
ARTICLE

HARNESSING INDIVIDUAL BEHAVIOR TO ADDRESS CLIMATE
CHANGE: OPTIONS FOR CONGRESS

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This Article addresses a question about the design of national climate change legislation that has not received significant attention: How should Congress engage individuals in the effort to address climate change? The comprehensive climate change bills introduced in 2007 focus primarily on large greenhouse gas (GHG)-emitting entities. While this focus should be a key element, Congress must also engage individuals. Individuals contribute significantly to GHG emissions in the United States, which has a higher per capita energy consumption rate than virtually any other country. Individuals can play at least two complementary and mutually reinforcing roles—as citizens participating in the implementation process and as consumers making energy choices. Although each of the legislative bills introduced in 2007 contains elements of an individual engagement strategy, none reflects a comprehensive approach. This Article recommends a broad range of provisions, including findings and purposes, public participation, targets and timetables, numerous forms of public information, and a variety of incentives and pathways for individual action. The purpose of such provisions is to complement, not substitute for, provisions addressing major emitters. A congressional effort to engage individuals would take advantage of some of the nation’s key strengths—individual initiative, engaged citizenship, and collective sense of purpose.

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I. INTRODUCTION

The prospects for major national climate change legislation are now greater than ever. With political opposition fading, design issues are coming into greater focus. Three approaches are available to achieve any GHG reduction goal, and they are subject to considerable discussion and analysis: a cap-and-trade approach, a GHG tax, and a “sectoral hybrid” approach,¹ which combines a large-source cap-and-trade program with product efficiency standards, such as those for automobiles and appliances.² Each of these approaches, in turn, has many iterations.

This Article attempts to answer a program design question that has not received significant attention in the literature: How should Congress engage individuals in the effort to address climate change? As Part II explains, the comprehensive bills currently before Congress focus primarily on large emitting entities, and all employ either a cap-and-trade or a sectoral hybrid approach. Yet Congress should also actively engage individuals in the implementation of any climate change legislation. The need for individual citizen involvement is necessary for a variety of reasons, including the importance of ensuring proper implementation, the need to reduce GHG emissions as rapidly as possible, and the significant contribution that individuals make to GHG emissions. Since the United States has significantly higher per capita energy consumption than other countries, and because this issue figures prominently in international discussions, the GHG issue necessarily implicates individuals.

Part II also identifies two roles that individuals can play in this legislation—as citizens and as consumers. Individuals can participate in the enforcement and implementation of climate change legislation in much the same manner as they have in other environmental laws. Individuals can also participate as consumers, making choices that result in little or no GHG emissions. As Part II argues, individuals can and should play these complementary and mutually reinforcing roles, improving the overall effectiveness of any climate change legislation.

¹ Robert R. Nordhaus & Kyle W. Danish, *Assessing the Options for Designing a Mandatory U.S. Greenhouse Gas Reduction Program*, 32 B.C. ENVTL. AFF. L. REV. 97, 98 (2005). The paper also appears, in substantially the same form, as ROBERT R. NORDHAUS & KYLE W. DANISH, PEW CENTER ON GLOBAL CLIMATE CHANGE, DESIGNING A MANDATORY GREENHOUSE GAS REDUCTION PROGRAM FOR THE U.S. (2003), available at <http://www.pewclimate.org/docUploads/USGas%2Epdf>.

² Nordhaus & Danish, *supra* note 1, at 110, 161–62, 163.

Part III suggests a path for engaging individuals in light of the five comprehensive climate change bills that were before Congress in early 2007. Although other bills have been introduced since that time, these bills provide a useful lens through which to examine this issue, and the more recent bills do not differ materially from the earlier bills on the issue of individual engagement. Part III describes provisions of those bills that are relevant to citizen and consumer actions, and identifies ways to strengthen these bills to more fully engage individuals in the national effort to address climate change. Although each of the bills contains some of the pieces of an individual engagement strategy, none of the bills reflects a comprehensive strategy to engage individual efforts to address this issue.

As Part III explains, the legislation should contain findings and statements of purpose that pertain not just to the problem and proposed reductions, but also to the available opportunities and the important role that individuals can play. Climate change legislation, at a minimum, should also contain the same provisions for citizen participation as other environmental laws. In addition, Congress should consider supplementing national targets and timetables for emissions reductions with supplemental targets for per capita energy consumption and GHG emissions.

The legislation should also require (1) the development and publication of a variety of public information; (2) public information about overall GHG emissions, including per capita GHG emissions and trends in those emissions; (3) more and better information about energy use and GHG emissions from goods and services, as well as information about individual GHG or carbon impacts; (4) more and better information about the choices that consumers have; and (5) information about the impacts of climate change in particular regions and economic sectors.

Finally, the legislation should also provide individuals with as many incentives as possible to use those alternatives, including tax credits and other comparable incentives. Similarly, individuals should be able to generate and trade allowances for activities that are highly energy efficient or reduce GHG emissions in some other way. The government should also authorize the distribution of proceeds from allowances in ways that would, for example, reduce the cost of certain energy efficient products. Finally, the legislation should provide for rigorous analysis and monitoring of the effectiveness of various behavioral incentives, and for adjustments and modification of efforts in light of feedback and new information.

Although the suggestions contained in this Article likely do not

exhaust all of the possible ways that Congress could engage individuals, they are a starting point. It is difficult to see how the national effort to address climate change will succeed without individual engagement.

II. NEED TO ENGAGE INDIVIDUALS

The comprehensive climate change bills introduced in Congress would not seriously engage individuals in the national effort to address climate change. As of April 1, 2007, five comprehensive climate change bills were pending in Congress. Two of the five proposals are companion bills in many respects. These bills are Senate Bill 280, the Climate Stewardship and Innovation Act of 2007 (Senator Lieberman and six cosponsors, including Senator McCain),³ and House Bill 620, the Climate Stewardship Act of 2007 (Representative Olver and seventeen cosponsors).⁴ The other three bills are Senate Bill 309, the Global Warming Pollution Reduction Act (Senator Sanders and ten cosponsors),⁵ Senate Bill 485, the Global Warming Reduction Act of 2007 (Senator Kerry and one cosponsor),⁶ and House Bill 1590, the Safe Climate Act of 2007 (Representative Waxman and 131 cosponsors).⁷ At least two more comprehensive bills have been introduced since then.⁸

These bills are comprehensive because they address all six gases that

³ Climate Stewardship and Innovation Act of 2007, S. 280, 110th Cong. (2007). Senators McCain, Lincoln, Snowe, Obama, Collins, and Durbin are cosponsors. The earlier versions of this bill were defeated in Senate floor votes in 2003 (43–55) and 2005 (38–60). Pamela Najor, *McCain Plans to Offer Bill to Cut Emissions of Greenhouse Gases as Energy Amendment*, DAILY ENVTL. REP. (BNA) June 13, 2005, at A-3; Pamela Najor, *Senate Rejects Effort to Force U.S. Cuts in Greenhouse Gas Emissions on 38-60 Vote*, DAILY ENVTL. REP. (BNA) June 23, 2005, at A-1.

⁴ Climate Stewardship Act of 2007, H.R. 620, 110th Cong. (2007). Representatives Gilchrest, Inslee, Walsh (N.Y.), Cummings, Kirk, Solis, Castle, Hinchey, Shays, Harman, Saxton, Dicks, McCollum (Minn.), DeGette, Thompson (Cal.), Cardoza, and Hare cosponsored the bill.

⁵ Global Warming Pollution Reduction Act, S. 309, 110th Cong. (2007). Senators Boxer, Kennedy, Menendez, Lautenberg, Leahy, Reed, Akaka, Inouye, Feingold, and Whitehouse cosponsored the bill.

⁶ Global Warming Reduction Act of 2007, S. 485, 110th Cong. (2007).

⁷ Safe Climate Act of 2007, H.R. 1590, 110th Cong. (2007).

⁸ See Low Carbon Economy Act, S. 1766, 110th Cong. (2007). Senator Bingaman sponsored the bill, and was joined by six cosponsors. A seventh bill, America's Climate Security Act of 2007, S. 2191, 110th Cong. (2007), is sponsored by Senator Joseph Lieberman and nine others, including Senator John Warner. Two major energy bills, House Bill 6 and House Bill 3221, contain renewable energy and energy efficiency provisions that would indirectly address climate change, but do not attempt to comprehensively reduce greenhouse gas emissions. Renewable Fuels, Consumer Protection, and Energy Efficiency Act of 2007, H.R. 6, 110th Cong. (2007) (as passed by Senate, June 27, 2007); New Direction for Energy Independence, National Security, and Consumer Protection Act, H.R. 3221, 110th Cong. (2007) (as passed by House, Aug. 3, 2007).

are subject to reduction under the Kyoto Protocol,⁹ not simply carbon dioxide. They also apply to all sectors of the economy rather than only electrical generation or transportation. The five bills tend to cover the largest direct emitters of GHGs as well as those entities indirectly responsible for the largest share of emissions. This approach makes considerable sense because it focuses on a discrete set of sources that contribute significantly to the problem. The bills, however, do not provide individuals with a serious role in the national effort to address climate change, either as citizens or as consumers. This is a significant omission because large emitting facilities and individuals each have a role to play in reducing GHG emissions and these roles can be mutually reinforcing. Individual engagement, moreover, is not just an add-on feature for legislation once the legal design work is done; it must be part of the design itself.

A. Large Emitters as Focus of Current Bills

Environmental laws typically focus on large sources of pollution.¹⁰ Recent climate change proposals follow that pattern. The Lieberman and Olver bills specifically identify the large emitting entities that the legislation will cover, and the other bills explicitly refer to certain large entities, likely large emitters, and give the Environmental Protection Agency (EPA) authority to regulate these entities.

The emissions reductions requirements in the Lieberman and Olver bills apply to “covered entities.” These include any entity in the electric, commercial, or industrial sectors of the economy that emits more than 10,000 metric tons of GHGs per year from any facility. The requirements would also apply to any refiner or importer of petroleum products used in transportation that would emit more than 10,000 metric tons of GHGs after combustion, and to any producer or importer of GHGs (including hydrofluorocarbons, perfluorocarbons, or sulfur hexafluoride) that would emit more than 10,000 metric tons of GHGs per year through the use of those GHGs.¹¹

A cap-and-trade program would apply to these entities, which represent about eighty-five percent of U.S. GHG emissions.¹² The

⁹ Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, U.N. Doc. FCCC/CP/1997/L.7/Add. 1, Annex A, *reprinted in* 37 I.L.M. 22 (1998).

¹⁰ Michael P. Vandenbergh, *From Smokestack to SUV: The Individual as Regulated Entity in the New Era of Environmental Law*, 57 VAND. L. REV. 515, 524-29 (2004).

¹¹ Climate Stewardship and Innovation Act of 2007, S. 280, 110th Cong. § 3(5) (2007); Climate Stewardship Act of 2007, H.R. 620 § 3(5) (2007).

¹² Press Release, Senator Joe Lieberman, Climate Stewardship and Innovation Act of 2005—Summary (May 26, 2005), *available at*

Lieberman and Olver bills recognize four “covered sectors”—commercial, industrial, transportation, and electricity.¹³ Covered entities could reduce their emissions directly, or they could obtain their reductions through the purchase of allowances from other emitters, including entities in one of the other sectors.¹⁴

The Sanders bill does not have a definition of covered entities, stating only that the EPA is to adopt regulations selecting “the most cost-effective options for global warming pollution control and emission reduction strategies.”¹⁵ On the other hand, the legislation proposes a variety of specific approaches to achieve the required reductions. For these approaches, covered entities are easy to identify, comprised primarily of automobile manufacturers and retail electric suppliers. The bill would impose specified carbon dioxide emission limits on motor vehicles and many electric generating units—requirements that are as stringent as those for new combined cycle natural gas generating plants.¹⁶ The legislation would require steady percentage increases over time in the amount of “low-carbon generation” electricity provided by retail electric suppliers.¹⁷ Furthermore, the bill requires retail electric suppliers to achieve incremental percentage reductions, in their peak demand and in their overall electricity use, beginning with targets in 2008, and continuing to 2020 and thereafter.¹⁸ In addition, it would mandate that retail electric suppliers increase the minimum percentage of electricity generated by renewable energy, from five percent in 2008 to twenty percent in 2020.¹⁹

The Kerry and Waxman bills also do not contain a precise definition of what entities are covered. Instead, they require that the EPA both adopt regulations needed to meet the emission targets stated in the legislation, and cover enough sources to do so.²⁰ Under the Kerry bill, the EPA’s regulations would apply to “the sources or sectors of the United States economy with (A) the greatest global warming pollutant emissions; (B) the most cost-effective opportunities to reduce global

<http://lieberman.senate.gov/newsroom/release.cfm?id=238307>.

¹³ S. 280 § 3(4); H.R. 620 § 3(4).

¹⁴ S. 280 § 141(b); H.R. 620 § 141(b).

¹⁵ Global Warming Pollution Reduction Act, S. 309, 110th Cong. § 2 (2007) (adding § 704(g) to the Clean Air Act (CAA)).

¹⁶ *Id.* (adding §§ 707-708 to the CAA).

¹⁷ *Id.* (adding § 709 to the CAA).

¹⁸ *Id.* (adding § 712(c) to the CAA).

¹⁹ *Id.* (adding § 713(b) to the CAA).

²⁰ Global Warming Reduction Act of 2007, S. 485, 110th Cong. § 101 (2007) (adding § 703(b)(2) to the CAA); Safe Climate Act of 2007, H.R. 1590, 110th Cong. § 3 (2007) (adding § 704(b)(2) to the CAA).

warming pollutant emissions; or (C) other characteristics that the Administrator determines make the source or sector appropriate for inclusion in the program.”²¹ In addition, the Waxman bill gives the EPA authority to adopt regulations “to reduce greenhouse gases from any source or sector,” regardless of whether the source or sector is otherwise regulated.²²

Like the Sanders bill, the Kerry and Waxman bills include specific regulatory provisions for particular sources. The bills call for the EPA to adopt standards for GHG emissions from motor vehicles that are at least as stringent as those adopted by California in 2004.²³ The bills also require the EPA to adopt regulations ensuring that retail electric suppliers achieve the same incremental reductions in peak demand and electricity use between 2009 and 2021 as specified in the Sanders bill.²⁴ In another similarity to the Sanders bill, the Kerry and Waxman bills would require the federal government to adopt regulations requiring retail electric suppliers to increase the minimum annual percentage of electricity from renewable sources between 2009 and 2021.²⁵ The Kerry bill includes other requirements not contained in the Sanders bill or Waxman bills. For example, it would require that major oil companies provide one or more pumps for E-85 fuel at their wholly-owned and branded stations on an increasing basis, so that half their stations have such pumps by 2017.²⁶ This combination of a cap-and-trade program with sector-specific requirements makes these bills “sectoral hybrids.”²⁷

Taken together, the bills focus primarily on the largest direct and indirect sources of GHG emissions. The definition of “covered entities” in the Lieberman and Olver bills reinforces this point by focusing on the industrial, commercial, and transportation sectors, and excluding the residential sector—even though the residential sector is responsible for about one-fifth of U.S. energy use.²⁸ The Sanders and Kerry bills

²¹ S. 485 § 101 (adding § 703(b)(1) to the CAA). Similar language is used in House Bill 1590. H.R. 1590 § 3 (adding § 704(b)(2) to the CAA).

²² H.R. 1590 § 3 (adding § 705(a) to the CAA).

