

FEDERAL CONTROL OF CARBON DIOXIDE EMISSIONS: WHAT ARE THE OPTIONS?

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Abstract: The U.S. Supreme Court in *Massachusetts v. EPA* held that carbon dioxide is a pollutant under the Clean Air Act (CAA) and remanded the case to EPA. The Agency must decide whether CO₂ emissions contribute to climate change. If the Agency responds affirmatively, it must meet other requirements of the CAA in order to regulate carbon dioxide or other greenhouse gases (GHGs). This Article explains why the CAA is a poor vehicle for regulating GHGs and covers in detail the difficulties that will arise in trying to use the Act to reduce CO₂ emissions. The Article then turns to what should be done to develop an energy policy that will effectively reduce U.S. GHG emissions. It examines the options for control, including the use of taxes and cap-and-trade programs and evaluates some of the most important legislative proposals being considered. It then turns to the two major sources of GHGs—electric power production and motor vehicle use—and addresses how the adverse impact these sources have on our climate could be reduced.

INTRODUCTION

The United States Supreme Court, in *Massachusetts v. EPA*, in a five to four decision, held that carbon dioxide (CO₂) qualifies as an air pollutant under section 302(g) of the Clean Air Act (CAA).¹ Proponents of greenhouse gas (GHG) regulation, since the Rio de Janeiro Conference in 1992, have been seeking, without success, to obtain congressional and administration support for both international treaties and domestic legislation that mandate GHG emission reductions. From 1999 to the date of the Court's decision, more than 200 bills were introduced in Congress to regulate GHGs, but none were enacted.² The

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¹ 549 U.S. 497, 528–29 (2007). The author represented automobile industry clients in this case.

² Pew Center on Global Climate Change, Legislation in the 109th Congress Related to Global Climate Change, http://www.pewclimate.org/what_s_being_done/in_the_congress/109th.cfm (last visited Jan. 16, 2009). The Energy Policy Act of 2005 charged the President with the creation of a “Committee on Climate Change Technology” to “coordinate Federal

petitioners were asking the Court to give them through litigation what they had failed to achieve from lobbying the legislative or the executive branch, and they were successful.³

The majority opinion determined GHGs are air pollutants based on section 302(g) of the CAA and then addressed the issue of whether EPA properly refused to exercise its authority to regulate CO₂, the most important GHG emitted in the U.S., pursuant to section 202(a)(1) of the CAA.⁴ The Court held that, “EPA can avoid taking further action only if it determines that greenhouse gases do not contribute to climate change or if it provides some reasonable explanation as to why it cannot or will not exercise its discretion to determine whether they do.”⁵ The Court went on to say EPA cannot refuse to regulate because of its concerns over scientific uncertainty or because of the implications concerning foreign affairs.⁶ “The statutory question is whether sufficient information exists to make an endangerment finding.”⁷ The Supreme Court remanded the case to EPA for additional proceedings.⁸ The Court did not say whether EPA must make an endangerment finding, and it did not articulate what policy concerns may be considered by EPA in making its finding.⁹

EPA must decide whether carbon dioxide and other GHGs are air pollutants that endanger public health or welfare. An affirmative finding will produce intense pressure to regulate mobile sources as well as stationary sources. But, regulating CO₂ emissions from motor vehicles, given the constraints imposed by section 202(a)(2) of the CAA, will be a challenge.

I. IS THE CAA AN EFFECTIVE TOOL TO CONTROL CARBON DIOXIDE?

The first problem in using the CAA to control carbon dioxide is that, despite the Supreme Court majority’s position that carbon dioxide is within section 302(g)’s definition of pollution, carbon dioxide and

climate change technology activities,” but the Act did not actually establish any regulations on GHG emissions. Pub. L. No. 109-58, § 1610, 119 Stat. 594, 1109–10 (2005).

³ The petitioners probably would disagree, arguing the case involved statutory interpretation of the CAA. See generally Lisa Heinzerling, *Climate Change and the Clean Air Act*, 42 U.S.F. L. REV. 111 (2007) (Professor Heinzerling was the primary author of the petitioners’ briefs in *Massachusetts v. EPA*).

⁴ *Mass. v. EPA*, 549 U.S. at 530–31.

⁵ *Id.* at 533.

⁶ *Id.* at 533–34.

⁷ *Id.* at 534.

⁸ *Id.*

⁹ *Id.*

water vapor are the natural end products of combustion. Conventional air pollution control efforts usually seek to create ideal combustion conditions that are expressed as: $\text{HC} + \text{O}_2 + \text{N}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{N}_2 + \text{heat}$.¹⁰ The process of forming carbon dioxide and water vapor from the combustion of hydrocarbons releases heat that produces steam to run electric power plants and the energy to propel motor vehicles.¹¹ Without the production of carbon dioxide and water vapor from fossil fuel combustion, there would be no useful energy produced. The modern world would come to a standstill. Because carbon dioxide is one of the end products of burning fossil fuels, the only ways to prevent the harmful effects of CO₂ emissions are either not to use fossil fuels or to capture and sequester the CO₂ before it is released to the atmosphere.

How may EPA control carbon dioxide within the traditional scope of the CAA? Conventional pollutants have been regulated by “command and control” measures since the Act was created. More recently, economic controls also have been utilized that usually involve an overall cap on emissions and an emissions trading system (cap-and-trade). If EPA is to regulate CO₂, it will be difficult to develop a viable program using the CAA’s traditional command and control approach. For six common pollutants, called criteria pollutants, EPA sets national ambient air quality standards (NAAQS).¹² Five of the six criteria pollutants are released or formed primarily from the combustion of fossil fuel. Each state creates its state implementation plan (SIP) to control emissions from various sources in order to reach the ambient levels of pollution set out in the applicable NAAQS.¹³ This is supplemented by technology-based requirements imposed on various sources in order to reduce emissions.¹⁴ Section 126 of the CAA provides EPA additional authority to prevent major sources from releasing air pollution that may significantly contribute to levels of air pollution in excess of NAAQS in another state.¹⁵ Interstate air pollution transport also may be controlled by EPA using section 110(k)(5) of the CAA.¹⁶ A SIP revision

¹⁰ ARNOLD W. REITZE, JR., AIR POLLUTION CONTROL LAW: COMPLIANCE & ENFORCEMENT 411 (2001).

¹¹ The total heat (enthalpy) given off (or absorbed) by a reaction is the difference between total heat content of the reactants and the heat content of the products. CHARLES E. MORTIMER, CHEMISTRY: A CONCEPTUAL APPROACH 169, 175 (4th ed. 1979).

¹² Clean Air Act § 109(a)(1), 42 U.S.C. § 7409(a)(1) (2000); 40 C.F.R. pt. 50 (2008).

¹³ § 110(a)(1), 42 U.S.C. § 7410(a)(1).

¹⁴ See § 169(3), 42 U.S.C. § 7479(3).

¹⁵ See *New York v. EPA*, 852 F.2d 574, 577–78 (D.C. Cir. 1988); see also 40 C.F.R. pt. 97 (2007) (SIP call regulations).

¹⁶ 42 U.S.C. § 7410(k)(5).

may be required if a plan does not adequately deal with air pollution being transported to a downwind state.

Carbon dioxide cannot be controlled effectively using the SIP process because atmospheric concentrations of CO₂ essentially are the same everywhere in the world.¹⁷ Moreover, control based on the CAA is limited by the fact that the United States contributes only about twenty-two percent of the world's anthropogenic GHG releases.¹⁸

Under section 108(a) of the CAA, the Administrator shall list air pollutants "which may reasonably be anticipated to endanger public health or welfare."¹⁹ After listing a pollutant the Administrator "shall publish" a proposed primary and secondary air-quality standard.²⁰ Primary standards are to protect public health; secondary standards are to protect public welfare.²¹ No existing criteria pollutant has been designated solely for its impact on public welfare. It is not clear from the wording of section 109 of the CAA that the Administrator could promulgate a criteria pollutant standard for a pollutant that adversely affected human welfare but did not adversely affect public health, and CO₂ does not adversely affect human health at the concentrations found in the atmosphere.²²

If EPA adopted a criteria pollutant approach to control CO₂, it would have to set atmospheric numerical standards that were either above or below present values. If CO₂ standards are set below present CO₂ atmospheric concentration, the entire country would have a non-attainment status with no realistic expectation that any measure taken as part of a SIP would lead to attainment of the standard.²³ If a NAAQS value above the present CO₂ atmospheric concentration was selected, the entire nation would be in attainment, and significant effort to reduce CO₂ would not be needed. Compliance with the prevention of significant deterioration program (PSD) would be the major applicable

¹⁷ There are small variations in the northern and southern hemisphere of about two ppm because approximately 95% of fossil fuel is combusted in the northern hemisphere. JOHN HOUGHTON, *GLOBAL WARMING: THE COMPLETE BRIEFING* 27 (2d ed. 1997).

¹⁸ ENERGY INFO. ADMIN., U.S. DEPT. OF ENERGY, *EMISSIONS OF GREENHOUSE GASES IN THE UNITED STATES 2006*, at 6 (2007), available at <ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggip/057306.pdf>.

¹⁹ § 108(a)(1)(A), 42 U.S.C. § 7408(a)(1)(A).

²⁰ § 109(a)(2), 42 U.S.C. § 7409(a)(2).

²¹ 42 U.S.C. § 7409(b)(1)–(2).

²² BENJAMIN DEANGELO ET AL., U.S. ENVTL. PROT. AGENCY, *TECHNICAL SUPPORT DOCUMENT FOR ENDANGERMENT ANALYSIS FOR GREENHOUSE GAS EMISSIONS UNDER THE CLEAN AIR ACT: SIXTH ORDER DRAFT ES-1* (2008).

²³ *Regulating Greenhouse Gas Emissions Under the Clean Air Act*, 73 Fed. Reg. 44,354, 44,367 (July 30, 2008).

requirement.²⁴ Sources could be forced to comply with the expensive and time-consuming new source review (NSR) process even if there is no effective technology to control carbon dioxide. Industry is concerned that the 100/250 ton per year of any pollutant that is the threshold for triggering the PSD program under section 169(1) and the 100 ton per year or less threshold for nonattainment areas under section 302(j) and sections 181 through 187 will result in the CAA's NSR program applying to millions of carbon dioxide sources.

A gallon of gasoline when combusted combines with oxygen in the air to produce about twenty pounds of carbon dioxide.²⁵ Therefore, the PSD threshold may be triggered by using about 10,000 gallons of fuel a year; in a nonattainment area it can take less combusted fuel to trigger the program's applicability.²⁶ Some people in industry would like to see EPA increase the 100-ton threshold, but it is not clear how the Agency could legally change a statutory requirement. Another approach would be to create a significant level test for CO₂ that would remove most sources from the need to comply with NSR. Carbon monoxide (CO) has a significance level of 100 tons per year.²⁷ However, to reduce the number of CO₂ sources needing regulation to a manageable level would require the significance threshold to be set at a number approaching 1000 tons per year. Whether the courts would approve such a regulatory fix is unknown. If the existing 100/250 ton threshold for determining what is a major source is not modified for CO₂ sources, the regulatory burden on permitting agencies will be overwhelming.

EPA could regulate CO₂ based on the new source performance standard (NSPS) provision found in section 111 of the CAA, which has no emissions threshold.²⁸ Therefore, almost all changes to existing facilities potentially could trigger NSPS applicability, although the absence of cost-effective control technology would hamper the use of this section. In addition, unlike other sections of the CAA, section 111(b)(1)(A) requires an air pollutant to "significantly" contribute to endangerment of public health or welfare.²⁹ It is not clear how much discretion the term "significantly" provides to EPA. Because section

²⁴ §§ 160–169B, 42 U.S.C. §§ 7470–7492.

²⁵ U.S. ENVTL. PROT. AGENCY, GREEN VEHICLE GUIDE—ABOUT THE RATINGS, <http://www.epa.gov/greenvehicles/Aboutratings.do> (last visited Jan. 16, 2009).

²⁶ See 42 U.S.C. § 7473.

²⁷ 40 C.F.R. § 51.165(a)(1)(x)(A) (2007).

²⁸ § 111, 42 U.S.C. § 7411.

²⁹ 42 U.S.C. § 7411(b)(1)(A).

111(b)(1)(B) requires EPA to review NSPS every eight years,³⁰ environmental advocates are expected to continue to pressure EPA to impose CO₂ controls in any new NSPS regulations. The Agency promulgated a final NSPS for refineries on April 28, 2008, but the rule does not regulate CO₂.³¹ EPA rejected consideration of GHG limits in a proposed NSPS for Portland cement facilities on May 30, 2008,³² and did not regulate GHGs in the NSPS for petroleum refineries that was published June 24, 2008.³³ The Agency is scheduled to propose other NSPSs. If EPA decides not to regulate GHGs, litigation is likely.³⁴ It also has been suggested that EPA regulate CO₂ emitted by existing sources using its section 111(d) authority, but this would not appear to provide any relief from the problems already discussed. If EPA designates CO₂ as either a criteria pollutant or a hazardous air pollutant (HAP) it cannot be regulated under section 111(d).³⁵

The CAA regulates HAPs that produce adverse health or environmental effects by limiting emissions using technology-based requirements pursuant to section 112.³⁶ Section 112(b)(1) lists 189 hazardous pollutants for potential regulation; CO₂ is not on the list.³⁷ EPA can add or subtract substances from section 112's list.³⁸ A substance is considered to be a hazardous pollutant if it creates serious health risks at low concentrations.³⁹ But despite its universal presence, there are no known adverse health effects due to CO₂ exposure at the concentration levels found in the atmosphere.

Section 112(b)(2) requires the health effects to come from "inhalation or other routes of exposure" and then goes on to list effects such as carcinogenicity.⁴⁰ These health effects are all the result of direct exposure. Any health effects from climate change, whether or not caused by increases in atmospheric CO₂ concentrations, are indirect effects, such

³⁰ *Id.* § 7411(b)(1)(B).

³¹ Proposed regulations were promulgated at 72 Fed. Reg. 27,177 (May 14, 2007).

³² *EPA Defers to ANPR in Opting Against Climate Controls for Cement NSPS*, 19 Clean Air Rep. (Inside Wash. Publishers, Washington, D.C.) No. 12, (June 12, 2008), available at 2008 WLNR 10985755.

³³ Standards of Performance for Petroleum Refineries, 73 Fed. Reg. 35,838 (June 24, 2008) (to be codified at 40 C.F.R. pt. 60).

³⁴ Steven D. Cook, *Agency to Confront Greenhouse Gas Controls as Litigation, Probes, Rule-makings Loom*, 39 Env't Rep. (BNA) No. 156 (Jan. 18, 2008).

³⁵ 42 U.S.C. § 7411(d)(1).

³⁶ § 112, 42 U.S.C. § 7412.

³⁷ See 42 U.S.C. § 7412(b)(1).

³⁸ *Id.* § 7412(b)(2).

³⁹ See S. REP. NO. 101-228, at 160 (1990), reprinted in 1990 U.S.C.C.A.N. 3385, 3545.

⁴⁰ 42 U.S.C. § 7412(b)(2).

as diseases spread by insect populations that increase at higher temperatures. This differs from the direct harm caused by substances regulated pursuant to section 112. Furthermore, when section 112 discusses adverse environmental effects as a basis for regulating a substance, the language “whether through ambient concentrations, bioaccumulation, deposition, or otherwise,” indicates a concern for the direct harmful effects of a substance.⁴¹ While EPA is given some flexibility in making decisions on the “frontiers of scientific knowledge,” case law requires a rational basis for a decision to designate a pollutant as hazardous.⁴² There is not a rational basis for EPA to designate CO₂ as hazardous. None of the section 112 toxic pollutants are as ubiquitous in the environment as is CO₂. It is unreasonable to assume Congress overlooked listing a pollutant emitted in the U.S. in the amount of 5061.6 million metric tons in 1990, when the CAA amendments were enacted.⁴³

The HAP control program primarily regulates major stationary sources, which are defined as sources of emissions of ten tons per year of a HAP or twenty-five tons per year of multiple HAPs.⁴⁴ If CO₂ is designated a HAP, section 112’s requirements would be triggered by the emission of ten tons of CO₂ per year.⁴⁵ This threshold would be reached by burning about 1000 gallons of petroleum-based fuel and would make almost every home in America a hazardous emissions stationary source. Nearly every furnace in the country would require an operating permit. Administering such a program would be difficult and expensive with marginal benefits, but some people in industry consider the need for an operating permit to be less onerous than having to comply with NSR requirements. If section 112 is used to control CO₂ emissions, presumably the technology standard of maximum available control technology (MACT) would need to be established.⁴⁶ It will not be easy to accomplish this because no suitable control technology exists.

Another approach would be for EPA to claim CO₂ is primarily an interstate transport problem and regulate it at the federal level. This would be similar to the approach used to regulate SO₂ in subchapter

⁴¹ *Id.*

⁴² *Ethyl Corp. v. EPA*, 541 F.2d 1, 28, 33–34 (D.C. Cir. 1976) (lead standards).

⁴³ ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2005, at ES-5 tbl.ES-2 (2007) [hereinafter INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS], available at <http://www.epa.gov/climatechange/emissions/downloads06/07CR.pdf>.

⁴⁴ 42 U.S.C. § 7412(a)(1).

⁴⁵ *See id.*

⁴⁶ *Id.* § 7412(d).

IV-A of the CAA.⁴⁷ However, to comply with a CO₂ reduction program would mean rationing the use of fossil fuel energy.

If EPA makes an endangerment finding for CO₂ in response to the remand in *Massachusetts v. EPA*, it will have ramifications beyond the CAA, because other environmental laws have provisions similar to the language of the CAA. This could result in most environmental laws being required to regulate GHG emissions. A critical issue will be whether EPA limits any endangerment finding under the CAA to impacts on the environment or extends an endangerment finding to include health effects.⁴⁸ On June 26, 2008, the D.C. Circuit rejected a petition seeking mandamus to compel EPA to regulate GHG emissions from automobiles.⁴⁹ In an Advance Notice of Proposed Rulemaking published in the Federal Register on July 30, 2008, EPA effectively decided not to regulate GHG at that time and initiated a lengthy regulatory process, precluding a decision being made before the end of the Bush Administration.⁵⁰

A. Construction Permit Litigation

The CAA may not be an effective tool for regulating GHG emissions, but that has not prevented opponents of new carbon emission sources from litigating to prevent construction of facilities that will release carbon dioxide in large quantities for the next half-century or more. The new source review (NSR) program requires major proposed new or modified sources to obtain a construction permit.⁵¹ The NSR process includes a determination of the appropriate pollution control to be used by an applicant. In areas that meet national ambient air quality standards, called prevention of significant deterioration (PSD) areas, section 165(a)(4) of the CAA requires the use of best available control technology (BACT),⁵² which, as defined in section 169(3), requires the consideration of economic impacts and costs.⁵³ In nonat-

⁴⁷ See § 401, 42 U.S.C. § 7651.

⁴⁸ *EPA Mulls Narrow CO₂ Regulatory Finding To Avoid NAAQS Hurdles*, 18 Clean Air Rep. (Inside Wash. Publishers, Washington, D.C.) No. 20 (Oct. 4, 2007), available at 2007 WLNR 19359393.

⁴⁹ *EPA Need Not Rush Greenhouse Gas Ruling, D.C. Cir. Says*, 28 Env'tl. Lit. Reporter (Andrews) No. 26, at 1 (July 8, 2008), available at 28 No. 26 ANENVLR 1 (Westlaw).

⁵⁰ See *Regulating Greenhouse Gas Emissions Under the Clean Air Act*, 73 Fed. Reg. 44,354 (July 30, 2008).

⁵¹ § 172(c)(5), 42 U.S.C. § 7502(c)(5). For an overview of the NSR program, see Arnold W. Reitze, Jr., *New Source Review: Should It Survive?*, 34 Env'tl. L. Rep. (Env'tl. Law Inst.) 10,673 (July 2004).

⁵² § 165(a)(4), 42 U.S.C. § 7475(a)(4).

⁵³ § 169(3), 42 U.S.C. § 7479(3).

tainment areas, section 173(a)(2) requires technology to be used that meets the lowest achievable emission rate (LAER).⁵⁴ To determine what qualifies as BACT/LAER, EPA usually uses a “top-down” analysis. The primary guidance is EPA’s 1990 New Source Review Workshop Manual.⁵⁵ This requires considering process changes, fuels, add-on controls and any other available methods to obtain the maximum degree of emission reduction,⁵⁶ but there is no effective technology to control CO₂ that meets BACT/LAER requirements.

The PSD process is applicable to “each pollutant subject to regulation under this chapter emitted from, or which results from, such facility.”⁵⁷ In nonattainment areas, the NSR process applies to any pollutant that is subject to a new source performance standard.⁵⁸ NSPSs apply to any air pollutant as defined in section 302(g).⁵⁹ This may provide permitting authorities the discretion to impose more stringent requirements than otherwise would be imposed by the CAA. Moreover, states may impose more stringent standards pursuant to section 116.⁶⁰ All states have been delegated the authority to run their nonattainment NSR programs; most states have been delegated the authority to run their PSD programs.⁶¹

An issue of concern is whether pollutants that are not regulated, but could be regulated, are subject to Federal PSD/NSR requirements. If emissions offsets may be imposed on any air pollutant as part of the PSD/NSR review process, may issues involving climate change be addressed?⁶² EPA has taken the position that CO₂ is not yet regulated by the CAA, therefore, its impacts do not have to be considered as part of the NSR permit process.⁶³ This resulted in EPA granting a PSD permit

⁵⁴ § 173(a)(2), 42 U.S.C. § 7503(a)(2).

⁵⁵ See ENVTL. PROT. AGENCY, NEW SOURCE REVIEW WORKSHOP MANUAL: PREVENTION OF SIGNIFICANT DETERIORATION AND NONATTAINMENT AREA PERMITTING (1990), available at <http://www.epa.gov/ttn/nsr/gen/wkshpman.pdf>.

⁵⁶ *Id.* at B.1.

⁵⁷ 42 U.S.C. § 7475(a)(4).

⁵⁸ § 171(3), 42 U.S.C. § 7501(3).

⁵⁹ § 111(a)(3)–(4), 42 U.S.C. § 7411(a)(3)–(4).

⁶⁰ § 116, 42 U.S.C. § 7416.

⁶¹ See 40 C.F.R. §§ 51.165–51.166 (2008).

⁶² See generally *Sur Contra La Contaminación v. EPA*, 202 F.3d 443 (1st Cir. 2000); *Multitrade Ltd. P’ship*, 4 E.A.D. 24 (1992); *Old Dominion Elec. Coop.*, 3 E.A.D. 779 (1992) (examples of PSD/NSR review process).

⁶³ AIR & RADIATION PROGRAM, REGION 8, U.S. ENVTL. PROT. AGENCY, RESPONSE TO PUBLIC COMMENTS ON DRAFT AIR POLLUTION CONTROL: PREVENTION OF SIGNIFICANT DETERIORATION (PSD) PERMIT TO CONSTRUCT: PERMIT No. PSD-OU-0002-04.00, at 5–6 (2007), available at <http://www.epa.gov/region8/air/pdf/ResponseToComments.pdf>. *But*

on August 30, 2007 to the Deseret Power Electric Company's proposed new facility near Bonanza, Utah, despite its potential for increasing CO₂ emissions.⁶⁴ The granting of the permit was appealed by the Sierra Club to EPA's Environmental Appeals Board (EAB), which on November 13, 2008 remanded the permit to EPA's Region 8 to reconsider whether to impose CO₂ BACT limits and to develop an adequate record for its decision. The Board found that the Region wrongly believed its discretion was limited by historical Agency interpretation. The EAB suggested the Region consider whether the public and the Agency would benefit from having the phrase "subject to regulation under the Act" determined as an interpretation of nationwide scope rather than through this specific permitting proceeding.⁶⁵ On June 2, 2008, the EAB rejected a challenge to a refinery expansion project for tar sands processing in Illinois that did not include GHG controls.⁶⁶ The case, however, was a win for environmentalists because the EAB remanded the permit to the state to review emission limitations for conventional pollutants.⁶⁷

While EPA has resisted designating GHGs as subject to PSD/NSR, states deny construction permits based on climate change concerns. On October 18, 2007, the Kansas Department of Health and Environment denied an air permit for a proposed new coal-fired power plant saying it could consider the effect of unregulated pollutants if they present a substantial endangerment to public health or the environment.⁶⁸ On March 21, 2008, the governor of Kansas vetoed a bill that would have allowed the construction of two coal-fired generation units by the Sunflower Electric Power Corporation.⁶⁹ The bill was designed to over-

see Steel Dynamics, Inc., 9 E.A.D. 165, 189 n.29 (2000); Genesee Power Station, 4 E.A.D. 832, 848 (1993); N. County Res. Recovery Assocs., 2 E.A.D. 229, 230 (1986).

⁶⁴ AIR & RADIATION PROGRAM, U.S. ENVTL. PROT. AGENCY, FINAL AIR POLLUTION CONTROL PREVENTION OF SIGNIFICANT DETERIORATION (PSD) PERMIT TO CONSTRUCT: PSD-OU-0002-04.00, *available at* <http://www.epa.gov/region8/air/pdf/30Aug07WCFUDeseretFinalPSDPermit.pdf>.

⁶⁵ Petition for Review and Request for Oral Argument at 1, *In re* Deseret Power Elec. Coop., PSD Appeal No. 07-03 (E.A.B. Oct. 1, 2007), *available at* http://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/Dockets/PSD+07-03 (follow hyperlink #1).

⁶⁶ ConocoPhillips Co., PSD Appeal No. 07-02, slip op. at 49-50 (E.A.B. June 2, 2008).

⁶⁷ *Id.* at 51; *EAB Ruling May Bolster Activists' Bid to Target Tar Sands Refining*, 29 INSIDE EPA WEEKLY REP. (Inside Wash. Publishers, Washington, D.C.) No. 23, (June 12, 2008), *available at* FACTIVA, Doc. EPAW000020080605e4660000o.

⁶⁸ *See* KAN. DEP'T OF ENERGY & ENV'T, RESPONSIVENESS SUMMARY: SUNFLOWER ELECTRIC POWER CORPORATION HOLCOMB EXPANSION: AIR QUALITY CONSTRUCTION PERMIT APPLICATION 9, 14 (2007), *available at* http://www.kdheks.gov/download/KDHE_Response_to_Comments_10.17.07.pdf.

