the realm of nuisance law rather than trespass); Maddy v. Vulcan Materials Co., 737 F. Supp. 1528, 1540–41 (D. Kan. 1990) (adopting the requirement from Bradley for a showing of “actual and substantial damage[s]”).
and, therefore, are properly denominated as nuisances.” 273 The problem is that airborne pollutants can and do in fact interfere with property rights directly (toxic pollutants) and indirectly, through effects such as heat and other consequences of climate change that affect the receptors’ properties. As the President’s Science Advisory Committee noted in 1965, “[i]n small amounts, pollution can produce effects so subtle as to escape notice.” 274 Thus, whether or not the intrusion is a technical (legal) trespass, the materials are actually within receptor property, causing mischief that might not be apparent for years.

These rulings place the burden squarely on the receptor. 275 Only the Colorado Supreme Court has recognized that physical entry by some, but not all, pollutants (in that case trichloroethylene (TCE)) constitute a physical trespass,276 and thus plaintiffs need not prove that “contaminants are present on their properties at levels of toxicological concern or are otherwise causing damage to their properties in order to prevail on their trespass claim.” 277 The components within this category are viewed as “intangible[s]” rather than physical invasions, apparently more like equations than actual physical intrusions. 278 This is all legal fiction of course, as science understands the concept of the physical invasion even by sound, noise, radiation, lasers, and heat. Why not simply hold that even if some invasions seem more abstract, the burden still ought to be on the generator to demonstrate: (1) why it is a priority to permit airborne waste disposal; (2) what harms may result; and (3) whether adequate provision has been made for any actual damages.

As for the other elements of trespass, intent has not proven to be a difficult issue, because courts quickly concluded there could be no other purpose for a stack (or exhaust pipe) than to disburse materials over and onto other properties.279 Although nominal damages and injunctive relief are the rule, a trespass analysis would then employ the same proof of

274. ENVIRONMENTAL POLLUTION PANEL, supra note 15.
275. See Bradley, 709 P.2d at 787 (stating the plaintiff has the burden to prove the tort of trespass).
276. See In re Hoery, 64 P.3d 214, 217 (Colo. 2003) (holding that any level of damage is sufficient for trespass).
277. Cook v. Rockwell Int’l Corp., 273 F. Supp. 2d 1175, 1201 (D. Colo. 2003). This federal district court recently reviewed Colorado law and noted that the Colorado courts reserved exceptions for “noise, electromagnetic fields and radiation waves emitted by power lines.” Id. at 1201.
278. Id. at 1201.
279. Cutting, supra note 13, at 872. See, e.g., Bradley, 709 P.2d at 786 (“We find that the defendant had the requisite intent to commit intentional trespass as a matter of law.”).
causation and damages as Messrs Pawa, Alex, and others believe would be straightforward.280

Ordinarily, once a trespass is proved, the remedy of injunction is available.281 The injuries commonly cannot be easily measured in monetary terms, thus equitable relief is routine.282 The “modern” view requires investigation by and at the expense of the receptors to support a finding of “reasonable suspicion” of injury. It is difficult to explain to the interdisciplinary community (both scientists and lay audiences) why property is entitled to absolute protection against visible (but benign) invasions. On the other hand, receptors must endure invisible and potentially lethal pollutants that are given free passage unless the receptors (at their expense) can prove some type of “damage.” This proof of harm is often established years later when someone in the scientific community is able to identify the harm through epidemiological studies of human test subjects, e.g., fine particulates, or alternately, through actual property damage.283 Why is the burden not on the generator to identify the effects before permission to pollute is granted, as the Precautionary Principle would appear to require? Even given that the regulatory system ought to uncover real, substantial harms, testing of chemicals, especially for long-term effects, is decades behind schedule. Therefore, it becomes difficult to demonstrate harm because the legal framework requires more data.284 Thus, discharges are permitted based on the argument that no harm has (yet) been demonstrated. The Industrial Revolution thus worked a revolution in the law of property and trespass that simply avoids the issues of unknown

280. Zasloff, supra note 20, at 1867–70.
281. Cutting, supra note 13, at 878 (stating that injunction is available (1) when there is irreparable injury; (2) where the remedy at law (damages) is inadequate; (3) to avoid the multiplicity of suits that continuing trespass would involve; or (4) to prevent the trespasser from acquiring a property interest by adverse possession, prescription, or some other property concept).
282. This burden of proof advantage in a trespass case is accompanied by a slight remedial advantage as well. Upon proof of a technical trespass plaintiff always is entitled to nominal damages. It is possible also that a plaintiff could get injunctive relief against a technical trespass—for example, the deposit of particles of air pollutant on his property causing no known adverse effects. The protection of the integrity of his possessory interests might justify the injunction even without proof of the substantial injury necessary to establish a nuisance. Of course absent proof of injury, or at least a reasonable suspicion of it, courts are unlikely to invoke their equitable powers to require expensive control efforts.
283. See Cutting & Cahoon, supra note 10, at 69–70 (providing that courts have altered trespass law to recognize “invisible” material but have shifted it from a property (spatial) basis to a harm basis, with the burden on the receptor).
284. See id. at 83 (discussing how environmental statutes, politics, and budget deficits make it difficult to determine the costs of pollution).
short-term and particularly long-term damages. By requiring proof of "substantial damage," many private actions for redress are doomed because of the passage of time until damages appear and the consequential difficulty of diagnosis and causation; not to mention issues of collectability. That is why relying on private actions is so "efficient" from a purely economic perspective: the very real and immediate costs of waste disposal are offset only by the few claims that might actually succeed years later.