²³ S. 485 § 101 (adding § 704(b)(2) to the CAA); H.R. 1590 § 3 (adding § 706(a) to the CAA).

²⁴ S. 485 § 101 (adding § 706 to the CAA). House Bill 1590 contains more general language requiring energy savings from retail electricity and natural gas suppliers. H.R. 1590 § 5 (adding § 611 to the Public Utility Regulatory Policies Act).

²⁵ S. 485 § 101 (adding § 707 to the CAA and imposing duties on the EPA); H.R. 1590 § 4 (adding § 610 to the Public Utility Regulatory Policies Act and imposing duties on the Department of Energy).

²⁶ S. 485 § 102(b).

²⁷ Nordhaus & Danish, *supra* note 1.

²⁸ ENERGY INFO. ADMIN., U.S. DEP’T OF ENERGY, DOE/EIA-0383, ANNUAL ENERGY OUTLOOK 2007 WITH PROJECTIONS TO 2030, at 137-38 tbl. A2 (Feb. 2007), available at [http://www.eia.doe.gov/oiaf/aeo/pdf/0383\(2007\).pdf](http://www.eia.doe.gov/oiaf/aeo/pdf/0383(2007).pdf) [hereinafter ANNUAL ENERGY OUTLOOK

largely focus on retail electric suppliers and auto manufacturers, but may also apply to other entities. The flexibility that the Kerry and Waxman bills would give the EPA to broaden the scope of its regulations to other entities suggests the possibility of broader coverage. But on the other hand, there is no language directing the EPA to consider any entities other than those named.

B. Importance of Individuals in National Climate Change Effort

The magnitude of the climate change challenge suggests not only that individuals need to be engaged in all of their relevant roles. Two roles are particularly important—the individual as citizen and the individual as consumer.²⁹ Congress should engage individuals because of the importance of ensuring that the legislation is properly implemented, the international significance of the legislation, and the substantial role that individuals play in contributing to GHG emissions. Additionally, this engagement is essential because the only way to address some important sources of emissions is by changing the behavior of individuals.

1. Individuals as Citizens

One key feature of U.S. environmental law is public participation in implementation and administration. American environmental laws tend to address large institutional sources of pollution, but individuals and citizen groups are necessary to ensure that these laws are properly implemented. Public participation provisions are thus directed at ensuring the effectiveness and responsiveness of government regulation of large institutional sources. Richard Andrews describes a “vast expansion of citizens’ rights of direct access to government information and decisionmaking processes . . . as a deliberate counterweight to the ‘iron triangles’ by which businesses interests had exercised privileged influence—‘agency capture’—over administrative as well as legislative decisions affecting the environment.”³⁰ A significant and fairly

2007]. These bills do include the electrical sector in the definition of covered entities, which constitutes a significant part of residential energy use. S. 280 § 3(4); H.R. 620 § 3(4). However, heating oil and natural gas—also providers of a significant part of residential energy use—are excluded. S. 280 § 3(4); H.R. 620 § 3(4). Energy efficiency or conservation changes made in homes or apartments could be aggregated in ways that would significantly reduce GHG emissions.

²⁹ Individuals certainly play a great many roles in the course of their daily lives. These two seem particularly relevant to climate change. A third role that is relevant to climate change, the individual as investor, is not discussed here.

³⁰ Richard N.L. Andrews, *Learning from History: U.S. Environmental Politics, Policies, and*

longstanding body of law and experience addresses the necessity and utility of this approach.³¹

Opportunities for public participation and involvement are plentiful at both the state and federal levels. Some of these opportunities, including the ability to comment on proposed regulations, the ability to obtain government documents, and the ability to attend meetings of public advisory committees, are based on administrative law as well as statutes such as the Freedom of Information Act³² and the Federal Advisory Committee Act.³³ But many of these opportunities are also required by the environmental laws. For instance, these laws typically require the administering agency to comply with a number of procedures, such as providing public notification of permit applications, allowing public participation in the process and public access to government files, and publicly disclosing information relating to the formulation of policies, regulations, as well as information about certain facilities.³⁴ Such provisions improve the quality of government decision-making because they allow citizens to bring information and issues to the government's attention that might otherwise be missed or given insufficient consideration. They also result in a government decision that is more likely to be publicly credible because issues that might otherwise have been neglected will be addressed and resolved.

In addition, under the Clean Air Act (CAA) and most federal environmental laws, citizens are specifically authorized to bring an action against the government and regulated entities for failure to perform a nondiscretionary duty.³⁵ Ordinarily, plaintiffs are entitled to injunctive or declaratory relief, attorneys' fees, and in certain instances, civil penalties.³⁶ Citizen suit provisions provide the public with an opportunity to act as "private attorneys general," acting on behalf of the government when it is unwilling or unable to act.³⁷ Among other things,

the Common Good, ENV'T, Nov. 2006, at 29, 32

³¹ JAMES SALZMAN & BARTON H. THOMPSON, JR., ENVIRONMENTAL LAW AND POLICY 68 (2003) ("Ask what has contributed the most to the development of a strong system of environmental regulation in the United States, and the most knowledgeable people are likely to point to the existence of a dynamic and forceful environmental movement.").

³² 5 U.S.C. § 552 (2006).

³³ 28 U.S.C. § 1361 (2006).

³⁴ ENVTL. LAW INST., PUBLIC PARTICIPATION IN ENVIRONMENTAL REGULATION 1-18 (1991) (summarizing and explaining the opportunities for public participation and involvement in environmental laws).

³⁵ SALZMAN & THOMPSON, *supra* note 31, at 69-72.

³⁶ *See, e.g.*, 42 U.S.C. § 7604 (2007) (CAA citizen suit provision); 33 U.S.C. § 1365 (2007) (Clean Water Act citizen suit provision).

³⁷ *Bennett v. Spear*, 520 U.S. 154, 165 (1997) (stating that the "obvious purpose" of the citizen suit provision in the Clean Water Act is "to encourage enforcement by so-called 'private

citizen suit provisions mean that environmental laws are enforced in a manner that is responsive to problems experienced by individuals and groups.³⁸

The justifications for citizen participation in the CAA and other environmental laws apply with equal and perhaps greater force to the implementation of climate change legislation. Citizen participation in the various administrative processes will operate as a counterweight to the influence of affected corporate interests. As a consequence, citizen participation will enhance the likelihood that a statute will be carried out more or less as written, reduce the ability of regulated entities to weaken the effect of the legislation, and ensure that decisions involving particular facilities or companies are more responsive to the concerns of citizens. The significant economic power of the affected entities, their history of previous opposition to climate change legislation, and their willingness to work together to advance their own interests are all factors that support an argument in favor of a high level of citizen participation.

These justifications are particularly important for climate change because both the national and international communities will likely feel the impact of any legislation. The United States is not a party to the Kyoto Protocol, but is a party to the United Nations Framework Convention on Climate Change.³⁹ Although the Convention imposes no quantifiable emission reduction obligations on developed countries such as the United States, it does require those countries to

adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs. These policies and measures will demonstrate that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions consistent with the objective of the Convention⁴⁰

The objective of the Convention, in turn, is “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate

attorneys general”).

³⁸ John C. Dermbach, *Citizen Suits and Sustainability*, 10 WIDENER L. REV. 503, 507-08 (2004) (also explaining that citizen suits increase the overall resources available for the enforcement of environmental laws and reinforce the rule of law).

³⁹ United Nations Framework Convention on Climate Change, U.N. Doc. A/AC.237/18, Annex I, reprinted in 31 I.L.M. 849 (1992) [hereinafter Framework Convention]; S. EXEC. REP. NO. 102-55, 102d Cong., 2d Sess., at 9 (1992).

⁴⁰ Framework Convention, *supra* note 39, art. 4.2(a).

system.”⁴¹ However imprecise these obligations may be, they can reasonably be viewed as imposing a duty on the United States to take serious action to address climate change.⁴² Thus, U.S. climate change legislation will be viewed not just in light of its domestic effect, but also in light of the international legal obligations imposed on the United States, including the obligation of the United States as a developed nation to lead the international effort. Because citizen participation reduces the ability of affected interests to weaken the effectiveness of climate change legislation, it increases the likelihood that climate change legislation will fulfill this international obligation.

2. *Individuals as Consumers*

Climate change legislation should also engage individuals as consumers. The magnitude of the challenge, the significant role that individuals in the United States now play in contributing to GHG emissions, and the substantial constructive role that individuals can play in reducing such emissions all support this conclusion.

The sheer magnitude of the climate change challenge is partly reflected in the size of the needed emissions reductions. According to one estimate, the United States needs to reduce emissions by at least eighty percent below 2000 levels by 2050.⁴³ By contrast, U.S. GHG emissions are projected to increase from 5945 million metric tons in 2005 to 7950 million metric tons in 2030—a thirty-four percent growth—in the absence of any legal or policy changes.⁴⁴ The other part of the challenge is reflected in recent scientific evidence of actual warming, and the evident acceleration in the pace of warming.⁴⁵ This scientific evidence means that the needed emissions reductions may be even greater than currently anticipated.

The scale and magnitude of that challenge indicate the need to

⁴¹ *Id.* art. 2.

⁴² Donald A. Brown, *Climate Change*, in *STUMBLING TOWARD SUSTAINABILITY* 273 (John C. Dernbach ed., 2002) (critically assessing U.S. compliance with the Framework Convention).

⁴³ UNION OF CONCERNED SCIENTISTS, *HOW TO AVOID DANGEROUS CLIMATE CHANGE: A TARGET FOR U.S. EMISSIONS REDUCTIONS* 13 (2007).

⁴⁴ ENERGY INFO. ADMIN., *supra* note 28, at 14 tbl.1.

⁴⁵ Richard B. Alley et al., *Summary for Policy Makers*, in *CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS* 2-12 (2007), available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf> (presenting the findings of Working Group I of the Intergovernmental Panel on Climate Change); James Hansen et al., *Global Temperature Change*, 103 *PROC. NAT'L ACAD. SCI.* 14,288, 14,288-89 (2006) (explaining that average surface temperatures have increased about 0.2 degrees Celsius in each of the last three decades, or about one degree Fahrenheit since 1980).

engage all available resources to address it.⁴⁶ Put somewhat differently, harnessing individual effort and participation is likely to mean that the U.S. response to climate change will be more effective, and the speed and size of emissions reductions greater than it would otherwise be.⁴⁷

In important ways, engaging individuals as consumers is tantamount to harnessing the power of the market. Ordinarily, market incentives are understood as applying to corporations and other large entities, but there is no reason to limit such incentives to them. Individuals participate in the market as consumers and therefore shape the market. Market-based approaches that harness human creativity and ingenuity can apply to both individuals and corporations. In each case, the effect of incentives is to enable and reward individual initiative. Among corporations, of course, there are leaders and laggards. Similarly, among individual consumers, there are those who ride a bicycle or drive a Prius to work and those who drive Hummers. By harnessing and engaging leaders and by expanding the number of individuals who take actions, more rapid and innovative approaches to reducing GHG emissions are more likely to be achieved.⁴⁸

Individual behaviors contribute significantly to U.S. GHG emissions. Activities that are under the “direct, substantial control of the individual and that are not undertaken in the scope of the individual’s employment” are responsible for about one-third of U.S. GHG emissions and eight percent of global GHG emissions.⁴⁹ By another estimate, about one-third of the energy consumed in the United States “is directly controlled by households.”⁵⁰ About eighty percent of all

⁴⁶ WILLIAM H. RODGERS, JR., ENVIRONMENTAL LAW § 4.2(A) (2d ed. 1994) (explaining that Congress supplemented the Clean Water Act with citizen suit and other provisions “that . . . were meant to be additive and supplementary” to improve enforcement and implementation of the Act); John C. Dernbach, *Sustainable Development as a Framework for National Governance*, 49 CASE W. RES. L. REV. 1, 8 (1998) (explaining Agenda 21, the action plan for sustainable development adopted at the United Nations Conference on Environment and Development, as urging national governments to engage every part of society to participate in achievement of national sustainable development goals).

⁴⁷ Michael P. Vandenbergh & Ann C. Steinemann, *The Carbon-Neutral Individual*, 82 N.Y.U. L. REV. 1673, 1739-40 (2007) (arguing that efforts directed at individuals could “buy time for new technologies or regulatory measures, create incentives for the development of these measures in the first place, and make them more effective when they are adopted”).

⁴⁸ See, e.g., ANDREW J. HOFFMAN, GETTING AHEAD OF THE CURVE: CORPORATE STRATEGIES THAT ADDRESS CLIMATE CHANGE 58 (2006) (describing program by PG&E Corporation to enable its customers to pay a small additional charge to their electric bills to fund projects removing carbon dioxide from the atmosphere, and PG&E’s expectation that four to five percent of their customers will enroll in this program).

⁴⁹ Vandenbergh & Steinemann, *supra* note 47, at 1690.

⁵⁰ Paul C. Stern & Gerald T. Gardner, *Psychological Research and Energy Policy*, 36 AM. PSYCHOLOGIST 329, 336 (1981).

U.S. carbon dioxide emissions result from the burning of fossil fuels for energy.⁵¹ Individuals use energy every day in a variety of ways that indirectly and less substantially affect energy use, but whose influence is nonetheless real.

Another reason to engage individuals is the high level of per capita energy consumption in the United States, both in absolute terms and relative that of other countries. Per capita energy consumption is approximately 340 million BTUs per year in the United States.⁵² With only five percent of the world's population, the United States is responsible for about twenty-five percent of the world's annual energy consumption.⁵³ Americans use twice as much energy as their European counterparts, almost seven times as much as the Chinese, and more than twenty-one times that of Africans.⁵⁴ No one seriously argues that the rest of the world can safely consume energy at the same per capita level currently consumed by Americans.⁵⁵

In the context of individual responses climate change, two types of behaviors are especially relevant.⁵⁶ The first is efficiency—the substitution of a more energy-efficient appliance, motor vehicle, or other device for a less energy-efficient one. Efficiency tends to require a financial investment, not an alteration, in daily behavior. The second is curtailment of energy use—for example, taking the bus to work rather than driving. Curtailment tends to require changes in daily behavior without a financial investment.⁵⁷ Because the overall contribution of individual Americans to GHG emissions is so significant, however,

⁵¹ Carbon dioxide is the dominant GHG emitted in the United States, contributing 5988 of the 7074.4 teragrams, or 84.6 percent, of carbon dioxide equivalent that were emitted in 2004. The overwhelming majority of carbon dioxide emissions, in turn, 5656.6 of 5988.0 teragrams in 2004, or 94.5 percent, are from fossil fuel combustion. ENVTL. PROT. AGENCY, INVENTORY OF GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2004, at ES-4, ES-5 (2006), available at [http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/RAMR6MBLP4/\\$File/06ES.pdf](http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/RAMR6MBLP4/$File/06ES.pdf).

⁵² ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, INTERNATIONAL ENERGY ANNUAL 2005, tbl. E.1c (2005), available at <http://www.eia.doe.gov/pub/international/iealf/tablee1c.xls> [hereinafter INTERNATIONAL ENERGY ANNUAL 2005].

⁵³ Energy Info. Admin., U.S. Dep't of Energy, Energy Kid's Page, <http://www.eia.doe.gov/kids/energyfacts/saving/efficiency/savingenergy.html> (last visited Jan. 15, 2008).

⁵⁴ INTERNATIONAL ENERGY ANNUAL 2005, *supra* note 52 (calculations by author from table).