⁶⁹ Susanne Pagano, *Governor Vetoes Legislation to Allow Expansion of Coal-Fired Power Plant*, 39 Env't Rep. (BNA) 623 (Mar. 28, 2008).

turn the state environmental agency's decision to deny a construction permit because of the facility's carbon dioxide emissions.⁷⁰ A legislative effort to override the governor's veto failed.⁷¹

On February 26, 2007, environmentalists announced a nonbinding agreement that eight of eleven proposed coal-fired power plants in Texas would not be built as part of a TXU Energy buyout.⁷² The company also agreed to reduce their carbon dioxide emissions to 1990 levels and invest \$400 million in energy efficiency.⁷³ On March 19, 2007, a legally binding agreement between the Sierra Club and Kansas City Power and Light (KCPL) allowed a new 600-megawatt coal-fired electric power plant to be built in return for an agreement to offset its GHG emissions through energy efficiency measures and to build 400 megawatts of wind-generated electric power by 2012.⁷⁴ On February 28, 2007, the North Carolina Utility Commission approved one of two 800-megawatt facilities proposed by Duke Energy, but required the company to invest one percent of its revenues in energy efficiency and demand-side programs.⁷⁵

On April 30, 2008, the Iowa Utilities Board approved a construction permit for a predominately coal-fired power plant to be built by Interstate Power and Light Company.⁷⁶ As part of the permit, five percent of the plant's electric generation is to be fueled by biomass within two years and ten percent of the power is to be fueled by biomass in five years.⁷⁷ In addition, ten percent of the company's electric generation in Iowa is to be from renewable sources by 2013, rising to twenty-five percent by 2028.⁷⁸ In this fast-changing regulatory environment, the ability to obtain a construction permit and the offsets that may be required is uncertain.

⁷⁰ *Id.*

⁷¹ Christopher Brown, *State Legislature Fails to Override Veto of Bill Allowing Coal-Fired Project*, 39 *Env't Rep.* (BNA) 923 (May 9, 2008).

⁷² Andrew Ross Sorkin, *A \$45 Billion Buyout Deal with Many Shades of Green*, *N.Y. TIMES*, Feb. 26, 2007, at A19.

⁷³ *Id.*

⁷⁴ *Kansas Pact May Set New Floor for Resolving Coal Plant Disputes*, 28 *INSIDE EPA WEEKLY REP.* (Inside Wash. Publishers, Washington, D.C.) No. 15 (Apr. 5, 2007), available at FAC-TIVA, Doc. EPAW000020070412e34d0000d.

⁷⁵ *North Carolina Ruling Underscores Hurdles for New Coal Plants*, 28 *INSIDE EPA WEEKLY REP.* (Inside Wash. Publishers, Washington, D.C.) No. 9 (Mar. 8, 2007), available at FAC-TIVA, Doc. EPAW000020070301e3320000h.

⁷⁶ Mark Wolski, *State Regulators Approve Power Plant, Tell Utility to Supplement Coal with Biomass*, 39 *Env't Rep.* (BNA) 923 (May 9, 2008).

⁷⁷ *Id.*

⁷⁸ *Id.*

For NSR permits, section 173(a)(5) of the CAA provides that a permit may be issued only if “an analysis of alternative sites, sizes, production processes, and environmental control techniques” for the proposed source demonstrates that the benefits significantly outweigh the environmental and social costs that are imposed by construction or modification.⁷⁹ For a PSD permit, section 165(a)(2) requires consideration of the “air quality impact of such source, alternatives thereto, control technology requirements, and other appropriate considerations.”⁸⁰ The extent to which alternative analysis can be used to require an alternative be adopted is not clear, and this ambiguity can be expected to be used to challenge permit applications.⁸¹

Court decisions have held that BACT/LAER requirements cannot be used to force an applicant to redesign a proposed facility, for example by forcing a proposed coal-burning plant to use alternative energy, gas or nuclear power.⁸² On August 24, 2006, EAB ruled that EPA could not require the use of low sulfur coal at Peabody Energy’s proposed Prairie State facility in Illinois because it would redefine the basic design of the facility, which was planned as a mine-mouth facility that would burn high-sulfur Illinois coal.⁸³ Subsequently, in *Sierra Club v. EPA*, the Seventh Circuit ruled that EPA does not have to consider whether the applicant should use low-sulfur coal as a pollution control technology because such a requirement would require significant modifications of the plant.⁸⁴ This case is considered an important precedent for the principle that BACT review cannot be used to require a redesign of a proposed facility. However, in Georgia, a state court in *Friends of the Chattahoochee, Inc. v. Couch*, on June 30, 2008, decided an appeal from a state administrative law judge that awarded a

⁷⁹ Clean Air Act § 173(a)(5), 42 U.S.C. § 7503(a)(5) (2000).

⁸⁰ *Id.* § 165(a)(2).

⁸¹ Compare *In re Hibbing Taconite Co.*, 2 E.A.D. 838, 843 (1989), and *In re Pennsauken County, N.J. Res. Recovery Facility*, 2 E.A.D. 667, 673 (1988) (finding permit conditions did not “redefine the source”), with *In re Kendall New Century Dev.*, 11 E.A.D. 40, 52 n.14 (2003), and *In re Hillman Power Co.*, 10 E.A.D. 673, 691–92 (2002) (finding permit conditions did redefine the source). See generally Gregory B. Foote, *Considering Alternatives: The Case for Limiting CO₂ Emissions from New Power Plants Through New Source Review*, 34 *Envtl. L. Rep.* (Envtl. Law Inst.) 10,642 (July 2004).

⁸² *Sierra Club v. EPA*, 499 F.3d 653, 656–57 (7th Cir. 2007) (imposing requirement to use low sulfur coal from another location is not BACT for proposed mine-mouth power plant).

⁸³ *Prairie State Generating Co.*, PSD Appeal No. 05-05, slip op. at 36–37 (E.A.B. Aug. 24, 2006).

⁸⁴ See *Sierra Club*, 499 F.3d at 655.

construction permit to a coal-fired power plant.⁸⁵ The court remanded the case to the agency finding that CO₂ emissions are subject to BACT requirements.⁸⁶ Moreover, the 1977 amendments to the CAA require BACT analysis to consider innovative fuel combustion, and integrated gasification combined cycle (IGCC) is an innovative fuel combustion technique.⁸⁷ On June 30, 2008, environmentalists challenged a proposed power plant near Great Falls, Montana because of the failure of the state to require an analysis of BACT for carbon dioxide.⁸⁸

The extent to which old plants can be forced to comply with current standards remains an ongoing political and legal struggle. The PSD/NSR program applies to major facilities that are modified.⁸⁹ On April 2, 2007, the U.S. Supreme Court moved in the direction of supporting EPA's position when it ruled that, for new source review purposes, an increase in emissions means an annual increase, not an hourly increase.⁹⁰ Winning this case was important to those concerned with the effects of power plant emissions, but it was only one step in an effort to control old electric power plants. Environmentalists and states have started challenging operating permit renewals pursuant to subchapter V of the CAA in an effort to force existing electric utilities to control emissions.⁹¹ Environmental organizations also are using the operating permit requirements to enforce the provisions of existing operating permits.⁹² However, they have had more success at preventing new facilities from being constructed than in controlling existing facilities.

B. Mobile Source Control

The 1970 CAA Amendments created the mobile source program in use today.⁹³ Exhaust emissions of hydrocarbons, carbon monoxide,

⁸⁵ No. 2008CV146398, at 1 (Ga. Sup. Ct. Fulton County, June 30, 2008), *available at* <http://alt.coxnewsweb.com/ajc/pdf/judgemoore.pdf>.

⁸⁶ *Id.* at 9.

⁸⁷ *Id.* at 14.

⁸⁸ Sherry Jones, *Environmental Advocates File Lawsuit Urging State to Regulate Carbon Dioxide*, 39 Env't Rep. (BNA) 1412 (July 11, 2008) (referring to *Mont. Env'tl. Info. Ctr. v. Mont. Dept. of Env'tl. Quality*, No. DVV-08-820 (Mont. 8th Jud. Dist. Ct., filed June 30, 2008)).

⁸⁹ Clean Air Act §§ 169(2)(C), 171(4), 42 U.S.C. §§ 7479(2)(C), 7501(4) (2000).

⁹⁰ *Env'tl. Def. v. Duke Energy Co.*, 549 U.S. 561, 578–79 (2007).

⁹¹ *Compare Nat'l Parks Conservation Ass'n v. Tenn. Valley Auth.*, 502 F.3d 1316 (11th Cir. 2007) (ruling in favor of TVA), *with Nat'l Parks Conservation Ass'n v. Tenn. Valley Auth.*, 480 F.3d 410 (6th Cir. 2007) (ruling against TVA).

⁹² *See, e.g., N.Y. Pub. Interest Research Group v. Johnson*, 427 F.3d 172, 180 (2d Cir. 2005).

⁹³ Clean Air Act Amendments of 1970, Pub. L. No. 91-604, § 6, 84 Stat. 1676, 1690.

and nitrogen oxides were to be reduced through the program found in section 202(b).⁹⁴ From 1970 to 1990, the numerical values for emissions from light-duty vehicles (LDVs) and light-duty trucks (LDTs) became more stringent, and more mobile sources became subject to control, but this program to control mobile sources did not significantly change. EPA's practice for the past thirty years has been to implement the pollutant-specific provisions of subchapter II, but it never regulated any other mobile source pollutant.

Heavy-duty vehicles (HDVs) manufactured after 1983 are subject to section 202(a)(3)(A) of the CAA, which regulates emissions of hydrocarbons, carbon monoxide, nitrogen oxides, and particulate matter.⁹⁵ Standards for HDVs under section 202 are to "reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year to which such standards apply, giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology."⁹⁶ Changes to heavy-duty truck standards are limited to standards promulgated under the CAA prior to the CAA Amendments of 1990, except for nitrogen oxides from model year 1998 and thereafter heavy-duty trucks.⁹⁷ Since GHGs, including CO₂, were not regulated prior to 1990, the language of section 202 appears to preclude their regulation from heavy-duty vehicles.

Section 202(a)(1) of the CAA grants the Administrator of EPA the power to regulate "any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare," but that power is restricted by section 202(a)(3)'s provision for heavy-duty trucks.⁹⁸ Air pollutant is defined in section

⁹⁴ FRANK P. GRAD et al., *THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT* 119 tbl.4-3, 335 (1975).

⁹⁵ Clean Air Act § 202(a)(3)(A), 42 U.S.C. § 7521(a)(3)(A) (2000).

⁹⁶ *Id.* § 202(a)(3)(A)(i).

⁹⁷ *Id.* § 202(a)(3)(B).

⁹⁸ *Id.* § 202(a)(1), (3). The origin of EPA's authority in § 202 of the CAA appears to be § 202(a)(1) of S. 4358, which was introduced in the 91st Cong., 2d Sess. by Senator Byrd (D-W.Va.) for Senator Muskie (D-Me.) on September 17, 1970. Section 202(b) included specific emission reduction requirements for pollutants regulated prior to 1970, including a ninety percent emission reduction from MY1970 vehicles by MY1975. Clean Air Act Amendments of 1970, Pub. L. 91-604, § 6, 84 Stat. 1676, 1690. A Senate Report prepared to accompany the National Air Quality Standards Act of 1970 explains that subsection (b) was to regulate carbon monoxide, hydrocarbons and nitrogen oxides. S. REP. NO. 91-1196, at 425 (1970). It stated that § 202(a) would regulate particulate matter because such standards could not be established under § 202(b) due to the lack of measurement tech-

302(g).⁹⁹ Sections 202(a)(1) and (2) were added by the Clean Air Act Amendments of 1970.¹⁰⁰ The clause “which in his judgment causes or contributes to, or is likely to cause or to contribute to, air pollution which endangers the public health or welfare;”¹⁰¹ found in the 1970 Amendments was changed in 1977 to “which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.”¹⁰² The remainder of sections 202(a)(1) and (2) has not been changed since 1970. Because the “endangerment” language also appears in section 211(c) (regulating fuels and fuel additives), section 213 (regulating non-road engines), and in section 213 (regulating aircraft), the Supreme Court’s decision in *Massachusetts v. EPA* has the potential to affect most of the CAA’s subchapter II mobile source program.

Welfare is defined in section 302(h) to include effects on climate.¹⁰³ If GHGs endanger health or welfare they can be regulated after giving vehicle manufacturers the time to develop and apply the requisite technology and after giving appropriate consideration to costs.¹⁰⁴ Thus, it appears that for a GHG to be regulated, there must be findings that: (1) it is a pollutant; (2) it endangers public health or welfare; (3) there is an appropriate control technology; (4) the technology is cost effective; and (5) appropriate time is provided to apply the technology. While the Supreme Court has ruled that GHGs are air pollutants, the requirements imposed by the other four tests have not yet been the subject of EPA guidance.

The major problem in meeting section 202(a)(2)’s requirements is that there is no technology to control CO₂ emissions.

II. WHAT SHOULD BE DONE?

For EPA to attempt to develop a response to climate change based on the CAA would be unwise. However, if *Massachusetts v. EPA* spurs

niques. *Id.* at 424. Measurement methods were to be developed, at which time particulate standards were to be established by the Secretary under § 202(a). *Id.* Accordingly, the legislative history indicates that the intent of section 202(a) was to prevent the delay of emission controls by allowing hydrocarbons, carbon monoxide, and nitrogen oxides to be controlled immediately, with particulates to be regulated using § 202(a) as soon as technology to measure particulates improved. *Id.*

⁹⁹ Clean Air Act § 302(g).

¹⁰⁰ *Id.* § 201(a)(1)–(2), 84 Stat. at 1690.

¹⁰¹ *Id.* § 201(a)(1).

¹⁰² *Id.* § 202(a)(1).

¹⁰³ *Id.* § 302(h).

¹⁰⁴ *Id.* § 202(a)(2).

Congress to develop a rational climate change and energy policy, the Court's decision will have achieved a desirable outcome. An appropriate response to climate change requires balancing scientific uncertainty against costs, including mitigation costs, and the costs of delayed response. Moreover, the costs of reducing both U.S. and global GHG emissions will depend on future population size, economic growth, technology development and use, and the mix and quantity of fossil fuels combusted. These factors may be influenced but are not subject to control by the United States. Moreover, costs and benefits of climate change mitigation are not incurred by the same people. Since CO₂ emissions will remain in the atmosphere for a century or more, present expenditures to control emissions will benefit generations not yet born. Because benefits occur in the future but costs will be incurred in the near term, a benefit/cost analysis will be extremely sensitive to the discount rate selected.¹⁰⁵ Put another way, utilizing traditional economic analysis, it is difficult to justify present expenditures that require a long time to achieve benefits.¹⁰⁶ Furthermore, most knowledgeable people do not believe that global warming can be prevented, but if we act appropriately we may be able to reduce some of its adverse consequences.

The costs of responding effectively to reduce GHG emissions will be high, but the costs of not responding could be even higher. The costs increase if a sudden, catastrophic, large-scale, irreversible change in the planet is considered a threat that requires an immediate response, such as the shutdown of the oceanic heat conveyor or the collapse of the West Antarctic ice sheet.¹⁰⁷ Most of the cataclysmic disasters identified by scientists are predictions based on computer analysis. But when real world evidence is available, it may be too late to effectively respond.¹⁰⁸ If uncertainties exist, who should bear the burden of proof, those who advocate business as usual or those who advocate GHG reductions? A noted scholar has written "catastrophic risks deserve some kind of precautionary principle."¹⁰⁹ But efforts to avert catastrophic harm should not be used if they give rise to other risks of catastrophic

¹⁰⁵ For more in-depth coverage of this issue, see Daniel A. Farber, *From Here to Eternity: Environmental Law and Future Generations*, 2003 U. ILL. L. REV. 289.

¹⁰⁶ See CONG. BUDGET OFFICE, UNCERTAINTY IN ANALYZING CLIMATE CHANGE: POLICY IMPLICATIONS, at vii (2005), available at <http://www.cbo.gov/ftpdocs/60xx/doc6061/01-24-ClimateChange.pdf>.

¹⁰⁷ WILLIAM K. STEVENS, *THE CHANGE IN THE WEATHER* 285 (1999).

¹⁰⁸ For a discussion of abrupt climate change, see CONG. BUDGET OFFICE, *supra* note 106.

¹⁰⁹ Cass R. Sunstein, *Irreversible and Catastrophic: Global Warming, Terrorism, and Other Problems*, 23 PACE ENVTL. L. REV. 3, 16–17 (2005–2006).

harm. “[E]ven for the Catastrophic Harm Precautionary Principle, the cost matters.”¹¹⁰ This advice is worth pondering because climate change involves high risks and high response costs.

In the United States in 2005, 83.9% of the GHGs released from human sources were CO₂, and 94.44% of the CO₂ emissions were from fossil fuel combustion.¹¹¹ A program to deal with climate change needs to focus on fossil fuel use and be tailored to the various sectors of the economy. Electric power plants, for example, depend heavily on coal for fuel. Coal combustion not only is responsible for CO₂ emissions, but also produces conventional air pollutants that have adverse health and ecosystem effects. Nearly all motor vehicles are petroleum fueled. In 2005, about forty-one percent of the CO₂ from fossil fuel combustion was released from electric power plants and thirty-three percent came from the transportation sector.¹¹² With these two sources accounting for seventy-four percent of the releases, they are the obvious targets for control efforts.

The first step to control CO₂ emissions should be to create an accurate emissions inventory that is publicly disclosed in a useful form such as facility specific, company wide, and source category aggregation of data. The Energy Policy Act of 1992, section 1605(b), requires the tracking of GHG emissions, but it has weak reporting standards, no verification, and no penalties for companies that do not report their data.¹¹³ This lack of accurate data makes it very difficult to have baseline protection for companies that take steps to reduce their GHG emissions. The voluntary reporting program permits three different types of reporting: (1) “[p]roject-level reporting, defined as the reporting of the emission reductions or carbon sequestration achieved as a result of a specific action or group of actions”; (2) “[e]ntity-level reporting, defined as the reporting of emissions, emission reductions, and carbon sequestration for an entire organization, usually defined as a corporation”; and (3) “[c]ommitment reporting, defined as the reporting of pledges to take action to reduce emissions in the future.”¹¹⁴ At present, electric generators are the primary sources reporting CO₂

¹¹⁰ *Id.* at 17.

¹¹¹ INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS, *supra* note 43, at ES-4, ES-5, tbl.ES-2.

¹¹² *Id.* at ES-7, ES-8.

¹¹³ See 42 U.S.C. § 13385(b) (2000).

¹¹⁴ U.S. ENERGY INFO. ADMIN., REPORT NO. DOE/EIA-0608 (2005/S): VOLUNTARY REPORTING OF GREENHOUSE GASES 2005 4 (2006), available at [http://www.eia.doe.gov/oiaf/1605/vrrpt/summary/pdf/0608\(2005-s\).pdf](http://www.eia.doe.gov/oiaf/1605/vrrpt/summary/pdf/0608(2005-s).pdf).

emission data and their data is not readily available in a useful form.¹¹⁵ The FY2008 omnibus spending bill enacted on December 26, 2007 requires EPA to finalize an economy-wide GHG registry within eighteen months that is expected to be integrated into the CAA's section 412 reporting program.¹¹⁶ The bill instructed EPA to adopt the quality controls mandated by the Regional Greenhouse Gas Initiative (RGGI) that is applicable to electric power plants in the Northeastern states.¹¹⁷ Congress appropriated \$3.5 million for EPA to develop and publish a rule for mandatory reporting of GHG emissions.¹¹⁸ It is unclear what will happen to DOE's section 1605(b) registry. However, in the FY2009 budget the Bush Administration eliminated funding for development of regulations by EPA for mandatory GHG emissions reporting.¹¹⁹

EPA, however, is moving forward. The Agency has developed an "Emissions & Generation Resource Integrated Database (eGRID)" that is a comprehensive inventory of environmental data on electric power systems that is based on information supplied to EPA, the Energy Information Administration (EIA), and the Federal Energy Regulatory Commission (FERC). Emissions data is integrated with generation data from EIA to produce useful information for policy making.¹²⁰ EPA's responsibilities concerning GHG reporting were expanded by the Consolidated Appropriation Act of 2008, which requires implementation regulations to be promulgated by the Agency.¹²¹

To stabilize atmospheric concentrations of CO₂ at even twice the pre-industrial level will be very difficult in the context of a growing world population and a growing demand for useable energy. To achieve stabilization will require that growth in primary power consumption come from non-CO₂-emitting sources. These include renewable sources (solar, wind, hydroelectric, biofuels), nuclear, geothermal, and fossil fuel combustion if it includes carbon capture and sequestration. A transition to a low-carbon economy could take half a century

¹¹⁵ *See id.*

¹¹⁶ Dawn Reeves, *FY08 Spending Bill Requires EPA to Craft Rigorous GHG Registry*, 29 INSIDE EPA WEEKLY REP. (Inside Wash. Publishers, Washington, D.C.) No. 1 (Jan. 4, 2008).

¹¹⁷ *Id.*

¹¹⁸ *Id.* The Western Climate Initiative has a 39 state voluntary GHG registry. The Climate Registry: List of Board Members, <http://theclimateregistry.org/memberlist.html> (last visited Jan. 13, 2009).

¹¹⁹ Dean Scott, *EPA Begins Rule on Greenhouse Gas Registry; Will Avoid Duplicative Reporting*, *Official Says*, 26 Daily Env't Rep. (BNA) A-11 (Feb. 8, 2008).

¹²⁰ U.S. ENVTL. PROT. AGENCY, EGRID FAQ, <http://www.epa.gov/cleanenergy/energy-resources/egrid/faq.html> (last visited Jan. 16, 2009).

¹²¹ H.R. 2764, Pub. L. No. 110-161 (Dec. 26, 2007).

and will be expensive. However, a low-carbon society may be healthier and more economically competitive. More than 2500 economists, including eight Nobel Prize winners, have stated that “[GHG] emissions can be cut ‘without harming American living standards.’”¹²² No single technology will provide a “silver bullet” solution to global warming; a long-term strategy needs to evolve using many approaches. In the short-term, however, energy conservation measures may provide the best opportunity for meaningful reductions in CO₂ emissions. To develop alternative energy sources and to encourage conservation requires that energy costs remain high or higher than they were in the summer of 2008. If energy costs are allowed to drop, those who invest in a low-carbon energy future may lose their investment, and attracting capital for a post-carbon economy will be difficult.

A. *Taxing Fossil Fuels*

The Congressional Budget Office (CBO) evaluated the pervasive uncertainty concerning both the risks from climate change and the uncertainty concerning the costs and effectiveness of the three options for limiting climate change effects: “research and development, mitigation of [GHGs], and adaptation to a warmer climate.”¹²³ It concluded the best policy is to select responses likely to minimize the costs of choosing an inappropriate level of control.¹²⁴ The CBO advocates price controls rather than emission caps in order to control costs.¹²⁵ If prices are set at a level close to the projected benefits of a measure, the risk to the economy is minimized. However, choosing the appropriate level of costs that should be incurred today to obtain benefits many years in the future is difficult. If standard economic evaluation approaches to discounting are used, benefits that are obtained a hundred years from now have almost no present value. Benefits also are keenly influenced by the values assigned to ecosystem protection, which are not easy to quantify. Imposing caps on emissions is a questionable policy choice when there is no known threshold for significant damage; price-based controls are the better way to proceed. Prices can be increased over

¹²² Gregg Easterbrook, *Greenhouse Common Sense*, U.S. NEWS & WORLD REP., Dec. 1, 1997, at 58, 58.

¹²³ See CONG. BUDGET OFFICE, *supra* note 106, at preface.

¹²⁴ *Id.* at xi.

¹²⁵ *Id.* at 27–28; see also CONG. BUDGET OFFICE, *THE ECONOMIC COSTS OF FUEL ECONOMY STANDARDS VERSUS A GASOLINE TAX* 22–23 (2003).

time, if necessary, when better information concerning costs and benefits is obtained.¹²⁶

Various energy taxes have been proposed to discourage the use of fossil fuels, including taxes on gasoline, oil imports, carbon, or the energy content of a fuel (Btu tax).¹²⁷ A carbon tax would tax fossil fuels based on their carbon content, which determines the amount of carbon dioxide that will be emitted when the fuel is burned.¹²⁸ Not all fossil fuels produce the same quantity of CO₂ per molecule of fuel combusted. The heat value comes from the formation of CO₂ and water after breaking the hydrogen bonds of the fuel. Thus, the more hydrogen atoms for each carbon atom in a molecule of fuel, the greater the energy that can be extracted from the fuel per molecule of CO₂ created.

Coal is a mixture of various chemicals. A typical coal molecule is C₁₃H₁₀O. Gasoline also is a mixture of hydrocarbons. Indoline is a common fuel and is expressed as C₇H₁₃. Natural gas is a mixture that may contain ethane (CH₃CH₃), propane (CH₃ CH₂ CH₃), butane (CH₃ CH₂ CH₂ CH₃) or other similar gases. The ratio of carbon to hydrogen bonds is about thirteen to ten for coal, seven to thirteen for gasoline, and two to five for butane. Because coal has fewer hydrogen atoms per carbon atom than oil or natural gas, it produces more carbon dioxide per Btu than the other fossil fuels. Because the carbon to hydrogen ratio varies among fuels, a carbon tax should be imposed on natural gas, petroleum and coal in a ratio of approximately 0.6, 0.8 and 1 per Btu respectively. This means that a carbon tax would impact those who use coal far more than users of petroleum or natural gas. To produce a kilowatt hour of electricity results, on average, in emission of 0.57 lbs of carbon from coal, 0.54 lbs of carbon from petroleum, and 0.36 pounds of carbon from natural gas.¹²⁹ The carbon from any fuel reacts with

¹²⁶ CONG. BUDGET OFFICE, *supra* note 106, at 31–32.

¹²⁷ See DOUGLAS COGAN, *THE GREENHOUSE GAMBIT: BUSINESS AND INVESTMENT RESOURCES TO CLIMATE CHANGE* (1992) and James Hartnett, *National Energy Policy: Its History and the Need for an Increased Gasoline Tax*, 28 CAL. W. L. REV. 81 (1991–1992) for discussions of techniques to use market-based pricing and trading schemes to reduce carbon emissions.

¹²⁸ Amy C. Christian, *Designing a Carbon Tax: The Introduction of the Carbon-Burned Tax (CBT)*, 10 UCLA J. ENVTL. L. & POL'Y 221, 232 (1992).