**H. The Modern View**

The first question is whether there is a trespass under the "modern" view, and if so, whether that trespass caused substantial damage. Each state court can answer that question differently, since substantive property law is a state matter (for now).285 The next question is whether "substantial damage" is really a proper standard, given the unknown effects of many pollutants, the relatively small number of sources (automakers, not vehicles), and the high costs to society of the effects (externalities that are subject to proof). A final question is whether authorization of a property invasion by government or the judiciary works a "taking" under the Fifth Amendment, so that either damages would lie as in Loretto and United States v. Causby,286 or the statute that authorized the emission would be voided.287

In a claim for global warming, on facts such as those alleged in the AEP and California v. GM cases, if causation can be established for nuisance, then causation should also be satisfied for trespass. This is so, because the emissions pass through both private and public airspace on the way to become part of the greenhouse.288 An additional trespass exists when heat is redirected to the property. If water or fire enters the property, or if onsite water is caused to leave the property, that is also a physical invasion with a demonstrable chain of causation. The courts under the "modern" view of trespass used the term "substantial" to mean, "not

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287. See Gacke v. Pork Xtra, L.L.C., 684 N.W.2d 168, 175 (Iowa 2004) (holding that a statute must be invalidated to the extent that it constituted a taking); Bormann v. Kossuth County Bd. of Supervisors, 584 N.W.2d 309, 321 (Iowa 1998) (holding a statute invalid since it provided for immunity against nuisance suits).

288. See Cutting, supra note 13, at 865–81 (stating that Courts have noted that there may be no nuisance that is not also a trespass given the physical invasion).
The claims that are at issue in the public nuisance cases are hardly trivial, and thus the test of “reasonable suspicion” should be satisfied.

I. Historic Trespass

We have argued that just as courts altered the historic rule, and because property rights are a state law matter, the highest court of any state could also restore the lost property rights of receptors to be free from any trespass. A court could simply strike the requirement for substantial damage. The burden would then shift back to the generators to contain wastes or to demonstrate consent that there is no harm, and that an intrusion into others’ property should be permitted. The question would also arise as to whether the authorizing agency would also become liable for all the consequences of the license. Considering the relatively small number of

289. E.g., Borland v. Sanders Lead Co., 369 So. 2d 523, 529 (Ala. 1979) (holding that in order to recover under a trespass theory, “substantial damages to the res” is required).

290. See, e.g., Bradley v. Am. Smelting & Refining Co., 709 P.2d 782, 787 (Wash. 1985) (holding that an intentional deposit of microscopic particulates gives rise to both a trespass and nuisance claim). The effects and potential damages are discussed at supra text accompanying notes 110 and 259 and at infra text accompanying note 345. This is an opportunity for the courts both to protect property rights (and thereby the occupants) and to reconcile the law with science. In United States v. Causby, 328 U.S. 256 (1946), the Court was of the view that the nation (particularly, the courts) can afford to ignore or accommodate physical intrusions by the very pollutants ultimately responsible for the effects of global warming. To be sure, those pollutants, of which the nature and extent of their effects are unknown “ha[ve] no place in the modern world.” Id. at 261. In the modern world though, the Precautionary Principle has long held that entities need not wait for proof of harm to act. Illustrative of this concept is Principle 15 Rio Declaration on Environment and Development that states: “In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost–effective measures to prevent environmental degradation.” Conference on Environment and Development, June 3–14, 1992, Rio Declaration on Environment and Development, Principle 15, U.N. Doc. A/CONF.151/26 (Aug. 12, 1992), available at http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm. There is, however, ample authority in the law of trespass and nuisance for action in the face of predicted harm. Here, waiting for proof generally dooms the receptors, sometimes literally, and most commonly results in no action because of limits on research and redress based largely on time and cost. With what we do not know, and with what we know now about some of those materials once thought to be desirable and benign (asbestos, mercury, dioxin, polychlorinated biphenyl, Agent Orange, fine particulates, etc.), the precautionary principle would seem to be the only prudent course of action. If the judiciary refuses to exercise its historic jurisdiction to adjust risks, then the costs fall on the receptors or on the public. In this case, a possible option would be to subsidize the industry; though, the process would require more transparency such as in the legislative arena.

291. Cutting & Cahoon, supra note 10, at 74 (proposing that those who choose to trespass should have the burden of showing the harm of the trespass and accepting any responsibility for future harms).
generators versus receptors,\textsuperscript{292} and considering the potentially catastrophic effects of global warming alone—not to mention all other pollutants—a return to the protection of property and persons of receptors seems more just than requiring those receptors, years later, to locate causes of harms and responsible parties, and then prove their cases in court.

\textit{J. The Constitutional Dimension}

For both nuisance and trespass there is a constitutional dimension present when the property invasion is authorized by the government.\textsuperscript{293} This is important: (1) because potential government liability would surely drive some change and (2) courts ruling on issues such as displacement and preemption should consider that elimination of the common law remedy renders the statute subject to this constitutional claim, whereas a decision that authorized parallel remedies should not.

The Alabama, Oregon, and Washington Supreme Courts had no difficulty concluding that invisible materials had physically invaded the space of the receptor plaintiffs.\textsuperscript{294} The cause was not actionable as a trespass, however, without proof of at least a reasonable suspicion of substantial damage.\textsuperscript{295} Whether there is a technical trespass or not, if the government participates in or permits a physical intrusion, there arises an issue regarding the “taking” of the private property rights of the receptors. This issue leads to one of two consequences: (1) the government is also held responsible for compensation (hardly likely to be a popular topic in budget discussions), or (2) the enabling act is declared to be unconstitutional.\textsuperscript{296}

