# II. ENERGY AND CLIMATE "WIN-WIN" SOLUTIONS

Global climate change and energy security are inextricably intertwined and together present one of the greatest challenges in the history of the United States and the world. To preserve our planetary home for ourselves and future generations, we must move swiftly to slash greenhouse gas emissions in the next couple decades. Ultimately, we must achieve global reductions of at least 50-85 percent by mid-century, requiring U.S. emissions to be cut by at least 80 percent in that time frame. At the same time, to preserve the United States' economic stability and national security, it is imperative that we move quickly to achieve energy independence. That can only be done by revolutionizing our transportation system to wean ourselves of oil, and by ramping up efficiency and clean electricity generation to power our growing economy.

The challenge facing America—and the core mission of the Select Committee—is to identify "win-win" solutions that simultaneously enhance energy security and combat global warming. Climate solutions are by necessity energy solutions: Energy production and consumption generate the vast majority of U.S. and global greenhouse gas emissions, and it is only by transforming our energy system that we will achieve the cuts needed to halt global warming. Fortunately, most of the leading technological solutions to global warming will substantially enhance energy security—including, most notably, boosting energy efficiency in the electric power, transportation, and buildings sectors, expanding renewable electricity generation, developing and deploying carbon capture and sequestration, expanding advanced biofuels production, and moving towards electric-drive vehicles. These are true "win-win" solutions.

The same cannot be said of some of the purported energy security solutions currently on the table. Notably, increasing our reliance on high-carbon fuels, such as coal-to-liquids, tar sands, or tar shale, may increase the domestic energy supply, but could greatly hinder our efforts to reduce greenhouse gas emissions. Increased domestic production of oil and natural gas can provide a "bridge" measure to help alleviate dependence on foreign oil in the medium-term, but its impact will be limited at best and it moves us no closer to solving the climate crisis. To the extent that a narrow focus on drilling distracts us from the larger challenges that are facing us, it will undermine our long-term energy and economic security.

This part lays out a series of recommendations—identifying "win-win" solutions that should be the priorities for enactment by the 111th Congress. The first and most overarching of these is the enactment of economy-wide "cap-and-invest" legislation that will simultaneously cut global warming pollution, protect American consumers, and channel private and public investment towards low-carbon energy technologies. In addition, we identify a series of sector-specific complementary measures—for the electric power sector, the built environment, and the transportation sector—that will support and enhance low-carbon energy technology development and deployment in these sectors.

In addition, in the Section entitled "Support Green Jobs and Clean Tech Investment," the report highlights the prospects for economic growth and green job creation these policies will

bring. As the United States is facing one of the most serious economic crises in history, this blueprint for change provides the key to jumpstart a powerful engine of economic recovery and development.

Finally, in the last two sections, the report identifies a series of measures needed to provide American consumers with short-term relief from high energy prices and to help guide the responsible development of domestic oil and gas resources while the United States brings alternative energy sources online.

## A. ENACT ECONOMY-WIDE "CAP-AND-INVEST" LEGISLATION

***The number one priority for energy security and climate change in the 111th Congress should be the adoption of economy-wide "cap-and-invest" legislation that will combat climate change while spurring an energy technology revolution.*** A number of proposals were introduced in the 110th Congress that provide useful precedents and ideas from which the next Congress can draw. These include:

- H.R. 6186, the Investing in Climate Action and Protection Act (iCAP), introduced by Mr. Markey
- The October 2008 climate legislation discussion draft circulated by Mr. Dingell and Mr. Boucher
- S. 3036, Lieberman-Warner Climate Security Act, introduced by Sen. Boxer
- H.R. 6316, the Climate MATTERS Act, introduced by Mr. Doggett
- H.R. 1519, the Safe Climate Act, introduced by Mr. Waxman
- S. 1766, the Low Carbon Economy Act, introduced by Sen. Bingaman and Sen. Specter

Based upon the Select Committee's work during the 110th Congress, balanced and workable climate legislation should adhere to the following design principles:

1. **Science-Based Emission Targets**: Reduce U.S. global warming pollution by at least 20 percent by 2020 and at least 80 percent by 2050, the necessary U.S. contribution to stabilize atmospheric concentrations of heat-trapping gases and avoid dangerous global warming.
2. **Economy-Wide, Market-Based, Cap-and-Trade Approach**: Utilize an economy-wide cap-and-trade system as the principal mechanism for achieving our emissions reduction targets.
3. **Ensure Effectiveness and Fairness Through Auctions:** Auction pollution allowances, instead of giving them free-of-charge to polluters, to avoid windfall profits to polluters, ensure fairness, and reduce social costs.
4. **Consumer Focused**: Return a substantial portion of the auction proceeds to low- and middle-income households to help compensate for any increase in energy costs as a result of climate legislation.
5. **Invest in Efficiency, Technology, and American Workers**: Make substantial investments to spur increases in energy efficiency and the development and deployment of low-carbon technologies, and to help American workers transition to the new low-carbon economy.