¹²⁹ DEP'T OF ENERGY & EPA, *CARBON DIOXIDE EMISSIONS FROM THE GENERATION OF ELECTRIC POWER IN THE UNITED STATES* 4 tbl.4 (2000), available at http://www.eia.doe.gov/cneaf/electricity/page/co2_report/co2emiss.pdf (based on carbon dioxide figures in the DOE report being divided by 44/12, which is the atomic weight of carbon dioxide divided by the atomic weight of carbon).

oxygen in the air in a three to eight ratio by weight.¹³⁰ Thus, for example, burning a gallon of gasoline weighing 6.32 pounds will release 5.47 pounds of carbon, which will combine with oxygen to create a little over twenty pounds of CO₂.

In the United States we tax labor and savings, which are activities that we should seek to encourage. Taxes should be imposed on activities we wish to discourage, such as pollution and fossil energy use. The impact that carbon taxes would have on the national economy depends primarily on how the revenues from the tax are used, and what other taxes are affected. Taxes on GHGs could be developed that are revenue neutral. The best approach would be to return the money collected equally to every citizen. Those who purchased less than the average amount of energy would benefit financially. Ultimately, the economic and environmental benefits of a pollution tax are determined by how it is designed and implemented.¹³¹ An ideal tax would be set at the lowest amount that modifies behavior but that does not have an unacceptable adverse impact on those subject to the tax.¹³² This may not be possible to accomplish.

A carbon tax has advantages and disadvantages, but its advantages make this approach a useful policy choice.¹³³ It would promote fuel efficiency, provide a wide variety of opportunities for energy conservation, and be “resilient and equitable” because its impacts would be diffuse, thus easing the burdens on sensitive sectors of the economy such as the automobile and farming industries.¹³⁴ A carbon tax would be less regressive than other energy taxes, such as a gasoline tax, because the “wealthy consume a greater share of electricity and ‘intermediate energy’ from manufactured goods than gasoline.”¹³⁵ A tax on coal, petroleum and natural gas would be shared more equally and generate the same revenue as a much larger gasoline tax. The disadvantage of a carbon tax would be its disproportionate effect on the coal industry and

¹³⁰ Carbon with an atomic weight of 12 reacts with two atoms of oxygen, each having an atomic weight of 15.9994. This results in a carbon to oxygen ratio of 12 to 32 or 3 to 8.

¹³¹ U.S. GEN. ACCOUNTING OFFICE, REP. NO. GAO/RCED-93-13, ENVIRONMENTAL PROTECTION: IMPLICATIONS OF USING POLLUTION TAXES TO SUPPLEMENT REGULATION 3 (1993).

¹³² See Christian, *supra* note 128, at 278–79; Douglas A. Kysar, *Climate Change, Cultural Transformation, and Comprehensive Rationality*, 31 B.C. ENVTL. AFF. L. REV. 555, 561 (2004).

¹³³ Roberta Mann, *Waiting to Exhale?: Global Warming and Tax Policy*, 51 AM. U. L. REV. 1135, 1220–21 (2002); Zhong Xiang Zhang & Andrea Baranzini, *What Do We Know About Carbon Taxes? An Inquiry into Their Impacts on Competitiveness and Distribution of Income*, 32 ENERGY POL’Y 507, 508–09 (2004).

¹³⁴ Charles Komanoff, Op-Ed., *Instead of a Gas Tax, How About a Carbon Tax?*, WASH. POST, Mar. 6, 1989, at A15.

¹³⁵ *Id.*

their customers because coal contains more carbon than other fossil fuels of equal heat values.¹³⁶ Coal is produced domestically, and reducing its use would adversely impact the U.S. economy.

A gasoline tax imposes a direct tax on each gallon of this fuel. Such a tax could be used to reduce vehicle miles traveled (VMT) and raise revenue by making automobile travel more expensive. Each additional penny per gallon in taxes generates about one billion dollars per year in revenue.¹³⁷ However, if VMT decreases, so will the revenue raised by a gasoline tax. A gasoline tax has several advantages. To the extent that VMT is reduced, carbon dioxide and other vehicle emissions would be lowered. A gasoline tax would help reduce U.S. dependency on foreign oil. It also would help compensate for costs that the price of energy currently does not reflect, including the costs associated with pollution, congestion, and the national security costs necessary to assure our petroleum supply.¹³⁸ One estimate is that the direct costs of military protection for Middle Eastern petroleum supplies from 1993 to 2003 was \$49 billion a year, and this does not include the cost of two wars in Iraq.¹³⁹

A gasoline tax has several disadvantages. It may be regressive and it may impact certain elements of the economy and regions of the country more than others. It has the potential to cripple sensitive industries like auto manufacturing, and it ignores other energy sources, such as coal, which contribute more CO₂, as well as other pollutants, on a per-Btu basis. Moreover, because of the “relative price inelasticity” of gasoline demand, the size of the tax increase necessary to significantly reduce gasoline consumption may have a damaging effect on the economy.¹⁴⁰

Gasoline or other liquid fuel taxes obviously would affect the petroleum industry and transportation sector, especially the trucking and airline industries. Carbon taxes would impact all fossil-fuel energy sources but would affect the coal industry and its customers more than industries that use other fuels. Industries most affected by a broad energy-based tax include electric power generators, steel, petrochemical,

¹³⁶ *See id.*

¹³⁷ *Id.*

¹³⁸ Robert J. Samuelson, Op-Ed., *Conserve Energy—Tax It*, WASH. POST, Jan. 24, 1991, at A21.

¹³⁹ Thomas Prugh, Christopher Flavin & Janet L. Sawin, *Changing the Oil Economy*, in STATE OF THE WORLD 2005: REDEFINING GLOBAL SECURITY 100, 109 (Worldwatch Inst. ed., 2005).

¹⁴⁰ BRENT D. YACOBUCCI & ROBERT BAMBERGER, CONG. RESEARCH SERV., AUTOMOBILE AND LIGHT TRUCK FUEL ECONOMY: THE CAFE STANDARDS, at CRS-12 (May 7, 2008), available at <http://www.cnrc.org/NLE/CRSreports/08Jun/RL33413.pdf>.

and some aluminum producers. Industry generally opposed energy taxes in the 1990s,¹⁴¹ but some members of the automobile industry advocated a gasoline tax as a substitute for regulatory controls based on Corporate Average Fuel Economy (CAFE) standards.¹⁴² For years, most people believed there was no realistic prospect that an energy tax could be enacted unless a catastrophic event occurred. But this view may be changing. The U.S. Chamber of Commerce has come out in favor of transportation user fees and a carbon tax if the money is used to upgrade roads, bridges, ports, airports, and the energy infrastructure.¹⁴³ The House Energy and Commerce Committee Chairman John Dingell (D-Mich.) proposed a carbon tax on September 27, 2007.¹⁴⁴

Any government action, including fuel taxes, can be misused to reward a group with political power. For example, in 1993 Congress created a flexible-fuel credit that allows automobile manufacturers to receive credit toward the federal fuel economy requirements for producing vehicles that run on ethanol.¹⁴⁵ CAFE standards provide for flexible-fuel vehicles to have their fuel economy calculated as 1.74 times their actual fuel economy with a total maximum increase per manufacturer of 1.2 miles per gallon (mpg).¹⁴⁶ “This adjustment is based on a legislative assumption that fifty percent of the fuel such vehicles use would, on average, be E85.”¹⁴⁷ However, in reality, drivers use pure ethanol less than one percent of the time,¹⁴⁸ and less than 0.2% of the gas stations in the U.S. sell ethanol.¹⁴⁹ The manufacturers have used this provision to avoid \$1.6 billion in federal penalties while selling vehicles that have poor fuel economy.¹⁵⁰ As implemented by the federal government, vehicles only need to have the capability to run on ethanol; they do not actually have to use the fuel. The vehicle is credited with a

¹⁴¹ *Key House Ways & Means Member Re-offers Bill for Taxing Carbon Emissions*, 4 Clean Air Rep. (Inside Wash. Publishers, Washington, D.C.) 3:6 (Feb. 11, 1993).

¹⁴² *Foreign Auto Manufacturers Criticize CAFE, Propose Gas Tax to Clinton Team*, 4 Clean Air Rep. (Inside Wash. Publishers, Washington, D.C.) 3:8 (Feb 11, 1993).

¹⁴³ Lynn Garner, *Chamber’s Donohue Endorses User Fees, Carbon Tax for Modernizing Infrastructure*, 39 Env’t Rep. (BNA) 70 (Jan. 11, 2008).

¹⁴⁴ *Id.*

¹⁴⁵ 49 U.S.C. § 32905(b) (2000).

¹⁴⁶ NAT’L RESEARCH COUNCIL, *EFFECTIVENESS AND IMPACT OF CORPORATE AVERAGE FUEL ECONOMY (CAFE) STANDARDS* 89 (Nat’l Academy Press 2002).

¹⁴⁷ *Id.*

¹⁴⁸ *Id.*

¹⁴⁹ GEN. ACCOUNTING OFFICE, NO. GAO-07-551T, *PASSENGER FUEL ECONOMY: PRELIMINARY OBSERVATIONS ON CORPORATE AVERAGE FUEL ECONOMY STANDARDS* 17 (2007).

¹⁵⁰ DOUG KOPLOW, *BIOFUELS—AT WHAT COST?: GOVERNMENT SUPPORT FOR ETHANOL AND BIODIESEL IN THE UNITED STATES* 44 (2006), available at http://www.globalsubsidies.org/files/assets/pdf/Brochure_-_US_Report.pdf.

fictional gas mileage. The flexible-fuel credit was to expire in 2008, but it was extended until model year 2019 with a declining credit in the Energy Independence and Security Act of 2007.¹⁵¹ As we move toward serious GHG regulation we can expect to see similar efforts by organized economic interests to direct large amounts of money from the public sector to their enrichment regardless of whether the environment of the nation benefits.

Even if a viable energy tax is enacted, it may not reduce petroleum consumption. Petroleum prices in the 1990s were about twenty dollars per barrel.¹⁵² The price dipped to a low of almost nine dollars per barrel in 1999 and then rose to around thirty-two dollars per barrel in 2000.¹⁵³ Petroleum was \$18.68 per barrel in January 2002, and it increased to over \$130 per barrel in the summer of 2008.¹⁵⁴ Despite a 600% increase in the cost of petroleum in six years, U.S. petroleum consumption increased at an annual average of 1.1% from 1997 to 2007,¹⁵⁵ but the high costs of petroleum-based fuel resulted in consumption falling 3.6% in the year ending in mid-2008.¹⁵⁶

B. Cap-and-Trade

Market-based mechanisms usually focus either on limiting emissions or limiting compliance costs. Tradable permits set emission limits using a cap. The costs then must be absorbed, and the trading mechanism should be designed to allow these costs to be efficiently distributed. Tradable permits have predictable emission reductions, but unknown costs. Emission taxes impose a predictable cost, but the marketplace determines the extent to which emissions are reduced. Tradable permits are a more rational approach for sulfur dioxide control, where costs and benefits can be more accurately estimated, than

¹⁵¹ Pub. L. No. 110-140 § 109 (2007) (amending 49 U.S.C. § 32906 (2000)). The statute was also changed to provide a new formula for calculating fuel economy. *Id.*

¹⁵² See Energy Information Administration, Petroleum Navigator, <http://tonto.eia.doe.gov/dnav/pet/hist/wtotworldw.htm> (last visited Jan. 13, 2009).

¹⁵³ *Id.*

¹⁵⁴ *Id.*

¹⁵⁵ STACY C. DAVIS, SUSAN W. DIEGEL & ROBERT G. BOUNDY, U.S. DEP'T OF ENERGY, TRANSPORTATION ENERGY DATA BOOK 1-5, tbl. 1.4 (27th ed. 2007), available at http://cta.ornl.gov/data/tebd27/Edition27_Full_Doc.pdf.

¹⁵⁶ ENERGY INFO. ADMIN., No. DOE/EIA-0208(2008-31), WEEKLY PETROLEUM STATUS REPORT: DATA FOR WEEK ENDED: AUGUST 1, 2008, at 1 tbl.1 (2008), available at http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/weekly_petroleum_status_report/historical/2008/2008_08_06/pdf/wpsrall.pdf.

for CO₂ control, where costs and benefits often are unknown and are heavily influenced by modeling assumptions.¹⁵⁷

It is unlikely that EPA legally could institute a tax-based program using its existing legal authority; it may need to use cap-and-trade if it seeks to reduce carbon emissions using an economic-based approach. However, cap-and-trade programs also are a suspect class since the U.S. Court of Appeals for the D.C. Circuit, on July 11, 2008, vacated EPA's Clean Air Interstate Rule (CAIR) that included a cap-and-trade program for nitrogen oxides.¹⁵⁸ If a cap-and-trade program for controlling carbon emissions could be promulgated that would withstand judicial scrutiny, presumably it would be similar to the program used to control sulfur dioxide under the CAA.¹⁵⁹ This program is a closed system that imposes an emissions limit on a group of sources, primarily fossil-fueled electric power plants, and each source is allocated a portion of the overall emissions cap, called allowances, that it can use to cover its emissions or sell if it has excess allowances.¹⁶⁰

A cap-and-trade program used to control CO₂ emissions could be imposed on major emission sources or it could be imposed on fuels at the source of the supply. Alternatively, a nationwide cap on gasoline consumption could be imposed where individuals would be given the right to buy a specified amount of gasoline, which they could use or sell to anyone seeking to obtain more gasoline than they were authorized to purchase. This would be similar to the rationing of gasoline during World War II. In Europe, a cap-and-trade system is used and this approach appears to be the technique of choice for much of the world,¹⁶¹ but it has been criticized as "ineffective, unwieldy, and prone to gaming and cheating."¹⁶² According to Congressman John Dingell, the European market for CO₂ emissions trading has fallen apart.¹⁶³ Nevertheless, the European Union is committed to cap-and-trade. One important change that is being proposed is a move toward having all allowances being auctioned by 2020 because of the windfall profits gar-

¹⁵⁷ See LARRY PARKER, CONG. RESEARCH SERV., GLOBAL CLIMATE CHANGE: CONTROLLING CO₂ EMISSIONS—COST-LIMITING SAFETY VALVES 2 (2004).

¹⁵⁸ *North Carolina v. EPA*, 531 F.3d 896, 929–30 (D.C. Cir. 2008). The court changed the vacatur to a remand without imposing a schedule for revising the rule. *State of North Carolina v. EPA*, No. 05-1244 (D.C. Cir. Dec. 23, 2008).

¹⁵⁹ Clean Air Act §§ 401–406, 42 U.S.C. §§ 7651–7651e (2000).

¹⁶⁰ *Id.*

¹⁶¹ David Harrison, Jr. et. al, *Using Emissions Trading to Combat Climate Change: Programs and Key Issues*, 38 *Envtl. L. Rep. (Envtl. Law Inst.)* 10,367, 10,367 (June 2008).

¹⁶² Fareed Zakaria, *In Search of a Better Kyoto*, WASH. POST, Apr. 9, 2007, at A13.

¹⁶³ Kimberley A. Strassel, *Some Inconvenient Truths*, WALL ST. J., Oct. 6, 2007, at A21.

nered by electric generators in the first phase of the Emissions Trading Scheme (ETS) from 2005 through 2007.¹⁶⁴ Using the CAA to impose a cap-and-trade program probably would work for a limited number of major sources, but it would be impractical to try to include all CO₂ stationary sources in a program. Because of the large number of mobile sources, to be manageable a cap aimed at motor vehicle emissions is most likely to be imposed at the refinery.¹⁶⁵ A cap-and-trade program appears to be more politically acceptable than a revenue-neutral carbon tax, but it will have higher transaction costs, it will be more complex, and it is unlikely to be revenue-neutral.¹⁶⁶ It may lead to a massive transfer of wealth to the energy industries. This is a major problem with the legislation pending before the Congress.

C. Legislative Proposals

In the 105th Congress (1997–1998), seven bills dealing with climate change were introduced,¹⁶⁷ and in each succeeding Congress interest in climate-change legislation intensified. In the 109th Congress (2005–2006), 106 bills, resolutions, and amendments were introduced that related to climate change.¹⁶⁸ An important GHG bill has been the Climate Stewardship Act (a.k.a. the McCain-Lieberman bill). It was introduced in January 2003 as S. 139 and provided for emission caps and tradable GHG allowances, but failed to pass.¹⁶⁹ It was reintroduced on February 10, 2005, as S. 342.¹⁷⁰ On May 26, 2005, Senators John McCain and Joseph Lieberman introduced a modified version of their climate change bill called the Climate Stewardship and Innovation Act (S. 1151).¹⁷¹ This third version of the bill continued to seek a reduction in CO₂ emissions to 2000 levels by 2010 through a regulatory program

¹⁶⁴ Stephen Gardner, *EU Parliament, Council Making Progress on Post-2012 Emissions Trading Scheme*, 39 Env't Rep. (BNA) 1417 (July 11, 2008).

¹⁶⁵ See Robert R. Nordhaus, *New Wine into Old Bottles: The Feasibility of Greenhouse Gas Regulation Under The Clean Air Act*, 15 N.Y.U. ENVTL. L.J. 53, 70 (2007).

¹⁶⁶ See generally J.R. DeShazo & Jody Freeman, *Timing and Form of Federal Regulation: The Case of Climate Change*, 155 U. PA. L. REV. 1499, 1539 (2007).

¹⁶⁷ Pew Center on Global Climate Change, *Legislation in the 109th Congress Related to Global Climate Change*, http://www.pewclimate.org/what_s_being_done/in_the_congress/109th.cfm (last visited Jan. 13, 2009).

¹⁶⁸ *Id.*

¹⁶⁹ Pew Center on Global Climate Change, *Summary of the McCain-Lieberman Climate Stewardship Act*, http://www.pewclimate.org/policy_center/analyses/s_139_summary.cfm (last visited Jan. 13, 2009).

¹⁷⁰ Pamela Najor, *Incentive to Push Technology Added to Bill by McCain, Lieberman on Greenhouse Gases*, 36 Env't Rep. (BNA) 1118 (June 3, 2005).

¹⁷¹ S. 1151, 109th Cong. (2005).

to be promulgated by EPA that would apply to GHG emissions from electric generators and to the transportation, industrial, and commercial sectors.¹⁷² The major change in the bill was that it allowed revenues generated by the trading program to be used to develop alternative energy technologies including solar, nuclear, and IGCC technologies, energy efficiency improvements, alternative vehicles, and alternative fuels.¹⁷³ On June 22, 2005, the Senate voted down the proposed legislation in a sixty to thirty-eight vote.¹⁷⁴ The addition of potential funding for nuclear power may have helped defeat the bill because eleven Democrats voted against it.¹⁷⁵

The Energy Policy Act of 2005 did not enact any provision directly regulating carbon emissions.¹⁷⁶ It provides numerous incentives to encourage the development of nuclear and renewable energy, but provides substantially more money to expand the use of carbon-based fuels.¹⁷⁷ These include the clean coal tax credit (section 1307), royalty incentives for natural gas production in the Gulf of Mexico (section 1344), and the shortening of the recovery period for depreciation deductions on natural gas distribution lines from twenty to fifteen years (section 1325).¹⁷⁸

Numerous legislative proposals before the 110th Congress in 2007 addressed some aspect of climate change.¹⁷⁹ Some dealt comprehensively with GHG issues while others were concerned with petroleum independence, terrorism, or were simply “pork” disguised as environmental legislation.¹⁸⁰ The most common proposal was to increase the corporate average fuel economy (CAFE) standards.¹⁸¹ Other bills

¹⁷² *Id.*

¹⁷³ *Id.*

¹⁷⁴ 151 CONG. REC. S7029 (daily ed. June 22, 2005).

¹⁷⁵ *See id.*

¹⁷⁶ Pub. L. No. 109-58, 119 Stat. 594 (codified as amended at 42 U.S.C. §§ 15801–16538 (2005)).

¹⁷⁷ *See* JOINT COMM. ON TAXATION, 109TH CONG., ESTIMATED BUDGET EFFECTS OF THE CONFERENCE AGREEMENT FOR TITLE XIII OF H.R. 6, THE “ENERGY TAX INCENTIVES ACT OF 2005,” at 1 (Comm. Print 2005).

¹⁷⁸ Energy Tax Incentives Act of 2005, §§ 1307, 1325, 1344, (codified in scattered sections of 26 U.S.C.).

¹⁷⁹ Pew Center on Global Climate Change, Legislation in the 110th Congress Related to Global Climate Change, http://www.pewclimate.org/what_s_being_done/in_the_congress/110thcongress.cfm (last visited Jan. 13, 2009).

¹⁸⁰ *Id.*

¹⁸¹ *See* Pew Center on Global Climate Change, Proposed Bills on: Transportation Emissions, [http://www.pewclimate.org/federal/congressional-proposals/110/Transportation Emissions](http://www.pewclimate.org/federal/congressional-proposals/110/Transportation_Emissions) [hereinafter Proposed Bills on: Transportation Emissions] (last visited Jan. 13, 2009).

sought to establish a GHG tradable allowance system.¹⁸² Some bills would nationalize the California mobile source standards.¹⁸³ Still another approach is to limit automobile carbon dioxide emissions on a gram per mile basis.¹⁸⁴ An important issue for Congress involves the choice of the agency to establish GHG emission standards for passenger vehicles. Some of the bills give the authority to EPA.¹⁸⁵ Other bills give the authority to the Department of Transportation, which presently has the authority to administer motor vehicle fuel efficiency standards.¹⁸⁶

The most important bill in 2008 was the Lieberman-Warner bill, S. 3036, America's Climate Security Act of 2008, which was introduced on May 20, 2008.¹⁸⁷ It is a modified version of the McCain-Lieberman bill that was first introduced in 2003 and evolved into the Climate Security Act of 2007, S. 2191.¹⁸⁸ S. 2191 was revised after it passed out of committee in December 2007 and was assigned a new bill number, S. 3036. The 2008 version of the bill has numerous changes from the 2007 version, but the overall thrust of the legislation remains focused on capping GHG emissions and substantially reducing them between 2012 and 2050.¹⁸⁹ These emission reductions would be implemented using three separate cap-and-trade programs: the first covers most GHGs, the second covers hydrochlorofluorocarbons (HFCs), and the third covers emissions embodied in imported products. Section 4(5) establishes the basic regulatory unit for the Act's program as one metric ton of carbon dioxide equivalent for GHGs. The bill's section 4(7) defines the facilities covered as those that use 5000 tons of coal a year; facilities in the natural gas sector; facilities that produce or import petroleum- or coal-based fuel; facilities that produce or import chemicals that are GHGs in excess of 10,000 CO₂ equivalent units; and facilities that emit as a by-product of the production of HFCs more than 10,000 carbon dioxide equivalents of HFCs. The Act provides in sections 1103 and 1104 for affected facilities to comply with mandatory reporting and a verifica-

¹⁸² See Pew Center on Global Climate Change, Economy-Wide Cap-and-Trade Proposals in the 110th Congress, <http://www.pewclimate.org/docUploads/Chart-and-Graph-120108.pdf> (last visited Jan. 13, 2009).

¹⁸³ Proposed Bills on: Transportation Emissions, *supra* note 181 (H.R. 2635).

¹⁸⁴ *Id.* (S. 309 and H.R. 2927 both propose gpm standards).

¹⁸⁵ *Id.* (S. 1297 & S. 1324).

¹⁸⁶ *Id.* (S. 1419 & S. 2927).

¹⁸⁷ S. 3036, 110th Cong. (2008).

¹⁸⁸ The McCain-Lieberman bill, S. 280, continued to be one of several bills on climate change that also were pending in the Senate in 2007.

¹⁸⁹ See Pew Center on Global Climate Change, S. 3036—Lieberman-Warner Climate Security Act of 2008, <http://www.pewclimate.org/docUploads/L-Wonopager.pdf> (last visited Jan. 13, 2009).

tion process based on regulations to be issued by EPA to establish a federal GHG registry that would be published on the internet. A failure to comply with the Act's requirements would subject the violator to its section 1106 civil penalty of up to \$25,000 for each day's violation.

Section 1201 creates an emission allowance account that begins in 2012 with 5775 million metric ton allowances and diminishes over time to 1732 million allowances in 2050. There were 7201.9 million tons of CO₂ equivalent emitted in 2006, therefore, it will take many years to achieve reductions that are considered to be needed sooner than the bill requires.¹⁹⁰ Section 1203 provides that emissions without an offsetting allowance would be subject to a penalty of at least \$200 per ton. Section 2601 would create a Carbon Market Efficiency Board to limit price spikes and act as a regulator of the carbon market. A Climate Change Credit Corporation would be established by section 4201 that will be a private corporation that will auction allowances allocated to it pursuant to section 3103 and distribute the rest based on regulations to be promulgated by EPA pursuant to sections 3201, 3301, and 3304. Distribution requirements are found in sections 3501 through 3504 for natural gas distribution and in sections 3902 and 3903 for electric power companies. The industrial sector and others would be guaranteed a portion of the allowances by sections 3904 through 3908. Sections 4301 through 4302 govern the auction process. Section 3101 provides for a deficit-reduction fund that will receive 6.10% of the allowances in 2012 and the percentage increases each year and peaks at 15.99% in 2031, remaining at that level through 2050. These allowances will be auctioned and the proceeds used for deficit reduction. While the proposed legislation provides for some allowances to be distributed through an auction, for many years most of the allowances will be given, without charge, to the major emitters of GHGs. Section 3103 provides that only 21.5% of the allowances are to be sold at auction in 2012 with increases each year until 2031 and thereafter when 69.5% of the allowances are to be auctioned.

Section 4402 encourages deployment of zero- or low-carbon technology. Incentives are provided for advanced coal technology development, including carbon sequestration in section 4403. Incentives to produce fuel from cellulosic biomass are found in section 4404. Section 4405 creates an incentive program for advanced-technology vehicles. Subtitle E provides for assistance to reduce energy costs for low-income

¹⁹⁰ Leora Faulk, *EPA Reports Emissions Declined in 2006 but Have Increased 14 Percent Since 1990*, 39 Env't Rep. (BNA) 501 (Mar. 14, 2008).

persons as well as for those in off-grid rural areas.¹⁹¹ Seven funds are to be created by section 4101 that will receive money from auctioning carbon dioxide allowances, including: The Energy Assistance Fund; The Climate Change Worker Training Fund; The Adaptation Fund; and The Climate Change and National Security Fund. Title V of the Act includes appliance efficiency standards that would modify the Energy Policy and Conservation Act at 42 U.S.C. § 6925(f) to create new boiler standards and modifications of 42 U.S.C. § 6297 to create new heating and cooling standards.¹⁹² It would require the Secretary of Energy to update building energy efficiency codes in 42 U.S.C. § 6833.¹⁹³ Title VI encourages international efforts to reduce GHG emissions.¹⁹⁴

Title VIII provides a framework for geological sequestration of carbon dioxide.¹⁹⁵ The Act in section 8001 would amend the Safe Drinking Water Act to allow carbon dioxide to be injected underground. Section 9003 provides for the retention of state authority to regulate GHGs if the regulations are no less stringent than applicable federal standards under the Act.