\begin{itemize}
\item \textsuperscript{292} See IPCC SYNTHESIS REPORT, supra note 38 (discussing the causes of climate change).
\item \textsuperscript{293} Cutting & Cahoon, supra note 10, at 75–78 (discussing the “taking” of property rights through trespass and nuisance).
\item \textsuperscript{294} See Bradley v. Am. Smelting & Refining Co., 709 P.2d 782 (Wash. 1985) (holding that an intentional deposit of microscopic particulates gives rise to both a trespass and nuisance claim); Borland v. Sanders Lead Co., 369 So. 2d 523 (Ala. 1979) (allowing a trespass claim for the emission of lead particulates and sulfoxide gases); Martin v. Reynolds Metals Co., 342 P.2d 790 (Or. 1959) (upholding a finding of trespass for the emission of fluoride compounds in the form of gases and particulates).
\item \textsuperscript{295} All three cases required that a plaintiff to show (1) the invasion affects an interest in the landowner’s exclusive possession of his/her property; (2) the act that led to the invasion was intentional; (3) reasonable foreseeability that the act could invade plaintiff’s possessory interest in their land; and (4) substantial damages to the res. Bradley, 709 P.2d at 790; Borland, 369 So. 2d at 529; Martin, 342 P.2d at 794.
\item \textsuperscript{296} See, e.g., United States v. Causby, 328 U.S. 256, 265 (1946) (Black J., dissenting) (proposing that damages and injunctive relief are the appropriate remedies in trespass and nuisance cases and cautioning against the use of the takings clause as it usurps congressional power).
\end{itemize}
Loretto v. Teleprompter Manhattan C.A.T.V., Corp. is illustrative.\[^{297}\] In that case, a Manhattan building owner successfully sued the City of New York by arguing that a city ordinance requiring installation (by the preceding owner) of wiring and relatively small cable boxes on her building constituted a “taking” under the Fifth Amendment.\[^{298}\] The Loretto Court noted a long line of cases holding that any physical intrusion is materially different from regulatory restrictions such as those contested in Penn Central.\[^{299}\] The Court held: “[w]e conclude that a permanent physical occupation authorized by government is a taking without regard to the public interests that it may serve. Our constitutional history confirms the rule, recent cases do not question it, and the purposes of the Takings Clause compel its retention.”\[^{300}\] The government need not actually commit the trespass. The Court added that “[a] permanent physical occupation authorized by state law is a taking without regard to whether the State, or instead a party authorized by the State, is the occupant.”\[^{301}\] Nor does size matter:

In United States v. Causby, the Court approvingly cited Butler v. Frontier Telephone Co., holding that ejectment would lie where a telephone wire was strung across the plaintiff’s property without touching the soil . . . . “[A]n owner is entitled to the absolute and undisturbed possession of every part of his premises, including the space above, as much as a mine beneath. If the wire had been a huge cable, several inches thick and but a foot above the ground, there would have been a difference in degree, but not in principle. Expand the wire into a beam supported by posts standing upon abutting lots without touching the surface of plaintiff’s land, and the difference would still be one of degree only. Enlarge the beam into a bridge, and yet space only would be occupied. Erect a house upon the bridge, and the air above the surface of the land would alone be disturbed.”\[^{302}\]

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\[^{298}\] Id. at 421.

\[^{299}\] Penn Cent. Transp. Co. v. New York City, 438 U.S. 104, 124 (1978) (arguing that a “physical invasion by the government” may be more readily characterized as a “taking” than “interferences from some public programs adjusting the benefits and burdens of economic life”).

\[^{300}\] Loretto, 458 U.S. at 426.

\[^{301}\] Id. at 432–33 n.9 (citation omitted).

\[^{302}\] Id. at 437 n.13 (citation omitted).
The *Loretto* Court also held that a permitting condition that authorizes physical entry by others effectively imposes an easement. The governmental action constitutes a taking because it interferes with the fundamental right to exclude and control:

In *Kaiser Aetna v. United States*, the Court held that the Government’s imposition of a navigational servitude requiring public access to a pond was a taking where the landowner had reasonably relied on Government consent in connecting the pond to navigable water. The Court emphasized that the servitude took the land-owner’s right to exclude, “one of the most essential sticks in the bundle of rights that are commonly characterized as property.”

The Court explained:

This is not a case in which the Government is exercising its regulatory power in a manner that will cause an insubstantial devaluation of petitioner's private property; rather, the imposition of the navigational servitude in this context will result in an *actual physical invasion* of the privately owned marina. . . . And even if the Government physically invades only an easement in property, it must nonetheless pay compensation.

. . .

Although the easement of passage, not being a permanent occupation of land, was not considered a taking *per se*, *Kaiser Aetna* reemphasizes that a physical invasion is a government intrusion of an unusually serious character.

. . .

In short, when the “character of the governmental action,” is a permanent physical occupation of property, our cases uniformly have found a taking to the extent of the occupation, without regard to whether the action achieves an important public benefit or has only minimal economic impact on the owner.

The historical rule that a permanent physical occupation of another's property is a taking has more than tradition to commend it. Such an appropriation is perhaps the most serious form of invasion of an owner's property
interests. To borrow a metaphor, cf. Andrus v. Allard, the
government does not simply take a single “strand” from the
“bundle” of property rights: it chops through the bundle,
taking a slice of every strand.303

The majority also noted the distinction between temporary and
permanent physical intrusions.304 Emissions could be considered permanent
as long as allowed, and as for waste disposal methods, they are qualitatively
different from truly temporary sources, such as the usual construction cases.
Intermittent intrusions can also constitute takings, although—as in Causby
and Kaiser Aetna—less than a total taking may result.305 In Causby, the
U.S. Supreme Court returned the case to the Court of Claims for
determination of damages based on its conclusion that since the Civil
Aeronautics Act306 only authorized flight at roughly 500 feet above ground
level and higher, any flight below that limit physically invaded private
airspace and constituted a “taking” per the Fifth Amendment.307 The Court
relied on earlier cases involving infrequent firing of artillery rounds over
plaintiff’s property and intermittent flooding, where the only real question
in each was the extent of damages.308 The Court held that the site need not
be completely uninhabitable: a navigation easement would also work a
taking. This taking would then be measured by its permanency and
intensity (or extent):

303. Id. at 433–35. (quoting Kaiser Aetna v. United States, 444 U.S. 164, 176 (1979); Andrus v.
328 U.S. 256, 265 (1946); Portsmouth Harbor Land & Hotel Co. v. United States, 260 U.S. 327, 329–30
(1922)) (alteration to original) (citations omitted) (footnotes omitted). See also id. at 427 n.5
(summarizing the case law concerning the role of physical invasion in the development of takings
jurisprudence).

304. Loretto, 458 U.S. at 434. Another recent case underscores the constitutional distinction
between a permanent occupation and a temporary physical invasion. In Pruneyard Shopping Center v.
Robbins, 447 U.S. 74 (1980), the Court upheld a state constitutional requirement that shopping center
owners permit individuals to exercise free speech and petition rights on their property, to which they had
already invited the general public. The Court emphasized that the State Constitution does not prevent
the owner from restricting expressive activities by imposing reasonable time, place, and manner
restrictions to minimize interference with the owner’s commercial functions. Since the invasion was
temporary and limited in nature, and since the owner had not exhibited an interest in excluding all
persons from his property, “the fact that [the solicitors] may have ‘physically invaded’ [the owners’]
property cannot be viewed as determinative.” Id. at 84.