6. **Ensure Global Participation**: Include an integrated package of "carrots" and "sticks" to ensure that major-emitting developing countries, like China and India, take comparable action on global warming—and to avoid negative effects on the competitiveness of U.S. industry.
7. **Smart Offsets and Incentives for Supplemental Emission Reductions**: Establish rigorous standards governing the award of offset credits and provide robust financial incentives for supplemental reductions in "uncapped" emissions not eligible to generate offset credits.
8. **Rigorous Market Oversight**: Establish a rigorous framework for market oversight and regulation to ensure transparency, fairness, and stability in the market for emission allowances, offset credits, and the derivatives thereof.
9. **Build Resilience to Climate Change Impacts**: Build resilience to unavoidable impacts of climate change, both in the United States and in vulnerable developing countries. This must include investment in the necessary capacity to provide a robust Earth observation and prediction system.
10. **Integrate Complementary Policies and State and Local Roles**: Integrate cap-and-invest with complementary policies to overcome market barriers and reduce the overall cost of climate legislation, and preserve appropriate roles for State and local action on climate change.

***1. Reduce U.S. global warming pollution by at least 20 percent by 2020 and at least 80 percent by 2050, the necessary U.S. contribution to stabilize atmospheric concentrations of heat-trapping gases and avoid dangerous global warming.***

***It is imperative that any proposal ensure that the United States meets science-based emissions reduction targets to avoid impacts of dangerous global warming.*** According to the IPCC's Fourth Assessment Report, stabilizing greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous interference with the climate system will require a global effort to reduce anthropogenic greenhouse gas emissions worldwide by at least 50 to 85 percent below 2000 levels by 2050.[249] The IPCC and others estimate that, to play its part, the United States must reduce its total emissions by at least 80 percent from current levels over that timeframe.[250] Establishing stringent near-term reduction targets will be essential to achieving adequate cumulative emission reductions, and to ensuring that long-term reduction targets are achieved in a cost-effective manner. At minimum, U.S. emissions should be reduced by 20 percent by 2020. A comprehensive climate proposal should also provide a mechanism for periodic review, whereby the United States' emissions reduction goals may be strengthened if the latest scientific information dictates that it is necessary.

[249] Intergovernmental Panel on Climate Change, Climate Change 2007: Mitigation of Climate Change, Summary for Policymakers at 15 (Table SPM.5) (2007).
[250] Intergovernmental Panel on Climate Change, Climate Change 2007: Mitigation of Climate Change, Summary for Policymakers at 38-39 (Table TS.2) (2007); Amy L. Luers et al. (Union of Concerned Scientists), How to Avoid Dangerous Climate Change: A Target for U.S. Emission Reductions (Sept. 2007), available at http://www.ucsusa.org/global_warming/solutions/big_picture_solutions/a-target-for-us-emissions.html.

***2. Utilize an economy-wide, market-based cap-and-trade system as the principal mechanism for achieving emissions reduction targets.***

***A market-based cap-and-trade system is the most cost-effective mechanism to achieve deep and certain emissions reductions in the United States.*** Unlike traditional command-and-control regulations like emissions performance standards, a cap-and-trade system allows reductions to be made where the cost is lowest, saving compliance and administrative costs and increasing flexibility. One alternative to a cap-and-trade system is a carbon tax, which can provide an effective mechanism to incentivize economy-wide emission reductions. For example, Rep. Larson has introduced H.R. 3416, the "America's Energy Security Trust Fund Act," an economy-wide carbon tax bill which is discussed in Rep. Larson's additional views, appended to this report. A cap-and-trade system has the advantage of guaranteeing a specified level of emissions reductions over a given timeframe—which is essential given the gravity of the impending climate crisis.

***To lower the overall cost of climate legislation, ensure fairness, and avoid perverse incentives, as many sources of emissions as is practicable should be included in the cap-and-trade program.*** Of course, it is not practicable or cost-effective to include all sources in such a program. Examples of categories that, because of administrative costs and difficulty, should not be under the cap include: (1) sources for which measurement of emissions is exceedingly difficult, and (2) categories that comprise very numerous sources, have very low emissions at each source, and are not susceptible to regulation at an "upstream" choke point (see discussion below). For these reasons, emissions from landfills, wastewater treatment facilities, coal mines, and small farms and agricultural soil management, for example, should be excluded from the cap—though some of these sources are readily susceptible to regulation through performance standards. Select Committee staff research indicates that 87 percent of U.S. emissions can be included in a cap-and-trade system, including virtually all emissions from the industrial, energy, and transportation sectors.

***Two additional important choices must be made—the point at which to regulate the "capped" emissions and the emissions threshold that determines whether a source is included or not included in the cap.*** Each emissions stream may be capped upstream, downstream, or midstream. An "upstream" cap places the point of regulation with the point-of-entry of fossil fuels or fluorinated industrial greenhouse gases (like HFCs, PFCs, $SF_6$, or $NF_3$) into commerce in the United States. A "downstream" cap is one in which the point of regulation coincides with the point of emissions of greenhouse gases. A "midstream" cap places the cap somewhere in between. For example, emissions from coal combustion could be regulated upstream at the coal mines or downstream at the electric power or industrial facilities burning the coal. Similarly, emissions from transportation could be regulated upstream at the refineries or (theoretically) downstream at the level of individual car, plane, train, and ship owners. Natural gas offers even more options: upstream at the wellheads, downstream at the electric power, industrial, commercial, or residential users of the gas, or midstream at the natural gas processing plants or natural gas distribution companies. Most current proposals employ some combination of upstream, downstream, and midstream caps.