⁵⁵ In addition, any global emissions trading scheme that involves developing countries will likely force the United States and other countries to deal with the issue of allocating allowances. Developing countries such as China and India, which are likely to become both economically and politically more powerful in coming decades, may argue for allocation of allowances on a per capita basis, rather than based on current emissions.

⁵⁶ Stern & Gardner, *supra* note 50, at 333.

⁵⁷ *Id.*

almost any reduction from either approach would be of value.

A major challenge in any such effort is that consumers—and American consumers in particular (who seem to equate high consumption with a high standard of living)—are often viewed as part of the problem rather than as part of the solution. Through much of American history, arguments for greater voluntary simplicity have almost always been minority positions.⁵⁸

A fruitful response appears to be emerging from both the legal and social science literature and from a considerable amount of state and national experience. Much of the social science research, in fact, is based on investigation of the effectiveness of various energy conservation and energy-efficiency policies adopted between the 1970s and 1980s, when a variety of laws were adopted or amended to reduce energy use.⁵⁹ This approach begins with the idea that under appropriate circumstances, individuals can be persuaded to change their behavior. Because individuals contribute directly to the environmental problems, individuals should be encouraged to play a role in addressing such problems. In this second role, individuals are seen as polluters, and not simply as watchdogs over (or participants in) the government's regulatory apparatus for large polluters.

At issue here is “personal, private-sphere, environmentally significant behavior—the purchase, use, and disposal of personal and household products that have environmental impact.”⁶⁰ Laws can be used to require or prohibit specific behaviors of this sort, or they can be used to encourage or dissuade individuals from acting in certain ways. Despite this, federal environmental laws are directed primarily at large emitters and make relatively infrequent efforts to direct individual behavior.

There is nonetheless a continuing, if less well-appreciated, effort to engage individuals. Perhaps the strongest statement about the role of individuals is contained in the National Environmental Policy Act, where “Congress recognizes . . . that each person has a responsibility to contribute to the preservation and enhancement of the environment.”⁶¹ This policy of engaging individuals appears to be most prevalent in state

⁵⁸ See, e.g., DAVID SHI, *THE SIMPLE LIFE: PLAIN LIVING AND HIGH THINKING IN AMERICAN CULTURE* (1985).

⁵⁹ Paul C. Stern, Dir., Comm. on the Human Dimensions of Global Change, Nat'l Research Council, Presentation to the California Energy Commission: Why Social and Behavioral Science Research is Critical to Meeting California's Climate Challenges (Dec. 12, 2006) (power point presentation on file with author) [hereinafter *California's Climate Challenges*].

⁶⁰ Paul C. Stern, *Understanding Individuals' Environmentally Significant Behavior*, 35 ENVTL. L. REP. 10,785, 10,786 (2005).

⁶¹ National Environmental Policy Act of 1969, Pub. L. No. 91-190, § 101(c), 83 Stat. 852, 853 (1970); 42 U.S.C. § 4331(c) (2000).

and federal energy laws, many of which have some effect in mitigating climate change. Congress and many state legislatures provide a number of tax credits and deductions for energy efficiency and renewable energy.⁶² Many states also allow individuals, small businesses, and others to install wind turbines or solar collectors, use such devices to provide electricity for themselves, and sell any excess electricity to their local utility or electric distribution company.⁶³ Net metering rules do not merely remove or modify legal and financial obstacles that inhibit individuals from supplying electricity to the grid; they also enable individuals to reduce or eliminate their electricity bill and perhaps earn money at the same time. Similarly, funds collected by utilities or states from public benefit funds or system benefit charges (small charges added to a person's electric bill) are often employed in ways that reduce the up-front cost of renewable energy or energy efficiency to individuals.⁶⁴ A variety of similar laws exist outside the energy context. These include anti-litter laws, recycling laws, and smoking bans in particular places. Another group of laws bans particular products (e.g., certain pesticides), thereby restricting consumer choice.

If one assumes that the object of engaging individuals is to maximize the effectiveness of particular policies, and not simply to pass symbolic legislation, then it is vital to know what works and what does not work in such efforts. For example, legislation passed in the 1970s and 1980s provided for available and cost-effective energy efficiency opportunities for homeowners, but homeowners did not take advantage of these legislative options.⁶⁵ Using the knowledge gained by studying these laws, it is now possible to determine the causes for their ineffectiveness, and sketch out future laws and policies that will engage individuals and be more effective.⁶⁶

⁶² Roberta F. Mann, *Subsidies, Tax Policy and Technological Innovation*, in GLOBAL CLIMATE CHANGE AND U.S. LAW (Michael Gerrard ed., 2007); WILLIAM PRINDLE ET AL., AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., ENERGY EFFICIENCY'S NEXT GENERATION: INNOVATION AT THE STATE LEVEL 32-35 (2003), available at <http://www.aceee.org/pubs/e031full.pdf>.

⁶³ Valerie J. Faden, *Net Metering of Renewable Energy: How Traditional Electricity Suppliers Fight to Keep you in the Dark*, 10 WIDENER. J. PUB. L. 109, 119-20 n.70 (2000); Steven Ferrey, *Sustainable Energy, Environmental Policy, and States' Rights: Discerning the Energy Future Through the Eye of the Dormant Commerce Clause*, 12 N.Y.U. ENVTL. L.J. 507 (2004); U.S. Dep't of Energy, Net Metering Policies, <http://www.eere.energy.gov/greenpower/markets/netmetering.shtml> (last visited Jan. 15, 2008).

⁶⁴ John Dernbach, *Stabilizing and Then Reducing U.S. Energy Consumption: Legal and Policy Tools for Efficiency and Conservation*, 37 ENVTL. L. REP. 10,003, 10,025-26 (2007).

⁶⁵ California's Climate Challenges, *supra* note 59.

⁶⁶ *Id.* See also GERALD T. GARDNER & PAUL C. STERN, ENVIRONMENTAL PROBLEMS AND HUMAN BEHAVIOR (2d ed. 2002).

Paul Stern and others use the “value-belief-norm” of environmentally significant behavior, a framework for changing individual behavior.⁶⁷ The idea behind the theory is that “individual choice can be driven by personal norms, that is, an internalized sense of obligation to act in a certain way.”⁶⁸ Personal norms for pro-environmental behavior can be activated in a specific situation (1) when a person is made aware that a particular action would adversely affect something the person values (awareness of consequences, or AC), and (2) where, by taking that action, the person would have “significant responsibility for those consequences” (ascription of responsibility, or AR).⁶⁹ According to Stern, the most effective way of providing this information is to make sure that it “arrives at the time and place of decision, is linked to the available choices, is delivered from trusted sources, and is delivered personally.”⁷⁰

Michael Vandenberg has developed an approach for using law to apply these insights to groups of similarly situated persons, not just to individuals.⁷¹ A key feature of this approach is reciprocity: the understanding that others in the group will also do their fair share can significantly contribute to the activation of abstract environmental norms.⁷² Information can trigger abstract personal norms if it shows (1) that the average or aggregate individual behavior for a particular activity causes an environmental problem (AC), and (2) that average or aggregate reductions in that behavior by individuals would significantly reduce the problem (AR). If this information shows that others in the group have done, or will do, the same thing, and that everyone’s effort is necessary to achieve a good outcome, it will be much more effective.⁷³ This information is also likely to be more effective if it is accompanied by an explanation of the convenience of the pro-environmental behavior.⁷⁴ Finally, this information tends to be more effective if it is focused on smaller groups, such as neighborhoods or

⁶⁷ Paul C. Stern et al., *A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmentalism*, 6 HUMAN ECOLOGY REV. 81 (1999).

⁶⁸ Stern, *supra* note 60, at 10,787.

⁶⁹ *Id.*

⁷⁰ *Id.* at 10,789.

⁷¹ See, e.g., Vandenberg, *supra* note 10, at 596-97; Michael P. Vandenberg, *Order Without Social Norms: How Personal Norms Can Protect the Environment*, 99 NW. U. L. REV. 1101, 1104 (2005); Michael P. Vandenberg, *The Individual as Polluter*, 35 ENVTL. L. REP. 10,723, 10,738-40 (2005).

⁷² Vandenberg, *The Individual as Polluter*, *supra* note 71, at 10,739.

⁷³ *Id.* at 10,738-39.

⁷⁴ Ann E. Carlson, *Social Norms and Individual Environmental Behavior*, 35 ENVTL. L. REP. 10,763, 10,764 (2005).

workplaces, than if it is focused on larger groups.⁷⁵

While information is at the heart of this approach, information alone is not enough. The focus of any effort should not simply be to provide information, but rather to change behavior.⁷⁶ As Doug McKenzie-Mohr and William Smith explain, individual behavior can be changed by increasing the benefits and reducing the obstacles of acting in a particular way. Similarly, competing behaviors can be changed by decreasing the benefits of those behaviors and increasing the obstacles.⁷⁷ Household collection of recyclables, for instance, is encouraged not just by the ready availability of good information, but also by the actual availability of convenient opportunities to recycle, such as curbside collection and the ability to mix or commingle different types of material (such as cans and bottles) in the same collection container.⁷⁸ Similarly, financial and other incentives can be used to encourage certain behaviors, discourage others, or both.⁷⁹

In the case of climate change, a variety of norms are capable of motivating appropriate individual behavior. These norms tend to cluster around three concerns: self-interest or self-preservation, the impact of climate change on other humans, and the impact of climate change on all life.⁸⁰ Perhaps the most obvious and immediate appeal to self-interest is a call to reduce energy costs through efficiency or conservation. The economic payback from efficiency and conservation, of course, varies with the type of technology being employed, but the potential for such a payback provides an incentive for its use. Other appeals to self-interest may involve reducing economic or physical vulnerability to climate change, particularly for individuals who use a great deal of energy or who live or work in vulnerable areas.⁸¹

The effects of climate change can motivate individuals in other ways as well. Appeals to citizenship, particularly in times of national emergency or obvious need, are often effective in motivating individuals. The citizenship aspect could be especially effective for

⁷⁵ *Id.*

⁷⁶ Deborah L. Rhode & Lee Ross, *Environmental Values and Behaviors: Strategies to Encourage Public Support for Initiatives to Combat Global Warming*, 26 VA. ENVTL. L.J. 155, 170 (2008).

⁷⁷ DOUG MCKENZIE-MOHR & WILLIAM SMITH, *FOSTERING SUSTAINABLE BEHAVIOR* 5 (1999).

⁷⁸ Ann E. Carlson, *Recycling Norms*, 89 CAL. L. REV. 1231, 1265-66 (2001).

⁷⁹ MCKENZIE-MOHR & SMITH, *supra* note 77, at 103-15.

⁸⁰ Rhode & Ross, *supra* note 76, at 171.

⁸¹ A variety of recent books seem based on such appeals. *See, e.g.*, DAN CHIRAS, *THE HOMEOWNER'S GUIDE TO RENEWABLE ENERGY* (2006); CONSUMER REPORTS, *COMPLETE GUIDE TO REDUCING ENERGY COSTS* (2006); GODO STOYKE, *THE CARBON BUSTER'S HOME ENERGY HANDBOOK* (2007).

climate change to the extent that the national government is able to communicate both the urgency of the challenge and the importance of the citizen's role. Climate change can also implicate deeply held moral, ethical, and even religious views.⁸² Such motivations could powerfully and positively influence any national effort if handled respectfully and in a nonsectarian manner. The broadest possible appeal, perhaps, would be to environmental stewardship. A second possible appeal would be based on the value of modeling sustainable development, an objective that is grounded in both morality and national self-interest. Sustainable development attempts to reconcile conventional development with environmental protection, not by compromising one or the other, but by achieving both at the same time.⁸³ Conventional development in industrialized countries tends to be imitated or sought by less industrialized countries. For instance, if the United States were to significantly reduce its per capita energy consumption while the prosperity and well-being of its citizens increased, the country would provide a better model of sustainable development. A third possible appeal is based on social justice, particularly to the extent that climate change caused primarily by developed countries adversely affects people living in developing countries. This last appeal, of course, also involves national self-interest.⁸⁴ Moral, ethical, and religious claims, in other words, can both reinforce and be reinforced by appeals to citizenship.

To activate these norms in the context of energy use at the household level, the most successful programs recognize that there are many obstacles to behavioral change. These obstacles include, for example, money, available technology, convenience, and trust in the information being provided. Successful programs address all of these obstacles by combining high-quality information, financial incentives, and convenient choices.⁸⁵ They are implemented based on an understanding of behavior from the homeowner's perspective, as well as recognition of

⁸² See, e.g., ROCK ETHICS INST., PENN STATE UNIV., WHITE PAPER ON THE ETHICAL DIMENSIONS OF CLIMATE CHANGE 8 (2007) (identifying and describing eight separate ethical issues associated with climate change—including responsibility for damages, allocating global emissions among nations, and the use of scientific uncertainty in policy making); The Regeneration Project, <http://www.theregenerationproject.org/> (last visited Jan. 15, 2008) (home page for Interfaith Power & Light campaign, which is “mobilizing a national religious response to global warming while promoting renewable energy, energy efficiency and conservation.”).

⁸³ Dernbach, *supra* note 46, at 24-29.

⁸⁴ This may be particularly true if these countries can successfully make political or legal claims for compensation. See Andrew L. Strauss, *The Legal Option: Suing the United States in International Forums for Global Warming Emissions*, 33 ENVTL. L. REP. 10,185 (2003).

⁸⁵ California's Climate Challenges, *supra* note 59.

the existence of constraining factors beyond the homeowner's control (such as available technology). Finally, these programs are subject to monitoring, evaluation, and adjustment to improve their effectiveness.⁸⁶

C. Relationship Between Citizen and Consumer Roles

Citizen and consumer roles should be complementary and mutually reinforcing rather than mutually exclusive. Indeed, individual efforts are already employed successfully in recycling and energy conservation programs.

The two individual roles raise a broader set of questions about the comparative responsibility of large public and private polluters on the one hand, and private individuals as polluters on the other. Environmental law tends to focus on larger polluters both because they are relatively fewer in number, and the payoff for reducing their environmental impact is quite large.⁸⁷ The citizen participation aspects of environmental law are intended to make certain that these polluters comply with applicable laws and to ensure proper implementation of the laws. Citizen participation is also a means of limiting the ability of large polluters to delay or undermine implementation of any comprehensive climate change law that is ultimately adopted.⁸⁸ Citizens, however, do not ordinarily see themselves as having direct responsibility for or control over the decisions that polluters make. Corporations, on the other hand, often ascribe to individuals some degree of environmental responsibility for the impacts of their products, claiming that public demand drives the sales of such products. The public demand for sport utility vehicles and light trucks is perhaps the most prominent example. Environmental laws typically do not address these personal choices; indeed, efforts to limit individual decisions concerning the environment are often met with strong resistance.⁸⁹

At the same time, there is a broad understanding that individuals have responsibility for the effects of their decisions, although liberals and conservatives tend to differ on the extent to which environmental effects are a matter of personal responsibility. Common ground for ascribing

⁸⁶ *Id.*

⁸⁷ Vandenberg, *supra* note 10.

⁸⁸ Jim Hansen, *Special Interests are the One Big Obstacle*, LONDON TIMES, Mar. 12, 2007, available at <http://business.timesonline.co.uk/tol/business/columnists/article1499726.ece> ("Until the public indicates sufficient interest [in climate change], and puts pressure on political systems, special interests will continue to rule.").