305. See, e.g., Kaiser Aetna, 444 U.S. at 179–80 (“Government must condemn and pay for
before it takes over the management of the landowner’s property.”); Causby, 328 U.S. at 267–68
(discussing the appropriateness of damages for temporary versus permanent takings).


307. Causby, 328 U.S. at 263–65. This case involved Army Air Corps bombers and other
aircraft using a final landing approach situated no more than 100 feet above plaintiffs’ property during
World War II.

308. Id. at 261 n.6, 263.
Though it would be only an easement of flight which was taken, that easement, if permanent and not merely temporary, normally would be the equivalent of a fee interest. It would be a definite exercise of complete dominion and control over the surface of the land. *The fact that the planes never touched the surface would be as irrelevant as the absence in this day of the feudal livery of seisin on the transfer of real estate.* The owner’s right to possess and exploit the land—that is to say, his beneficial ownership of it—would be destroyed. In the supposed case, the line of flight is over the land. And the land is appropriated as directly and completely as if it were mused [sic] for the runways themselves.

There is no material difference between the supposed case and the present one, except that here enjoyment and use of the land are not completely destroyed. But that does not seem to us to be controlling. The path of glide for airplanes might reduce a valuable factory site to grazing land, an orchard to a vegetable patch, a residential section to a wheat field. Some value would remain. But the use of the airspace immediately above the land would limit the utility of the land and cause a diminution in its value.\(^{309}\)

With global warming, the collective invasions occur on two levels: the initial pass-through and the effects. The effects—however microscopic—are very substantial: certainly inundation, fires, or elimination of major

\(^{309}\) *Id.* at 261–62 (emphasis added). The Court did not address whether the Civil Aeronautics Act itself had violated constitutionally protected property rights of *all* private owners by lopping off ownership of airspace over about five hundred feet above ground level as a “public highway,” but one for which the government paid nothing. The Court simply declared that the notion of private property ownership to the “periphery of the universe . . . has no place in the modern world.” *Id.* at 260–61. The government also conceded that flights into airspace below about 500 feet that rendered the property uninhabitable would constitute a “taking,” thus offering a way to save the bulk of the statute, at least in that case. With the stroke of a pen the Court effectively validated Congressional elimination of historic property rights. By avoiding the issue for airspace above the jurisdictional limit, the Court in essence adopted the view of the dissent that airspace, if not the air itself, ought to be considered to be in public ownership as are public trust waters. *Id.* at 260–61. Justice Black in the *Causby* dissent would have voided the entire Civil Aeronautics Act based on his view that the Act did include the “private airspace” and that the singular nationalization of so much airborne real estate without compensation would require nullification of the Act. However, he concluded that there was no taking based on the argument that there exist navigation easements in all airspace, just as there are navigation easements on waters. *Id.* at 271–72, 273 n.3. A federal navigation easement for the public is very different from a permit to trespass by pollutants of unknown effect.
water supplies will have a far more dramatic effect than flying B-24s at midnight above Causby’s chicken coops. If anything, the Causby view of airspace simplifies the task of the states to protect public property rights in airspace as well as the underlying private property rights. In Causby, for example, the Court used the North Carolina statute both to confirm private ownership and to acknowledge the federal claim to navigation.\footnote{See Causby, 328 U.S. at 264–65 (stating that the definition of property will normally be determined by referring to local law; therefore, ownership of the airspace that rests above the waters and lands of North Carolina is vested in the owners of the surface below—this is in accordance with local law); see, e.g., Long v. Charlotte, 293 S.E.2d 101, 101, 108–09 (N.C. 1982) (holding that inverse condemnation—a claim that the government has interfered with an owner’s property rights without giving the owner just compensation—is the sole remedy for landowners suing the city because the local airport was producing noise and vibration).}

That government “permitted” the intrusion is provable on two levels: (1) the federal government has intentionally elected to permit unlimited greenhouse gas emissions in the face of evidence that the U.S. Supreme Court found overwhelming in Mass. v. EPA,\footnote{Massachusetts v. Envtl. Prot. Agency, 127 S. Ct. 1438, 1462–63 (2007). The trial court in California v. GM also found that the conduct of the Administration in permitting unlimited GHG was deliberate and intentional. California v. Gen. Motors Corp., No. C06-05755 MJJ, 2007 U.S. Dist. LEXIS 68547, at *24 (N.D. Cal. Sept. 17, 2007).} and (2) the few states that have attempted to regulate GHG emissions, if the courts uphold the regulations, have issued conventional “permits,” as the EPA may eventually do.

There is another line of taking-by-nuisance cases emanating from Causby and Richards that is analogous but likely limited to private nuisance actions. In Bormann, as in Richards, plaintiffs argued that a statute insulating farm nuisances from liability created a private nuisance and imposed an easement on private property in violation of the Iowa Constitution’s “takings” clause.\footnote{See also, Richards v. Wash. Terminal Co., 233 U.S. 546, 548 (1913) (holding that Congress could not immunize private railroads from suits for private nuisance even when the route was dictated by Congress and not by the railroad). We discuss the issue at some length in Cutting & Cahoon, supra note 10, at 75–77.} The Iowa Supreme Court voided the statute because it shielded against private actions for nuisance and thus affected only a limited number of landowners.\footnote{Bormann v. Bd. of Supervisors, 584 N.W.2d 309, 313, 319–20 (Iowa 1998). See also, Richards v. Wash. Terminal Co., 233 U.S. 546, 548 (1913) (holding that Congress could not immunize private railroads from suits for private nuisance even when the route was dictated by Congress and not by the railroad).}
There are two further constitutional issues. Even if the government does not permit the trespass, the courts should no longer permit the imposition of even a temporary easement for a private party trespass or nuisance over receptor property by allowing the generator to pay damages. Courts have noted that under many state laws (and perhaps the Federal Constitution) the process would unconstitutionally extend to private parties the right to condemn interests in the property.\footnote{314} Further, if the use of public property for waste disposal is permissible, that use should constitute a violation of the public trust concept or even qualify as a “gift of public funds” in some jurisdictions.\footnote{315}