Free allowances that increase the price of energy would be a tremendous windfall to the regulated industries.¹⁹⁶ It would be far more equitable to auction allowances and return the money to consumers. Because the financial benefits from the carbon allowances are estimated as having a value between \$50 billion and \$300 billion per year, there will be substantial competition by potential beneficiaries to financially benefit from the bill.¹⁹⁷ The effect of most of the provisions in S. 3036 would be to increase the cost of energy to all Americans and to distribute the money gathered by the government to the interests that successfully lobby for funds.

A competing bill is the Bingaman-Specter bill, the Low Carbon Economy Act of 2007, S. 1766, which in section 101 calls for a reduction from the year 2000 GHG emissions of one percent by 2025 and an eight percent reduction by 2050.¹⁹⁸ However, reductions of sixty per-

¹⁹¹ S. 3036 §§ 4501–4502.

¹⁹² *Id.* §§ 5101–5102, 5201–5202.

¹⁹³ *Id.* § 5201.

¹⁹⁴ *Id.* §§ 6101–6107.

¹⁹⁵ *Id.* §§ 8001–8004.

¹⁹⁶ Dean Scott, *Air Board Urges Auction of Allowances Under Federal Cap-and-Trade Legislation*, 38 *Env't Rep.* (BNA) 2199 (Oct. 12, 2007).

¹⁹⁷ *See id.*

¹⁹⁸ S. 1766, 110th Cong. § 101 (2008); Kenneth R. Richards & Stephanie Hayes Richards, *An Analysis of the Leading Climate Change Bills in the U.S. Senate*, 38 *Env't L. Rep.* (Env'tl.

cent or more below 2006 levels are authorized by section 501 if the five largest trading partners of the United States reduce their emissions through comparable action.¹⁹⁹ This bill would effectively cap the cost of allowances at twelve dollars per ton.²⁰⁰ Other competing bills are Senator Carper's S. 1177 and Senator Diane Feinstein's S. 317.²⁰¹ They apply to the power sector while the Lieberman-Warner bill applies to most sources of carbon emissions. The Lieberman-Warner bill, S. 2191, was approved by the Public Works Committee on December 5, 2007, the first such bill to obtain approval, but it failed to pass the Senate in 2008.²⁰² It is expected to return as a priority legislative matter in the new Congress in 2009.

Legislative efforts in the Senate have received more attention than the House cap-and-trade bills, and efforts to enact the House versions must contend with the powerful House Energy and Commerce Committee Chairman, John Dingell.²⁰³ However, the Democratic leadership has worked to limit the influence of Representative Dingell. Representative Edward Markey (D-Mass.) is sponsoring H.R. 6186, and Representatives Lloyd Doggett (D-Tex.), Christopher Van Hollen (D-Md.), and Earl Blumenauer (D-Ore.) introduced the Climate MATTERS Act on June 19, 2008.²⁰⁴ Both bills call for a 100% auction of emissions allowances, but the Doggett bill would make the Treasury Department responsible for auctioning allowances, thereby bypassing the Energy and Commerce Committee.²⁰⁵ The Doggett bill is expected to become more important in 2009 because it is the Democratic leadership's bill and is supported by about half the Democrats on the Ways and Means Committee.²⁰⁶

Law Inst.) 10,388, 10,388–89 (June 2008) (analyzing the Lieberman-Warner and Bingaman-Specter bills).

¹⁹⁹ S. 1766 § 501(b)(1).

²⁰⁰ *Id.* § 102(d)(1).

²⁰¹ Pew Center on Global Climate Change, 110th Congress Index of Proposals, http://www.pewclimate.org/what_s_being_done/in_the_congress/indexbills.cfm (last visited Jan. 13, 2009).

²⁰² Leora Falk, *Senate Climate Bill Goes Down to Defeat, 12 Votes Short on Cloture Motion*, 39 *Env't Rep.* (BNA) 1146 (June 13, 2008).

²⁰³ See Dean Scott, *House Democrats Introduce Bill to Require 80 Percent Cut in Greenhouse Gas Emissions*, 39 *Env't Rep.* (BNA) 1210 (June 20, 2008).

²⁰⁴ *Id.*

²⁰⁵ *Id.*

²⁰⁶ *Key Democrats Back Climate Bill that Bypasses House Energy Panel*, 19 *Clean Air Rep.* (Inside Wash. Publishers, Washington D.C.) No. 13 (June 26, 2008), available at 2008 WLNR 11928452.

If the Lieberman-Warner bill, or something similar, is enacted the big winner will be the nuclear industry, although the industry is not mentioned by name. The nuclear industry expects to tap into the money from the carbon dioxide auction proceeds that will fund the “zero- or low-carbon energy technologies program.” More important, however, is that an emissions cap and the cost of emission allowances will be an impediment to the expansion of the coal industry, which will benefit the nuclear industry.²⁰⁷ Geographically, the major loser will be the Southeast and Midwest states that are the most dependent on coal-fired electricity and that have relatively high summer and winter demand for cooling and heating.²⁰⁸

There should be a comprehensive federal program designed to reduce GHG emissions and Congress, not the Supreme Court, should designate the agency or agencies to implement the program. The mandate from the Supreme Court in *Massachusetts v. EPA*, while a poor way to deal with climate change, may turn out to be an appropriate stimulus for Congress to act. Congress now should move quickly to enact new climate change legislation that would give political legitimacy to federal efforts to control CO₂. Such legislation should explicitly overrule *Massachusetts v. EPA* to provide structure and guidance to the EPA or some other government department concerning how Congress expects the new energy policy program to function. As part of this program, the cost of using carbon-based fuels must increase, but the increased costs should not be used to enrich the energy industry through free allowances or to create large semi-permanent subsidies for the energy industry.

IV. CONTROL OF FOSSIL-FUELED ELECTRIC POWER’S CARBON EMISSIONS

Even if legislation is enacted to increase the cost of using fossil fuel, there will remain a need to regulate industries with high GHG emissions. Fossil fuel combustion in 2005 in the United States was responsible for about 94% of the CO₂ emissions and 79.2% of the nation’s overall GHG emissions.²⁰⁹ Forty-one percent of the CO₂ from fossil fuel combustion was emitted by electric power plants, which makes them the largest source of GHG emissions in the United States.²¹⁰ There were

²⁰⁷ Mike Ferullo, *More Nuclear Plant Applications Expected; Climate Debate Could Spur More Incentives*, 39 Env’t Rep. (BNA) 199 (Jan. 18, 2008).

²⁰⁸ Dean Scott, *Uneven Impact of Senate Cap-and-Trade Bill Raises Concerns Following EPA Cost Analysis*, 39 Env’t Rep. (BNA) 547 (Mar. 21, 2008).

²⁰⁹ INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS, *supra* note 43, at ES-5 tbl.ES-2.

²¹⁰ *Id.* at 3–11.

1336 electric-generating units in the United States in 2000 and 1032 of them were coal fired.²¹¹ In 2006, U.S. electric power production by fuel source was: 49% coal, 19% natural gas, 20% nuclear, 7% hydroelectric, 1.6% oil, and 2.4% other renewable resources.²¹² Approximately one ton of CO₂ is produced for each megawatt-hour of electricity generated from coal.²¹³ But emissions can vary significantly depending on factors such as the age of the plants.²¹⁴ In California in 2007, 358.55 pounds of CO₂ were emitted per megawatt-hour; in Texas, 1278.71 pounds per megawatt-hour were emitted.²¹⁵ CO₂ emissions from electric power production in 2005 increased 31.5% since 1990, and in the same period overall U.S. CO₂ emissions increased 21.74%.²¹⁶ In 2007, power plant CO₂ emissions increased 2.9%, which is the largest one-year increase since 1998.²¹⁷ In government reports, the electric power industry's CO₂ emissions are usually attributed on a pro-rated basis to the other end-use sectors: transportation (where it is negligible), industrial, commercial, and residential.

Getting rid of old coal-burning power plants would be the single move that could significantly reduce CO₂ and criteria-pollutant emissions. Replacing coal with modern natural gas plants would be the most practical immediate step if GHG emissions are to be reduced. Modern gas turbines are up to sixty percent efficient compared to thirty-three percent for coal-fired steam turbine plants,²¹⁸ so CO₂ emissions are lower, but natural gas availability and its high cost are problematic. Moreover, using natural gas for boiler fuel is not the best use for this valuable natural resource. A long-term goal should be to use renewable energy technologies to meet an increasing share of the nation's electric power demand.

²¹¹ OFFICE OF INSPECTOR GEN., ENTVL. PROT. AGENCY, NEW SOURCE REVIEW RULE CHANGE HARMS EPA'S ABILITY TO ENFORCE AGAINST COAL-FIRED ELECTRIC UTILITIES 1-2 (2004), available at <http://www.epa.gov/oig/reports/2004/20040930-2004-P-00034.pdf>.

²¹² Lynn Garner, *Electricity Prices Highest Since 1981; Sulfur, Carbon Dioxide Emissions Down*, 38 Env't Rep. (BNA) 2303 (Oct. 26, 2007).

²¹³ Steven Cook, *Report Finds Some Power Plant Emissions Decline, but Carbon Dioxide Holds Steady*, 38 Env't Rep. (BNA) 1606 (July 27, 2007).

²¹⁴ See Leora Falk, *Study Finds Rise in Carbon Emissions from Power Plants Largest Since 1998*, 39 Env't Rep. (BNA) 552 (Mar. 21, 2008).

²¹⁵ *Id.*

²¹⁶ See INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS, *supra* note 43, at ES-8 tbl.ES-3 (calculated from data).

²¹⁷ Falk, *supra* note 214.

²¹⁸ See STEVEN FERREY, THE NEW RULES: A GUIDE TO ELECTRIC MARKET REGULATION 4 (2000).

Even if coal is replaced by cleaner technology, such as combined cycle natural gas generation, government intervention will be required to prevent old coal plants from being used to provide capacity reserve rather than being retired. More stringent air pollution control requirements applicable to such plants could spur their retirement. Emission limitations based on power produced rather than fuel input would be an obvious step in the correct direction. EPA's regulations usually provide for emissions based on heat input, not on the amount of electricity generated.²¹⁹ This allows inefficient electric power producers to legally have emissions higher than energy-efficient plants.²²⁰

The role of coal in generating electricity in the United States is an important policy issue that has not yet been resolved. In early 2008 there were twenty-four coal-fired plants under construction involving \$23 billion of new capital investment.²²¹ These facilities are expected to be far less polluting than older existing plants, but they could contribute massive amounts of carbon dioxide to the atmosphere for a half-century or more. At the same time, pressure from environmental groups and state governments caused electric utilities to cancel or delay the construction of fifty-nine coal-fired power plants in 2007.²²² The coal industry is lobbying hard to have the U.S. taxpayer dramatically increase the funding for clean-coal-related programs. If they are successful in obtaining the funding, and the money expended results in technology advances, the continued dependence on coal-fired electric power plants would likely continue.²²³ However, the coal-fired electric power industry is not only facing expensive regulatory requirements related to climate change, but is also facing other increases in costs that threaten the economic viability of new coal-burning plants. The costs of these plants are two to three times the costs incurred in the 1970s even without CO₂ control being mandated by EPA.²²⁴ Duke Power Carolinas

²¹⁹ Standards of Performance for Electric Utility Steam Generating Units for Which Construction is Commenced After September 18, 1978, 40 C.F.R. § 60.40Da (2008).

²²⁰ An exception is the nitrogen oxides standards for sources whose construction commences after July 9, 1997, which have emissions limitations of 1.6 pounds per megawatt-hour of gross energy output. *Id.* § 60.44Da(d)(1).

²²¹ Lynn Garner, *Coal, Electricity Industries Ask White House to Double Funding for Carbon Technologies*, 39 Env't Rep. (BNA) 157 (Jan. 25, 2008).

²²² *Id.*

²²³ *See id.*

²²⁴ Press Release, Interfaith Ctr. on Corporate Responsibility, ICCR Report: Coal-Fired Power Plants Facing Risks, Uncertainties: Cost Hikes "Comparable" to Those That Pulled the Plug on Nuclear Power in U.S. (Feb. 26, 2008), *available at* http://www.iccr.org/news/press_releases/2008/pr_coalpanel022608.htm [hereinafter ICCR Report].

says their construction costs have nearly doubled since 2002.²²⁵ Many states are imposing reductions in GHGs as well as imposing renewable energy and energy efficiency requirements.²²⁶ Sequestering carbon emissions will be a costly process, although the costs and effectiveness of such measures are currently uncertain. More stringent controls on conventional air pollutants and the potential regulation of mercury emissions using MACT standards based on section 112 of the CAA will add to the costs and uncertainty.²²⁷ Moreover, the worldwide growth in electric power generation is creating competition for the resources and skills necessary to build plants, and that is leading to skyrocketing increases in construction costs.²²⁸

A. *Integrated Gasification Combined Cycle Technology*

For new coal-burning electric power plants, conventional technology is to use pulverized coal boilers. The use of circulating fluidized bed (CFB) boilers results in less air pollution. Even better is the use of integrated gasification combined cycle (IGCC) technology, which is based on coal gasification. The coal gasification process can use high-sulfur, low-quality coal or petroleum coke to produce coal gas (a.k.a. synthetic gas or syngas), which is then processed to remove pollutants. Coal of any quality is fed to a gasifier where it is partly oxidized by steam under pressure. By reducing the oxygen in the gasifier, the carbon in the fuel is converted to a gas that is eighty-five percent carbon monoxide and hydrogen. Sulfur can be removed as elemental sulfur or sulfuric acid and sold. Inorganic ash and metals drop out as slag, which is impervious to leaching and may be used in construction materials. When used to produce electricity in an IGCC facility, coal gas is combusted relatively cleanly in a gas turbine and the heat from the exhaust gas is used to run a separate steam turbine in order to increase the system's efficiency. This is known as a combined cycle. Conventional coal-burning power plants combust fuel at about 3000 degrees Fahrenheit to produce process steam at temperatures that are usually below 400 degrees Fahrenheit.²²⁹ Much of the heat energy of the fuel is wasted.

²²⁵ *Id.*

²²⁶ *Id.*

²²⁷ Clean Air Act § 112, 42 U.S.C. § 7412 (2000).

²²⁸ ICCR Report, *supra* note 224.

²²⁹ Steven Ferrey, *Corporate Governance and Rational Energy Choices*, 31 WM. & MARY ENVTL. L. & POL'Y REV. 113, 118 (2006).

Cogeneration facilities use the excess heat to produce electricity, and can be twice as efficient as conventional power plants.²³⁰

IGCC, when used with stack gas pollution controls, provides the lowest emissions of criteria pollutants from coal-burning electric power plants and has a superior ability to cost-effectively reduce mercury and CO₂ emissions. IGCC technology can reduce sulfur dioxide by ninety-eight percent or more and nitrogen oxides by ninety percent,²³¹ which exceeds New Source Performance Standards. New coal-burning facilities require a heat input of about 10,500 Btu per kilowatt-hour of electricity produced, but the best IGCC generation facilities need only 4500 Btu per kilowatt-hour.²³² Because IGCC is more thermally efficient than a conventional pulverized coal plant, CO₂ emissions are less per kilowatt-hour of production. IGCC technology may be a partial solution to the control of carbon dioxide emissions because it creates a separate gas stream of carbon dioxide that can be removed from the process and sequestered when the technology to accomplish this becomes available.²³³

In 2002, there were 160 commercial IGCC plants, built or planned, in twenty-eight countries.²³⁴ The United States has only two IGCC plants, the Polk County Florida 260 megawatt facility owned by the Tampa Electric Company, and the Wabash River Repowering Project owned by Cinergy. The Wabash River IGCC project cost, if applied to a green field project, was estimated at \$1700 per kilowatt.²³⁵ The Tampa Electric Project cost \$1213 per kilowatt.²³⁶ Project costs have dropped, but despite construction costs as low as \$1000 per kilowatt and very effective emissions control, these plants have not been able to compete with low cost retrofits of existing plants that are subject to less stringent air pollution controls.²³⁷ Moreover, to get nitrogen oxide emissions to the level of natural gas-fired facilities requires the use of selective catalytic reduction devices which significantly increase the costs of using

²³⁰ *Id.*

²³¹ U.S. DEPT. OF ENERGY, CLEAN COAL DEMONSTRATION PROGRAM: PROGRAM UPDATE 2001, at 5-121 (2002) [hereinafter CLEAN COAL DEMONSTRATION PROGRAM].

²³² Ferrey, *supra* note 229, at 119 n.49.

²³³ CLEAN COAL DEMONSTRATION PROGRAM, *supra* note 231, at 5-115, 5-117, 5-121.

²³⁴ Curtis A. Moore, *The 1990 Clean Air Act Amendments: Failing The Acid Test*, 34 *Envtl. L. Rep. (Envtl. Law Inst.)* 10,366, 10,372 (Apr. 2004).

²³⁵ CLEAN COAL DEMONSTRATION PROGRAM, *supra* note 231, at 5-127.

²³⁶ *Id.* at 5-119.

²³⁷ Moore, *supra* note 234, at 10,372.

this technology.²³⁸ Tampa Electric was seeking to build another IGCC plant at the site of its first plant, but on October 4, 2007, the company announced it was scrapping its plan and giving up \$133.5 million in federal tax credits because of the uncertainty concerning the requirements for carbon capture and sequestration and the associated costs.²³⁹ On March 3, 2008, environmental groups sued the Department of Energy to prevent the granting of \$1 billion in tax credits for new power plants in nine states that are to employ “clean coal” technology, including three IGCC facilities.²⁴⁰

Section 1307 of the Energy Policy Act of 2005 provides a tax credit for IGCC projects in the Internal Revenue Code (IRC).²⁴¹ Section 48A of the IRC provides a twenty percent investment tax credit for qualifying advanced coal projects using IGCC technology. On February 21, 2006, the Internal Revenue Service issued Notice 2006-24 to establish the tax credit program.²⁴² Section 48A defines a “qualified advanced coal project” as one that: (a) uses IGCC; (b) operates at forty percent efficiency; or (c) is a retrofitted or repowered unit that achieves an efficiency of thirty-five percent and meets specified design efficiency improvements.²⁴³ The project also is required to have ninety-nine percent sulfur dioxide removal and ninety percent mercury removal.²⁴⁴

If IGCC technology is to be used to make it easier to control CO₂ emissions, some assurance of an appropriate return on investment will be needed. There has been an effort to get the federal government to provide loan guarantees to encourage IGCC installation, but environmental groups often oppose efforts to expand the use of coal.²⁴⁵ A site was to be selected in either Texas or Illinois for the construction of a 275 megawatt prototype plant as part of the FutureGen initiative that would produce electricity and hydrogen while removing and sequester-

²³⁸ EPA, *DOE Eye Study on Benefits of Coal Gasification Power Plants*, 15 Clean Air Rep. (Inside Wash. Publishers, Washington, D.C.) § 27 (Dec. 30, 2004), available at 2004 WLNR 15307594.

²³⁹ Drew Douglas, *Tampa Electric Scuttles Plan to Build IGCC Generating Plant in Central Florida*, 38 Env't Rep. (BNA) 2202 (Oct. 12, 2007).

²⁴⁰ Steven D. Cook, *Lawsuit Seeks Environmental Review for Plants Supported by Energy Department*, 39 Env't Rep. (BNA) 429 (Mar. 7, 2008) (citing *Appalachian Voices v. Bodman*, No. 08-0380 (D.D.C. filed Mar. 3, 2008)).

²⁴¹ Pub. L. No. 109-58, § 1307, 119 Stat. 594, 999 (to be codified at 26 U.S.C. § 48A).

²⁴² INTERNAL REVENUE SERVICE, NOTICE 2006-24: QUALIFYING ADVANCED COAL PROJECT PROGRAM 1 (2006), available at <http://www.irs.gov/pub/irs-drop/n-06-24.pdf>.

²⁴³ § 1307, 119 Stat. at 1000-03.

²⁴⁴ *Id.* at 1003.

²⁴⁵ *Fuel Gasification Plan Expanded in Response To Rising Energy Prices*, INSIDE EPA (Inside Wash. Publishers, Washington D.C.) No. 2 (Jan. 19, 2005), available at 2005 WLNR 459804.

ing carbon dioxide in a coal gasification process.²⁴⁶ However, after selecting the Mattoon, Illinois site, the estimated cost increased about fifty percent, and in January 2008, DOE announced it planned to cancel the FutureGen program, and it did so on June 13, 2008.²⁴⁷ Some members of Congress are holding hearings, claiming that the FutureGen project was cancelled because an Illinois site, rather than the Texas site, was selected.²⁴⁸ However, industry continues to lobby Congress for funds to continue the project, but may build the facility without government funding assistance.²⁴⁹

In June 2007, EPA approved a construction permit to build a 630 megawatt IGCC plant in Taylorville, Illinois, but the plant is not designed to sequester carbon.²⁵⁰ If the plant becomes operational, it will be the first commercial scale IGCC plant in the United States.²⁵¹ The Sierra Club subsequently challenged EPA's position before the Environmental Appeals Board in *In re: Christian County Generation, LLC*,²⁵² but the EAB denied review of the PSD permit on January 28, 2008.²⁵³ In Minnesota, Excelsior Energy is attempting to build an IGCC plant, although it will not capture and sequester carbon dioxide emissions.²⁵⁴ It will be years before there can be large-scale commercial deployment of

²⁴⁶ U.S., *China to Expand Environmental Work; China Joins U.S. "Clean Coal" Initiative*, 37 Env't Rep. (BNA) 2582 (Dec. 22, 2006).

²⁴⁷ *EPA Advisors Back CO₂ Storage Fund As Future-Gen Alternative*, 19 Clean Air Rep. (Inside Wash. Publishers, Washington D.C.) No. 3 (Feb. 7, 2008), available at 2008 WLNR 2251163; Steven D. Cook, *Energy Department Ends FutureGen Funding; Science Committee to Consider Subpoena*, 39 Env't Rep. (BNA) 1213 (June 20, 2008).

²⁴⁸ *Lawmakers to Ask GAO to Investigate FutureGen Restructuring*, 25 ENVTL. POL'Y ALERT (Inside Wash. Publishers, Washington D.C.) No. 4 (Feb. 13, 2008), available at FACTIVA, Doc. EPAL000020080213e42d0000y.

²⁴⁹ Andrew Childers, *FutureGen Alliance to Ask Congress to Fund Carbon Capture Plant Through January*, 39 Env't Rep. (BNA) 1213 (June 20, 2008); *Industry Picks FutureGen Site Despite DOE Budget Worries*, 10 Clean Air Rep. (Inside Wash. Publishers, Washington D.C.) No. 26 (Dec. 27, 2007), available at 2007 WLNR 25429090.

²⁵⁰ Michael Bologna, *State Issues Air Permit for Construction of Power Plant Using Coal Gasification*, 38 Env't Rep. (BNA) 1297 (June 8, 2007).

²⁵¹ *Id.*

²⁵² Jonathan S. Martel, *Climate Change Law and Litigation in the Aftermath of Massachusetts v. EPA*, Daily Env't Rep. (BNA) B-1 (Nov. 6, 2007).

²⁵³ Steven D. Cook, *EPA Permit for Utah Coal-Fired Power Plant Under Challenge at Agency's Appeals Board*, 39 Env't Rep. (BNA) 344 (Feb. 22, 2008).

²⁵⁴ See Press Release, Excelsior Energy, Mesaba Energy Project Fact Sheet, http://www.excelsiorenergy.com/pdf/Fact_Sheets/CurrentFactSheet.pdf (last visited Jan. 13, 2009).

sequestration technologies.²⁵⁵ For that reason, the Sierra Club and other environmental organizations are opposing the project.²⁵⁶

With about 154 new coal-fired plants proposed in forty-two states,²⁵⁷ an important factor for IGCC technology acceptance is whether it is mandated as BACT or LAER in order to obtain a construction permit under section 173(a)(2) of the CAA in a PSD area or section 165(a)(4) in a nonattainment area. It has been argued that IGCC is BACT even though it is a different production process and is not an “end of stack” control. This position is supported by referring to the language of section 169(3) of the CAA that includes different production processes, fuel cleaning, and innovative fuel combustion processes as BACT options.²⁵⁸ EPA’s 1990 draft guidance indicated that it was not the Agency’s general policy to redefine an applicant’s design for a facility for purposes of considering what is the best available control technology.²⁵⁹ In the 2005 Energy Policy Act, Congress did not take a position as to whether IGCC was adequately demonstrated for purposes of section 111 or whether it is achievable for the purposes of sections 169 or 171 of the CAA.²⁶⁰ EPA’s Stephen D. Page, in a letter of December 23, 2005, stated that IGCC is not BACT because it involves the basic design of a proposed source.²⁶¹ EPA’s position is that section 165(a)(2) requires alternative sources to be considered at an early stage in the permitting process, but once a technology is selected, section 165(a)(4) requires appropriate air pollution controls to be considered.²⁶² IGCC is considered by EPA to be a technology for generating electricity; it is not an air pollution control technology.²⁶³ On September 2, 2006, in a settlement agreement in *Natural Resources Defense Council v. EPA*, EPA stipulated that

²⁵⁵ DOE Admits CO₂ Sequestration Years Away in *Coal-To-Fuel Plant Study*, 18 Clean Air Rep. (Inside Wash. Publishers, Washington D.C.) No. 2 (Jan. 25, 2007), available at 2007 WLNR 1385518.

²⁵⁶ *Environmentalists Cite Sequestration Concerns in Opposing IGCC Plant*, 18 Clean Air Rep. (Inside Wash. Publishers, Washington D.C.) No. 2 (Jan. 25, 2007), available at 2007 WLNR 1385514.