⁸⁹ See, e.g., Craig N. Oren, *Getting Commuters Out of Their Cars: What Went Wrong?*, 17 STAN. ENVTL. L.J. 141, 197-201 (1998) (explaining how difficulties in changing individual behavior helped lead to the repeal of the employee trip reduction mandate in the Clean Air Act).

individual responsibility for environmental effects may exist where individuals have real choices between less damaging and more damaging behaviors.⁹⁰ This approach allocates some responsibility for GHG emissions to both the large emitters and to individuals. For example, individuals have virtually no impact on the energy efficiency of a turbine at a power plant. Many power plants recover only one-third of the energy of the fuel they use, and much more efficient designs are available.⁹¹ Individuals, however, have more control over the temperature at which they set their thermostat, or over the energy efficiency of a new car or home appliance.

It is certainly true that people with lesser means have fewer choices, particularly because the initial price of purchasing more efficient appliances or vehicles may be out of reach. It is also true that some choices involve tradeoffs (perceived or real) between energy use and other values (e.g., personal safety).⁹² Still, individuals have real choices over a significant number of actions that affect GHG emissions. In fact, any effort to engage individuals must focus on (1) real choices that are available to individuals, and (2) increasing the number, attractiveness, and awareness of those choices.

The two roles, taken together, are likely to be more effective than either role by itself. The citizen who is initially interested or engaged in the effective implementation of a regulatory program will more likely be interested in what he or she can do to contribute to solving the problem addressed by that program. Similarly, the consumer who is initially concerned with her product choices may often become engaged in how the regulatory program for those products is being administered. Because the range of activities in the two roles is so broad, more people are likely to find a way to express their interest through either or both of these roles. In fact, the potential synergies are even greater, because individuals act in a variety of other roles: within families and communities; as employees, managers, and leaders in organizations; and as investors.⁹³ Appeals to individuals as citizens and consumers are likely to influence their behavior in these other roles as well. Thus, this

⁹⁰ Vandenberg & Steinemann, *supra* note 47.

⁹¹ PRINDLE ET AL., *supra* note 62, at 13.

⁹² COMM. ON THE EFFECTIVENESS AND IMPACT OF CORPORATE AVERAGE FUEL ECONOMY (CAFE) STANDARDS, NAT'L RESEARCH COUNCIL, EFFECTIVENESS AND IMPACT OF CORPORATE AVERAGE FUEL ECONOMY (CAFE) STANDARDS 24 (2002) (finding that CAFE standards have improved fuel efficiency but at some cost to traffic safety in collisions between large and small vehicles).

⁹³ See, e.g., HOFFMAN, *supra* note 48, at 35 (explaining that "[e]mployee buy-in is crucial to the success of any [corporate] climate-related strategy"). If employees are already engaged as consumers or citizens, then employee buy-in should be easier to obtain.

Article is not an examination of the merit of individual or voluntary action in lieu of legislation or regulatory action directed at large emitters; rather, the suggestion is that individual efforts are a necessary supplement to legislative or regulatory action.⁹⁴

Arguably, individual responsibility detracts from or weakens the case for the responsibility of large polluters, which is where, according to this objection, sole attention should be drawn. Corporations and other large polluters, in fact, often seek to deflect attention from their environmental damage by trying to focus on individual behavior.⁹⁵ The need to seriously address climate change, however, is so great that both large emitters and citizens must be engaged. Of course, it is necessary to ensure that the failure of individuals to act does not provide an excuse for large emitters to fail to act, and vice versa.

Moreover, the twin-pronged approach is already employed successfully at the state level in several contexts. Pennsylvania and other states have stringent regulations for the operation of municipal waste landfills and incinerators.⁹⁶ At the same time, these states engage millions of individuals in the separation and collection of household recyclables, such as cans, bottles, and newspapers.⁹⁷ The responsibilities of both individuals and facility operators are clearly assigned and separated, and neither can escape responsibility by pointing to the other. In addition, as already noted, state and federal efforts to address energy and climate change already provide ways for individuals as consumers to contribute to the solution.

D. Individuals and Program Design

A serious effort to engage individuals in addressing climate change will necessarily affect the design of the overall climate change program, perhaps in profound ways. In other words, this effort is not just an added feature of whatever legal regime is in place—to a significant degree, the presence or absence of citizen engagement is an inherent part of the design of the legislation itself. A significant share of the

⁹⁴ Alan Randall, *The Policy Context for Flexible, Negotiated, and Voluntary Measures*, in *NEW TOOLS FOR ENVIRONMENTAL PROTECTION: EDUCATION, INFORMATION, AND VOLUNTARY MEASURES* 311, 317-18 (Thomas Dietz & Paul C. Stern eds., 2002) (voluntary actions “make a nice frosting on the regulatory cake. But the cake itself must be there.”).

⁹⁵ In the early 1970s, for example, the author recalls that McDonald’s ran advertisements saying that, when you point a finger at a polluter, you point three fingers back at yourself.

⁹⁶ See, e.g., 25 PA. CODE §§ 271.1-285.225 (2006)

⁹⁷ See, e.g., Municipal Waste Planning, Recycling and Waste Reduction Act, 53 PA. STAT. ANN. §§ 4000.101-4000.104 (West 2007); Penn. Dep’t of Envtl. Prot., Recycling Works!, <http://www.dep.state.pa.us/dep/deputate/airwaste/wm/RECYCLE/Recyworks/recyworks1.htm> (last visited Jan. 16, 2008).

important and needed reductions, in fact, can only be achieved by affecting individual behavior.

The tax versus trade debate on climate change illustrates this point. A carbon or fossil fuel tax would reach the broadest range of individual behavior because price increases for fossil fuels would permeate through the entire economy, driving a variety of GHG-reducing behaviors that have not been foreseen or projected. In fact, part of the argument for a carbon or fossil fuel tax is premised on the ability of that tax to reach such a broad range of actors. As a result, economists argue, a tax will stimulate widespread innovation and reduce GHG emissions more cost-effectively than cap-and-trade programs.⁹⁸ Regardless of the political feasibility of a carbon or fossil fuel tax—and most see such a tax as exceedingly unattractive—it is hard to dismiss the benefits of a tax.⁹⁹ No government cap-and-trade or regulatory program is likely to capture all of the various ways in which individuals and groups use energy, or the variety of ways in which individuals and groups are able to conserve energy or use energy sources that are not derived from fossil fuels.¹⁰⁰

This is particularly true because a conventional regulatory program—even a program for climate change—will necessarily largely address the major sources of GHG emissions. Although there will likely be indirect effects on individuals and smaller sources of GHG emissions, the effects will be less influenced by individual behavior. There are also likely to be some price signal distortions because of what is or is not directly regulated.

Two of the most obvious examples of GHG reduction opportunities available only by reaching individual behavior involve improving the energy efficiency of both motor vehicles and buildings. Motor vehicle fuel efficiency standards and appliance and equipment efficiency standards affect newly manufactured products, but not those that are currently in use. Similarly, energy efficiency provisions in building codes affect newly constructed residential and commercial structures,

⁹⁸ Nordhaus & Danish, *supra* note 1, at 146-49.

⁹⁹ John D. Dingell, Editorial, *The Power in the Carbon Tax*, WASH. POST, Aug. 2, 2007, at A21 (stating the preference of Representative Dingell, the Chairman of the House Energy and Commerce Committee, for a carbon tax).

¹⁰⁰ For instance, students at a dozen Minnesota colleges are competing to see which college can reduce its energy use the most, and have reduced energy use at these colleges as a result. Tim Post, *Which Minnesota College Can Cut Energy Use the Most?* (Minnesota Public Radio broadcast Feb. 27, 2007), available at <http://minnesota.publicradio.org/display/web/2007/02/12/energywars/>. Similarly, Frito-Lay saved forty million dollars by reducing the energy required to cook Doritos and other chips. Chad Terhune, *Frito-Lay Aims to Cut Gas Bill's Bite*, WALL ST. J., June 5, 2006, at B2.

but have relatively little effect on existing buildings. These energy efficiency provisions affect the “shell” of buildings (wall, window, and roof insulation) as well as the efficiency of heating, ventilating, and air conditioning equipment used in these buildings. Yet efficiency upgrades for buildings, motor vehicles, and major appliances represent the individual behaviors that have the most potential to reduce energy use. An analysis of how much household energy could be saved by thirty different conservation behaviors put purchase of a more fuel-efficient car at the top (20%), followed by insulating and weatherizing the house (10%), and installing more efficient heating equipment (8%).¹⁰¹

These behaviors also have national significance in any effort to reduce GHG emissions. Residential and commercial buildings account for nearly forty percent of the nation’s carbon dioxide emissions.¹⁰² Sixty percent of residential buildings are not adequately insulated, and seventy percent of commercial buildings lack any roof or wall insulation.¹⁰³ Moreover, at least half of these buildings will still be in use fifty years from now.¹⁰⁴ Despite the likely availability of cost-saving opportunities, energy efficiency upgrades and retrofits do not occur at these buildings for a variety of reasons, including the initial cost, the lack of appropriate and accessible information, and the fact that individual energy users have no control over the building itself in traditional residential and commercial landlord-tenant relationships.¹⁰⁵ At the same time, the energy efficiency of new products continues to improve. The annual energy intensity improvement for new equipment is about five percent.¹⁰⁶ As a consequence, the continuing replacement of existing, less-efficient equipment with new, increasingly-efficient equipment provides a significant opportunity to reduce energy

¹⁰¹ Stern & Gardner, *supra* note 50, at 333. The next most significant behaviors were car pooling to work (4-6%) and lowering the thermostat from seventy-two to sixty-eight degrees during the day and to sixty-five degrees at night (4%). The impact of other behavior changes is even smaller. Only 0.5% of household energy consumption would be affected by a decision not to use a clothes dryer six months per year, for example. *Id.*

¹⁰² MARILYN A. BROWN ET AL., TOWARDS A CLIMATE-FRIENDLY BUILT ENVIRONMENT 1 (2005), available at <http://www.resourcesaver.org/file/toolmanager/CustomO16C45F65020.pdf>.

¹⁰³ *Id.* at 14.

¹⁰⁴ *Id.* at 11.

¹⁰⁵ *Id.* at 20; REPRESENTATIVES OF THE COMMERCIAL BLDG. INDUS., HIGH-PERFORMANCE COMMERCIAL BUILDINGS: A TECHNOLOGY ROADMAP 4-5 (2000), available at http://www.eere.energy.gov/buildings/info/documents/pdfs/roadmap_lowres.pdf.

¹⁰⁶ Kornelis Blok, *Improving Energy Efficiency by Five Percent and More per Year?*, 8 J. INDUSTRIAL ECOLOGY 87, 88 (2005); Arthur H. Rosenfeld, *The Art of Energy Efficiency: Protecting the Environment with Better Technology*, 24 ANN. REV. ENERGY & ENV'T 33, 78-79 (1999).

consumption.¹⁰⁷

The same pattern occurs with motor vehicles. The full effect of improved fuel economy standards does not occur until at least fourteen years after their introduction, when cars with less fuel economy are scrapped.¹⁰⁸ The effectiveness of improved fuel economy standards will thus be enhanced to the extent that existing vehicles are retired more quickly. The standard federal legislative and regulatory tools for improving energy efficiency simply do not address this issue because their effect generally is limited to new buildings, equipment, appliances, and motor vehicles. To affect older buildings, Congress may need to adopt a new energy tax that would encourage retrofits, upgrades, and product replacement. Additional taxes, however, are politically unpalatable, so Congress may need to consider other options for influencing individual behavior on this issue. It may even find that a new energy tax, coupled with specific provisions to engage individuals, works better than either approach alone.

The relationship between program design and the role of the individual is manifested in other ways as well. Citizen suits, for example, can ordinarily be filed against the government and regulated entities where one or both fail to perform a nondiscretionary duty. The statutory rules will thus need to impose sufficiently clear and nondiscretionary responsibilities on administrative agencies and regulated entities. In a broader sense, such rules are important to ensure that agency discretion does not become a byword for subverting or delaying the implementation of the legislation.

III. OPPORTUNITIES TO ENGAGE INDIVIDUALS IN CLIMATE CHANGE LEGISLATION

What follows is an analysis of key ways in which climate change legislation may induce individual behavior changes. This analysis uses the first five comprehensive bills introduced in 2007 as a point of departure, particularly the scattered provisions on individual participation or involvement in implementation.¹⁰⁹ To what extent, in

¹⁰⁷ Blok, *supra* note 106, at 92-94. If eighty percent of new equipment met this energy intensity improvement, and existing equipment is replaced after thirty years, energy consumption from this equipment could be reduced by half in fifty years. Energy use is even lower after fifty years if equipment is replaced after fifteen years instead of thirty years, and higher if equipment is used for sixty years. *Id.*

¹⁰⁸ CONG. BUDGET OFFICE, THE ECONOMIC COSTS OF FUEL ECONOMY STANDARDS VERSUS A GASOLINE TAX 20 (2003), available at http://www.cbo.gov/ftpdocs/49xx/doc4917/12-24-03_CAFE.pdf.

¹⁰⁹ For another analysis of these bills, see LARRY PARKER, CONG. RESEARCH SERV.,

other words, could the ultimately adopted legislation most effectively engage individuals in a national effort to mitigate climate change?

As already noted, the social science literature indicates that a variety of interventions directed at the same result are more likely to be effective than fewer interventions. As a consequence, this analysis covers findings and purposes, public participation, targets and timetables, public information, and incentives for individual action. It also reviews the role of states in such efforts as well as the need for adaptive management to ensure the continuing effectiveness of these programs. Climate change legislation that addresses individual behavior from these and perhaps other approaches is more likely to be effective because the various provisions would be mutually reinforcing. The suggestions below are intended as starting points.

A. Findings and Purpose

Appropriate findings and purposes in climate change legislation could help motivate individuals by appealing to such norms as personal or national self-interest, concern for the impact of climate change on other humans, and environmental stewardship.¹¹⁰ Legislative findings and statements of purpose should thus be crafted and reviewed with an eye toward their potential effect in engaging citizens. To be sure, findings and purposes will likely trigger desired behaviors only if the legislation also provides appropriate information, incentives, and means to induce such desired behaviors. But findings and purposes could foster individual engagement by helping citizens understand what is being sought.

Most of the bills contain findings about the need for climate change legislation and purpose statements directed at specific levels of emissions reduction. None contain findings of fact on the benefits and opportunities of addressing climate change, or the importance of individuals as citizens and consumers to the effective implementation of the legislation. Appropriate findings and statements of purpose on these two points would likely help individual engagement. There is little reason to believe they would in any way lessen it.

A law addressing a particular problem validates the existence of that problem and indicates the existence of sufficient consensus to address it. The law may thus change beliefs about the nature of that problem and the social support for addressing it, which increase the likelihood that

CLIMATE CHANGE: GREENHOUSE GAS REDUCTION BILLS IN THE 110TH CONGRESS 4-13 (2007), available at http://assets.opencrs.com/rpts/RL33846_20070131.pdf.

¹¹⁰ Rhode & Ross, *supra* note 76, at 179.

both the law and the problem will be taken more seriously.¹¹¹ While findings and statements of purpose are much different from rules prohibiting, requiring, or allowing certain actions, they can influence the interpretation of these rules as well as public and judicial understanding of the legislation itself.¹¹² They thus provide an additional opportunity to engage individuals by providing a kind of public appeal and by appealing to norms that individuals share. Evidence from the 2000-2001 California energy crisis indicates that households are responsive to public appeals,¹¹³ which means that households may also be responsive to public appeals contained in climate change legislation.