\textit{K. Displacement and Preemption}

We think the analysis applied earlier to nuisance applies to trespass with full force. Any interpretation of \textit{Milwaukee II} (and \textit{Ouellette}) that results in a trespass without any remedy under either federal or state common law should trigger the \textit{Loretto} trespass analysis and the \textit{Richards/Bormann} private nuisance analysis,\footnote{316} that must be avoided both as a matter of construction and as a matter of protecting the public treasury. A claim against the sovereign would not be subject to preemption arguments under the Federal Constitution, nor would the supremacy clause likely affect claims against the government under state constitutions. The sovereign may enact GHG standards protecting citizens; it is the government’s failure to do so that results in trespasses constituting “takings.”
The possible net results of either a nuisance or trespass finding (as in *AEP* and *California v. GM*) are: (1) compensatory damages; (2) equitable relief; (3) takings compensations; or (4) a declaration that the statute itself is unconstitutional. 317

The attorneys general can also represent direct interests of the state in public lands. 318 The attorney general plays an interesting role in the conflict by conducting the state’s defense of its statutes against actions by private parties who claim a “taking.” The state might avoid paying damages by conceding the unconstitutionality of the statute. The attorney general could argue that the state will likely incur defense litigation costs (if not damages costs) from citizen and NGO suits. The attorneys general should be able to seek indemnity and damages from defendant generators who benefited from the trespass or nuisance.

We have also argued that any remedy should become effective at the generators’ borders, since by definition any transgression is an invasion of some airspace. This result would reduce the multiplicity of litigation and focus immediate attention on all effects of the transboundary movement of greenhouse (or other) gases.

## A. Damages

Calculating compensation for pollution with delayed effects is difficult for at least four reasons: (1) legislatures have not provided regulatory agencies, the legal authority, or the resources to acquire more data on pollutants and their effects on the population (critics contend this is because of campaign contributions that have “captured” them); 319 (2) lacking research, scientists and economists cannot fully quantify the costs of pollution; (3) many environmental amenities, such as open space or a stable climate, are difficult to quantify monetarily 320 (though given this current data deficit, the appropriate courts could retain jurisdiction to decide

317. See *Gacke*, 684 N.W.2d at 171, 175 (Iowa 2004) (declaring statutes permitting nuisance without recovery to be unconstitutional); *Bormann v. Bd. of Supervisors*, 584 N.W.2d 309, 321 (Iowa 1998) (holding that a statute authorizing a taking without just compensation is unconstitutional).

318. See, e.g. *New Mexico v. Gen. Elec. Co.*, 467 F.3d 1223, 1243, 1247–48 (10th Cir. 2006) (stating that there is not doubt that New Mexico manages public waters for the people and that the state is authorized to initiate suits to protect those waters, but Congress’ creation of CERCLA, designed to cleanup hazardous waste, creates a comprehensive scheme that will preempt a state’s cause of action against polluters when the state seeks an unrestricted award of money damages).


320. See generally *Cutting & Cahoon*, *supra* note 10, at 68 (arguing that parties should look at property from an ecosystemic viewpoint).
damages issues later); and (4) as a result of the lack of knowledge, judges, policymakers, and the public have difficulty even comprehending catastrophic scenarios as far out as 2050 or 2100. 321

The fraud themes of the tobacco litigation raised in the Cipollone case could be used in the damages and injunctive relief phases. 322 Critics contend that automakers and power generators have concealed knowledge of greenhouse gas emissions risks and funded disinformation campaigns, much as Big Tobacco did with the hazards of smoking. 323 For example, automakers have for decades lobbied against tougher CAFE standards and for favorable tax status to promote larger vehicles (e.g., SUVs), when they knew in the 1970s that fuel efficient vehicles also produce fewer emissions. 324 They should have been reasonably aware of the cumulative effects of emissions, including the ultimate effects of the accumulation of greenhouse gases. 325 Similarly, utilities have marketed conversion to electric power without regard to the resulting increase in emissions, instead of encouraging conservation and investing in sustainable energy sources. 326 Claims for punitive damages on these theories would be subject to the new rule of Exxon Shipping Co. v. Baker, but the actual damages—even under that formula—would result in staggering sums. 327

Damage calculation would differ depending on source category. A mobile source manufacturer’s total emissions vary with the use of its vehicles; thus requiring apportionment via market-share or some other valid statistical measurement (at least until each vehicle is wired in through some

321. See supra Part II.D.
323. Stephen Faris, Conspiracy Theory, THE ATLANTIC, June 2008, at 32, 34. (discussing the legal ramifications of the possibility that industry has funded groups to promote writers who overestimate the uncertainties of global warming and minimize the anticipated effects, as recently alleged by the Union of Concerned Scientists). See generally Pawa, supra note 5, at 119 (discussing industry-funded campaigns to deceive policymakers and the public about the consequences of global warming).
324. THE ENERGY PROJECT, HARVARD BUSINESS SCHOOL, ENERGY FUTURE 181 (Robert Stobaugh & Daniel Yergin eds., 1979) (discussing industry attitudes towards fuel efficiency and the energy economy from the 1950s to the 1970s). Thomas Friedman notes that Amory Lovins of the Rocky Mountain Institute calculates that we could also have been free of dependence on Middle East oil as of 1985 had we continued to conserve fuel at the same rate as the country did in the years after the OPEC oil embargo of 1974, but that President Reagan rolled back the CAFE standards in the heat of deregulation. HOT, FLAT, AND CROWDED, supra note 14, at 12.
327. See Exxon Shipping Co. v. Baker, 128 S. Ct. 2605, 2626–27 (2008) (stating punitive damages need to be regulated at common law so that penalties are “reasonably predictable”).
Regulators for stationary sources can calculate stack emissions much more directly and in real-time.