²⁵⁷ Walter Mugdan, *Back to the Future: Coal Gasification Comes of Age . . . Again*, 18 Env’tl. L. N.Y. (MB) No. 4, at 55, 58 (Apr. 1, 2007).

²⁵⁸ Clean Air Act § 169(3), 42 U.S.C. § 7479(3) (2000).

²⁵⁹ U.S. ENVTL. PROT. AGENCY, NEW SOURCE REVIEW WORKSHOP MANUAL: PREVENTION OF SIGNIFICANT DETERIORATION AND NONATTAINMENT AREA PERMITTING 88 (1990), available at <http://www.epa.gov/ttn/nsr/gen/wkshpman.pdf>.

²⁶⁰ See Pub. L. No. 109-58, § 402, 119 Stat. 594, 750 (2005).

²⁶¹ Stephen D. Page, *EPA Letter on Use of Integrated Gasification Combined Cycle Technology as BACT*, 36 Env’t Rep. (BNA) 2666 (Dec. 23, 2005).

²⁶² *Id.*

²⁶³ *Id.*; see also Steven D. Cook, *EPA Official Reports Gasification as Standard for New Coal-Fired Electric Power Plants*, 36 Env’t Rep. (BNA) 2625 (Dec. 23, 2005).

the Page letter was not final Agency action; it creates no rights and does not have any legally binding effect.²⁶⁴ However, the 2008 decision by a Georgia state court, previously discussed, held that IGCC is an innovative fuel combustion technology that must be considered.²⁶⁵

B. Sequestration

Carbon sequestration may be accomplished through storage in a geologic depository or by using a biologic process in which carbon dioxide is removed from the atmosphere by plants that store carbon. A major benefit from effective sequestration is that America's abundant supply of coal could be utilized without the adverse environmental impacts associated with CO₂ emissions. Risks from sequestration that have been identified include changes in soil chemistry that could harm the ecosystem, effects on water quality due to acidification, and the potential for large releases that could harm or suffocate people and animals. A report developed by the Intergovernmental Panel on Climate Change (IPCC) suggests that the risks of CO₂ storage are equivalent to the risks from existing industrial activities.²⁶⁶ However, for geologic sequestration (GS) to be effective it must prevent releases for centuries. We do not have much experience with injection on the scale that will be required for GS. GS will require dealing with the properties of flue gas from fossil-fuel combustion. That includes the relative buoyancy of CO₂, its mobility within subsurface formations, the corrosive properties of the gases in water, the impact of the impurities in the flue gas, and the large volume of material that will need to be injected.²⁶⁷ The flue gas is expected to be compressed in order to convert it from gas to a supercritical fluid.²⁶⁸ It then will be transported to the injection site by pipeline; aided by the location of ninety-five percent of the largest stationary sources within fifty miles of a potential storage reservoir.²⁶⁹ The supercritical liquid will be injected, using proven technology, at a depth

²⁶⁴ Mugdan, *supra* note 257, at 59 & n.34.

²⁶⁵ See *Friends of the Chattahoochee, Inc. v. Couch*, No. 2008CV146398, at 1 (Ga. Sup. Ct. Fulton County, June 30, 2008), available at http://alt.coxnewsweb.com/ajc/pdf/judge_moore.pdf.

²⁶⁶ *International Climate Study Examines Feasibility of CO₂ Storage*, 16 Clean Air Rep. (Inside Wash. Publishers, Washington D.C.) No. 4 (Feb. 24, 2005), available at 2005 WLNR 2764072.

²⁶⁷ U.S. ENVTL. PROT. AGENCY, EPA PROPOSES NEW REQUIREMENTS FOR GEOLOGIC SEQUESTRATION OF CARBON DIOXIDE (2008), available at http://www.epa.gov/ogwdw/uic/pdfs/fs_uic_co2_proposedrule.pdf.

²⁶⁸ *Id.*

²⁶⁹ *Id.*

of about 800 meters (2625 feet) in order to keep the CO₂ in a liquid state.²⁷⁰

Carbon sequestration in underground reservoirs requires a permit issued under the Safe Drinking Water Act (SDWA).²⁷¹ The Energy Independence and Security Act of 2007 gave EPA the explicit authority under the SDWA to regulate injection and geologic sequestration of carbon dioxide.²⁷² Governors from oil and gas producing states did not want federal regulation of CO₂ injection because they do not want interference with the use of CO₂ to force natural gas and petroleum to the surface.²⁷³ These operations are small compared to what would be required to sequester CO₂ emissions from fossil-fueled electric power plants.²⁷⁴ EPA's proposed rule governing underground injection of carbon dioxide under the Safe Drinking Water Act was released July 15, 2008.²⁷⁵

The proposed rule creates a new class of injection well for GS wells, but it does not mandate the capture and sequestration of CO₂.²⁷⁶ It includes requirements to ensure wells are appropriately sited and are constructed to prevent fluid movement.²⁷⁷ There are monitoring and reporting requirements, including periodic re-evaluation of the underground area to verify the material injected is moving as predicted.²⁷⁸ It includes testing requirements to ensure underground sources of drinking water are protected, including post-injection monitoring.²⁷⁹ The rule also includes financial responsibility requirements to assure the resources are available for well plugging, site care, closure, and emergency remedial response.²⁸⁰ The proposed rule does not resolve the uncertainty concerning whether carbon dioxide injected underground will be considered to be a hazardous substance under the Resource

²⁷⁰ *Id.*

²⁷¹ See 42 U.S.C. § 300h(b)(1)(A) (2000).

²⁷² Pub. L. No. 110-140 § 706, 121 Stat. 1492, 1710 (2007) (to be codified at 42 U.S.C. § 17254).

²⁷³ *Oil, Natural Gas Producing States Offer Strategy For Carbon Capture*, 16 Clean Air Rep. (Inside Wash. Publishers, Washington D.C.) No. 6 (Mar. 24, 2005), available at 2005 WLNR 4551374.

²⁷⁴ *Id.*

²⁷⁵ Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO₂) Geologic Sequestration (GS) Wells Proposed Rule, 73 Fed. Reg. 43,492 (Jul. 25, 2008).

²⁷⁶ *Id.* at 43,495.

²⁷⁷ *Id.* at 43,498–99.

²⁷⁸ *Id.* at 43,499.

²⁷⁹ *Id.*

²⁸⁰ *Id.*

Conservation & Recovery Act (RCRA)²⁸¹ or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund).²⁸² EPA indicates that the concentration of impurities in the waste is expected to be low, but the Agency will not categorically determine whether CO₂ injection is hazardous under RCRA or CERCLA.²⁸³ This means that those involved in sequestration could be subject to liability under these federal laws if there is contamination of underground water.²⁸⁴

The proposed rule affects state regulation, but the role of the states cannot easily be preempted because many legal issues concerning sequestration will involve property, tort, and contract law that are controlled by state law.²⁸⁵ An important issue is whether the surface owner or the mineral owner has the right to sequester CO₂ and which property interest has the associated liability.²⁸⁶ Wyoming became the first state to address this issue when on March 2, 2008, House Bill 89 was enacted.²⁸⁷ It provides that the pore space underneath the surface estate is owned by the surface owner.²⁸⁸ However House Bill 90, which became law on the same day, allows the mineral interest owner to drill through sequestration sites.²⁸⁹ These laws help to answer some questions but do not remove uncertainties concerning liability.²⁹⁰ Moreover, it has not yet been resolved which federal agency will have oversight over long-term liability for sequestration or other aspects of the program.²⁹¹

²⁸¹ 42 U.S.C. §§ 6901–6992k (2000).

²⁸² 42 U.S.C. §§ 9601–9675 (2000).

²⁸³ See 73 Fed. Reg. at 43,497.

²⁸⁴ *EPA Opens Door to Cleanup Liability for Underground CO₂ Contamination*, 19 Clean Air Rep. (Inside Wash. Publishers, Washington D.C.) No. 15 (July 24, 2008), available at 2008 WLNR 13723933.

²⁸⁵ See, e.g., Elizabeth J. Wilson & Mark A. de Figueiredo, *Geologic Carbon Dioxide Sequestration: An Analysis of Subsurface Property Law*, 36 Env'tl. L. Rep. (Env'tl. Law Inst.) 10,114, 10,121 (Feb. 2006).

²⁸⁶ *Id.*

²⁸⁷ H.R. 89, 59th Leg. Budget Sess. (Wyo. 2008), available at <http://legisweb.state.wy.us/2008/Enroll/HB0089.pdf>.

²⁸⁸ *Id.* § 1 (to be codified at WYO. STAT. § 34-1-152(a)).

²⁸⁹ H.R. 90, 59th Leg. Budget Sess. § 1 (Wyo. 2008) (to be codified at WYO. STAT. § 30-5-501), available at <http://legisweb.state.wy.us/2008/Enroll/HB0090.pdf>.

²⁹⁰ See Kipp A. Coddington, David M. Meezan & Kristin Holloway Jones, *The Commercial Deployment of Carbon Capture and Storage Technology*, 38 Env't Rep. (BNA) 2045 (Sept. 21, 2007).

²⁹¹ See *Energy Law Gives EPA Shared Powers Over CO₂ Storage Program*, 19 Clean Air Rep. (Inside Wash. Publishers, Washington D.C.) No. 2 (Jan. 24, 2008), available at 2008 WLNR 1281583.

While the federal government has not been a leader in GHG regulation, the Department of Energy has been active in promoting the development of a framework and infrastructure needed to validate and deploy carbon sequestration technologies. It created seven Regional Carbon Sequestration Partnerships with more than 140 organizations in thirty-three states, three Indian nations, and two Canadian provinces as participants.²⁹² Many profit and non-profit corporations are part of the various partnerships. The partnership program has two phases. Phase I is to develop partnerships, over about a two year period; identify potential carbon sources and projects; and evaluate infrastructure needs.²⁹³ Phase II will establish monitoring, mitigation, and verification protocols and begin to implement sequestration projects.²⁹⁴ Data from the partnerships characterizing sources and sinks are being integrated into the National Carbon Sequestration Database and Geographic Information System (NATCARB).²⁹⁵ There also is a website for terrestrial sequestration demonstrations and for the environmental impact statement evaluating the DOE sequestration program.²⁹⁶

The Department of Energy is providing \$66.7 million for its seven-year Regional Carbon Sequestration Partnership Program.²⁹⁷ To evaluate carbon sequestration injection technology, DOE is funding a three-year effort to inject one million tons of CO₂ one mile beneath the earth's surface in Illinois beginning in October 2009.²⁹⁸ An issue in moving such projects forward is the long-term liability of those participating. Texas and Illinois passed legislation providing protection through indemnification.²⁹⁹

At this time there is no commercial-scale demonstrated technology for use at electric generating plants that would capture and store carbon

²⁹² MELISSA CHAN & SARAH FORBES, NAT'L ENERGY TECH. LAB., DOE/NETL-2005/1212, CARBON SEQUESTRATION ROLE IN STATE AND LOCAL ACTIONS 17 (2005).

²⁹³ *Id.* at 19.

²⁹⁴ *Id.*

²⁹⁵ NatCarb, A National Look at Carbon Sequestration, www.natcarb.org (last visited Jan. 13, 2009).

²⁹⁶ NETL.com, Technologies: Carbon Sequestration, http://www.netl.doe.gov/technologies/carbon_seq/index.html (last visited Jan. 20, 2009).

²⁹⁷ Michael Bologna, *Energy Department, Midwest Partners Launch Carbon Sequestration Project in Illinois Basin*, 39 Env't Rep. (BNA) 67 (Jan. 11, 2008).

²⁹⁸ *Id.* The Sleipner facility, located off the coast of Norway, injects one million tons of carbon dioxide annually 3000 feet below the sea floor. Charles W. Schmidt, *Carbon Capture & Storage: Blue-Sky Technology or Just Blowing Smoke?*, 115 ENVTL. HEALTH PERSPECTIVES A-539, A-539 (2007).

²⁹⁹ *California Struggles with Carbon Sequestration Policies*, 25 Envtl Pol'y Alert (Inside Wash. Publishers, Washington D.C.) No. 1 (Jan. 2, 2008), available at FACTIVA, Doc. EP-AL000020080102e4120000m.

dioxide.³⁰⁰ Moreover, carbon capture from most conventional power plants that use pulverized coal would require post-combustion capture using technologies such as chilled ammonia, which could increase the cost of electricity by fifty-nine percent.³⁰¹ However, a report prepared at the University of Utah found the cost of carbon capture to be about forty dollars per ton and underground storage costs ten dollars per ton, which would add 7.5 cents to the cost of a kilowatt-hour or a seventeen percent incremental increase in the cost of generating electricity.³⁰² EPA is backing the creation of a carbon capture fund, and DOE plans to support sequestration efforts “at multiple sites as an alternative to its canceled FutureGen demonstration facility.”³⁰³ The FY2009 budget request includes \$156 million to support carbon capture and storage efforts at several commercial scale electric power plants.³⁰⁴

C. Nuclear Energy

Nuclear energy has no conventional air pollution emissions and no GHG emissions. While its use as a substitute for coal provides obvious environmental benefits,³⁰⁵ there are tradeoffs involving safety, radioactive waste disposal, and the centralization of energy generation (an issue not limited to nuclear power). Nuclear power facilities also present targets for terrorists, although the industry is a “harder” target than many other potential targets.

The United States generates nineteen percent of its electric power from 104 nuclear plants located in thirty-one states, mainly located in the eastern half of the U.S.³⁰⁶ Ten companies that operate seventy-six reactors dominate the nuclear electric power industry; Exelon is the largest with seventeen reactors.³⁰⁷ There have been no new nuclear

³⁰⁰ Garner, *supra* note 221; Steven D. Cook, *Energy Industry Officials Disagree On Future of Carbon Capture, Storage*, 38 Env't Rep. (BNA) 2071 (Sept. 28, 2007).

³⁰¹ *Industry Downplays DOE Report Doubling CO₂ Capture Process*, 18 Clean Air Rep. (Inside Wash. Publishers, Washington D.C.) No. 15 (July 26, 2007), available at 2007 WLNR 14210145.

³⁰² Stephen Siciliano, *Sequestration Called Best Way to Achieve Short-Term Reductions of Carbon Emissions*, 38 Env't Rep. (BNA) 2286 (Oct. 26, 2007).

³⁰³ *EPA Advisors Back CO₂ Storage Fund As Future-Gen Alternative*, *supra* note 247.

³⁰⁴ Dean Scott, *Budget Boosts Clean Coal, Nuclear Research, but Solar, Other Renewables Would See Cuts*, 39 Env't Rep. (BNA) 247 (Feb. 8, 2008).

³⁰⁵ See generally Fred Bosselman, *The Ecological Advantages of Nuclear Power*, 15 N.Y.U. ENVTL. L.J. 1 (2007) (Contrasting the “disastrous” impacts of coal use on ecological systems as compared to nuclear power).

³⁰⁶ NRC.gov, List of Power Reactor Units, <http://www.nrc.gov/reactors/operating/list-power-reactor-units.html> (last visited Jan. 13, 2009).

³⁰⁷ *Id.*

plants ordered in the United States since 1973. After the 1979 partial meltdown of Pennsylvania's Three Mile Island plant the nuclear industry was crippled. In the 1980s, Duke Power abandoned its partially built reactor in Cherokee County, S.C. at a loss of \$2.7 billion.³⁰⁸ But the climate for the nuclear industry may be changing. In 2007, the Tennessee Valley Authority opened a reactor it closed in 1985.³⁰⁹ In late 2007, NRG filed an application to build two new plants in Alabama.³¹⁰ Constellation Energy Group is seeking a partial license to add a nuclear unit to its Calvert Cliffs, Maryland facility.³¹¹ As of January 2008, the Nuclear Regulatory Commission had been notified that fifteen license applications would be submitted in 2008.³¹² Each application is expected to take forty-two months to process and will cost the applicant approximately \$100 million.³¹³

One of the reasons for the interest in nuclear plants is that the production cost of electricity is lower than natural gas, its primary rival energy. The nuclear industry's average production cost for electricity in 2007 was 1.68 cents per kwh.³¹⁴ Moreover, most of the cost of waste disposal and decommissioning of the plant is paid by the electric power consumer. But a nuclear power plant is expensive to build. A new nuclear reactor costs over \$4 billion, and the cost of twin reactor facilities that most nuclear applicants will propose cost \$12 to \$18 billion.³¹⁵ Florida Power and Light claims its proposed twin advanced design reactors near Miami could cost as much as \$24 billion.³¹⁶ An important element in revival of the nuclear energy industry is the amount of public subsidies and loan guarantees Congress is willing to provide. Title VI of the Energy Policy Act of 2005, provides \$1.6 billion for research and infrastructure and includes a number of provisions intended to jumpstart the construction of new nuclear power plants.³¹⁷ Foremost among these are the approval of a production tax credit of 1.8 cents per kwh

³⁰⁸ Steven Mufson, *Nuclear Power Primed for Comeback*, WASH. POST, Oct. 8, 2007, at A1, A10.

³⁰⁹ *Id.*

³¹⁰ *Id.*

³¹¹ *Id.*

³¹² Ferullo, *supra* note 207.

³¹³ *Id.*

³¹⁴ Press Release, Nuclear Energy Inst., U.S. Nuclear Power Plants Set Record Highs for Electricity Production, Efficiency in 2007 (Feb. 6, 2008), available at <http://www.nei.org/newsandevents/newsreleases/setrecordhighs/>.

³¹⁵ Ferullo, *supra* note 207.

³¹⁶ Lynn Garner, *Nuclear Power Advocates Tell Congress Federal Subsidies Are Critical to Renewal*, 39 Env't Rep. (BNA) 816 (Apr. 25, 2008).

³¹⁷ Pub. L. No. 109-58, tit. VI, 119 Stat. 594 (2005).

for the first eight years of operation in section 1306 and the authorization of the Department of Energy to provide loan guarantees of up to eighty percent of project cost for advanced nuclear energy facilities.³¹⁸ Section 638 provides standby support for delays beyond 180 days in the commencement of full operation for up to six new facilities due to litigation or delayed Nuclear Regulatory Commission approval, and section 602 extends liability protection for NRC licensees and DOE contractors to 2025 through amendments to the Price-Anderson Act.

The Energy and Water Appropriations Act of 2008 extends the loan guarantee program to FY 2010 and provides \$18.5 billion for nuclear reactors and \$2 billion for uranium enrichment.³¹⁹ In early 2008, it had not been resolved how the loan guarantee program was going to be financed. Project applicants may have to pay fees to cover the risk of default on the loans that are federally guaranteed, but the industry would prefer the risk and costs to be placed on the taxpayer. It also is not clear whether the loan guarantee program is large enough to move the industry to a new construction phase because of the high cost of construction.³²⁰ The FY2009 budget request would more than double funding for nuclear research and development from \$259 million in FY2008 to \$630 million in FY2009.³²¹ This is more than ten times the budget for wind power development. The budget request also would extend the loan guarantee fund for nuclear projects through FY2011.³²² A characteristic of nuclear power is its long dependency on federal subsidies, which have amounted to \$145 billion over the past fifty years.³²³ This is twenty-five times the support provided to develop wind and solar technologies.³²⁴

Another consideration are the limitations of the entire nuclear cycle. Uranium conversion is mainly carried out in a plant operated by CONVERDYN in Illinois.³²⁵ Uranium enrichment is primarily done at a

³¹⁸ *Id.* §§ 1701–1703, 119 Stat. at 1117–20 (to be codified at 42 U.S.C. §§ 16511–16513).

³¹⁹ S. REP. NO. 110-416, at 39, 44 (2008), available at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_bills&docid=f:s3258pcs.txt.pdf; Ferullo, *supra* note 207, at 199.

³²⁰ See Ferullo, *supra* note 207, at 199.

³²¹ Dean Scott, *Budget Boosts Clean Coal, Nuclear Research, but Solar, Other Renewables Would See Cuts*, 39 Env't Rep. (BNA) 247 (Feb. 8, 2008).

³²² Mike Ferullo, *Energy Department Plans Loan Guarantees for Clean Energy Nuclear Projects in 2008*, 39 Env't Rep. (BNA) 272 (Feb. 8, 2008).

³²³ Lynn Garner, *Markey Questions Focus on Nuclear Power, Favors Renewables for Future Power Needs*, 39 Env't Rep. (BNA) 520 (Mar. 14, 2008).

³²⁴ *Id.*

³²⁵ See Honeywell's Metropolis Works, <http://www.converdynam.com/metropolis/index.html> (last visited Jan. 13, 2009).

United States Enrichment Corporation (USEC)-operated plant in Paducah, Kentucky.³²⁶ Two new plants are being constructed, one at Picketon, Ohio and another at Eunice, New Mexico. Both are targeted to begin operating in 2009. The uranium oxide (UO₂) fuel assemblies are produced at four plants in Lynchburg, Virginia; Columbia, Maryland; Richland, Washington; and Wilmington, North Carolina. After the fuel is used in the reactor and removed it must be recycled and/or stored. Since 1977, there has been no recycling of spent nuclear fuel in the United States. Until recently, it was expected that spent fuel would be stored at Yucca Mountain, Nevada. However construction delays and political opposition have resulted in spent fuel being stored in fuel storage pools or in dry casks at reactor sites. Since 1998, the DOE has been responsible for storing this waste, with the costs covered by a tax on the production of electricity from nuclear plants. Yucca Mountain's capacity is now too small to store the reactor waste produced to date. This led the Bush Administration, in February 2006, to propose reprocessing spent fuel in the United States, which in addition to producing new fuel would reduce waste volume and its radioactive life.³²⁷

In many European nations nuclear power is an important source of electricity. Five nations generate more than half their electricity from nuclear sources—France (78.1%), Lithuania (72.1%), Slovakia (55.2%), Belgium (55.1%), and Sweden (51.8%).³²⁸ Germany and Finland and the other Eastern European nations are heavily dependent on nuclear power, and the Eastern European nations are building a new generation of nuclear power plants.³²⁹ China has nine plants and may build up to thirty more by 2021.³³⁰

D. *Renewable Energy*

Renewable energy sources such as wind, solar, biomass, landfill gas-to-energy projects, geothermal, and hydro can reduce dependence on fossil fuels. The cost of generating electricity using renewable energy has dropped by eighty to ninety percent in the past twenty years and is

³²⁶ USEC, Overview: Paducah Gaseous Diffusion Plant, http://www.usec.com/gaseous_diffusion_pad_overview.htm (last visited Jan. 13, 2009).

³²⁷ Press Briefing, Clay Sell, Deputy Sec'y, Dep't of Energy, Announcing the Global Nuclear Energy Partnership (Feb. 6, 2006), <http://www.energy.gov/news/3171.htm>.

³²⁸ Nina Sovich, *Europe's New Nuclear Standoff—Eastern States Embrace Atomic Energy, as Western Neighbors Waver*, WALL ST. J., June 29, 2005, at A13.

³²⁹ See *id.*

³³⁰ Steven Mufson, *Warming Up to Nuclear Power; Energy Source Gets Another Look as Fuel Costs Reach New Heights*, WASH. POST, Apr. 27, 2006, at D1.

continuing to drop.³³¹ Development of these “green” energy sources is a fast-growing segment of the energy industry, but the government has a mixed record in encouraging “green” power. The federal research and development budget for wind power is a modest \$50 million in FY2008 and in FY2009 it is to increase to \$53 million.³³²

Subchapter IV of the CAA provides 300,000 bonus allowances for utilities that implement renewable energy and conservation programs—as of November 2002, 47,493 allowances had been allocated.³³³ Most were in the western United States, not in the South or Mid-West where most electric power plant pollution is produced.³³⁴ Yet wind power in 2005 could be generated at \$.04 to \$.05 per kwh and some facilities get close to \$.03 per kwh.³³⁵ Replacing ten percent of 1993 levels of electric power production with wind power could have been accomplished by developing 1.8% of the wind resources in the lower forty-eight states.³³⁶

An important development is the spread of state renewable portfolio standards (RPS) that require a minimum percentage of the power sold in a state to come from renewable energy. Iowa, in 1991, was the first state to enact an RPS; it requires a specific amount of renewable electricity to be sold in the state.³³⁷ Most states that subsequently enacted RPS specified a percentage of electricity that had to be generated from renewable sources. The percentage of renewable electricity that is required to be sold ranges from 0.2 to 33%.³³⁸ By mid-2007, twenty-four states and the District of Columbia had RPS.³³⁹ New York, for example, requires twenty-five percent of the state’s power to be generated from renewable sources by 2013; California requires at least twenty percent by 2017.³⁴⁰ The major problem with RPS is they will not produce carbon reductions beyond those that could be achieved with a cap-and-trade system. Moreover cap-and-trade will achieve the same objective as

³³¹ Jeff Deyette, *Easing the Natural Gas Crisis*, CATALYST, Fall 2003, at 12, 13.

³³² Garner, *supra* note 321, at 247.

³³³ Curtis A. Moore, *The 1990 Clean Air Act Amendments: Failing the Acid Test*, 34 *Env'tl. L. Rep.* (Env'tl. Law Inst.) 10,366, 10,372 (2004).

³³⁴ *Id.*

³³⁵ *Id.* at 10,376.

³³⁶ *Id.*

³³⁷ BARRY G. RABE, *RACE TO THE TOP: THE EXPANDING ROLE OF U.S. STATE RENEWABLE PORTFOLIO STANDARDS* 3 (2006).

³³⁸ *Id.* at 4 tbl.1.

³³⁹ Lynn Garner, *Business Groups Battle Environmentalists Over Federal Renewable Electricity Standard*, 38 *Env't Rep.* (BNA) 1684 (Aug. 3, 2007).

³⁴⁰ Paul A. O'Hop, *Growing Green Power: Renewable Energy Must Overcome Financial and Legal Uncertainties*, *LEGAL TIMES*, May 16, 2005, at 39.