Four of the five bills contain finding or statements of purpose.¹¹⁴ Two contain findings about the risks and dangers of climate change to the United States and other countries. The Kerry bill contains findings about the negative effects of climate change, the need for decisive action to address climate change, and the need for U.S. leadership.¹¹⁵ The Sanders and Waxman bills contain detailed findings about warming around the world, U.S. GHG emissions, and the potential for energy efficiency or technology to significantly reduce emissions.¹¹⁶ Two of the bills also contain statements of purpose. A purpose of the Lieberman bill is to substantially reduce U.S. GHG emissions “without weakening the economic position of the United States or otherwise imposing hardship on its citizens.”¹¹⁷ The purposes of the Sanders bill are to prevent global temperatures from increasing more than 3.6 degrees Fahrenheit (or two degrees Celsius) above preindustrial levels, to reduce U.S. GHG emissions by eighty percent below 1990 levels, and to put the United States in a leadership position in reducing GHG emissions.¹¹⁸

From the standpoint of citizen engagement in national climate change legislation, at least two additional kinds of findings and purpose statements would be helpful. The first is a finding that efforts to

¹¹¹ Richard McAdams, *The Origin, Development, and Regulation of Norms*, 96 MICH. L. REV. 338, 346-47 (1997).

¹¹² See, e.g., *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 178-86 (1978) (using Congressional findings and statements of purpose to help interpret the Endangered Species Act).

¹¹³ Peter C. Reise & Matthew W. White, *What Changes Energy Consumption Habits? Prices versus Public Pressures*, 22-23 (2007), available at <http://bpp.wharton.upenn.edu/mawhite/Papers/PricesAndPressures.pdf> (explaining that households were also responsive to higher prices).

¹¹⁴ The Olver bill contains no findings or statements of purpose.

¹¹⁵ S. 485 § 2.

¹¹⁶ S. 309 § 2 (adding § 701 to the CAA); H.R. 1590 § 2(a).

¹¹⁷ S. 280 § 2(1).

¹¹⁸ *Id.* (adding § 702 to the CAA). See also H.R. 1590 § 2(a)(2) (stating the importance of keeping the increase in global surface temperature below two degrees Celsius).

mitigate climate change can create jobs, foster the development of new technology, reduce other air pollutants, reduce the vulnerability of individuals and businesses to high and fluctuating energy prices, and improve domestic security. As the states have experience with these effects as a result of their climate change strategies, there is considerable empirical evidence to support these claims.¹¹⁹ Such a finding, coupled with comparable statements of purpose could enable the American public to see the opportunities present in this challenging situation, and could strengthen an understanding that the legislation is consistent with personal and national self-interest. In turn, these opportunities could help engage individuals. Some of this language is found in three of the bills. Purposes of the Lieberman bill include promoting advanced technology, improving the “economic well-being of low- and middle-income Americans,” and “mitigating the human and wildlife impacts of climate change.”¹²⁰ The Kerry bill contains findings that energy efficiency would reduce global warming and save money for consumers, improve national security, and clean the air.¹²¹ It also includes goals such as maximizing public benefits and promoting economic growth, providing assistance to those adversely affected by the transition from high-carbon fuels, and mitigating the effect of price increases on the poor.¹²² The Waxman bill identifies “[m]aximizing public benefit and promoting economic growth” as a goal.¹²³ None of the bills, however, address the opportunities in climate change legislation as forcefully and explicitly as they could. While mitigating adverse transition effects is important, such statements by themselves hardly create an inspiring vision of the available opportunities.

The second type of useful finding would state that individual effort and engagement are needed to make the legislation work more effectively, quickly, and cheaply. The legislation could include as a statement of purpose Congress’s intent for individuals as consumers to play a major role in the national effort to address climate change. As the California energy crisis indicates, such language may very well help engage individuals in the effort. None of the bills does that. The closest any bill comes is a finding in the Sanders bill that the United States could play an international leadership role because of the

¹¹⁹ See, e.g., BARRY G. RABE, STATEHOUSE AND GREENHOUSE: THE EMERGING POLITICS OF AMERICAN CLIMATE CHANGE POLICY 38-73 (2004); John Dernbach & the Widener University Law School Seminar on Global Warming, *Moving the Climate Debate from Models to Proposed Legislation: Lessons from State Experience*, 30 ENVTL. L. REP. 10,933, 10,972-76 (2000).

¹²⁰ S. 280 § 2(2).

¹²¹ S. 485 § 2.

¹²² S. 485 § 101 (adding § 702(a) to the CAA).

¹²³ H.R. 1590 § 3 (adding § 704(e)(1) to the CAA).

ingenuity of the American people.¹²⁴

B. Public Participation

While three of the bills would have the full range of procedural opportunities for citizen participation because they amend the CAA, two simply fail to address this issue. The Kerry, Sanders, and Waxman bills piggyback on the existing public participation provisions of the CAA because they would amend that statute. As a result, the public participation and citizen suit provisions in the CAA would apply to the new climate change provisions.¹²⁵

The Lieberman and Olver bills, by contrast, would create a new statute rather than amend an existing one. Some minor public participation provisions are included.¹²⁶ These bills do not, however, have broad and express provisions for public participation or citizen suits. Indeed, the bills contain no provisions whatsoever for judicial review. They are almost bereft of government enforcement provisions as well; the only enforcement provision requires a covered entity to pay a civil penalty for failing to meet its required emissions reductions.¹²⁷ In all likelihood, these omissions are either oversights or indications that these bills, too, are intended to amend the CAA. Still, the existence of these omissions suggests that citizen as well as government roles in implementation and enforcement deserve greater attention.

The bills also raise important questions about whether citizens will be able to effectively participate in their implementation. The comparative length of the five bills provides some important clues about the extent to which Congress resolves key issues or, alternatively, assigns resolution of those issues to the administering agency—primarily the EPA. The Lieberman bill, at 127 pages, is more than five times longer than the twenty-one page Waxman bill. The other bills fall somewhere in

¹²⁴ S. 309 § 2 (adding § 701 to the CAA).

¹²⁵ See S. 309 § 4 (incorporating and modifying the CAA provisions for enforcement and judicial review). The bill would also require federal agencies to consider climate change impacts in preparing an environmental impact statement under the National Environmental Policy Act, 42 U.S.C. §§ 4321 et seq., S. 309 § 8. The Waxman bill would lead to somewhat different outcomes on public participation because it also amends the Public Utility Regulatory Policies Act. Unlike the CAA, for instance, the Public Utility Act does not contain a citizen suit provision.

¹²⁶ H.R. 620 § 104(b); S. 280 § 104(c) (authorizing a 90-day public comment period for certain regulations in contrast to the 30-day period ordinarily required under the Administrative Procedure Act).

¹²⁷ S. 280 § 125; H.R. 620, § 125. The penalty is to be three times the market price of the number of tradable allowances that would have been necessary to meet its required reduction. In partial contrast, see S. 485 § 101 (adding § 703(f)(2)(1) to the CAA) (imposing a civil penalty of twice the market price for each allowance); H.R. 1590 § 3 (adding § 704(g)(2) to the CAA).

between—fifty-seven pages for the Olver bill, and seventy-one pages for the Sanders and Kerry bill.

While length is an imperfect proxy for legislative precision on key policy choices, the Supreme Court's recent decision in *Massachusetts v. Environmental Protection Agency* is a cautionary tale about the extent to which disputes about the exercise of discretion can occur even when legislative language is relatively clear.¹²⁸ The case grew out of the EPA's denial of a rulemaking petition to regulate GHG emissions from motor vehicles; the denial of the rulemaking petition occurred four years after the petition was originally filed.¹²⁹ Five justices, a bare majority, decided that carbon dioxide is a pollutant under the CAA and that the EPA is required to make a decision on the petition by applying the statute, not factors extraneous to the statute.¹³⁰ The four dissenting justices believed that the EPA properly exercised its discretion in denying the petition.¹³¹ This case is a particularly appropriate tale because it involves the same statute—the CAA—that three of the five bills would amend.

Because it is easier to challenge an EPA decision for violating its own statute than for improperly exercising its discretion,¹³² greater administrative discretion likely means fewer and weaker opportunities for effective citizen participation, and greater opportunities for affected interests to undermine the effective implementation of the legislation. Legislation that assigns primary responsibility for program design to an administrative agency, for example, is not likely to work effectively in the absence of specific legislative provisions for public participation and engagement in program design.¹³³ It may not work even then. At the national level, abundant experience suggests the need for Congress to make the most important policy decisions, regardless of the level of discretion it gives the EPA and other agencies to work out the details.

C. Targets and Timetables

All of the bills contain both long-term national targets and timetables

¹²⁸ 127 S.Ct. 1438 (2007).

¹²⁹ *Id.* at 1449.

¹³⁰ *Id.* at 1459-60.

¹³¹ *Id.* at 1471-78 (Scalia, J., dissenting).

¹³² *Chevron U.S.A. Inc. v. Natural Res. Def. Council*, 467 U.S. 837, 842-845 (1984).

¹³³ California's Global Warming Solutions Act, for example, sets a goal of reducing the state's GHG emissions to 1990 levels by 2020. The precise legal and policy mechanisms for achieving that goal are, to a very large degree, assigned to the California Air Resources Board. CAL. HEALTH & SAFETY CODE § 38500 (2007). CARB is using intensive public involvement and outreach, including several advisory committees, to develop the plans and regulations necessary to achieve that goal.

and interim targets. Climate change legislation would be more likely to effectively engage individuals if it also contained (or authorized the EPA to establish) corresponding national targets for stabilizing and reducing overall energy use, sector-specific targets, and targets for per capita energy consumption and GHG emissions.

Specific goals are an invaluable way of guiding the implementation of a statute. Such goals are often expressed in the form of targets, which are the goals themselves, and timetables, consisting of the dates when the goals are to be met.¹³⁴ Targets and timetables are also social norms: they indicate what should be achieved. They can be effective in guiding the behavior of governments, corporations, and individuals if they are seen as needed and achievable. Targets and timetables accomplish several things that are of particular importance in climate change legislation.

First, targets and timetables would clarify what the United States wants to achieve, and how ambitious it wants to be.¹³⁵ Instead of saying generally that the country should treat climate change seriously, specific legislative targets and timetables would indicate precisely what the country should achieve. The choice of the targets is also important. Goals work best when they are directed at the precise problem at issue rather than some proxy for that problem. Because GHG emissions are the problem to be addressed, for instance, it makes sense for targets and timetables to be directed at absolute levels of those emissions. The Bush Administration, by contrast, has set a goal of reducing the GHG intensity of the U.S. economy by eighteen percent by 2012.¹³⁶ Although achievement of this goal would prevent the emission of 500 million metric tons of emissions over the decade,¹³⁷ it would only slow the growth of U.S. GHG emissions, not reduce total emissions. GHG intensity measures GHG emissions per dollar of gross domestic product (GDP):¹³⁸ it is not an absolute measure of emissions. In its *Annual Energy Outlook 2007*, the Energy Information Administration projected GDP to increase by almost three percent per year between 2005 and 2030.¹³⁹ If GHG intensity declines by two percent per year—which is

¹³⁴ John C. Dernbach, *Targets, Timetables and Effective Implementing Mechanisms: Necessary Building Blocks for Sustainable Development*, 27 WM. & MARY ENVTL. L. & POL'Y REV. 79, 89-90 (2002).

¹³⁵ *Id.* at 92-100.

¹³⁶ The White House, *Global Climate Change Policy Book* (2002), <http://www.whitehouse.gov/news/releases/2002/02/climatechange.html> (last visited Jan. 16, 2008).

¹³⁷ *Id.*

¹³⁸ *Id.*

¹³⁹ ANNUAL ENERGY OUTLOOK 2007, *supra* note 28, at 4.

what the Administration's goal means on an annual basis—U.S. GHG emissions would continue to increase by about one percent per year.

Targets and timetables would also show seriousness in congressional commitment, because failure to meet targets could be easily shown. Thus, a statement of targets and timetables is not just a political act; it is also a commitment to achieving that goal.¹⁴⁰ Because the United States now has no absolute goal for the reduction of GHG emissions, the significance of establishing targets and timetables cannot be understated.

Long-term targets and timetables are also necessary for climate change legislation because of the long time period over which GHG emission reductions will need to be achieved. Such goals focus the efforts of governmental and nongovernmental actors, and remain constant even when there is change in political leadership. When many stakeholders and the public are involved, long-term goals help ensure that all actors are working toward the same objective.¹⁴¹ The mid-century mark—2050—is also a reasonable period for marking an outer boundary for a target, even though the national effort to address climate change is likely to require a much longer period. The period represents about two human generations, and is also a period within which the United States can act and plan with reasonable certainty.¹⁴²

By contrast, a perceived weakness in the Kyoto Protocol is the absence of any required emissions reductions after the period of 2008-2012. A second protocol, not yet negotiated or agreed to, is required to establish further reductions. In the meantime, decisions about investments and other actions that largely would be carried out in this subsequent period must be determined in the face of substantial uncertainties about what emissions control regime, if any, will be in place after 2012. Conversely, a problem with long-term targets is that they may lack the immediacy, and thus the effectiveness, of shorter-term goals. As a consequence, interim targets and timetables are a necessary part of any long-term target and timetable.¹⁴³

The five bills all establish long-term targets and timetables and also contain interim targets and timetables. Moreover, these targets and timetables would be set in absolute rather than relative terms. The Sanders and Waxman bills are the most ambitious of the five; they are intended to ensure that U.S. GHG emissions in 2050 are eighty percent

¹⁴⁰ Dernbach, *supra* note 134, at 101-02.

¹⁴¹ *Id.* at 99-100.

¹⁴² BD. ON SUSTAINABLE DEV., NAT'L RESEARCH COUNCIL, OUR COMMON JOURNEY: A TRANSITION TOWARD SUSTAINABILITY 3 (1999).

¹⁴³ Dernbach, *supra* note 134, at 105-06.

below 1990 levels.¹⁴⁴ Within two years after the effective date of the legislation, the EPA would be required to adopt rules requiring that GHG emissions in 2020 are no higher than they were in 1990. For each of the three decades between 2020 and 2050, the EPA would adopt regulations achieving one-third of the eighty percent reduction.¹⁴⁵ The Waxman bill uses a slightly different reductions structure to get to the same result.¹⁴⁶

The Lieberman and Olver bills contain similar, but slightly less ambitious, targets and timetables. Under the Lieberman bill, by 2012, emissions from covered entities (large sources of emissions, as explained *infra*) would be capped at 6130 million metric tons of carbon dioxide equivalent, reduced by the amount of GHG emissions from non-covered facilities. The cap for covered entities would be reduced to 5239 million tons in 2020, 4100 million metric tons in 2030, and 2096 tons in 2050.¹⁴⁷ Thus, emissions by 2050 would be about one-third of emissions in 2012. The caps in the Olver bill are structured somewhat similarly, beginning with 6150 million metric tons in 2012 and ending with 1504 million metric tons in 2050, or about one-fourth of 2012 emissions.¹⁴⁸

The Kerry bill establishes annual (as opposed to decadal) interim targets.¹⁴⁹ The goals of the Kerry bill include preventing global atmospheric concentrations of GHG from exceeding 450 parts per million and reducing U.S. GHG emissions in 2050 by sixty-five percent from 2000 levels.¹⁵⁰ Within two years of the bill's enactment, the EPA must adopt regulations requiring that GHG emissions in 2020 do not exceed 1990 levels, that emissions decline by at least 2.5 percent annually between 2021 and 2030, and that emissions decline by at least 3.5 percent annually between 2031 and 2050.¹⁵¹

The Kerry, Sanders, and Waxman bills would also require periodic reports from the National Academy of Sciences. In the Kerry bill, the

¹⁴⁴ S. 309 § 2 (adding § 702(2) to the CAA); H.R. 1590 § 3 (adding § 701(3) to the CAA). The purposes of the Sanders bill also include preventing average global temperatures from rising above 2 degrees Celsius (or 3.6 degrees Fahrenheit) above preindustrial levels, or atmospheric concentrations of global warming pollutants from rising above 450 parts per million (which is roughly double preindustrial levels). S. 309 § 2 (adding § 702(1) to the CAA).