Monetary damages in court actions as well as emissions charges or legislatively-imposed taxes might also be utilized to: (1) support data collection to eliminate the “data deficit,” at least on global warming issues, and (2) mitigate future damages through a pool, insurance, or bonding (thus utilizing very efficient free-market prognosticators of environmental damage).

B. Equitable Remedies

Equitable relief in the nuisance cases would involve balancing. In trespass cases at least one state supreme court has indicated that Boomer-like balancing ought to be used for trespass, but only at the remedy phase after there has been a clear determination of liability. The toolbox includes:

1. Injunction

An injunction could be as straightforward as a prohibition on transboundary emission of greenhouse gases. Injunctions could also be utilized to mandate the submission of a plan to eliminate the incursions, allowing creative solutions by defendants themselves.

2. Creative Remedies

In attorneys general or NGO public interest litigation, public officers have vast experience handling mass claims in consumer and antitrust litigation; hence courts might be more likely to utilize continuing jurisdiction. Remedies could include:

- Bonding or indemnification by generators for past, present, and future harms;
- A mechanism for expedited resolution of any claims resulting from the effect of a discharge (although numerous procedural issues arise, e.g., employing special masters);
- Timetables and conditions for emissions reductions reflecting prevailing scientific wisdom and the precautionary principle;

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329. See generally FED. R. CIV. P. 53.
• Regulation of products that emit, such as restrictions on sales of high emission/low mileage cars, retrofits or recalls, and buybacks;
• Efforts to reduce emissions through changed consumer behavior (e.g., energy conservation), including contributions to alternative transportation and advertising;
• Restoration damages, such as reforestation;
• Pre- and post-decree monitors, monitoring, and receivers;
• Restitution of profits from avoidance of the control emissions costs;
• Funding research to better inform the nation and litigants; and
• Credits for reductions in other, more potent greenhouse gases such as methane, nitrous oxide, or CFCs, perhaps based on their relative radiative forcings.330

A court could also consider ordering credit for actions such as global reduction of carbon dioxide emissions. Negotiated settlements could quite clearly include an even wider range of creative options for defendants. Could the court reach the issue of reduction in vehicle trips per day by requiring such things as alternative transportation? Certainly courts could require a plan affording creativity to defendants in meeting timetables for reduction that might include credit for reductions through mass transit alternatives such as contributing to publicity to stimulate demand and providing hardware or other technology.

Professor Zasloff believes that damages claims are superior to equitable relief claims because they may avoid (1) justiciability arguments (such as those made in AEP); (2) they more closely approximate to “green taxes” favored by economists; and (3) equitable relief is difficult and expensive to manage and leads to transaction costs.331 The California Attorney General’s lead counsel argued that California v. GM seeks damages because there are real and identifiable past and future costs.332 All of these are valid considerations, but equitable relief may actually provide more flexibility to the generators. Moreover, the attorneys general have substantial experience managing extensive systems of redress, and equitable remedies can be used to provide additional incentives—such as the threat of contempt—encouraging defendants to avoid damaging conduct.333

330. IPCC SYNTHESIS REPORT, supra note 38, at 36 (explaining relative radiative forcing).
331. See Zasloff, supra note 20, at 1835 (discussing the higher transaction costs in consumer-demand scenarios for encouraging emissions producers to engage in cost-avoidance activities).
332. Alex, supra note 4, at 167–70.
333. This is a major goal of consumer protection litigation, for example, those cases under California’s Business and Professions Code. Once the public prosecutor has a “handle” on the defendant through injunctive relief, later compliance is enhanced. Attorneys general have for many years administered complex damage and refund cases in the arenas of consumer protection, antitrust,
Note that because Professor Zasloff believes that the California automaker case, \textit{California v. GM}, is preempted; he is of the view that damages should be sought from upstream defendants (e.g., fossil fuel producers).\textsuperscript{334}

\textbf{C. The Constitutional Claims}

\textbf{1. Loretto Damages}

“Takings” damages vary with the nature and extent of the invasion. Permanent takings would effectively require condemnation damages. Temporary takings might only result in damages during that temporary taking.\textsuperscript{335} Condemnation (or inverse condemnation) theoretically results in the payment of fair market value, which might be difficult to determine given the data deficit and the effects of any permitted continuation of the trespass. The best solution would include an adjustment mechanism with low transactional costs to adjust for the risk of future unknown damages and provide for payment security through bonding or insurance.

\textbf{2. Voiding the Statute}

We think temporary “takings” damages are preferable to voiding the statute because: (1) the temporary nature of the pollution is recognized, and (2) the government must either reduce the effect or condemn the property, an option that might not be palatable. The shield statutes were voided because they eliminated the right of private parties to sue for a nuisance property invasion.\textsuperscript{336} But taking all airspace for the transit and deposition of

and in the tobacco litigation, among others. Devices include \textit{cy pres}, restitution, damages, and refunds per the unfair business practice statutes, special masters, private contractors (for mailings, e.g.), multi-state remedies, such as the tobacco settlement funds, and expedited claims review. Interview with Thomas Greene, Special Assistant Attorney General, State of California (Oct. 15, 2008). Mr. Greene confirmed that the office is fully prepared to administer complicated claims procedures for \textit{California v. GM}.

\textsuperscript{334} Zasloff, \textit{supra} note 20, at 1856–58.

\textsuperscript{335} \textit{See generally} First English Evangelical Lutheran Church v. Los Angeles, 482 U.S. 304, 318–19, 321 (1987) (“We merely hold that where the government’s activities have already worked a taking of all use of property, no subsequent action by the government can relieve it of the duty to provide compensation for the period during which the [temporary] taking was effective.”); United States \textit{v. Causby}, 328 U.S. 256, 268 (1946) (stating it would be “premature” to evaluate the amount of the award without knowing if the taking was temporary or permanent).