RPS at a lower cost and will preserve the freedom of the regulated entities to decide for themselves how to best comply.³⁴¹

The U.S. Department of Interior's Bureau of Land Management (BLM) on June 21, 2005, published its programmatic environmental impact statement (EIS) that is part of BLM's Wind Energy Development Program.³⁴² BLM hopes that in twenty years electricity generated using wind power on public lands will increase from 500 to 3200 megawatts of capacity.³⁴³ While the plan covers the western states, most of the development is expected to occur in Utah and in the three states—California, Nevada, and Wyoming.³⁴⁴ The BLM considers 160,000 acres of public land to be capable of wind-powered electric generation, based on both technical and economic suitability criteria.³⁴⁵

The federal government prior to 2005 provided tax incentives such as the 1.5 cents per kilowatt-hour production tax credit for wind, solar, closed-loop biomass, and geothermal projects.³⁴⁶ There also is a federal investment tax credit available.³⁴⁷ However, the tax incentives were not effective because they were unpredictable in their duration, while the industry's financing typically is based on twenty-year power purchase agreements. The production tax credit was available only for facilities coming on line before January 1, 2006. The uncertainty and short duration of these federal incentives limited their value.³⁴⁸

The 1992 Energy Policy Act, established a 1.5 cent tax credit for every kilowatt hour of electricity produced using "qualified energy resources," a term that includes by definition only wind and closed-loop biomass, at a "qualified facility."³⁴⁹ Closed-loop biomass is defined as "any organic material from a plant which is planted exclusively for purposes of being used at a qualified facility to produce electricity."³⁵⁰ This credit may be earned by a qualified facility, which is "any facility owned

³⁴¹ Neal J. Cabral, *The Role of Renewable Portfolio Standards in the Context of a National Carbon Cap-and-Trade Program*, SUSTAINABLE DEV. L. & POL'Y, Fall 2007, at 13, 14.

³⁴² Mike Ferullo, *Interior Completes Environmental Review Aimed at Boosting Wind Power Production*, 36 Env't Rep. (BNA) 1335 (July 1, 2005).

³⁴³ *Id.*

³⁴⁴ *Id.*

³⁴⁵ *Id.*

³⁴⁶ See 26 U.S.C. § 45 (2000).

³⁴⁷ See *id.* § 48(a).

³⁴⁸ See Lynn Garner, *Congress to Tie Up Loose Ends, Plans Early Action on Renewable Energy in 2008*, 39 Env't Rep. (BNA) 198 (Jan. 18, 2008).

³⁴⁹ Energy Policy Act of 1992, Pub. L. No. 102-486, § 1914, 106 Stat. 2776, 3220-22 (1992) (codified as amended at 26 U.S.C. § 45 (2000)).

³⁵⁰ 26 U.S.C. § 45(c)(2) (2000); see also Renewable Energy Production Incentives, 60 Fed. Reg. 36,959, 36,964 (July 19, 1995) (codified at 10 C.F.R. § 451 (2008)).

by the taxpayer which is originally placed in service after” December 31, 1992 for closed-loop biomass or after December 31, 1993 for wind.³⁵¹ The Energy Policy Act of 2005 provided a two-year extension for certain facilities of the production tax credit and expanded the qualifying methods to include solar, landfill gas, trash combustion, and certain hydropower facilities in addition to wind and biomass.³⁵² Various tax credits for renewable energy have either expired or are near their termination date. Section 45 of the IRC provides a production tax credit for electricity produced from renewable energy.³⁵³ IRC section 48 provides investment tax credits for commercial solar and fuel cell installation, and section 25D provides investment tax credits for residential solar and fuel cell installation.³⁵⁴ The tax benefits for renewable energy were to be extended by the bill that became the 2007 energy act. However, the bill’s renewable tax provisions were removed at the last minute because of opposition of the Bush Administration and the electric power industry. It also was opposed by the petroleum industry because Democrats wanted to fund the renewable program by removing \$16 billion in tax benefits from the oil and gas industry.³⁵⁵ The efforts to extend the investment tax credit for solar energy investment and the production tax credit for building wind turbines continued in 2008 as a small part of a tax bill, S. 3335.³⁵⁶ The bill is opposed by many interests because of its costs, and supported by those who stand to benefit, but renewable energy subsidies are trapped in the larger issue of tax legislation.³⁵⁷

Both wind power and solar power are intermittent power sources. Providing back-up power to intermittent sources is costly and limits their use. Therefore, to be economically viable these sources need to be able to sell surplus electricity to the power grid and to have the right to purchase power from the grid when needed. This is known as net metering or net billing, and is encouraged by laws in many states.³⁵⁸ An-

³⁵¹ 26 U.S.C. § 45(d)(1)–(2)(A)(i).

³⁵² Energy Policy Act of 2005, Pub. L. No. 109-58, § 1301, 119 Stat. 594, 986–90 (amending 26 U.S.C. § 45 (2000)).

³⁵³ 26 U.S.C. § 45.

³⁵⁴ 26 U.S.C. §§ 25D, 48.

³⁵⁵ Garner, *supra* note 348, at 198.

³⁵⁶ The Jobs, Energy, Families, and Disaster Relief Act of 2008, S. 3335, 110th Cong. § 103 (2008).

³⁵⁷ See Office of Mgmt. & Budget, Statement of Administration Policy: S.3335—Jobs, Energy, Families, and Disaster Relief Act of 2008 (July 30, 2008), <http://www.whitehouse.gov/omb/legislative/sap/110-2/saps3335-s.pdf>.

³⁵⁸ An issue that helps determine whether investments in alternative energy will be made concerns the price small generators receive for delivering electricity to the grid. In

other potential solution is to use intermittent power to produce hydrogen from water, which is a form of energy storage. But this also adds to the cost of using these technologies.

Some of the costs of using alternative energy sources may be offset by siting the facilities near the source of demand. This reduces the need for long-distance transport of electricity and the accompanying stress on the power grid and also reduces the danger of disruption of the electricity supply from mistakes, natural forces, or terrorism. As the number of independent generating units grows, so does the overall reliability of the system. But, despite the environmental benefits of using renewable energy, coal-burning plants enjoy a significant cost advantage. A centralized coal-burning electric power plant can produce electricity for about \$0.045 per kwh, while distributed alternative energy, such as that from small wind turbines, can cost about \$0.11/kwr.³⁵⁹

V. CONTROLLING THE TRANSPORTATION SECTOR

In 2006, the U.S. used twenty four percent of the world's oil supply but it has only two percent of the world's petroleum reserves.³⁶⁰ Transportation is responsible for 68.3% of U.S. petroleum consumption.³⁶¹ The U.S. imports approximately fifty-nine percent of the country's oil, with nearly one-fifth of the imports coming from the Persian Gulf states.³⁶² Twenty-two percent of the world's oil is controlled by states that are under U.S./U.N. sanctions for sponsoring terrorism.³⁶³ Venezuela does not support international terrorism, but its President, Hugo Chavez, is unfriendly to the U.S.³⁶⁴ With the United States importing about 4938 billion barrels of oil each year at prices in the summer of 2008 that were in excess of \$130 a barrel, producers are receiving about half a trillion dollars for petroleum. However, the U.S. Commerce Department reported a trade deficit for 2007 of \$815.6 billion, with only \$293.5 billion being the petroleum deficit.³⁶⁵ Regardless of the apparent

Colorado on March 26, 2008, legislation was enacted that allows customers to sell power back to the grid at the retail price that they pay as consumers. Tripp Baltz, *Governor Signs Legislation Allowing Renewable Energy to Offset Consumption*, 39 Env't Rep. (BNA) 677 (Apr. 4, 2008). This is an attractive incentive.

³⁵⁹ Ferrey, *supra* note 229, at 123.

³⁶⁰ DAVIS, DIEGEL & BOUNDY, *supra* note 155, at 1-6 tbl.1.5.

³⁶¹ *Id.* at 1-1 & 1-17 tbl.1.13.

³⁶² *Id.* at 1-8 tbl.1.7, 1-15.

³⁶³ Lou Dobbs, *That Old Black Magic*, U.S. NEWS & WORLD REP., Mar. 21, 2005, at 52.

³⁶⁴ See Jackson Diehl, *The Facade of Latin Democracy*, WASH. POST, June 6, 2005, at A19.

³⁶⁵ U.S. CENSUS BUREAU, ANNUAL TRADE HIGHLIGHTS (2008), www.census.gov/foreign-trade/statistics/highlights/annual.html.

discrepancy in these figures, our international relations and diplomacy options are dominated by the nation's dependence on oil. This petroleum dependence requires tremendous public sector expenditures to support the military capability to protect our petroleum supply. The expenditures for petroleum affect the value of the dollar and the overall economy, and the increasing worldwide demand is expected to keep upward pressure on oil prices despite the temporary drop in late 2008 due to a worldwide recession.

If efforts to limit climate change are to obtain the support of a majority of American voters, GHG controls need to be justified based on issues of concern to voters, such as energy security, the trade deficit, and national security. Concern for biosphere protection is unlikely to motivate either the national political leadership or the American public to modify their behavior, but other national economic and energy security concerns may do so. A program that involves the United States incurring a substantial portion of the costs and receiving a disproportionately small share of the benefits is difficult to sell to American voters.

The transportation sector accounted for thirty-three percent of the U.S. CO₂ emissions from fossil fuel combustion in 2005.³⁶⁶ Petroleum use is responsible for “virtually all” of the sector's emissions—gasoline consumption for personal vehicle use accounted for over sixty percent and other activities, including diesel use, accounted for the rest.³⁶⁷ From 1990 to 2005, CO₂ emissions from the transportation sector increased about twenty-nine percent for an average annual growth of 1.9%.³⁶⁸ During the same time period, population in the U.S. grew at a rate of 1.1%.³⁶⁹ Thus, more than half of the growth in carbon dioxide emissions from the transportation sector may be attributable to the effects of population growth.

The U.S. Supreme Court sent a strong signal to EPA that it should regulate carbon dioxide from motor vehicles. This will be difficult unless subsequent judicial decisions interpret away the clear language of the CAA that limits EPA's power to regulate motor vehicle GHG emissions. To effectively regulate CO₂ would require the Agency to limit the amount of fuel consumed by the transportation sector. Its efforts will of necessity overlap and perhaps supplant law that presently regulates motor vehicle fuel economy.

³⁶⁶ INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS, *supra* note 43, at ES-7.

³⁶⁷ *Id.*

³⁶⁸ *See id.* at 2-28.

³⁶⁹ *Id.* at ES-16 tbl.ES-9.

Prompted by the 1973–1974 Arab oil embargo and the consequent tripling of petroleum prices, in 1975 Congress enacted the Energy Policy and Conservation Act (EPCA).³⁷⁰ Among its provisions were Corporate Average Fuel Economy (CAFE) standards that impose fuel economy standards on light-duty vehicles.³⁷¹ Since model year 1990 they have been set at 27.5 miles per gallon (mpg) for passenger cars and for light-duty trucks they were 20.7 mpg from MY1996 through MY2004.³⁷² CAFE standards for light trucks increased in stringency to 21.0 mpg in 2005, 21.6 mpg in MY2006, and 22.2 mpg in MY2007, and the standard was changed in 2007 to require modest fuel efficiency improvements in MY2008 and thereafter in light-duty trucks.³⁷³ The 2007 changes are discussed below.

Passenger car fuel efficiency standards are set by Congress and are administered by the National Highway Traffic Safety Administration (NHTSA) within the Department of Transportation. NHTSA's authority is limited to adjusting the standards within a range of 26.0 to 27.5 mpg.³⁷⁴ If NHTSA amends the standard above or below the mandated range, the amendment must be submitted to Congress, and either House has sixty days to veto the amendment, although this one-House veto may be unconstitutional.³⁷⁵ NHTSA may amend the CAFE standards for light-duty trucks after considering “technological feasibility, economic practicability, other vehicle standards, and the need to conserve energy.”³⁷⁶ However, from FY1996 to FY2001, Congress prohibited NHTSA from changing CAFE standards.³⁷⁷

EPA determines fuel economy using the Federal Test Procedure (FTP) that it uses to determine a vehicle's emissions, but the test reports higher gas mileage than is achieved in real world driving. The FTP numbers are lowered by EPA because these unadjusted values are about twenty-five percent higher than an adjusted “real world” compos-

³⁷⁰ Energy Policy and Conservation Act, Pub. L. No. 94-163, 89 Stat. 871, 874 (1975); YACOBUCCI & BAMBERGER, *supra* note 140, at CRS-2.

³⁷¹ 49 U.S.C. §§ 32901–32902 (2000).

³⁷² DAVIS, DIEGEL & BOUNDY, *supra* note 155, at 4-18 tbl.4.17, 4-19 tbl.4.18.

³⁷³ *Id.* at 4-19 & tbl.4.18 (containing the 2005–07 CAFE standards); Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 102, 121 Stat. 1492 (2007) (amending 42 U.S.C. § 32902 (2000)).

³⁷⁴ 49 U.S.C. § 32902(c)(2).

³⁷⁵ *Id.*; YACOBUCCI & BAMBERGER, *supra* note 140, at CRS-2.

³⁷⁶ BRENT D. YACOBUCCI, SPORT UTILITY VEHICLES, MINI-VANS, AND LIGHT TRUCKS: AN OVERVIEW OF FUEL ECONOMY AND EMISSIONS STANDARDS CRS-3 (CRS Report RS20298) (2004).

³⁷⁷ *Id.*

ite value (55/45 combined city/highway mileage).³⁷⁸ CAFE standards are based on vehicle tests at the end of each model year; EPA calculates the fuel economy performance for each manufacturer.³⁷⁹ If the company's production fails to meet the standard, it is liable to the federal government for a civil penalty of five dollars for each 0.1 miles per gallon the fleet is above the standard for each vehicle manufactured.³⁸⁰ The CAFE program distinguishes between domestic and imported passenger cars. An imported car is one with less than seventy-five percent domestic content. The domestic fleet and the imported fleet each must meet the 27.5 mpg standard.

The actual fuel economy of U.S. cars and light trucks was 22.0 mpg in MY1987.³⁸¹ It dropped to its lowest value of 19.3 mpg in MY2004 and then improved slightly to 20.2 mpg in MY2006 and 2007.³⁸² Because of the increased sales of light trucks, vans, and sport utility vehicles (SUVs) the fuel efficiency of the motor vehicle fleet remained relatively constant for a decade despite improvements in vehicle technology.³⁸³ In 1970, trucks made up 17.4% of the nation's vehicle fleet,³⁸⁴ but in 2007, light-duty trucks and SUVs accounted for 49% of new vehicle sales.³⁸⁵ In 2006, 44.35% of the U.S. vehicle fleet were trucks and SUVs.³⁸⁶

In 1978 Congress created a gas-guzzler tax to discourage the purchase of passenger cars that get less than 22.5 mpg.³⁸⁷ This tax increased in the 1990 Omnibus Budget Reconciliation Act.³⁸⁸ However, the failure to impose the tax on light-duty trucks exacerbated the tendency of consumers to purchase trucks that actually are used as passen-

³⁷⁸ U.S. ENVTL. PROT. AGENCY, LIGHT-DUTY AUTOMOTIVE TECHNOLOGY AND FUEL ECONOMY TRENDS: 1975 THROUGH 2007, at i (2007) [hereinafter EPA FUEL REPORT].

³⁷⁹ 49 U.S.C. § 32904(a) (2000) (presenting the formula for calculating the average fuel economy).

³⁸⁰ *Id.* § 32912(b). Enforcement provisions are found at 49 U.S.C. §§ 32913–32916. Regulations for calculating penalties are found at 40 C.F.R. § 578.6(h) (2006). From 1983 to 2002, civil penalties were slightly over \$600 million, which mostly was paid by “small and specialty European manufacturers, not by the major U.S. or Japanese automotive manufacturers.” YACOBUCCI & BAMBERGER, *supra* note 140, at CRS-3.

³⁸¹ EPA FUEL REPORT, *supra* note 378, at 10 tbl.1.

³⁸² *Id.* at iii, 10 tbl.1.

³⁸³ Pamela Najor, *EPA Reports Average Fuel Economy of Model Year 2005 Vehicles Rose Slightly*, 36 *Env't Rep.* (BNA) 1556 (July 29, 2005).

³⁸⁴ *See* DAVIS, DIEGEL & BOUNDY, *supra* note 155, at 3-5 tbl.3.3.

³⁸⁵ *Id.* at 4-9 tbl.4.9.

³⁸⁶ *See id.* at 3-5 tbl.3.3.

³⁸⁷ Energy Tax Act of 1978, Pub. L. No. 95-618, § 201, 92 Stat. 3174, 3180–81 (codified as amended at 26 U.S.C. § 4064 (2000)).

³⁸⁸ Omnibus Budget Reconciliation Act of 1990, Pub. L. No. 101-508, 104 Stat. 1388, 1388–1437.

ger vehicles. For a car that gets 12.5 mpg or less, the gas-guzzler tax is \$7700.³⁸⁹ The tax drops as fuel economy improves and is not applicable to cars that meet a 22.5 mpg standard.³⁹⁰ EPA does not appear to have the power to modify this law.

The Energy Policy Act of 2005 contained no significant provision for improving the fuel economy of conventional vehicles, but it did authorize \$3.5 million per year to carry out fuel economy rulemakings.³⁹¹ It requires a report on the feasibility and effects of a significant reduction in fuel consumption by 2014, and it requires the estimated in-use fuel economy that is posted on the window of a new vehicle to be adjusted to approximate the mileage per gallon actually obtained by the vehicle.³⁹²

CAFE standards for automobiles are more stringent than the standards for light-duty trucks, SUVs, and crossover vehicles. A light-duty truck is “any truck or ‘truck derivative’ with a gross vehicle weight rating (GVWR) of 8500 pounds or less, and a vehicle curb weight (VCW) of 6000 pounds or less.”³⁹³ On April 6, 2006, the Department of Transportation published a final rule mandating new fuel economy standards for sport-utility vehicles, pickup trucks, vans, and minivans beginning with MY2008.³⁹⁴ The rule is expected to result in fuel economy for these vehicles of approximately twenty-four miles per gallon in MY2011.³⁹⁵ The new rule divides light-duty trucks into six classes according to size, with each class required to meet a different fuel economy standard.³⁹⁶ President Bush asked Congress for statutory authority to develop passenger car standards using a similar classification system, but Congress did not enact legislation, so NHTSA must continue to use a straight-line average for passenger cars.

Manufacturers are required to follow the reformed CAFE system starting in 2011.³⁹⁷ During a transition period from MY2008 through 2010, “manufacturers may comply with CAFE standards established under the [new] structure (Reformed CAFE) or with standards established

³⁸⁹ 26 U.S.C. § 4064(a).

³⁹⁰ *Id.*

³⁹¹ Energy Policy Act of 2005, Pub. L. No. 109-58, § 771, 119 Stat. 594, 834.

³⁹² *Id.* § 773, 119 Stat. at 834; YACOBUCCI & BAMBERGER, *supra* note 140, at CRS-11.

³⁹³ YACOBUCCI, *supra* note 376, at CRS-2.

³⁹⁴ Average Fuel Economy Standards for Light Trucks Model Years 2008–2011, 71 Fed. Reg. 17,566, 17,566 (Apr. 6, 2006) (codified at 49 C.F.R. pts. 523, 533, 537).

³⁹⁵ *Id.* at 17,568.

³⁹⁶ *Id.*

³⁹⁷ *Id.* at 17,566.

in the traditional way (Unreformed CAFE).³⁹⁸ The unreformed fuel economy limits will go from the MY2007 standard of 22.2 mpg to 22.5 mpg in MY2008, 23.1 mpg in MY2009, and 23.5 mpg in MY2010.³⁹⁹ In MY2011, the reformed light truck CAFE standards impose a fuel economy standard of 21.79 to 30.42 mpg and apply to all manufacturers.⁴⁰⁰ In addition, the final rule expands the applicability of CAFE standards. Starting in MY2011, the CAFE program will include medium-duty passenger vehicles (MDPV) (i.e., larger passenger vans and SUVs with a gross vehicle weight rating of under 10,000 lbs), which is expected to bring an additional 240,000 vehicles into the CAFE program by MY2011.⁴⁰¹ MDPVs have been subject to EPA's "Tier 2" emission standards since MY2004. Pickup trucks and panel trucks are not subject to MDPV requirements. The final rule also contains language claiming that federal requirements relating to fuel economy preempts California's mandate to reduce carbon dioxide emissions from motor vehicles.⁴⁰²

The new light-duty truck CAFE standards have been criticized by environmental groups for not going nearly far enough in tightening fuel economy standards.⁴⁰³ However, the new system attempts to incorporate safety concerns into the standards by considering the product of a vehicle's width (distance between tires) and its wheelbase (the distance from the front to the rear axles).⁴⁰⁴ The increased costs of the new CAFE average requirements are expected to be more than offset by fuel cost savings.⁴⁰⁵

In the *Center for Biological Diversity v. National Highway Traffic Safety Administration*, California, Connecticut, Maine, Massachusetts, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont, Minnesota, the District of Columbia, New York City, and four national environmental organizations challenged the "Average Fuel Economy Standards for Light Trucks, Model Years 2008–2011," promulgated by the NHTSA.⁴⁰⁶ Petitioners challenged the final rule under EPCA and

³⁹⁸ *Id.*

³⁹⁹ *Id.* at 17,568.

⁴⁰⁰ 71 Fed. Reg. at 17,607 tbl.4.

⁴⁰¹ *Id.* at 17,570.

⁴⁰² *See id.* at 17,654.

⁴⁰³ *See* Steven D. Cook, *New CAFE Standards to Raise Fuel Efficiency for Light Trucks 2.4 Miles a Gallon in 2011*, [Mar.] Daily Env't Rep. (BNA) No. 61, at A-1 (Mar. 30, 2006).

⁴⁰⁴ 71 Fed. Reg. at 17,568–69.

⁴⁰⁵ *See* YACOBUCCI & BAMBERGER, *supra* note 140, at CRS-9.

⁴⁰⁶ 508 F.3d 508, 508, 513 (9th Cir. 2007).

the National Environmental Policy Act of 1969 (NEPA).⁴⁰⁷ Petitioners claimed the rule could lead to increased GHG emissions because the use of vehicle weight classifications may encourage manufacturers to build larger, less fuel-efficient vehicles.⁴⁰⁸ Petitioners also challenged the final rule as arbitrary, capricious, and contrary to EPCA because it does not meet the “maximum feasible” standard; it perpetuates the SUV loophole that allows light-duty trucks to satisfy lower fuel economy standards; and it excludes most vehicles between 8500 and 10,000 pounds gross vehicle weight.⁴⁰⁹

On November 15, 2007, the Ninth Circuit held that the final rule is “arbitrary and capricious, contrary to the EPCA in its failure to monetize the value of carbon emissions, failure to set a backstop, failure to close the SUV loophole, and failure to set fuel economy standards for all vehicles in the 8500 to 10,000 GVWR class.”⁴¹⁰ The court also held that the Environmental Assessment was inadequate.⁴¹¹ The Ninth Circuit remanded the rule to NHTSA to promulgate new standards as expeditiously as possible and to prepare a full Environmental Impact Statement.⁴¹² The case will have continuing significance because of the court’s comprehensive review of CAFE regulation under the 1975 EPCA legislation.

While the challenges to NHTSA’s weak regulations were being litigated, the ongoing efforts to enact legislation imposing more stringent CAFE standards for passenger vehicles succeeded when the Energy Independence and Security Act of 2007 was signed into law on December 19, 2007.⁴¹³ Section 102 imposes more stringent CAFE standards beginning with MY2011. Two sets of standards are imposed, one set for passenger vehicles and another set for non-passenger vehicles.⁴¹⁴ The two categories are to achieve a combined fuel economy of thirty-five mpg for the fleet of vehicles sold in the United States by MY2020.⁴¹⁵ For 2021–2030, the fuel economy of each fleet of passenger and non-passenger automobiles sold in the United States shall meet the maximum feasible average fuel economy as determined by regulations to be

⁴⁰⁷ *Id.* at 513.

⁴⁰⁸ *See id.* at 513–14.

⁴⁰⁹ *Id.*

⁴¹⁰ *Id.* at 558.

⁴¹¹ *Id.*

⁴¹² *Ctr. for Biological Diversity*, 508 F.3d at 558.

⁴¹³ Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 102, 121 Stat. 1492, 1498 (to be codified at 42 U.S.C. § 17001).

⁴¹⁴ *Id.* at 1499.

⁴¹⁵ *Id.*

issued by the Secretary of Transportation.⁴¹⁶ In addition, each manufacturer shall meet a minimum standard for domestically manufactured passenger automobiles that is the greater of 27.5 mpg or “92 percent of the average fuel economy projected by the Secretary for the combined domestic and non-domestic passenger automobile fleets manufactured for sale in the United States by all manufacturers in the model year.”⁴¹⁷ How this legislation will affect EPA’s efforts to regulate mobile source GHGs is not clear. The Act, however, does not preempt EPA’s authority to set vehicle GHG emission standards, which will allow EPA to promulgate standards that either have the same effect as CAFE requirements or are more stringent. Creating two sets of overlapping fuel economy standards seems absurd, but such an action would be consistent with the Supreme Court’s holding.

Commercial medium-duty and heavy-duty highway vehicles as well as work trucks with a gross vehicle weight of 8500 to 10,000 pounds are to have new standards based on the maximum feasible improvement as determined by the Secretary.⁴¹⁸ The regulations are to be promulgated within two years after a report—called for by section 108 of the Ten-in-Ten Fuel Economy Act—is published by the National Academy of Sciences.⁴¹⁹ After regulations are promulgated they shall not be applicable for four full model years.⁴²⁰ Thus, the earliest that new regulations can be expected to be applicable will be in MY2016. The legislation enacted in 2007 includes a program that allows manufacturers that exceed the standards to obtain credits that can be applied to other vehicles in the manufacturer’s fleet that fail to meet the standard.⁴²¹ The Act also includes new labeling requirements aimed at requiring more accurate fuel efficiency information as well as information on GHG emissions.⁴²² The Act will require new regulations to be promulgated that will be applicable in about four years.

The effectiveness of the 2007 legislation will not be manifested for many years and will depend on the discretionary actions of NHTSA. The discussion found in the *Center for Biological Diversity* demonstrates that NHTSA cannot be considered a strong supporter of environ-

⁴¹⁶ *See id.*

⁴¹⁷ *Id.*

⁴¹⁸ *Id.* at 1500–01.

⁴¹⁹ § 102, 121 Stat. at 1500.

⁴²⁰ *Id.*

⁴²¹ § 104, 121 Stat. at 1502.