¹⁴⁵ S. 309 § 2 (adding § 704(b)).

¹⁴⁶ H.R. 1590 § 3 (adding § 701 to the CAA).

¹⁴⁷ S. 280 § 124(a). Each number would be reduced by the amount of greenhouse gas emissions in that calendar year from non-covered entities. *Id.*

¹⁴⁸ H.R. 620 § 124(a). Like the McCain-Lieberman bill, each number would be reduced by the amount of GHG emissions from non-covered entities. *Id.*

¹⁴⁹ S. 485 § 101 (adding § 702(b)(1)(c) to the CAA).

¹⁵⁰ S. 485 § 101 (adding § 702(a)(1) to the CAA).

¹⁵¹ S. 485 § 101 (adding § 702(b) to the CAA).

report would assess “(1) the probability of avoiding dangerous anthropogenic interference with the climate system; and (2) the progress made by the United States as of the date of the report to avoid that interference.” If the Academy concludes that the emission targets in the bill are unlikely to prevent dangerous climate change or prevent global atmospheric concentrations of GHGs from exceeding 450 parts per million, the report must identify the needed level of additional reductions and recommend further actions that the United States and the international community may take.¹⁵²

The long-term and interim timetables in the bills are comparable, though the target level of reductions is greater in the Sanders and Waxman bills. From a precautionary perspective, more ambitious targets seem preferable to less ambitious targets. However, the ability to make targets and timetables more ambitious in light of new scientific evidence would reduce the importance of differences among the five bills concerning initial goals.

International experience regulating substances that deplete the stratospheric ozone layer provides a useful comparison. The 1987 Montreal Protocol required reductions in the production of certain ozone-depleting chemicals by specified dates. As the subsequently-unfolding science began to indicate a greater urgency, the Protocol was amended to regulate more chemicals, to phase out rather than simply reduce production of certain chemicals, and to ban the production of certain chemicals sooner than initially required.¹⁵³ In light of developing scientific information, the implied built-in potential modification present in the Kerry, Sanders, and Waxman goals resembles this approach. Given the long time frame over which the climate change legislation would be implemented, it seems similarly appropriate for the National Academy of Sciences to be constantly monitoring the targets and timetables that Congress has established.

On the other hand, the Kerry and Sanders bills contain language that may undercut the achievement of the long-term goal. The National Academy of Sciences report must include a determination of whether the statutory emissions reduction target “cannot be met due to

¹⁵² S. 485 § 101 (adding § 710 to the CAA). Somewhat similar language appears in the Sanders bill, S. 309 § 2 (adding § 705 to the CAA) and the Waxman bill, H.R. 1590 § 3 (adding § 702 to the CAA).

¹⁵³ Saleem S. Saab, Comment, *Move Over Drugs, There's Something Cooler on the Black Market - Freon: Can the New Licensing System Stop Illegal CFC Trafficking?*, 16 DICK. J. INT'L L. 633, 640-43 (1998) (describing modification of Montreal through subsequent amendments adding new substances and making existing restrictions more stringent).

technological infeasibility.”¹⁵⁴ The Sanders bill specifically authorizes the EPA to modify targets and timetables for automobiles and electric generating facilities based on this determination.¹⁵⁵ The potential for this determination weakens the commitment to the targets and timetables contained in the bills, and may encourage behavior intended to generate findings of technological infeasibility. A better approach would be to (1) require the federal government to develop a strategic plan on research and development strategies so that technologies are available to meet the statutory deadlines, (2) instruct the Academy to review that plan before and after it is finalized, and (3) ask for the Academy’s periodic report on progress under that plan.¹⁵⁶ This approach places the question of technological infeasibility within the larger and more important issue of a technology strategy. It also removes what appears to be a contingency in the national goals (i.e., technological infeasibility) that could weaken public commitment to and engagement in the legislation.

Despite the importance of interim targets and timetables, Congress would more effectively engage individuals and other entities if it directed the EPA to translate its broad targets and timetables into goals for the industrial, commercial, residential, and transportation sectors. Similar targets and timetables for the electricity sector, a sector that involves energy use in each of the other four sectors, would also prove useful. Congress could direct the EPA to further divide these targets and timetables (e.g., type of energy use, region) in ways that would be relevant to specific groups of similarly situated individuals and other entities.¹⁵⁷

Another set of useful targets and timetables would pertain to overall energy consumption. Stabilizing overall U.S. energy consumption is likely to be an important interim goal. The sharp reductions in GHG emissions that these bills seek to achieve would prove difficult and perhaps impossible to accomplish without stabilizing and then reducing overall energy consumption.¹⁵⁸ Corporate experience with climate mitigation targets demonstrates that energy efficiency or consumption

¹⁵⁴ S. 485 § 101 (adding § 710(a)(4) to the CAA). *See also* S. 309 § 2 (adding § 705 to the CAA).

¹⁵⁵ S. 309 § 2 (adding §§ 707(c) (vehicle emission standards), 708(c) (electric generating units), 709(h) (low carbon requirements) to the CAA).

¹⁵⁶ The federal government’s climate change science strategy is managed in a similar way. John C. Dernbach, *U.S. Policy*, in *GLOBAL CLIMATE CHANGE AND U.S. LAW*, *supra* note 62, at 61, 75-80.

¹⁵⁷ John C. Dernbach, *Overcoming the Behavioral Impetus for Greater U.S. Energy Consumption*, 20 *GLOBAL BUS. & DEV. L. J.* 15 (2007).

¹⁵⁸ Dernbach, *supra* note 64, at 10,031.

goals serve as a useful and important supplement to GHG reduction goals.¹⁵⁹ Energy efficiency goals have been used by corporations for a longer time than GHG reduction goals, and thus employees have greater familiarity with them. They are also more specific and more obviously relevant to the corporate bottom line, which makes them more understandable and credible.¹⁶⁰

Congress could direct the EPA to establish appropriate targets and timetables for stabilizing overall energy consumption for times and at levels consistent with overall GHG targets and timetables. GHG emission reductions can be achieved in a variety of ways, including cuts in emissions, reduction of energy use, and sequestration of carbon. Separately stated targets and timetables for energy use would send simple and understandable messages to individuals, encouraging energy efficiency and conservation. This would be particularly true if Congress established such targets and timetables for the residential, commercial, industrial, transportation, and electricity sectors. This approach may be particularly effective because, as previously noted, while energy efficiency has the greatest potential for an economic payback, initial investment costs often prevent the full realization of these opportunities.¹⁶¹

Congress could even more effectively direct this effort at individuals by requiring the EPA to set targets and timetables focusing on per capita energy consumption.¹⁶² Per capita consumption, of course, would be immediately relevant to individuals. Per capita energy consumption is expected to grow at an annual rate of only 0.3 percent per year, or about eight percent, between 2005 and 2030.¹⁶³ Similarly, per capita carbon dioxide emissions are projected to increase by only nine percent

¹⁵⁹ See ANDREW J. HOFFMAN, *GETTING AHEAD OF THE CURVE: CORPORATE STRATEGIES THAT ADDRESS CLIMATE CHANGE* 25-26 (2006).

¹⁶⁰ *Id.* The biggest motivating factor for an increase in energy consumption is population; energy consumption is expected to increase by thirty-one percent in that period, while population grows by twenty-three percent. ANNUAL ENERGY OUTLOOK 2007, *supra* note 28, at 9.

¹⁶¹ See, e.g., Stephen J. DeCanio, *The Efficiency Paradox: Bureaucratic and Organizational Barriers to Profitable Energy-Saving Investments*, 26 ENERGY POL'Y 441, 453-54 (1998).

¹⁶² The Energy Information Administration already publishes some data on per capita energy consumption, which would make the task of setting targets and timetables somewhat easier. See, e.g., Energy Info. Admin., U.S. Dep't of Energy, Energy Consumption by Source and Total Consumption, State Energy Consumption, Price, and Expenditure Estimates (SEDS), per Capita, Ranked by State, 2004, http://www.eia.doe.gov/emeu/states/sep_sum/plain_html/rank_use_per_cap.html per Capita, Ranked by State, 2004, http://www.eia.doe.gov/emeu/states/sep_sum/html/pdf/rank_use_per_cap.pdf (last visited Jan. 16, 2008) [hereinafter EIA Per Capita Data].

¹⁶³ ANNUAL ENERGY OUTLOOK 2007, *supra* note 28, at 9.

between 2005 and 2030.¹⁶⁴ The relatively slow growth rate for per capita energy consumption and per capita carbon dioxide emissions means that stabilizing per capita energy use and carbon dioxide emissions would be relatively easy to achieve. Stabilization would also have considerable symbolic effect: it would undermine the assumption that energy consumption must continue to increase to ensure U.S. prosperity. Congress could also direct the EPA to establish per capita targets and timetables for separate energy sectors.

D. Public Information

Congress should ensure that individuals are provided with information so as to maximize their engagement in the national effort to address climate change. Although none of the five bills do that, they collectively identify four kinds of public information related to climate change that are essential to the effectiveness of any comprehensive legislation.¹⁶⁵ First, and most obviously, public information about overall emissions and emissions reductions is essential for determining progress in meeting the targets and timetables. Without credible information on this issue, targets and timetables are empty gestures. This information should also provide an incentive to meet the targets and timetables, and is likely to induce corporations and individuals to act voluntarily. Second, more and better information about energy use and GHG emissions associated with the purchase and use of particular goods and services would help consumers make more informed purchasing decisions. Third, and similarly, more and better information about available choices would help consumers understand the availability and impact of alternatives. Finally, and more broadly, reliable information about the probable effect of climate change in particular sectors of the economy and in each region would help individuals make better choices about where and how to live and work in light of the changing climate.

An overarching theme in any public information or education effort should be that individuals make significant contributions to U.S. GHG emissions, and that individuals must reduce their emissions accordingly. No individual engagement effort, or any serious effort to address climate change, will work if people believe that solving GHG emissions involves simply building more wind turbines and reducing emissions from coal-fired power plants. Instead, this effort must show individuals that better technology and an increase in renewable energy cannot, by

¹⁶⁴ *Id.* at 13.

¹⁶⁵ As explained in Subsection F, *infra*, other kinds of information may also be essential.

themselves, achieve the needed reductions in GHG emissions.

1. Emissions Reporting

Two of the bills require the creation of a national database that includes considerable data about overall emissions from facilities as well as overall GHG emissions.¹⁶⁶ This information would enable individuals and others to monitor implementation of the climate change program. Congress could also enhance citizen engagement by requiring the EPA to collect and publish information on per capita GHG emissions.

The Lieberman and Olver bills, for example, require the EPA to establish a National GHG Database to “collect, analyze, and verify data on greenhouse gas emissions.”¹⁶⁷ Additionally, the bills establish a system for registering GHG reductions as well as increases in sequestration.¹⁶⁸ Properly verified GHG reductions and sequestration increases can be used to satisfy the bill’s emissions reductions requirements.¹⁶⁹ The bills also require the EPA to adopt regulations for “comprehensive measurement and verification methods and standards to ensure a consistent and technically accurate record of greenhouse gas emissions reductions, sequestration, and atmospheric concentrations.”¹⁷⁰ The proposed legislation would require the EPA to publish an annual report that (1) describes total GHG emissions, emissions reductions, and sequestration increases; (2) provides entity-specific and sector-specific analysis of that information; (3) describes and compares current and past GHG concentrations; and (4) describes trading activity for GHG emissions allowances.¹⁷¹

The information provided by this database would be essential to any effective and credible program for reducing U.S. GHG emissions. The database’s comprehensiveness, verified reductions requirement, annual

¹⁶⁶ H.R. 620 § 101(a); S. 280 § 101(a).

¹⁶⁷ *Id.*

¹⁶⁸ H.R. 620 § 103; S. 280 § 103.

¹⁶⁹ H.R. 620 § 103(c)(3); S. 280 § 103(c)(4).

¹⁷⁰ H.R. 620 § 104(a)(1); S. 280 § 104(a)(1).

¹⁷¹ H.R. 620 § 103(d); S. 280 § 103(d). The Sanders, Olver, and Kerry bills authorize the establishment of standards for accrediting certified reductions in carbon dioxide emissions through carbon sequestration, including the use of unique serial numbers to enhance tracking and prevent double counting. S. 309 § 2 (adding § 714 to the CAA); H.R. 620 § 101; S. 485 § 101 (adding § 708 to the CAA). The existence of such standards could be said to encourage individuals and other market entrants because of the greater reliability of claims concerning reductions. The Sanders and Kerry bills also require the Securities and Exchange Commission to adopt regulations requiring the issuer of securities to inform securities investors of the financial exposure of the issuer because of its greenhouse gas emissions and the “potential economic impacts of global warming on the interests of the issuer.” S. 309 § 9; S. 485 § 302.

reporting requirement, tracking mechanism for trading activity, and entity-specific and sector-specific analysis all point to its usefulness. The database would also provide the public with specific information about the program's effectiveness in reducing GHG emissions, which could have a powerful and positive effect on how the EPA implements the program.

The database would be of greater value to individuals as both citizens and consumers if the legislation also required the federal government to collect and publish detailed data on per capita energy use, GHG emissions, and specific data on the overall level of U.S. energy consumption and changes in that consumption.¹⁷² To prove useful, such information would need to be specifically relevant to the targets and timetables established by the EPA. Even if the legislation did not require the EPA to set targets and timetables for per capita energy use, per capita GHG emissions, or energy consumption, such data would nevertheless prove useful to individuals and others to understand the effect of the actual or potential activities they undertake.

Under the Olver and Lieberman bills, each covered entity would also be required to submit an annual report to the EPA stating its overall GHG emissions.¹⁷³ Such a report would include direct emissions from stationary sources; the amount of GHGs emitted in transportation, based on the amount of petroleum products the entity imports or refines for use in transportation; and the amount of hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride that the entity ultimately produced, imported, or emitted.¹⁷⁴ The Sanders and Kerry bills would also require major stationary sources to submit annually a GHG emissions report.¹⁷⁵

The obligation of covered entities or major stationary sources to submit an annual emissions report mirrors the obligation to report releases of toxic chemicals under the Emergency Planning and Community Right-to-Know Act. These annual reports, which the EPA

¹⁷² The Energy Information Administration already publishes data on per capita energy consumption. See EIA Per Capita Data, *supra* note 162.

¹⁷³ H.R. 620 § 102(a); S. 280 § 102(a)

¹⁷⁴ *Id.* All of this data is to be expressed in carbon dioxide equivalents. The six covered gases have different global warming potentials. Methane, for instance, traps about twenty-one times more heat per ton than carbon dioxide. U.S. Env'tl. Prot. Agency, Methane, <http://www.epa.gov/methane/scientific.html> (last visited Jan. 16, 2008). Measuring emissions or reductions in terms of carbon dioxide equivalents (H.R. 620 § 3(3); S. 280 § 3(3)) is a way of harmonizing reporting for all six gases. H.R. 620 § 3(3); S. 280 § 3(3).