\textsuperscript{336} \textit{See, e.g.}, Gucke \textit{v. Pork Xtra}, L.L.C., 684 N.W.2d 168, 171, 175 (Iowa 2004) (declaring statutes permitting nuisance without recovery to be unconstitutional); Bormann \textit{v. Bd. of Supervisors}, 584 N.W.2d 309, 321–22 (Iowa 1998) (invalidating a statute that authorized the use of property in such a way as to infringe on the rights of others by allowing the creation of a nuisance without the payment of just compensation).
pollutants without a mechanism to counter the effects might justify voiding the entire statute. Voiding the permitting statute might outlaw all emissions if the statute requires an emitting permit, or alternatively voiding might also allow emissions if the statute only outlaws emissions requiring a permit. If the statute is voided, courts would still play a key role because common law remedies could be utilized in the same action to eliminate the trespass or nuisance and allow the plaintiff to recover damages. The courts would also hear any enforcement actions.

On the other hand, there are reasons to consider voiding an enabling act. First, why permit any invasion of others’ property, especially if the court concludes it would constitute a “taking?” Second, does the statute impose identifiable rights on private property (easement allowing trespass or nuisance, e.g.) and then deny a private party’s access to the courts for claiming special damages? Third, does the statute sweep away extensive public and private rights in actual physical space, a result that as a matter of judicial economy might invite invalidation rather than a multitude of individual actions for redress of damages?

IV. COUNTERMEASURES

To avoid government liability, states might react either positively to implement rights of receptors through a statutory mechanism to control

337. See Causby, 328 U.S. at 273–74 (Black, J., dissenting) (concluding that the Civil Aeronautics Act was constitutional, but noting that in his view the proper remedy for the court would have been to void the entire statute if the majority wanted to reach the issue in the case (a constitutionally protected zone of airspace)).

338. See Gacke, 684 N.W.2d at 171, 175 (declaring statutes permitting nuisance without recovery to be unconstitutional); Bormann, 584 N.W.2d at 321–22 (invalidating a statute that authorized the use of property in such a way as to infringe on the rights of others by allowing the creation of a nuisance without the payment of just compensation).

339. Other policy criteria that might be considered include: (1) the existence of a valid public purpose that justifies an invasion by pollutants sufficient to satisfy the tests of Kelo v. City of New London, 545 U.S. 469, 480, 483 (2005), and Hawaii Housing Auth. v. Midkiff, 467 U.S. 229, 244 (1984); (2) the nature of the pollutant, including the risk of harm; (3) the scope of interest affected, including the impact on the property (under Causby and its progeny); (4) the harmfulness of the invasion (determined in large measure by whether there has been an appropriation of the entire property rather than just an easement); and (5) the larger interest. The larger interest is especially relevant if the extent of the taking is broad in scope, and might give little reason to save the statute (although a minor easement over a wide region could be compensable in temporary damages). If there is no valid public purpose, then the statute ought to be voided. If the emissions are not immediately harmful, consideration must be given to whether both the short-term and long-term effects might be managed by a combination of equitable relief and compensation. This discussion is about greenhouse gases, but the concepts are the same for other pollutants. The cumulative extent of the damages from greenhouse gas emissions might augur for the invalidation of any statutes permitting catastrophes on the scale of those predicted as a result of global warming.
emissions, or negatively by attempting to block actions by receptors. Legislatures could: (1) authorize courts to exercise continuing jurisdiction during a temporary taking period; (2) require indemnification, insurance, and bonding from dischargers; or (3) specifically authorize condemnation (if the test of valid public purpose can be met). We have previously suggested concrete steps to reconcile receptors’ rights with those of the generators.340

A legislature could also alter its regulatory structure to protect receptors against transboundary emissions by outlawing any emissions and implementing a reduction procedure and timetable. The declining rights could even be allocated via a cap-and-trade system. A compensation mechanism for receptors—enforceable by either state agencies or the courts—in the event of damage could be included. Alternatively, of course, without legislation in many jurisdictions, the government might initiate enforcement proceedings (through either statutes or the common law), act as parens patriae, or even utilize the trade regulation statutes.341 Enforcement actions would involve far fewer litigants (not all sources would resist) resulting in less time and cost, and could result in very substantial penalties (to offset costs and fund research) as well as extensive equitable relief (especially compared with the complexity and potential governmental downside of defense of mass claims for “takings”).

There are significant issues regarding the government’s acquisition of pollution rights through condemnation, including concerns relating to logistics and cost. Another issue is the government’s liability as the owner of the condemned property who facilitates the effects of global warming. The question is whether imposing unknown pollutants on receptors—especially without any remedy for harm—would be a valid public interest.342 Is protecting the economic interest of generators sufficient to overcome the impact on receptors? The government’s best argument is that sovereign immunity would blunt any action for damages, which generally insulates the government from a constitutional claim (but did not save the

340. See Cutting, supra note 13, 893–94 nn.461–63 (discussing the reconciliation of receptors’ and generators’ property rights); see also Cutting & Cahoon, supra note 10, at 87–90 nn.111–17 (proposing concrete requirements for shifting pollution burdens away from receptors to generators).

341. See, e.g., CAL. BUS. & PROF. CODE §§ 17202, 17204 (West 2008) (providing public prosecutors and courts the power to bring charges and grant relief in instances of unfair competition).

342. See generally Kelo, 545 U.S. at 480, 483 (“The disposition of this case therefore turns on the question [of] whether the City’s development plan serves a public purpose.”); Hawaii Housing Auth., 467 U.S. at 244 (“[I]n our system of government, legislatures are better able to assess what public purposes should be advanced by an exercise of the taking power.”).
That position, however, might prove politically unpalatable. While generally the existence of a permit cannot constitute a defense if the landholder has not consented to the intrusion, a legislature might be tempted to enact specific shield legislation to avoid the multiplicity and complexity of trespass actions by NGOs and attorneys general. Many states have done this for farm nuisance claims. This procedural shield would deprive owners of their property rights under either nuisance or trespass theories and should be voided following the U.S. Supreme Court precedent in Richards. The state could also amend property laws to exclude airspace—even below 500 feet—but then the statute would eliminate all private property rights—a taking under Causby.

V. GLOBAL WARMING IN A GLOBAL ECONOMY

Given the global nature of the problem, a serious issue we cannot overlook is how a nation might implement the advocated common law remedies sought by the plaintiffs in the GHG litigation and still remain competitive in the global economy. While a full discussion is beyond the scope of this article, we cannot ignore that trade pacts must be modified to permit nations to limit access to their markets for entities that operate under less-stringent environmental regulations. Failure to allow such limits constitutes an unfair trade practice as well as a practice that is harmful to the global environment and therefore public health. In a “race to the

343. United States v. Causby, 328 U.S. 256, 266–68 (1946) (the Court agreed with the Court of Claims that there was a taking of an easement of private airspace and returned the case for determination of damages).