⁴²² § 105, 121 Stat. at 1503.

mental protection.⁴²³ Nevertheless, the U.S. Department of Transportation may be trying to act more responsibly. On April 22, 2008, its Secretary, Mary Peters, announced a proposed rule that calls for a 4.5% increase in fuel efficiency from MY2011 through MY2015, which exceeds the 3.3% increase in efficiency called for in the 2007 legislation.⁴²⁴ For passenger cars, the standard will be an industry average of 35.7 mpg by 2015.⁴²⁵ Light-duty trucks must average 28.6 mpg by 2015, and the combined average must meet a 31.6 mpg standard.⁴²⁶

Only about twelve to twenty percent of the energy in fuel is used to propel the vehicle. Between 1976 and 1989 “roughly 70% percent of the improvement in fuel economy was the result of weight reduction, improvements in transmissions and aerodynamics, wider use of front-wheel drive, and use of fuel-injection.”⁴²⁷ The potential for motor vehicle fuel efficiency improvements by 2015 is only between 10 and 15%; a mid-range 12.5% improvement would produce about an 11% CO₂ emission reduction.⁴²⁸ Ultimately, using existing technology, GHG emissions could be reduced by about thirty-eight percent for cars and light-duty trucks and twenty-four percent for heavy-duty vehicles.⁴²⁹ A National Academy of Sciences study in 2001 concluded that it is possible to obtain a forty percent fuel efficiency improvement in light-duty trucks and SUVs at costs that could be recovered over the lifetime of ownership.⁴³⁰ A study by the Northeast States Center for a Clean Air Future concluded that a twenty-five percent reduction in carbon dioxide emissions could be made using existing technology.⁴³¹ This potential improvement would not be realized if car buyers selected vehicles

⁴²³ See *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 508 F.3d 508, 558 (9th Cir. 2007).

⁴²⁴ Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011–2015, 73 Fed. Reg. 24,352, 24,355 (proposed May 2, 2008) (to be codified at 49 C.F.R. pts. 523, 531, 533, 534, 536, 537); Mary Peters, Sec’y, Dep’t of Transp., CAFE Standards Announcement (Apr. 22, 2008), *available at* <http://www.dot.gov/affairs/peters042208.htm>.

⁴²⁵ 73 Fed. Reg. at 24,355.

⁴²⁶ *Id.*

⁴²⁷ YACOBUCCI & BAMBERGER, *supra* note 140, at CRS-4.

⁴²⁸ DAVID L. GREENE & ANDREAS SCHAFER, REDUCING GREENHOUSE GAS EMISSIONS FROM U.S. TRANSPORTATION 22 (2003).

⁴²⁹ *Id.*

⁴³⁰ See NAT’L RESEARCH COUNCIL, *supra* note 146, at 5, 45.

⁴³¹ NORTHEAST STATES CTR. FOR A CLEAN AIR FUTURE, REDUCING GREENHOUSE GAS EMISSIONS FROM LIGHT-DUTY MOTOR VEHICLES, at xiv (2004). A subsequent study by the National Highway Traffic Safety Administration did not use mpg, but estimated substantial savings in fuel use could be achieved. See NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEP’T OF TRANSP., STUDY OF FEASIBILITY AND EFFECTS OF REDUCING USE OF FUEL FOR AUTOMOBILES 4 (2006).

with enhanced performance or if the improvement in fuel economy led to an increase in vehicle miles traveled (VMTs).⁴³²

The 2007 Act requires a forty percent increase in fuel economy from cars and light-duty trucks by 2020, but improved fuel efficiency is expected to be nullified by a projected fifty percent increase in VMTs by 2030.⁴³³ Population increases, as well as consumer choice, have contributed to the doubling of VMTs since 1970.⁴³⁴ With VMTs averaging an increase of 1.9% per year from 1996 through 2006, it is very difficult to improve efficiency enough to overcome the effect on CO₂ emissions from VMTs increases.⁴³⁵ The number of vehicles in the United States increased by over 55 million between 1990 and 2006.⁴³⁶ This is primarily the result of the growing population because the number of vehicles per thousand people in the United States increased by about sixty-seven per thousand between 1990 and 2006, so about 12 million additional vehicles are attributable to increases in consumption, but 35 million additional vehicles appear to be attributable to increased population.⁴³⁷ Sections 771 (automobiles), 751 (railroads), 752 (mobile emission reductions), 753 and 758 (aviation), and 754 (diesels) of the Energy Policy Act of 2005 authorize research on vehicle fuel efficiency, and section 721 establishes a program to promote domestic production and sale of hybrid and advanced diesel vehicles.⁴³⁸ The Energy Independence and Security Act of 2007 amended the Energy Policy Act of 1992 to include electric vehicles in the categories eligible for government assistance and created new incentives for electric vehicle development.⁴³⁹ But there appears to be no concern for the population growth that is driving much of the increase in VMTs.

To reduce CO₂ emissions from the transportation sector will require both technology improvements and changes in the use of transportation. To reduce VMTs requires long-term changes in land use and transportation that will be difficult to achieve because of the lack of political support. Moreover, many tax benefits are provided that encour-

⁴³² See Steven D. Cook, *Growth in Vehicle Travel May Wipe Out Emissions Reductions from New CAFE Bill*, 39 Env't Rep. (BNA) 158 (Jan. 25, 2008).

⁴³³ *Id.*

⁴³⁴ See NAT'L RESEARCH COUNCIL, *supra* note 146, at 19 fig.2-9.

⁴³⁵ DAVIS, DIEGEL & BOUNDY, *supra* note 155, at 8-2 tbl.8.1.

⁴³⁶ See *id.* at 3-5 tbl.3.3 (basing estimate on Federal Highway Administration numbers).

⁴³⁷ See *id.* at 3-8 tbl.3.5, 8-2 tbl.8.1.

⁴³⁸ Energy Policy Act of 2005, Pub. L. No. 109-58, §§ 721, 751-754, 758, 771, 119 Stat. 594, 818-20, 826-34.

⁴³⁹ Energy Independence and Security Act of 2007, Pub. L. No. 110-140, §§ 133-136, 121 Stat. 1492, 1511-16.

age a “petroleum-intensive lifestyle” including parking as an employee fringe benefit, “the home mortgage interest deduction,” “preferential tax treatment of the oil and gas industry,” and “rules that encourage the purchase of large sport utility vehicles.”⁴⁴⁰ Unless there is a major effort to reduce fuel consumption, GHG emissions will increase significantly. For the period 1997 to 2007, U.S. petroleum consumption by the transportation sector increased by 1.5% per year, and VMTs per capita increased by 0.9% annually from 1996 to 2006.⁴⁴¹ This resulted in a 2.11 million gallon per day increase in U.S. fuel consumption from 1997 to 2007.⁴⁴²

Proponents of programs to reduce emissions of GHGs push for increased CAFE standards because it is believed to be more politically feasible than increasing gasoline taxes or imposing fees on fuel-inefficient vehicles, although both economic-based measures and more stringent CAFE requirements could be used. If we are serious about reducing petroleum demand, we will need to increase the cost of driving by enacting a carbon tax or increasing gasoline taxes or by enacting other economic disincentives. According to the National Research Council, during the 1970s, CAFE standards reinforced the effect of high fuel prices and contributed to improved fuel economy.⁴⁴³ In the 1990s—when gasoline prices declined—the CAFE standards helped keep fuel economy above the level to which it might have fallen.⁴⁴⁴ But CAFE requirements require many years to have a beneficial effect, and delay is increased by the need to provide manufacturers adequate time to meet the standard. Moreover, without high fuel costs, it is difficult to get consumers to buy fuel-efficient vehicles. There are at least twenty-six vehicles marketed in the United States that achieve thirty-four mpg or better, based on EPA’s highway fuel economy test.⁴⁴⁵ But not enough of these vehicles have been purchased to prevent motor vehicle CO₂ emissions from increasing.

The use of hybrid vehicles can lower fossil fuel consumption and sales would benefit from more generous tax benefits for those purchasing these vehicles. The tax credit for buying a hybrid is as high as \$3400

⁴⁴⁰ Roberta F. Mann, *On the Road Again: How Tax Policy Drives Transportation Choice*, 24 VA. TAX REV. 587, 589 (2005).

⁴⁴¹ DAVIS, DIEGEL & BOUNDY, *supra* note 155, at 1-15 tbl.1.12, 8-3 tbl.8.2.

⁴⁴² *See id.* at 1-15 tbl.1.12.

⁴⁴³ *See* NAT’L RESEARCH COUNCIL, *supra* note 146, at 14.

⁴⁴⁴ *Id.* at 15.

⁴⁴⁵ *See* U.S. DEP’T OF ENERGY ET AL., 2007 FUEL ECONOMY GUIDE 5–9 (2007), available at <http://www.fueleconomy.gov/feg/FEG2007.pdf>.

a vehicle, but the credit drops as a manufacturer sells more vehicles and terminates when a manufacturer sells 60,000 vehicles.⁴⁴⁶ Thus, the Toyota Prius, the most fuel-efficient vehicle marketed in large numbers, gets forty-six mpg and no tax subsidy. This makes the Prius less attractive to many potential buyers since its higher cost requires many years to be recouped from fuel savings. If the goal of Congress is to reduce the nation's consumption of petroleum, it should not remove an incentive because it works. Congress wastes billions of dollars subsidizing ethanol and dual-fuel vehicles, which have little beneficial effect on fuel consumption or the environment, but Congress limits the use of incentives to purchase hybrids. While hybrids offer improved fuel economy, we should be planning to use plug-in hybrid vehicles that could be recharged at night when electric power demands are low.⁴⁴⁷

An important part of a GHG reduction program is an alternative fuels program to replace some of the gasoline and diesel fuel used in the transportation sector. Most of the effort to use alternative fuel has been directed at increasing the use of ethanol, which in the United States is almost always made from corn. Because ethanol is made from a renewable resource, it should produce no net CO₂ increase to the atmosphere when combusted. However, because fossil fuel is used to produce the corn and convert it to ethanol there is little net energy gain, and the combustion of ethanol increases air pollution.⁴⁴⁸ The manufacture of ethanol also results in air pollution. On May 1, 2007, EPA promulgated regulations to allow ethanol fuel plants to avoid air pollution requirements imposed by the PSD and nonattainment programs and to avoid fugitive emissions requirements.⁴⁴⁹ Ethanol production also has significant adverse impacts on water resources. Section 208 of the Energy Independence and Security Act of 2007 responds to part of this concern with language that gives EPA the power to consider water pollution impacts when deciding whether to ban or restrict the use

⁴⁴⁶ U.S. Dep't of Energy & U.S. EPA, New Energy Tax Credits for Hybrids, http://www.fueleconomy.gov/Feg/tax_hybrid.shtml (last visited Jan. 13, 2009).

⁴⁴⁷ See generally ELECTRIC POWER RESEARCH INST., ENVIRONMENTAL ASSESSMENT OF PLUG-IN HYBRID ELECTRIC VEHICLES (2007), available at <http://mydocs.epri.com/docs/public/PHEV-ExecSum-vol1.pdf> (finding carbon emissions diminish with the increased use of plug-in electric vehicles).

⁴⁴⁸ Arnold W. Reitze, Jr., *Should the Clean Air Act Be Used to Turn Petroleum Addicts into Alcoholics?*, 36 *Envtl. L. Rep.* (Envtl. Law Inst.) 10,745, 10,754–55 (Oct. 2006).

⁴⁴⁹ Prevention of Significant Deterioration, Nonattainment New Source Review, and Title V: Treatment of Certain Ethanol Production Facilities Under the "Major Emitting Facility" Definition, 72 *Fed. Reg.* 24,060, 24,061–62 (May 1, 2007) (to be codified at 40 C.F.R. pts. 51–52, 70–71).

of a fuel due to its water quality impacts.⁴⁵⁰ This is expected to help spur the development of cellulosic ethanol, which has a lower adverse environmental impact.

Without massive federal subsidies there would be no significant market for ethanol. Ethanol receives an excise tax credit and an income tax deduction that is worth about \$0.68 per gallon.⁴⁵¹ If the renewable fuels goal of 7.5 billion gallons by 2012 is met, the cost to the taxpayer will be \$5.1 billion a year.⁴⁵² If the Energy Independence and Security Act of 2007's 9 billion gallon requirement for 2008 is met, the costs will be higher. In addition, both the production of the corn feedstock and the construction of ethanol production facilities are subsidized. Despite ethanol having no benefit, except political, that justifies the large subsidies given to mid-west corn farmers and ethanol producers, Congress in the 2007 Energy Act expanded the program to require 36 billion gallons of renewable fuel to be used by 2022.⁴⁵³ The Act defines renewable fuel as fuel produced from biomass and cellulosic ethanol. It also includes a low-carbon standard that requires refiners to achieve at least a 20% reduction in GHGs from new facilities, 50% for biomass facilities, and 60% for cellulosic facilities over their lifecycles.⁴⁵⁴ On February 14, 2008, EPA announced the renewable fuel standard for 2008 would require 7.76% renewable fuel, by volume, to be in gasoline.⁴⁵⁵

The use of ethanol for fuel has raised the price of food and threatens the food supply of those nations that depend on U.S. food exports because farmland is being used to grow corn for ethanol production. In 2005 the United States used fifteen percent of the corn crop to supplant less than two percent of gasoline consumed.⁴⁵⁶ In 2007, government-created demand for ethanol was responsible for diverting twenty percent of the corn crop to ethanol refineries, which has contributed to the soaring price of corn.⁴⁵⁷ At the same time, we impose a fifty-four

⁴⁵⁰ Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 208, 121 Stat. 1492, 1531.

⁴⁵¹ Reitze, *supra* note 448, at 10,760.

⁴⁵² *Id.*

⁴⁵³ Pub. L. No. 110-140, § 202, 121 Stat. at 1521-22.

⁴⁵⁴ *Id.* at 1525.

⁴⁵⁵ Revised Renewable Fuel Standard for 2008, Issued Pursuant to Section 211(o) of the Clean Air Act as Amended by the Energy Independence and Security Act of 2007, 73 Fed. Reg. 8665, 8667 (Feb. 14, 2008).

⁴⁵⁶ George F. Will, *The Biofuel Follies*, NEWSWEEK, Feb. 11, 2008, at 64.

⁴⁵⁷ See Rod Nordland & Daniel Gross, *Now It's the \$6 Loaf of Bread*, NEWSWEEK, May 5, 2008, at 46.

cent per gallon tariff on Brazilian ethanol to keep it out of the country.⁴⁵⁸ The demand for ethanol for fuel also is leading to a worldwide conversion of land to the production of ethanol feedstock, and in the process forests are being destroyed to convert land to agricultural use.⁴⁵⁹ Congress, which appears to believe it should act first and then get the facts, authorized a study by the National Academy of Sciences to assess the impact of its renewable fuel requirements on the “production of feed grains, livestock, food, forest products, and energy,” in the Energy Independence and Security Act of 2007.⁴⁶⁰

The CAA and other federal statutes encourage the use of alternative fuel. The Alternative Motor Fuels Act of 1988 requires the federal government to acquire as many light-duty alcohol and natural-gas-powered vehicles as is practicable.⁴⁶¹ It established the Interagency Commission on Alternative Motor Fuels and provides for a commercial demonstration program.⁴⁶² The Energy Policy Act of 1992 applies to vehicles of 8500 pounds or less in fleets of twenty or more located in 125 consolidated statistical areas, as compared with twenty-two urban regions under the CAA.⁴⁶³ Beginning in 1996, state entities and “alternative fuel providers” are subject to the Energy Policy Act of 1992.⁴⁶⁴ The Department of Energy (DOE) may extend regulations to private and municipal fleets in 1999 if its program fails to generate sufficient voluntary efforts to procure alternative fuel vehicles.⁴⁶⁵ On March 14, 1996, DOE issued a final rule requiring companies that produce alternate fuels and operate light-duty vehicle fleets to acquire vehicles that run on alternative fuels.⁴⁶⁶ In addition to statutory requirements, executive orders establish alternative-fuels policy. For example, Executive Order 13149 seeks to reduce the federal government’s petroleum consumption, and encourages the use of alternative fuel and hybrid vehi-

⁴⁵⁸ See Will, *supra* note 456, at 64.

⁴⁵⁹ See Michael Grunwald, *The Clean Energy Scam*, TIME, April 7, 2008, at 40.

⁴⁶⁰ Energy Independence and Security Act of 2007, Pub. L. No. 110-140 § 203, 121 Stat. 1492, 1528.

⁴⁶¹ Alternative Motor Fuels Act of 1988, Pub. L. No. 100-494, § 4, 102 Stat. 2441, 2442 (codified at 42 U.S.C. § 6374 (2000)).

⁴⁶² *Id.* at 2445 (codified at 42 U.S.C. § 6374(c)).

⁴⁶³ Energy Policy Act of 1992, Pub. L. No. 102-486, § 301, 106 Stat. 2776, 2867-68 (codified at 42 U.S.C. § 13211 (9) & (11) (2000)); see Clean Air Act § 246, 42 U.S.C. § 7586 (2000).

⁴⁶⁴ Energy Policy Act of 1992, Pub. L. No. 109-58, § 501, 106 Stat. 2887 (codified at 42 U.S.C. § 13251).

⁴⁶⁵ See *id.* § 507, 106 Stat. at 2891-95 (codified at 42 U.S.C. § 13257).

⁴⁶⁶ Alternative Fuel Transportation Program, 61 Fed. Reg. 10,622, 10,623 (Mar. 14, 1996) (to be codified at 10 C.F.R. pt. 490).

cles.⁴⁶⁷ The Energy Independence and Security Act of 2007 added requirements for federal vehicles to improve fuel efficiency.⁴⁶⁸

For many years there has been a hope that a cost-effective technology would be developed that would allow the abundant supply of coal to be converted to a liquid fuel in a manner that did not create unacceptable environmental impacts. The process for conversion was advanced by the Germans during World War II and was improved by work in South Africa.⁴⁶⁹ The Air Force has been particularly interested in this technology because of its need for assured supplies of fuel for military operations.⁴⁷⁰ In the Energy Independence and Security Act of 2007, Congress created a major barrier to using coal-to-liquid fuel or fuel derived from tar sands, both of which produce almost double the GHGs of conventional fuels based on a life cycle analysis. Section 526 of the Act bars federal agencies from procuring alternative fuels or synthetic fuels unless a lifecycle analysis shows that GHGs are equal to or less than the GHG emissions from conventional petroleum.⁴⁷¹ The Air Force seeks to expand its purchase of coal-based synthetic fuels and fuel derived from oil sands from Canada. It is not clear whether these fuels are alternative fuels under section 526, and Canada may litigate under international trade rules if its oil export trade is restricted.⁴⁷²

The Energy Policy Act of 2005 provides funding for states, local governments, school districts, and private cargo carriers to replace existing diesel engines and vehicles with alternative fuel, fuel cell, and advanced diesel technologies, or to retrofit emissions systems on existing engines (Clean School Bus Program, section 741 and Diesel Truck Retrofit and Fleet Modernization Program, section 742).⁴⁷³ It also pro-

⁴⁶⁷ Exec. Order No. 13,149, 65 Fed. Reg. 24,607 (Apr. 26, 2000); *see also* Charles Openchowski, *The Next Greenhouse Gas Executive Order?*, 38 *Env'tl. L. Rep.* (Env'tl. Law Inst.) 10,077, 10,078–80 (Feb. 2008).

⁴⁶⁸ Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 142, 121 Stat. 1492, 1518 (amending 42 U.S.C. § 6374e).

⁴⁶⁹ Jeff Kinney, *Waxman Seeks to Clarify Energy Bill Ban on Fuels That May Worsen Global Warming*, 39 *Env't Rep.* (BNA) 552 (Mar. 21, 2008).

⁴⁷⁰ *House Faces Battle Over Pollution Limits on DOD Synfuel Purchases*, *Env'tl. Pol'y Alert* (Inside Wash. Publishers, Washington, D.C.), Mar. 26, 2008, *available at* FACTIVA, Doc. EPAL000020080326e43q00011; Dean Scott, *Pentagon Urged to Show How It Will Comply with Procurement Ban on Coal-to-Liquid Fuel*, 39 *Env't Rep.* (BNA) 206 (Feb. 1, 2008).

⁴⁷¹ Energy Independence and Security Act of 2007 § 526, 121 Stat. 1663 (to be codified at 42 U.S.C. § 17142).

⁴⁷² *House Faces Battle Over Pollution Limits*, *supra* note 470; *EPA Faces DOD Pressure on Measure for Fuels' Lifecycle GHG Emissions*, 19 *Clean Air Rep.* (Inside Wash. Publishers Washington, D.C.) No. 6 (Mar. 20, 2008), *available at* 2008 WLNR 5333047.

⁴⁷³ Energy Policy Act of 2005, Pub. L. No. 109-58, §§ 741–742, 119 Stat. 594, 821–25 (to be codified at 42 U.S.C. §§ 16091–16092).

vides in section 802 for the promotion of the development of commercial hydrogen and fuel cell technology.⁴⁷⁴ The Act in section 804 requires the Secretary of the Department of Energy to develop a five-year plan, with milestones.⁴⁷⁵ The plan's goal, found in section 805, is to develop an infrastructure by 2020 that will produce a significant number of hydrogen fuel cell and other hydrogen-powered vehicles.⁴⁷⁶ The goal identified in section 811(a)(4) is to have 100,000 hydrogen-fueled vehicles in the U.S. by 2010 and 2.5 million vehicles by 2020.⁴⁷⁷ The Act calls for programs that lead to the production of hydrogen from diverse sources including using renewable fuels, such as ethanol and methanol, and biofuels for hydrogen production. The Act's Title VIII authorizes \$3.3 billion for hydrogen fuel and fuel cell research and development during FY2006 to FY2010.⁴⁷⁸ However, the budget request for FY2009 calls for funding for hydrogen fuel cell and other hydrogen projects to be cut from the \$211 million in FY2008 to \$146 million.⁴⁷⁹ As part of this program numerous demonstration programs are authorized at section 808. Included in the Act's directives are requirements to develop solar technologies to produce both electricity and hydrogen at section 812.⁴⁸⁰ The Act calls for five projects to demonstrate the production of hydrogen at wind energy facilities at section 812(b).⁴⁸¹ The Act authorized \$1.25 billion over ten years for the development of a nuclear plant to produce electricity and hydrogen, and \$100 million to demonstrate hydrogen production at existing nuclear power plants at sections 645 and 634, respectively.⁴⁸²

The only way EPA can accomplish a reduction in carbon dioxide emissions from mobile sources is to impose fuel economy standards more stringent than the CAFE fuel economy standards administered by

⁴⁷⁴ *Id.* § 802.

⁴⁷⁵ *Id.* § 804.

⁴⁷⁶ *Id.* § 805.

⁴⁷⁷ *Id.* § 811(a)(4).

⁴⁷⁸ *Id.* §§ 805(h)–(i), 808(d), 809(c).

⁴⁷⁹ Lynn Garner, *President Requests \$1.1 Billion Increase in Funds for Energy Department in FY 2009*, 39 *Env't Rep.* (BNA) 246 (Feb. 8, 2008) (discussing the energy budget as a whole and noting that the 2009 budget for energy efficiency and renewable energy was cut by twenty-seven percent). For a discussion of the hydrogen program, see Arnold W. Reitze, Jr. & Jennifer B. Heaven, *The Hydrogen Economy and Its Potential Impacts*, 35 *Env't. L. Rep.* (Env't. Law Inst.) 10,003 (Jan. 2005).

⁴⁸⁰ Energy Policy Act of 2005, Pub. L. No. 109-58, § 812, 119 Stat. 594, 853–54 (to be codified at 42 U.S.C. § 16161).

⁴⁸¹ *Id.*

⁴⁸² *Id.* §§ 634 & 645, 119 Stat. at 790, 798–99 (to be codified at 42 U.S.C. §§ 16011 & 16025).

the Department of Transportation or by imposing requirements limiting the use of fossil fuels for transportation. Such actions would seem to be well beyond what Congress intended the CAA to regulate. However, in response to *Massachusetts v. EPA*, EPA and the National Highway Traffic Safety Administration (NHTSA) are trying to coordinate their rulemaking efforts so that compliance with one rule will achieve compliance with the requirements of both organizations.⁴⁸³

VI. STATE MOBILE SOURCE EMISSION CONTROLS

In 2002, California became the first state to impose GHG emission limits on motor vehicles when it enacted A.B. 1493.⁴⁸⁴ On September 24, 2004, the California Air Resources Board (CARB) adopted GHG regulations for passenger and light-duty vehicles. CARB's regulations address carbon dioxide, methane, nitrous oxide and hydrofluorocarbons; the control level is based on each gas's global warming potential expressed on a grams per mile (gpm) carbon dioxide equivalent basis.⁴⁸⁵ Compliance requirements are based on the "fleet average" for: (1) passenger cars (PCs) and light-duty trucks (LDTs) under 3750 pounds; and (2) LDTs over 3750 pounds and medium duty passenger vehicles (MDPVs).⁴⁸⁶ CARB's CO₂ regulations commence with MY 2009 and require a reduction in CO₂ emissions of about twenty-eight percent for cars and LDTs and eighteen percent for larger trucks and sport utility vehicles before 2013.⁴⁸⁷ The second phase, targeted for 2013 to 2016, requires a thirty-six percent reduction for cars and LDTs and twenty-four percent for larger vehicles from 2009 levels.⁴⁸⁸ Manufacturers that meet or exceed the requirements receive credits that may be used to

⁴⁸³ EPA, *NHTSA to Align GHG Auto Rules to Ensure Joint Compliance*, 24 *Env'tl. Pol'y Alert* (Inside Wash. Publishers, Washington, D.C.), Sept. 12, 2007.

⁴⁸⁴ Rachel L. Chanin, Note, *California's Authority to Regulate Mobile Source Greenhouse Gas Emissions*, 58 *N.Y.U. ANN. SURV. AM. L.* 699, 705 (2003); Carla Meninsky, Note, *California and Greenhouse Gas Emissions: Can the New Global Warming and Greenhouse Gas Emissions Act Survive Challenge?*, 9 *ENVTL. LAW.* 565, 565 (2003).

⁴⁸⁵ CAL. CODE REGS tit. 13, § 1961.1(a)(1)(B) (2008) (calculation of fleet average greenhouse gas value) & (e)(4) (defining "Greenhouse gas"). Hydrofluorocarbons are controlled through regulation of vehicle air conditioning systems. *Id.* § 1961.1(e)(1).

⁴⁸⁶ *Id.* § 1961.1(a).

⁴⁸⁷ See *id.* § 1961.1(a)(1)(A) n.1 (requiring reduction for PCs and LDTs under 3750 lbs from 323 gpm to 233 gpm and reduction for LDTs over 3750 lbs and MDPVs from 439 gpm to 361 gpm).