¹⁷⁵ S. 309 § 2 (adding § 715(a) to the CAA); S. 485 § 101 (adding § 709(a) to the CAA). The EPA would be required to make this data publicly available. S. 309 § 2 (adding § 715(d) to the CAA); S. 485 (adding § 709(d) to the CAA).

publishes in the form of the Toxics Release Inventory, have led many companies to reduce releases of such chemicals.¹⁷⁶ These reductions are due in part to concerns by and for people living or working in the neighborhood of these facilities.¹⁷⁷ Because GHG emissions generally do not have negative local effects, these concerns would probably not precipitate reductions under this legislation. On the other hand, reductions of TRI emissions also expose companies to comparison with similar companies, and significant releases of TRI chemicals have a negative effect on the public's perception of the company.¹⁷⁸ Thus, this kind of report would also likely drive emissions reductions to some degree.

2. Consumer Information

None of the bills provides for the dissemination of information that individuals could use in their role as consumers. This is unfortunate, because such information could help individuals make better decisions, including choices about the goods and services they purchase. More detailed information about the energy or GHG impact of particular products would be particularly helpful in individual decision-making.

Federal law already contains such requirements for some products. For example, automobile dealers are required to attach a label in a prominent place on each new car offered for sale, stating the fuel economy of that car.¹⁷⁹ A variety of products include labels that contain information on energy use, providing, for example, the annual operating cost of the product.¹⁸⁰

Congress could broaden these public information or labeling requirements in several ways. First, it could require disclosure of more information about new products. For example, it could mandate disclosure of the estimated monthly or annual energy costs of operating motor vehicles. Second, it could encourage or require states to provide public information about energy use and GHG emissions for matters that are traditionally subject to state regulation.¹⁸¹ Thus, Congress could

¹⁷⁶ Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257, 295-309 (2001).

¹⁷⁷ *Id.* at 316-23.

¹⁷⁸ *Id.* at 305-309, 316-23.

¹⁷⁹ 49 U.S.C. § 32908(b)(1)(A) (2006).

¹⁸⁰ 42 U.S.C. § 6294(c)(1) (2006).

¹⁸¹ California's "Flex Your Power" program is among the most effective such programs. Flex Your Power—California Energy Efficiency and Conservation, <http://www.fypower.org> (last visited Jan. 16, 2008). Similar programs exist at the local level. *See, e.g.*, Spare the Air—Bay Area Air Quality Management District, <http://www.sparetheair.org> (last visited Jan. 16, 2008).

require development and publication of information on the estimated monthly or annual energy costs of operating new or existing residential and commercial buildings.¹⁸² The legislation could also direct electricity suppliers to provide information in their bills about average electricity use by that particular type and size of customer, enabling customers to understand whether their consumption is above or below average.¹⁸³

In addition, Congress could require the EPA to publish information on the energy or carbon footprint of individuals. The Energy Information Administration already collects and publishes considerable data about energy use around the country. The legislation could require the EPA to put this information in a regularly updated form that would enable individuals to compare their footprint with that of others who are similarly situated in their part of the country, along with information on what others have done to reduce their energy or carbon footprint.¹⁸⁴

3. Public Information on Available Choices

In addition, Congress could direct the EPA and other agencies publicly provide information about how individuals can reduce their energy use in a variety of contexts.¹⁸⁵ This information would be especially effective in the context of the required disclosure of information about the energy use or greenhouse gas emissions associated with the purchase and use of certain products and services. If the goal is to enable individuals to make environmentally oriented choices, the associated information must be easily available. For example, tips on reducing energy consumption, as well as an explanation of the consequences of consumption reductions, could accompany information on energy use from particular actions. Similarly, Congress could mandate the publication of comparative information about the energy efficiency and operational cost of various appliances and types of equipment. The idea is to enable consumers to easily compare the energy and dollar cost of their current refrigerator, air conditioner, or furnace with the ones available for sale. This kind of comparative information could be made available as part of a broader effort to educate individuals that upgrades or retrofits for appliances,

¹⁸² Dernbach, *supra* note 157, at 34-35.

¹⁸³ Carlson, *supra* note 74, at 10,768.

¹⁸⁴ Vandenberg & Steinemann, *supra* note 47, at 1731; Dernbach, *supra* note 157, at 36.

¹⁸⁵ The EPA is already providing considerable public information of this type. *See, e.g.*, ENVTL. PROT. AGENCY, ENERGY STAR ACTION GUIDE: PROTECTING OUR ENVIRONMENT STARTS AT HOME (2004), available at http://www.energystar.gov/ia/news/estar_action_guide_4-8-04.pdf.

equipment, or insulation in residential and commercial buildings offer some of the largest energy and cost savings available. In addition, information about an individual's energy or carbon footprint should include information on what others have done to reduce their energy or carbon footprint.¹⁸⁶

Where manufacturers and a market for less carbon intensive products already exist, the government simply must gather and publish available information. The challenge is greater when there is a gap in the market. For example, there does not appear to be a significant number of providers of energy efficiency and conservation services for residences and smaller businesses, even though substantial opportunities for energy and cost savings are available from such structures.¹⁸⁷ As a consequence, Congress may want to direct the Small Business Administration or a related agency to provide financial and technical support to start such businesses, and then to direct the publication of information of information about such businesses. Similarly, Congress should direct the EPA to use funds from the sale of allowances or from other sources to make more energy efficient (and less GHG-producing) goods and services more affordable to persons with lower incomes.

Another set of choices for individuals involves curtailment of energy use, as well as changes in lifestyle and diet. Such actions, if undertaken by individuals, could likely result in significant reductions in GHG emissions. A vegetarian diet, for example, is less energy intensive than a meat-based diet and also reduces dependence on livestock, which are responsible for significant GHG emissions.¹⁸⁸ Of course, there is also little doubt that many of these choices, including a vegetarian diet, would face considerable public resistance. However, if information about the effect of such lifestyle and diet choices would motivate even a fraction of the population to make changes, Congress should then direct or authorize the government to provide it.

4. Public Information on Climate Change Effects

Public information about the impact of climate change on U.S. citizens is a necessary part of any national climate change program. Such information provides state, local, and regional decision makers, as well as individuals, with useful information about the likely effects of

¹⁸⁶ Dernbach, *supra* note 157, at 36; Vandenberg & Steinemann, *supra* note 47.

¹⁸⁷ Dernbach, *supra* note 157, at 36-38.

¹⁸⁸ Livestock are responsible for eighteen percent of the world's GHG emissions. U.N. FOOD AND AGRICULTURAL ORG., *LIVESTOCK'S LONG SHADOW: ENVIRONMENTAL ISSUES AND OPTIONS* xxi (2006), available at http://www.virtualcentre.org/en/library/key_pub/longshad/A0701E00.pdf.

climate change. Two bills already require such information.

The U.S. government first provided climate change information in 2001, with the publication of *Climate Change Impacts on the United States: The Potential Consequences of Climate Variability and Change*.¹⁸⁹ This report assessed the likely impact of climate change on each region of the United States as well as on a variety of economic sectors (agriculture, water, human health, coastal areas and marine resources, and forests). The U.S. government also published separate reports on likely regional impacts. These reports were more than assessments: they were produced out of intensive stakeholder processes that involved considerable interaction among scientists and persons representing a variety of interests. For many participants, the public meetings and other participatory processes were at least as important as the assessments themselves.¹⁹⁰ The regional assessments were also to be repeated periodically, creating and supporting an ongoing network of stakeholders and information sharing, not just on climate change effects but also on how to address them.¹⁹¹ No updated national report of this type is yet published, however, and there has been much less federal support for subsequent regional reports.¹⁹²

Several of the proposed bills would respond to this problem, although none of them would require a public participatory process for developing or exchanging information. The Kerry bill would require the creation of a National Climate Change Vulnerability and Resilience Program to assess and make recommendations on “local, regional, and national vulnerability and resilience to” short- and long-term climate change.¹⁹³ Among other things, this assessment must include a

¹⁸⁹ GLOBAL CLIMATE CHANGE RESEARCH PROGRAM, CLIMATE CHANGE IMPACTS ON THE UNITED STATES: THE POTENTIAL CONSEQUENCE OF CLIMATE VARIABILITY AND CHANGE, FOUNDATION (2001), available at <http://www.gcric.org/NationalAssessment/foundation.html>; GLOBAL CLIMATE CHANGE RESEARCH PROGRAM, CLIMATE CHANGE IMPACTS ON THE UNITED STATES: THE POTENTIAL CONSEQUENCES OF CLIMATE VARIABILITY AND CHANGE, OVERVIEW (2000), available at <http://www.gcric.org/NationalAssessment/overpdf/overview.html>. For a more recent nongovernmental assessment, see CAMILLE PARMESAN & HECTOR GALBRAITH, OBSERVED IMPACTS OF GLOBAL CLIMATE CHANGE IN THE U.S. (2004), available at <http://www.pewclimate.org/docUploads/final%5FObsImpact%2Epdf>.

¹⁹⁰ M. Granger Morgan et al., *Learning from the U.S. National Assessment of Climate Change Impacts*, 39 ENVTL. SCI. & TECH. 9023, 9026 (2005).

¹⁹¹ *Id.* at 9024-25.

¹⁹² As a result, nongovernmental organizations have sponsored some recent regional reports, using many of the same scientists who prepared the government reports. See, e.g., PETER C. FRUMHOFF ET AL., UNION OF CONCERNED SCIENTISTS, CONFRONTING CLIMATE CHANGE IN THE NORTHEAST: SCIENCE, IMPACTS, AND SOLUTIONS (2007), available at <http://www.climatechoices.org/assets/documents/climatechoices/confronting-climate-change-in-the-u-s-northeast.pdf>.

¹⁹³ S. 485 § 402(a).

“vulnerability scorecard” for each state, which would include each state’s ability to respond to climate change.¹⁹⁴ The Secretary of Commerce would be required to make recommendations on actions that can be taken to minimize negative effects of climate change, and to make available “appropriate information, technologies, and products” to help reduce the negative effects of climate change.¹⁹⁵

The Olver bill would require publication of a report of the effect on the “possible and projected impacts” of climate change on coastal areas, including impacts on ecosystems, fisheries, tourism, and coastal communities every five years. The report would include impacts from increases in sea level, temperature, storms, and other extreme weather.¹⁹⁶ The Secretary of Commerce must also provide technical assistance to prepare “persons living in coastal zones to adapt to climate change.”¹⁹⁷ Somewhat similarly, the McCain-Lieberman bill would require an assessment of the “climate change technological needs of various regions of the country.”¹⁹⁸

Finally, the McCain-Lieberman and Olver bills would require the Secretary of Commerce to conduct research “on the impact of climate change on low-income populations everywhere in the world,” including appropriate mitigation strategies and costs.¹⁹⁹ To the extent that U.S. GHG emissions adversely affect low-income persons in other countries, such research could help the American public understand the global consequences of its emissions.

E. Incentives for Individual Action

It is one thing to provide individuals with information about energy use and the GHG impacts of their choices, to identify and provide information about alternatives, and to make those alternatives more readily available. It is quite another to provide them with affirmative incentives to act on that information. Congress could do much more to

¹⁹⁴ *Id.* § 402(d)(2).

¹⁹⁵ *Id.* §§ 402(e), (g).

¹⁹⁶ H.R. 620 § 301. For analyses of the potential effects of sea level rise and what the federal government could do to address the problem, see James G. Titus, *Does the U.S. Government Realize That the Sea is Rising? How to Restructure Federal Programs so that Wetlands and Beaches Survive*, 30 GOLDEN GATE U. L. REV. 717 (2000); James G. Titus, *Rising Seas, Coastal Erosion, and the Takings Clause: How to Save Wetlands and Beaches Without Hurting Property Owners*, 57 MD. L. REV. 1279 (1998).

¹⁹⁷ H.R. 620 § 301. Under both the McCain-Lieberman and Olver bills, the Secretary of Commerce is also required to submit a national climate change adaptation plan to Congress. S. 280 § 401(c); H.R. 620 § 302(c).

¹⁹⁸ S. 280 § 401(a).

¹⁹⁹ H.R. 620 § 303; S. 280 § 402.

provide such incentives. The combination of information and incentives can be very effective in inducing individuals to act, and considerable opportunity exists to create incentives for individuals. These opportunities include tax incentives, distribution of allowances, the ability to generate and trade allowances, and the distribution of proceeds from allowances. Some of the bills provide some of these incentives, but none provides them all. Mutually reinforcing incentives for same behavior, moreover, may be particularly effective.

A common thread needed for any incentive to be effective, however, is convenience in both changing behavior and collecting the reward. For instance, grant programs for energy efficiency in homes are more widely used in Europe than in the United States because the European programs do not require an energy audit as a precondition.²⁰⁰ Similarly, tax incentives are more likely to be used if they do not require extensive or difficult documentation. At a minimum, Congress could address this issue by requiring the administering agency to provide incentives in the most convenient ways possible.

1. Tax Incentives

The most obvious individual incentive in energy policy takes the form of tax incentives, including tax credits and deductions. Because tax incentives reduce an individual's tax bill, they reduce the overall cost to the individual of energy efficient appliances and equipment or renewable energy technology. Only one of the five bills contains tax incentives for individuals, however. The Kerry bill would increase the size of the existing tax credit for a range of more fuel-efficient vehicles, including hybrids.²⁰¹

Congress should provide the fullest possible set of tax credits and other incentives, particularly for behaviors that involve significant initial financial outlays. These tax incentives should not be limited to a specific window of time or to a limited number of taxpayers, as many of the current tax incentives under the Energy Policy Act of 2005 are.²⁰² Rather, they should target specific types of decisions—such as the purchase of more fuel-efficient vehicles or energy-efficient upgrades and renovations to existing residential and commercial structures. It may be appropriate to provide some form of reduced taxation to

²⁰⁰ COMM. ON BEHAVIORAL AND SOC. ASPECTS OF ENERGY CONSUMPTION AND PROD., COMM'N ON BEHAVIORAL AND SOC. SCIENCES AND EDUC., NAT'L RESEARCH COUNCIL, ENERGY EFFICIENCY IN BUILDINGS: BEHAVIORAL ISSUES 38-39 (Paul C. Stern, ed., 1985) [hereinafter ENERGY EFFICIENCY IN BUILDINGS: BEHAVIORAL ISSUES].

²⁰¹ S. 485 §§ 201-202.

²⁰² 42 U.S.C.S. §§ 15801 et seq. (2006).

individuals who can demonstrate that their actions over the previous year were carbon neutral. To avoid a drain on federal tax revenues, the funds for these tax credits could be provided by a small increase in the federal gasoline tax or some other comparable energy or carbon tax.

2. Distribution of Allowances

A major issue in the implementation of any trading system is the allocation of allowances. The two most commonly identified choices are allocation of allowances to generators of GHG emissions and allocation by auction.²⁰³ Other choices, however, are available. One alternative is to distribute allowances to individuals and entities that significantly reduce their energy use or GHG emissions. In this way, the government provides a financial incentive or reward to those persons or entities, equivalent to the market value of the allowances themselves. Such an award would provide a financial incentive to reduce energy use or GHG emissions, and the incentive would not involve reduced revenue to the treasury.