344. See generally Bates v. Dow Agrosciences, L.L.C., 544 U.S. 431, 448 (2005) (arguing that states are not precluded from providing remedies where federal statutes do not, so long as the state requirements do not differ from those imposed by the federal statute); DANIEL SELMI & KENNETH MANASTER, STATE ENVIRONMENTAL LAW § 4:1 (2007) (“Moreover, the fact that the government has issued a permit authorizing the ‘invasion’ will not preclude a trespass action if the owner of the invaded property did not consent to the intrusion.”).

345. See Richards v. Wash. Terminal Co., 233 U.S. 546, 553 (1913) (“The legislature . . . may not confer immunity from an action for private nuisance . . . as to amount in effect to a taking of private property for public use.”); Gacke v. Pork Xtra, L.L.C., 684 N.W.2d 168, 171, 175 (Iowa 2004) (declaring statutes permitting nuisance without recovery to be unconstitutional); Bormann v. Bd. of Supervisors, 584 N.W.2d 309, 321 (Iowa 1998) (invalidating a statute that authorized the use of property in such a way as to infringe on the rights of others by allowing the creation of a nuisance without the payment of just compensation).


347. See generally PATRICK WOODALL, WHEN BAD THINGS HAPPEN TO GOOD LAW 8 (2004), available at http://www.sierraclub.org/trade/california/CATradeReport.pdf (arguing that the major trade treaties threaten to invalidate state as well as federal environmental laws).
“Gift” That Keeps on Giving

bottom,” generators move from jurisdictions with more stringent pollution control laws (as well as labor laws) to areas with few laws or lax enforcement, thereby achieving significant cost reductions. Some economists, however, contend that manufacturing countries still behave more as the customer nations environmental regulations would require. One example is the U.S. border with Mexico, where U.S. companies simply moved from the U.S. to the Mexican side of the Rio Grande, and where Mexican enforcement of environmental regulations has historically been lax (the maquiladora phenomena). Why should entities that operate in less-developed nations to avoid more stringent pollution control rules enjoy any advantage for evading measures intended to protect the population’s health and the planet’s resources and environment? U.S. laws are presently designed to prohibit just such tactics. The CAA and the CWA both contain provisions designed to prevent polluters from simply moving to another area to avoid pollution regulations. Why countenance the phenomenon at a global level? We have thus advocated renegotiation of the trade treaties to make evasion of market countries’ standards an unfair trade practice.

On another level, could U.S. enforcement actions reach foreign sources? The customary law offers one avenue for enforcement, but only if the parties agree. Is there jurisdiction in U.S. courts? Professor Zasloff makes an interesting case for U.S.-based actions. Causing effects in the jurisdiction ought to permit it, unless the plaintiff has “unclean hands” because the U.S. is doing the same things! But, in any forum, would India, China, and Russia, and the U.S. comply? We think the idea is useful to illustrate why the trade pacts must be modified so that it is declared to be an unfair trade practice to produce goods or services that generate pollutants in excess of the market state law and that actually cause damage in the market state (1) because of the pollution, or (2) because of the competitive


advantage enjoyed by the state with lax laws.\textsuperscript{354}

Clearly, negotiations on the successor treaty to Kyoto offer the most immediate promise, although with the fall 2008 monetary crisis, E.U. countries have suggested retreat from earlier goals. “This is not the time to abandon a climate change agenda,” stated British Prime Minister Gordon Brown, saying the two issues were linked.\textsuperscript{355} It is assumed that any new pact will rely on emissions trading since it appears that it will be less expensive and more politically palatable to contain emissions at foreign facilities than to retrofit many developed nations’ existing sources and developing countries continue to maintain that they should shoulder less of the burden because of the costs and the advantage that the developed world obtained from polluting for decades. Creativity in credits for reductions from other sources (e.g. indirect source control, such as assisting mass transit) or of other greenhouse gases is attractive when the alternatives are available globally. With these options business entities should have less incentive to facilities or work offshore. The principle problem with emissions trading is that if the emissions reduction goal is insufficient, as critics contend has been the case in the E.U.,\textsuperscript{356} and costs are not internalized, who will compensate the victims?

**CONCLUSION**

Given an absence of coordinated national activity to address the effects of global warming, the common law offers an interesting resurrection of the concept of accountability for GHG emissions. Current actions by the attorneys general and NGO’s: (1) raise public awareness, particularly of the costs of inaction; (2) keep some pressure on reluctant administrations, especially if part of the price tag of the damage litigation falls on government; and (3) offer a real tool to provide remedies for the results of global warming. The concept of trespass offers some further procedural as well as substantive advantages. It also provides a worldview that blends traditional property rights with the scientific realities of pollutant transport from generators to receptors.

Under nearly any scenario, significant public or private research investment would be needed so that scientists, the medical community, and economists could finally quantify the actual costs of pollution. In many

\textsuperscript{354} The same should be true for child labor and other unfair labor practices, including workplace exposure to toxics.


cases, the results may reveal process changes or new uses for wastes. In any event, generators ought to provide both research and sufficient licensing fees for regulatory evaluation, similar to the review procedures for pharmaceutical products, before disposing of waste in public and private space. If pollution is to be subsidized by government permit, the process should be crystal clear. The public sector could then allocate additional subsidies to researchers through more independent scientific panels than have been seen for most of the eight years of the Bush Administration. Presumably, generators would then have a market incentive to fund research to eliminate transboundary waste. Appropriately, better research should also reveal areas that have been over-regulated.

Perhaps most importantly, the public interest in holding generators responsible for adverse effects cannot be underestimated—especially when the costs to that same body politic are fully understood. There are far more receptors than generators and we will lay odds that the public would rather see generators shoulder the burden for all the costs of polluting as the free market demands, than let the populace be subjected to both the conditions and the costs.