⁴⁸⁸ *Id.* (requiring reduction for PCs and LDTs under 3750 lbs from 323 gpm to 205 gpm and reduction for LDTs over 3750 lbs and MDPVs from 439 gpm to 332 gpm).

offset a manufacturer's emissions for up to five years.⁴⁸⁹ The law was challenged by automobile dealers and by the Alliance of Automobile Manufacturers.⁴⁹⁰ They claimed the CAA and the Energy Policy and Conservation Act (EPCA) preempt California's law.⁴⁹¹ In February 2005, the Association of International Automobile Manufacturers (AIAM) joined the lawsuit.⁴⁹²

On December 21, 2005, CARB requested a waiver from EPA pursuant to section 209(b) of the CAA in order for the state to regulate GHGs.⁴⁹³ An issue that needed to be resolved was whether EPCA preempts the field of fuel economy regulations pursuant to the Supremacy Clause of the U.S. Constitution.⁴⁹⁴ In *Central Valley Chrysler-Jeep v. Witherspoon*, the court, in motions for judgment on the pleadings, addressed the preemption issues.⁴⁹⁵ The court held that neither the CAA's section 209, EPCA, nor any other statute before the court allows California to disrupt the CAFE program, but this is not any issue to be decided on the pleadings.⁴⁹⁶ The regulations, the court held, are preempted under section 209(a) unless EPA grants a section 209(b) waiver because they are emission standards.⁴⁹⁷ The court went on to deny that EPCA creates a Dormant Commerce Clause issue because Congress, in enacting section 209, made a decision that more stringent California emission standards were a justified burden on commerce, although the court did not rule on whether EPCA preempts California's regulations.⁴⁹⁸ After this procedural skirmish, the court placed the case on hold until the Supreme Court could decide *Massachusetts v. EPA*.⁴⁹⁹

Meanwhile, EPA was not acting on California's waiver request to allow the state to set mobile source CO₂ emission standards. EPA was concerned that it might not have authority to issue a waiver because such standards are actually fuel economy standards regulated by DOT,

⁴⁸⁹ *Id.* § 1961(b)(3)(B) (“[C]redits earned in the 2009 and subsequent model years shall retain full value through the fifth model year after they are earned.”).

⁴⁹⁰ *Central Valley Chrysler-Jeep v. Witherspoon*, 456 F. Supp. 2d 1160, 1165 n.4 (E.D. Cal. 2006).

⁴⁹¹ *Id.* at 1166.

⁴⁹² *See id.* at 1165–66 n.4; Carolyn Whetzel, *International Automakers Join Challenge to California Rule Limiting Carbon Emissions*, 36 *Env't Rep.* (BNA) 276 (Feb. 11, 2005).

⁴⁹³ *Central Valley Chrysler-Jeep*, 456 F. Supp. 2d at 1165.

⁴⁹⁴ *Id.* at 1167.

⁴⁹⁵ *Id.* at 1167–75.

⁴⁹⁶ *Id.* at 1172, 1174 & n.12.

⁴⁹⁷ *Id.* at 1173.

⁴⁹⁸ *Id.* at 1185–86.

⁴⁹⁹ Carolyn Whetzel, *Auto Industry Challenge to California Rules Stayed Pending Decision on EPA Authority*, 38 *Env't Rep.* (BNA) 134 (Jan. 19, 2007).

but it said that it would wait until the Supreme Court decided *Massachusetts v. EPA* before making a decision. After the Supreme Court decided the case on April 2, 2007 and approved the use of overlapping fuel economy standards by both EPA and DOT, the pressure on EPA to issue a waiver to California increased. Pursuant to section 177 of the CAA, states with nonattainment areas may adopt California's new motor vehicle emission standards.⁵⁰⁰ Nine northeastern states (Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont), as well as Arizona, Florida, New Mexico, Oregon, and Washington adopted California's standards. In addition, states, including California, are seeking to have the federal government impose GHG emission restrictions on nonroad engines, which were claimed to be the source of 220 million tons of GHG emissions in 2007.⁵⁰¹ Their standards, however, are not enforceable until California receives a waiver from EPA allowing the standards to be implemented. Automobile dealers and manufacturers were litigating in California in the *Witherspoon* case to prevent imposition of fuel economy standards more stringent than federal requirements. In Vermont and Rhode Island, the automobile industry sued to prevent GHG regulations based on section 177 of the CAA from being implemented.⁵⁰²

Green Mountain Chrysler Plymouth Dodge Jeep v. Crombie was decided on September 12, 2007.⁵⁰³ The court, in a long opinion, ruled on Vermont's effort to regulate GHG emissions, although the regulation cannot be implemented until California receives a waiver for its regulations from EPA.⁵⁰⁴ The court concluded that the case was not about federal preemption under the Energy Policy and Conservation Act (EPCA), as plaintiffs claimed.⁵⁰⁵ The case was about the potential conflict between the EPCA and the CAA.⁵⁰⁶ The court held that the EPCA does not expressly preempt Vermont's GHG regulations, nor are they preempted under the doctrine of field preemption or conflict preemption.⁵⁰⁷ The court held that Vermont's rules that limit the grams per mile of carbon

⁵⁰⁰ Clean Air Act § 177, 42 U.S.C. § 7507 (2000).

⁵⁰¹ Carolyn Whetzel, *States, Advocacy Groups Seek Federal Rule to Cut Emissions from Nonroad Equipment*, 39 Env't Rep. (BNA) 204 (Feb. 1, 2008).

⁵⁰² *Lincoln-Dodge, Inc. v. Sullivan*, No. 06-70T, 2007 WL 4577377, at *1 (D. R.I. Dec. 21, 2007); *Green Mountain Chrysler Plymouth Dodge Jeep v. Crombie*, 508 F. Supp. 2d 295, 300–01 (D. Vt. Sept. 12, 2007).

⁵⁰³ 508 F. Supp. 2d at 295.

⁵⁰⁴ *Id.* at 302.

⁵⁰⁵ *Id.* at 354.

⁵⁰⁶ *Id.* at 302.

⁵⁰⁷ *Id.* at 354–57.

dioxide equivalent that may be emitted are not fuel economy standards but are emission standards.⁵⁰⁸ The court held “the fact that manufacturers may have to increase fuel economy . . . to comply does not per se convert an emissions standard to a fuel economy standard.”⁵⁰⁹ The court suggests that new technologies can be used to reduce GHG emissions, which supports its position that emission standards are not fuel economy standards.⁵¹⁰ The court’s position that regulatory limits on carbon dioxide equivalents in grams per mile is not a fuel economy standard is not supported by the laws of chemistry, but it is consistent with the U.S. Supreme Court’s ruling in *Massachusetts v. EPA*, which also twisted the applicable science to obtain the desired holding.

On December 19, 2007, EPA denied California’s request for a waiver, and on February 29, 2008, the denial was submitted for publication in the Federal Register.⁵¹¹ This denial also prevents the fourteen other states that have adopted California’s GHG regulations from implementing their programs.⁵¹² This is the first time that a request by California for a waiver has been denied; fifty-three waivers previously had been granted.⁵¹³ In response to EPA’s action, Representative Henry Waxman (D-Ca.) opened an investigation, and other members of Congress were demanding investigations.⁵¹⁴ On January 2, 2008, California and fifteen other states filed a lawsuit in the Ninth Circuit seeking to overturn EPA’s decision.⁵¹⁵ The Congressional Research Service issued a report on December 27, 2007 analyzing the legal requirements for granting or denying a waiver.⁵¹⁶ Four tests are identified: (1) whether the state has determined that its standards will be, in the aggregate, “at least as protective of public health and welfare as applicable federal

⁵⁰⁸ *Id.* at 397–98.

⁵⁰⁹ *Green Mountain Chrysler*, 508 F. Supp. 2d at 352.

⁵¹⁰ *See id.* at 352–53, 399.

⁵¹¹ California State Motor Vehicle Pollution Control Standards, Notice of Decision Denying a Waiver of Clean Air Act Preemption for California’s 2009 and Subsequent Model Year Greenhouse Gas Emission Standards for New Motor Vehicles, 73 Fed. Reg. 12,156, 12,157 (Mar. 6, 2008).

⁵¹² Richard Simon & Janet Wilson, *California Emissions Law Rejected; The EPA Says a New Energy Bill Trumps the State’s Tougher Greenhouse Standards. A Court Battle Is Expected*, L.A. TIMES, Dec. 20, 2007, at A1.

⁵¹³ JAMES E. MCCARTHY & ROBERT MELTZ, CALIFORNIA’S WAIVER REQUEST TO CONTROL GREENHOUSE GASES UNDER THE CLEAN AIR ACT, at CRS-2 (2007).

⁵¹⁴ Steven D. Cook, *Waxman Opens Investigation into EPA Denial of California’s Greenhouse Gas Limit Waiver*, 39 Env’t Rep. (BNA) 12 (Jan. 4, 2008).

⁵¹⁵ Petition for Review at 1, *California v. EPA*, No. 08–70011 (9th Cir. Jan 2, 2008); *California Disputes EPA Claims over Energy Law’s GHG Reductions*, 25 Envtl. Pol’y Alert (Inside Wash. Publishers, Washington, D.C.) No. 2 (Jan. 16, 2008).

⁵¹⁶ MCCARTHY & MELTZ, *supra* note 513, at CRS-7.

standards”; (2) whether this determination was “arbitrary and capricious”; (3) “whether the state needs such standards to meet compelling and extraordinary conditions”; and (4) “whether the standards and accompanying enforcement procedures are consistent with section 202(a) of the Clean Air Act.”⁵¹⁷ The tenor of the report supports California’s position that EPA acted illegally.

EPA’s Administrator Stephen Johnson said that the Energy Independence and Security Act of 2007 would address global warming better than a “patchwork” of standards.⁵¹⁸ This appears to be an erroneous statement. A California Air Resources Board (CARB) study documents that its GHG rules require more than double the reduction of the federal rules.⁵¹⁹ If the states that already have adopted the California standards are included in an evaluation, the CO₂ reduction between 2008 and 2016 would be 145 million metric tons (MMT) compared to 66 MMT from the federal standard.⁵²⁰ California’s rule would equate to a forty-three mpg CAFE standard by 2020 compared to a federal CAFE standard of thirty-five mpg by 2020.⁵²¹

CONCLUSION

Environmental degradation usually results from combined effects of population, per capita consumption and the amount of pollution per unit of consumption.⁵²² However, there is little, if any, widespread support for controlling either population or consumption. Because CO₂ emissions are produced even during ideal combustion, there is little hope of controlling carbon emissions through traditional pollution control efforts. To reduce CO₂ emissions requires increasing the thermal efficiency of production, substituting nuclear or renewable energy for fossil fuel, and sequestering CO₂. But utilizing these approaches will be costly and will require the use of technology that is not yet commercially available. Thus, worldwide emissions of carbon diox-

⁵¹⁷ *Id.* at Summary.

⁵¹⁸ See Letter from Stephen Johnson, Administrator, Env’t. Prot. Agency, to Arnold Schwarzenegger, Governor, State of California (Dec. 19, 2007), available at <http://www.epa.gov/otaq/climate/20071219-slj.pdf>.

⁵¹⁹ CAL. AIR RES. BD., COMPARISON OF GREENHOUSE GAS REDUCTIONS FOR THE UNITED STATES AND CANADA UNDER U.S. CAFE STANDARDS AND CALIFORNIA AIR RESOURCES BOARD GREENHOUSE GAS REGULATIONS, at vi (2008), available at <http://www.climatechange.ca.gov/publications/arb/ARB-1000-2008-012/ARB-1000-2008-012.PDF>.

⁵²⁰ *Id.* at vii tbl.ES-1.

⁵²¹ *Id.* at vii.

⁵²² See Arnold W. Reitze, Jr., *Population, Consumption and Environmental Law*, 12 NAT. RESOURCES & ENV’T 89, 89 (1997).

ide are expected to grow fifty percent from 2005 to 2030 according to the U.S. Energy Information Administration.⁵²³

The climate change debate pits the developed world, which has been responsible for most of the increase in CO₂ levels, against the developing world, which is expected to contribute to most of the increase in the future.⁵²⁴ Moreover, much of the increase is driven by the demands of an expanding population. World carbon dioxide emissions have increased 500% as the population increased 264% since 1950.⁵²⁵ This would indicate that the growth in population is responsible for a significant portion of the increase in carbon dioxide emissions and the remainder of the increase is due to an increased standard of living, assuming a rough correlation between energy consumption and the standard of living. However, restrictions on energy use could have devastating effects on efforts to improve the standard of living in poor nations because the increase in population and the increase in energy consumption in the past half century have not necessarily occurred in the same countries.

If humans are the cause of global warming, the rational approach would be to focus on the increase in population and consumption, but these factors are usually not addressed because of the lack of any political consensus in the United States or with most of the international community. It may be fair to say that the probability of successful efforts to control world population growth is slim, and the odds of nations abandoning efforts to improve their standards of living are lower. By 2015, thirteen cities are expected to have populations exceeding 10 million. Dhaka, Bangladesh, for example, located in a region expected to have serious problems from climate change, is projected to grow

⁵²³ Steven D. Cook, *EIA Forecasts 50 Percent Increase in Carbon Dioxide Between 2005–2030*, 39 *Env't Rep. (BNA)* 1271 (June 27, 2008).

⁵²⁴ See generally Steven Ferrey, *Why Electricity Matters, Developing Nations Matter, and Asia Matters Most of All*, 15 *N.Y.U. ENVTL. L.J.* 113 (2007)

⁵²⁵ DEP'T OF ECON. & SOC. AFFAIRS, UNITED NATIONS, *WORLD POPULATIONS PROSPECTS: THE 2006 REVISION 1 & tbl.1* (2007), available at http://www.un.org/esa/population/publications/wpp2006/WPP2006_Highlights_rev.pdf. Worldwide carbon dioxide emissions increased from about 5 billion metric tons in 1950 to over 28 billion metric tons in 2005. See ENERGY INFO. ADMIN., *GREENHOUSE GASES, CLIMATE CHANGE & ENERGY 1* fig.1 (2008), available at <http://www.eia.doe.gov/bookshelf/brochures/greenhouse/greenhouse.pdf>. Note the 1950 figures vary by source and appear to be crude estimates. See the estimates for 1950 of 1638 million metric tons and 1589 million metric tons made by the Carbon Dioxide Information Analysis Center at <http://cdiac.ornl.gov/ftp/ndp058/ndp058.pdf> (last visited Jan. 13, 2009). The DOE estimates for 1980 and thereafter can be found at Energy Info. Admin., *World Carbon Dioxide Emissions from the Use of Fossil Fuels*, <http://www.eia.doe.gov/ica/carbon.html> (last visited Jan. 13, 2009).

from 10 million people in 2000 to 22.8 million by 2015.⁵²⁶ The effect of climate change on these unstable and unsustainable areas of the world will have serious repercussions for national security.⁵²⁷

The United States is the world's third-largest nation, after China and India, with a population of over 300 million people.⁵²⁸ The primary contributor to GHG emissions from U.S. sources is carbon dioxide created by our large population directly and indirectly utilizing fossil fuels.⁵²⁹ Carbon dioxide emissions in the U.S. from fossil fuel combustion have increased annually since 1990 by an average of 1.4%; more recently the rate of increase has been less—0.7% in 2004.⁵³⁰ The nation's CO₂ emissions increase at about the same rate as the population increase of about 0.97% annually, which is among the highest rates of population increase of any developed nation.⁵³¹ In the span of thirty-nine years, from 1967 to 2006, the U.S. population rose by 100 million.⁵³² More than three million people are added to the U.S. population each year.⁵³³ If present trends in birthrate and immigration continue, the country is projected to have another 100 million people by 2043.⁵³⁴

To stabilize domestic carbon dioxide emissions, each American will have to reduce their fossil-fuel energy consumption by about one percent annually to overcome the emissions that appear to be attributable to the annual U.S. population increase. To reach the 1990 emission levels, which is the target of the Kyoto Protocol, would require additional reductions to offset the effects of the production necessary to sustain the more than fifty-seven million people added to the popula-

⁵²⁶ Pat Rizzuto, *Climate Change, Other Environmental Issues Affect Security, Development, Speakers Say*, 39 Env't Rep. (BNA) 455 (Mar. 7, 2008).

⁵²⁷ See generally CNA CORPORATION, NATIONAL SECURITY AND THE THREAT OF CLIMATE CHANGE (2007) (discussing the "national security consequences of climate change").

⁵²⁸ DEP'T OF ECON. & SOC. AFFAIRS, UNITED NATIONS, *supra* note 525, at 49 tbl.A.3 (2007).

⁵²⁹ INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS, *supra* note 43, at 2-1 (stating carbon dioxide from fossil fuel combustion "has accounted for approximately 77 percent" of GHG emissions since 1990).

⁵³⁰ *Id.*

⁵³¹ GLOBALIS, ANNUAL POPULATION GROWTH RATE 2005, http://globalis.gvu.unu.edu/indicator_detail.cfm?IndicatorID=29&Country=US (last visited Jan. 13, 2009).

⁵³² Mary Beth Ginder, *300-Million and Counting: Immigration Fuels U.S. Population Growth*, POPULATION NEWS, Oct. 6, 2006, available at <http://www.populationinstitute.org/newsroom/population-news/index.php?&id=41>.

⁵³³ VICTORIA D. MARKHAM WITH NADIA STEINZOR, CTR. FOR ENV'T & POPULATION, U.S. NATIONAL REPORT ON POPULATION AND THE ENVIRONMENT 10 (2006).

⁵³⁴ Ginder, *supra* note 532.

tion since 1990.⁵³⁵ The required reduction creates problems not shared by most developed nations because they do not have the same generous acceptance of legal and illegal immigration. Stabilizing our population would make the control of GHG emissions easier for the United States to achieve. But, in EPA's publication, *U.S. Greenhouse Gas Emissions and Sinks 1990–2005*, the Agency's discussion of the factors contributing to climate change in its executive summary makes no mention of population growth as a factor in the U.S. carbon dioxide emissions.

Because population stabilization appears to be an issue that is “off-the-table,” use of fossil fuels needs to be reduced at a rate that exceeds the effect of an expanding population. The most important stationary source of CO₂ emissions is the electric power industry. Cleaner and more efficient coal-burning plants could be built if we are willing to pay for them, but for thirty-six years the CAA and the political process has protected the electric utility from being required to upgrade many of its facilities. However, while new facilities can be designed to produce significantly less conventional pollution, fossil-fuel plants at this time can reduce carbon emissions by only about fifteen percent because carbon dioxide emissions are a function of energy conversion efficiency, not pollution controls. Moreover, with a dozen new coal-burning plants under construction and up to 150 new plants being projected by the Department of Energy to be constructed by 2030, the probability of significant CO₂ reductions are small, although the move to prevent the construction of new coal-burning power plants, previously discussed, may limit the number of plants actually constructed.⁵³⁶

An alternative approach would be to utilize more non-fossil-fueled electric power generation. Nuclear energy is an obvious choice, but its use presents issues of capital costs, subsidies, safety, and radioactive waste disposal.⁵³⁷ New hydroelectric plants are almost impossible to build because of opposition from environmentalists. Wind power often is opposed by environmentalists and by citizens living near proposed

⁵³⁵ See DEP'T OF ECON. & SOC. AFFAIRS, UNITED NATIONS, *supra* note 525, at 49 tbl.A.3 (estimating the U.S. population in 2007 to be approximately 306 million); 1990 Census, <http://www.census.gov/main/www/cen1990.html> (estimating the U.S. population in 1990 to be 248,709, 873).

⁵³⁶ Steven Mufson, *Midwest Has “Coal Rush,” Seeing No Alternative*, WASH. POST, Mar. 10, 2007, at A1.

⁵³⁷ See generally Harold P. Green, *Safety Determinations in Nuclear Power Licensing: A Critical View*, 43 NOTRE DAME L. REV. 633 (1968) (reflecting the long-standing challenges posed by nuclear power).

facilities.⁵³⁸ Moreover, wind power usually is not capable of being used for base load power. This could change if wind power generation was spread over a large area, but such an effort would require costly additions to the transmission grid. To reduce CO₂ emissions from the electric power sector is difficult, but California has successfully reduced its per capita use, primarily through conservation, to about one quarter of Wyoming's per capita use, which is among the highest in the nation.⁵³⁹ In 2001, the overall U.S. per capita GHG emissions was twenty tons per year, but California's per capita emissions were eleven tons per year.⁵⁴⁰

Reducing the one-third of the CO₂ emissions from fossil fuel combustion that is created by the transportation sector is not a technically difficult challenge. Vehicles presently available for sale could end most of our dependence on foreign oil, and more efficient vehicles could be produced without the need for new technology to be developed. Reducing the transportation sector's petroleum consumption is primarily a political and social problem. To get Americans to reduce their energy-consumptive lifestyle in order to reduce GHG emissions is the major challenge. Inefficient use of petroleum, exacerbated by domestic population growth and increased foreign demand for oil helps drive prices upward and the value of the dollar down. The nation's use of petroleum is an economic problem, an energy problem, a military problem, and a foreign policy problem. The world that was awash in inexpensive petroleum for a century now is gone, and other fossil fuel prices will continue to increase because they are linked to the price of petroleum.

The sooner we face the multifaceted problems created by the use of carbon-based fuels, the more likely a political consensus will emerge that may lead to solutions. While most efforts to date have failed, it is more alarming that even if the major international and domestic proposals were implemented they would have only a modest positive effect. Only reductions in fossil fuel use significantly larger than those proposed to date will have any chance for ultimately stabilizing atmospheric CO₂ concentrations. Whether the costs necessary to control CO₂

⁵³⁸ Jeremy Firestone et al., *Regulating Offshore Wind Power and Aquaculture: Messages from Land and Sea*, 14 CORNELL J.L. & PUB. POL'Y 71, 76 (2005); see Thomas Arthur Utzinger, *Federal Permitting Issues Relating to Offshore Wind Energy, Using the Cape Wind Project in Massachusetts as an Illustration*, 34 ENVTL. L. REP. (Envtl. Law Inst.) 10,794, 10,796 (Sept. 2004).

⁵³⁹ See Steven Mufson, *In Energy Conservation, California Sees Light*, WASH. POST, Feb. 17, 2007, at A1; Energy Information Administration, Table R2: Energy Consumption by Source and Total Consumption per Capita, Ranked by State, 2006, http://www.eia.doe.gov/emeu/tates/sep_sum/html/pdf/rank_use_per_cap.pdf (last visited Jan. 13, 2009).

⁵⁴⁰ David Hodas, *Imagining the Unimaginable: Reducing Greenhouse Gas Emissions by Forty Percent*, 26 VA. ENVTL. L.J. 271, 274 (2008).

emissions should be incurred will be a major scientific and political issue in the coming decade. However, since CO₂ released into the atmosphere has a residency time of perhaps 100 years, the costs that would be incurred today to prevent CO₂ releases mostly will benefit future generations that have little or no present political clout.

Reducing petroleum consumption should be a priority for the United States. Reducing the use of coal would help protect public health and the environment. The challenge is to do what needs to be done without unjustified adverse effects on the economy and without creating an intrusive bureaucracy that determines who can use energy and the amount that can be used. The legal system works best when it “tweaks” the system but allows the free market to work. GHGs as the primary causative factor in climate change need continued investigation, and any programs to control GHGs will need the flexibility to respond appropriately to new information. The science of climate change is still based to a great extent on mathematical models that require continued verification and refinement. The changes needed to stabilize the atmosphere’s GHG concentrations will take many years to accomplish and require profound changes in how energy is utilized. However, it is important to begin to make serious, but prudent, efforts to control GHG emissions. Many states, local governments, trade associations, and corporations are not waiting for a federal response, but have taken the lead in responding to climate change. This should be encouraged. To address climate change will involve many small steps that in aggregate could help reduce our dependence on fossil fuels. While time may be needed to develop national leadership on this issue, progress can be achieved by focusing on the fact that energy efficiency saves money.

Congress needs to take a more responsible position concerning climate change and enact comprehensive legislation aimed at lowering carbon emissions. A carbon tax would be the best approach, but such legislation may be politically impossible to enact. The energy legislation recently enacted has been designed primarily to benefit the energy industry. This needs to change. Efforts to enact new legislation to deal with climate change have focused primarily on a cap-and-trade approach. The trading part is likely to be inflationary. It also could result in a massive transfer of wealth to the industries that use or produce fossil fuels. The cap could have unintended consequences. It could lead to electric power brownouts and gasoline shortages, it would give a boost to nuclear energy, and it may lead to the kind of avoidance that appears to have occurred with the European Union’s cap-and-trade program. It also could encourage what manufacturing is left in the United States to move to foreign countries, and could lead to more importation of elec-

tricity from Canada and perhaps Mexico. A substantial energy tax designed to be as revenue neutral as possible would be a more effective approach, but no one program or piece of legislation is going to do the job.

An undesirable response would be to rely on the Clean Air Act because it is not a tool designed to deal with GHG emissions, or more specifically, CO₂. The five Justices in the majority in *Massachusetts v. EPA* promulgated a decision that pressures EPA to limit combustion. It is difficult to believe that Congress intended EPA to be the czar of fossil energy use based on the Clean Air Act. To limit carbon dioxide requires less fossil fuel to be combusted. This could be achieved through improvement in combustion efficiency, but the CAA does not provide EPA with the power or the ability to make this happen. Combustion of fossil fuels could be reduced by mandating the use of fuel-efficient motor vehicles, but Congress has a substantial track record of making only modest and ineffective use of this approach, and the CAA cannot easily be used to mandate fuel efficiency improvements. A motor vehicle program that has both EPA and the Department of Transportation imposing fuel efficiency standards would be ridiculous, but it would be consistent with the Supreme Court's opinion. EPA could encourage the use of nuclear power, expanded use of hydroelectric power, or seek to expand the use of alternative energy. Such efforts are unlikely to be effective and would carry the EPA well beyond what most people would consider the authority granted by the Clean Air Act and perhaps beyond what many people would consider the appropriate role of the Agency. EPA could achieve some of the goals of reduced fossil fuel combustion by making the Clean Air Act so onerous and expensive that the regulated community would be forced to seek alternatives to the use of fossil fuel. EPA lacks both the resources and the expertise to function effectively as the arbiter of energy use, and the potential for it to devastate the economy in the attempt to control GHG emissions is substantial.

The best hope for a viable program is that Congress will nullify *Massachusetts v. EPA* by creating an effective new program to reduce our dependence on carbon-based fuels without harming the economy. This may be overly sanguine.