The Sanders bill would provide such an incentive. It would authorize the EPA to allocate allowances to “owners and operators of highly energy-efficient buildings,” including residential users.²⁰⁴ It would also authorize the distribution of allowances to individuals and entities that carry out projects for biological sequestration of carbon dioxide.²⁰⁵ These are appropriate incentives. To be fully effective, though, the EPA should be authorized to distribute allowances to individuals or entities who take any action that reduces net GHG emissions, including the installation of renewable energy technology that can supply electricity to the grid. Congress might also consider setting aside, or having the EPA set aside, a specified significant percentage of allowances for this purpose.

3. Ability to Generate and Trade Allowances

Another way to reward and encourage individual behavior that reduces GHG emissions or energy use is to authorize individuals to create and market allowances on their own. Like the previous option, this approach takes advantage of the trading system created by the

²⁰³ See, e.g., S. 280 §§ 161-62 (allowance allocation provisions); H.R. 620 §§ 161-62 (allowance allocation provisions).

²⁰⁴ S. 309 § 2 (adding § 706(b)(2) to the CAA).

²⁰⁵ *Id.* (adding § 706(b)(4) to the CAA). The bill would also authorize distribution of allowances to individuals or entities that carry out projects to protect and restore ecosystems. *Id.* (adding § 706(b)(5) to the CAA).

legislation, and does not involve a loss of funds to the treasury. This option, however, may be more attractive as it allows individuals to generate the allowances themselves rather than depend on allocation by the government.²⁰⁶ This option may also generate a suite of cost-effective reductions that would not otherwise occur.²⁰⁷

The Lieberman bill allows a covered entity to meet up to thirty percent of its allowance submission requirement from tradable allowances it obtains from other sources.²⁰⁸ One of these sources is GHG reduction projects carried out by a person other than a covered entity and registered in the national GHG database.²⁰⁹ Another source is carbon sequestration projects registered in that database.²¹⁰ To be sure, such projects would be subject to a variety of monitoring and verification requirements that would make them too costly or difficult for many individuals. To some degree, these barriers could be overcome by commercial entities that function as aggregators, managing projects for a variety of individuals while splitting the financial benefit of the allowances with the individuals themselves. At the same time, the individuals who are most likely to benefit from the generation and sale of these allowances may also be individuals with the highest individual carbon footprint.

4. *Distribution of Proceeds from Sale of Allowances*

Any government auction or sale of allowances will result in the receipt of money by the government. This money could, in turn, be distributed to individuals who significantly reduce their GHG emissions. It could also be distributed directly or indirectly to low-income persons for home weatherization or for the purchase and installation of other energy-efficient or GHG-reducing technologies. The distribution of funds from the sale of allowances, in other words,

²⁰⁶ The Model Rule adopted under the Regional Greenhouse Gas Initiative, which involves Northeastern and Mid-Atlantic states, allows for the creation of allowances to offset emissions. Offsets can come from methane capture from farms, conversion of land to forest, sodium hexafluoride gas leak prevention in electricity distribution, methane gas capture at small landfills, and end-use energy efficiency projects. REGIONAL GREENHOUSE GAS INITIATIVE MODEL RULE § XX-10.3 (Reg'l Greenhouse Gas Initiative, Draft as of Jan. 5, 2007), available at http://www.rggi.org/docs/model_rule_corrected_1_5_07.pdf.

²⁰⁷ Cf. CAL. HEALTH & SAFETY CODE § 38561(f) (requiring California Air Resources Board, in developing a scoping plan for reducing greenhouse gas emissions, to “identify opportunities for emission reduction measures from all verifiable and enforceable voluntary actions, including, but not limited to, carbon sequestration projects and best management practices.”).

²⁰⁸ S. 280 § 144(a).

²⁰⁹ *Id.* § 144(a)(3).

²¹⁰ *Id.* § 144(a)(2).

could be used to provide incentives or overcome disincentives.

The Lieberman and Olver bills would do something like this by creating a Climate Change Credit Corporation. The Corporation would use tradable allowances and the money from sale of allowances “to reduce costs borne by consumers as a result of the greenhouse gas reduction requirements of this [a]ct.”²¹¹ These reduced costs could come in a variety of forms, including price discounts, subsidies, and consumer rebates, and may be directed at those who can least afford higher costs.²¹²

5. Other Incentives

If Congress wants to fully engage individuals, it should look to provide other incentives as well. A variety of such incentives are available. Some of these are directed at individuals as employees or as landowners. The Lieberman bill provides examples. It would allow employees in federal laboratories to participate in the commercial exploitation of their research work for up to three years.²¹³ The legislation would create a national award for up to twenty individuals who have made “outstanding contributions to knowledge in the field of climate change innovation.”²¹⁴ It would create a program within the National Science Foundation to enhance climate science and technology knowledge for teachers in elementary, middle, and secondary schools.²¹⁵ The bill would also require an interagency panel to, among other things, “increase landowner accessibility to technologies and practices” for agricultural carbon storage.²¹⁶

The social science literature on incentives, moreover, indicates a greater variety of potential incentives than are ordinarily provided in legislation. Many of these incentives are specific to particular economic sectors.²¹⁷ Congress should authorize the implementing agency to recommend to Congress additional incentives within a specified period after the legislation is enacted. This report should be prepared in conjunction with the National Academy of Sciences, which has a long

²¹¹ *Id.* §§ 201, 202(b)(1); H.R. 620 §§ 201, 202(b)(1)..

²¹² S. 280 §§ 202(b)(1)(A), (C); H.R. 620 §§ 202(b)(1)(A), (C).

²¹³ S. 280 § 313.

²¹⁴ *Id.* § 316.

²¹⁵ *Id.* § 317.

²¹⁶ *Id.* § 355(b)(9).

²¹⁷ *See, e.g.*, ENERGY EFFICIENCY IN BUILDINGS: BEHAVIORAL ISSUES, *supra* note 200; Paul C. Stern et al., *The Effectiveness of Incentives for Residential Energy Conservation*, 10 EVALUATION REV. 147 (1985).

track record on behavioral issues associated with energy use.²¹⁸ Congress should also require that this report be updated on a regular basis—for example, every three to five years.

F. Role of States

The bills do not fully reflect or protect the many climate change efforts of states.²¹⁹ The Waxman bill comes closer than the others to recognizing the contribution of states to climate change mitigation; it states that nothing in the legislation is to be “interpreted to preempt or limit State actions” to address climate change, enhance renewable energy, or foster energy efficiency.²²⁰ But categorical protection of all state efforts may not be the most efficient or effective way to address climate change, particularly because of the importance of creating and encouraging national markets.

It is therefore not surprising that these bills do not address the role of states in engaging individuals. This is particularly true because the bills do not indicate comprehensive consideration of what the federal government can do to engage individuals. Many of the elements of a national strategy on individual engagement could be done at least as well by states, and are in fact already being done by states. Because information is more effective in influencing behavior when it comes from a variety of sources, it would likely be helpful if both the federal government and the state and local governments were providing some of the same kinds of information.

Congress could address this issue by requiring or allowing states to adopt individual or public engagement plans.²²¹ In such plans, states would explain what they intend to do to engage individuals in addressing climate change. Such plans would allow states to tailor individual engagement efforts to their own economic, geographic, and demographic situations. The legislation could contain a relatively brief

²¹⁸ See, e.g., NAT’L RESEARCH COUNCIL, DECISION MAKING FOR THE ENVIRONMENT: SOCIAL AND BEHAVIORAL SCIENCE RESEARCH PRIORITIES 69-84 (Garry D. Brewer & Paul C. Stern eds., 2005); ENERGY EFFICIENCY IN BUILDINGS: BEHAVIORAL ISSUES, *supra* note 200.

²¹⁹ See, e.g., Thomas D. Peterson, Robert B. McKinstry & John C. Dernbach, *Developing a Comprehensive Approach to Climate Change Policy in the United States that Fully Integrates Levels of Government and Economic Sectors*, 26 VA. ENVTL. L. J. 217 (2008)

²²⁰ H.R. 1590 § 3 (adding § 707 to the CAA); *Id.* § 4 (adding § 610(d) to Public Utility Regulatory Policies Act), *Id.* § 5 (adding § 611(f) to Public Utility Regulatory Policies Act).

²²¹ These plans would be modeled, in some ways, on State Implementation Plans under the CAA, 42 U.S.C. § 7410 (2006). See also *Fed. Energy Regulatory Comm’n v. Mississippi*, 456 U.S. 742, 769-772 (1982) (upholding Congressional authority under the Public Utility Regulatory Policies Act of 1978 to require state public utility commissions to consider specified energy efficiency and conservation policies).

list of issues that state plans should address, and provide funds to states in proportion to their success in reducing GHG emissions or energy consumption.²²²

States could be encouraged, for example, to set overall per capita targets and timetables, as well as sector-specific goals. Considerable variation exists between states in per-capita energy consumption: the rate in Texas, for instance, is twice that of New York and California.²²³ While some of the differences among states are due to economic and geographic differences, some are also due to differences in energy efficiency and other policies.²²⁴ State specific targets and timetables could be a useful way to engage citizens across the country. States could also be encouraged to require that information be provided to consumers on matters for which states are traditionally involved, such as the purchase or sale of a home or business.²²⁵ States could also be encouraged to involve local governments in similar efforts.

G. Evaluation and Improvement

For all that is known about how to make programs for individual engagement work more effectively, there is still a great deal that is unknown. In a 1985 report on behavioral issues associated with energy use in buildings, the National Academy of Sciences/National Research Council made a cautionary point that is still true: “conservation policies and programs have been built on an inadequate understanding of how people respond to prices, information, incentives, and other stimuli. Some of the needed knowledge exists, but much still has yet to be developed in the process of designing and implementing energy policies and programs.”²²⁶ Over the forty-plus years of the congressional timeline for these bills (between the present and 2050), a great deal will occur that cannot now be predicted. It will thus be necessary to make adjustments in any effort to engage individuals based on new information and learning.

One of the most basic things Congress could do is to give an appropriate federal agency (most likely the EPA) broad responsibility to continually find better and more effective ways to inform individuals of the GHG effects of their choices, to develop and recommend more effective incentives, and to conduct ongoing research on the

²²² Funding sources include receipts from the sale of allowances as well as a small carbon or energy tax.

²²³ EIA Per Capita Data, *supra* note 162.

²²⁴ Dernbach, *supra* note 64, at 10,030-31.

²²⁵ Dernbach, *supra* note 157, at 35.

²²⁶ ENERGY EFFICIENCY IN BUILDINGS: BEHAVIORAL ISSUES, *supra* note 201, at 3.

effectiveness of their efforts.²²⁷ This evaluation would best be conducted in cooperation with the National Academy of Sciences, and should include evidence from the United States²²⁸ and other countries.²²⁹ The legislation should also make clear that the implementing agency or agencies are expected to enter into appropriate partnerships with nongovernmental entities, including the entertainment media and advertisers.²³⁰

Congress could also direct that this effort be focused on specific issues. As previously explained, a particularly important challenge is increasing the rate at which existing, less energy-efficient appliances, equipment, buildings, and vehicles are upgraded or replaced. A great many options are available for achieving this result, including creative financing; public information about the comparative efficiency of new and existing devices; and the creation of partnerships among manufacturers, contractors, community colleges, and government to create and build businesses with the know-how to complete this kind of work.²³¹ On this and other issues, the challenge is to find out what works and how it can be improved. While Congress and the executive branch attempt particular approaches, there should be constant evaluation and improvement.

In addition, Congress should be chary of specifying program details that might not reflect the state of present or future knowledge. While

²²⁷ NAT'L RESEARCH COUNCIL, DECISION MAKING FOR THE ENVIRONMENT: SOCIAL AND BEHAVIORAL SCIENCE RESEARCH PRIORITIES 69-84 (Garry D. Brewer & Paul C. Stern eds. 2005) (explaining existing research needs); MCKENZIE-MOHR & SMITH, *supra* note 77, at 122-35 (emphasizing and explaining the importance of including an evaluation component in such programs).

²²⁸ See Loren Lutzenhiser, *Social and Behavioral Aspects of Energy Use*, 18 ANN. REV. ENERGY & ENV'T 247 (1993) (providing a review of the literature).

²²⁹ See, e.g., JOHN NYBOER & CHRIS BATAILLE, ENERGY INTENSE EQUIPMENT PURCHASING BEHAVIOR: A REVIEW OF THE LITERATURE (2004), available at <http://www.cieedac.sfu.ca/CIEEDACweb/pubarticles/Reports%20on%20Other%20Data/BEPR2004.pdf>; Wouter Poortinga et al., *Values, Environmental Concern, and Environmental Behavior: A Study Into Household Energy Use*, 36 ENV'T & BEHAVIOR 70 (2004).

²³⁰ The EPA's Energy Star® program is a government-industry energy efficiency partnership that promotes energy-efficient products for the purpose of reducing greenhouse gas emissions. U.S. Env'tl. Prot. Agency, History of ENERGY STAR, http://www.energystar.gov/index.cfm?c=about.ab_history (last visited Jan. 16, 2008). For examples of efforts to use radio and television to change behavior, see Population Media Ctr., PMC Program Fundamentals—Sabido Method, <http://www.populationmedia.org/programs/sabido.html> (last visited Jan. 16, 2008). Advertisers are also showing an increasing interest in running public service announcements concerning lifestyle changes that are more environmentally friendly. Eric Pfanner, *Advertising: Al Gore Finds Friends at a Cannes Ad Festival*, INT'L HERALD TRIBUNE, June 17, 2007, available at <http://www.iht.com/articles/2007/06/17/business/ad18.php>.

²³¹ Dernbach, *supra* note 157, at 36-38.

legislative amendments will no doubt occur over time, it is probably appropriate to be somewhat more general in the drafting of provisions concerning individual behavior. Exceptions are appropriate, of course, where a particular provision is best specified by statute (e.g., the imposition of legal duties to provide information or tax credits) or where new information is unlikely to change anything. This part of the program, in other words, may rely more on administrative discretion and expertise than other parts of the legislation. To ensure that the agency's legal duties are legally enforceable through citizen suits and other means, and that discretion is not a byword for inaction, Congress should require the agency to implement specified programs by particular times, to issue recommendations on further informational and incentive programs by particular times, and to update or modify those by programs or recommendations by particular dates.²³²

IV. CONCLUSION

Climate change legislation is likely to be much more effective if Congress engages individuals as much as possible. While there is considerable discussion over the appropriate design of a regulatory and market-based structure, it is impossible to separate those issues from issues involving the role of individuals. The problem is too daunting to focus simply on large polluters, and there is considerable reason to believe that individuals can make a significant contribution—as citizens and consumers as well as in other roles.

As this Article shows, elements of an individual engagement strategy are scattered throughout different bills, and some elements are missing altogether. A congressional effort to put all of the elements in one bill, and connect them in a coherent way, would result in climate change legislation that engages some of the nation's key strengths—individual initiative, engaged citizenship, and collective sense of purpose. Such legislation would more likely be able to at least meet the challenge in front of us.

²³² See, e.g., *Ctr. for Biological Diversity v. Brennan*, 2007 U.S. Dist. LEXIS 65456 (N.D. Cal., Aug. 21, 2007) (granting summary judgment to plaintiffs who alleged that the federal government missed statutory deadlines for revising the national climate change research plan and scientific assessment, and issuing an order to produce the required plan and assessment). In the Global Change Research Act, 15 U.S.C. § 2921 et. seq. (2006), which formed the basis for this litigation, Congress did not specify what the scientific outcomes were to be; it simply established a process for developing and updating the research. Similarly here, Congress should establish a process with deadlines, so that citizens and others can obtain judicial relief if the agency fails to act in a timely or appropriate manner.