Many economists favor upstream caps because they reduce the number of points of regulation, and therefore—it is argued—reduce administrative costs.[251] Nevertheless, downstream caps for power plants and large industrial point sources generally are preferable, because these entities directly control the decisions that affect the emissions-intensity of their operations. If emissions thresholds are set correctly, the number of covered sources is manageable. And in the case of electric power plants, these entities also typically already monitor their $CO_2$ emissions and have experience with other market-based approaches to environmental protection.[252] Downstream caps are not feasible for the transportation sector or for industrial gases, which are characterized by a vast number of dispersed emission sources. Combustion of natural gas in the residential and commercial sectors poses a unique problem. It is not advisable to place an upstream cap on natural gas processing plants, as at least one legislative proposal this Congress has done. Doing so would eliminate coverage of emissions from the use of "pipeline-quality" gas, which is not processed and currently represents at least 25 percent natural gas produced in the United States.[253] Creating this loophole could encourage increased production of pipeline quality gas, further decreasing the cap's coverage.

***To maximize emissions coverage while reducing administrative complexities, a mixed approach including upstream and downstream caps is recommended.*** This approach would include the following:

- Power Plants and Industrial Facilities: A downstream cap on power plants and industrial facilities;
- Transportation and Other Liquid- and Gaseous Coal or Petroleum-Based Fuels: An upstream cap on producers or importers of petroleum- or coal-based liquid or gaseous fuels—capturing most of the emissions attributable to the transportation sector, as well as those attributable to home heating oil and oil-fired electric generating units;
- Fluorinated Gases: An upstream cap is placed on producers or importers of HFCs, PFCs, $SF_6$, or $NF_3$;
- Residential and Commercial Natural Gas Use: A midstream cap on natural gas local distribution companies—capturing emissions from residential and commercial use of natural gas; and
- Geological Carbon Sequestration Sites: A downstream cap carbon capture and sequestration sites to capture any leakage of carbon dioxide.

To avoid double-counting of emissions, (1) industrial facilities and electric utilities should not be required to submit allowances for any emissions resulting from the use of petroleum- or coal-based liquid or gaseous fuels; (2) natural gas local distribution companies should not be required to submit allowances for emissions resulting from combustion of any natural gas delivered to industrial facilities and electric utilities subject to the program; and (3) industrial facilities and

[251] Robert N. Stavins, "Addressing climate change with a comprehensive U.S. cap-and-trade system," ENRP Discussion Paper 2008-01, Belfer Center for Science and International Affairs, John F. Kennedy School of Government, Cambridge, MA (Jan. 2008); Robert Repetto, "National Climate Policy: Choosing the Right Architecture", Yale School of Forestry and Environmental Studies (June 2007).

[252] CERA Advisory Service/North American Environmental Startegies (for Edison Electric Institute and National Commission on Energy Policy), "Design Issues for Market-Based Greenhouse Gas Reduction Strategies" (Feb. 2006).

[253] Select Committee Majority staff communication with Department of Energy staff.

power plants should not be required to submit allowances for emissions of HFCs, PFCs, $SF_6$, or $NF_3$ that are purchased for use at the facility.

***The second choice to be made is what level of emissions from a given source should trigger compliance responsibilities.*** This choice of emissions threshold affects both the number of facilities with compliance obligations and the aggregate emissions covered under the cap. To maximize emissions coverage while limiting administrative costs, a fair test is that entities that do not emit 10,000 metric tons $CO_2$-equivalent of greenhouse gases annually should not be required to submit allowances. A 10,000 metric ton $CO_2$-equivalent threshold would account for 80 percent of emissions from the manufacturing sector (while burdening only 2 percent of facilities with compliance requirements) and virtually 100 percent of emissions from the electric power sector (while burdening 35 percent of facilities) in the United States.[254] This threshold would yield approximately 10,000 regulated entities for an economy-wide program. Other proposals recommend a higher threshold of 25,000 metric tons $CO_2$-equivalent like the one used in the EU's reporting program. Research by the California Environmental Protection Agency indicates that in California, raising the reporting threshold from 10,000 metric ton $CO_2$-equivalent to 25,000 metric ton $CO_2$-equivalent for currently permitted facilities would decrease emissions coverage by only 2 percent, but decrease the number of affected facilities by half.[255] Similar analysis should be performed on a national level, taking into consideration the scope of the national program, before making a final determination.

***3. Auction pollution allowances, instead of giving them free-of-charge to polluters, to avoid windfall profits to polluters, ensure fairness, and reduce social costs.***

***One of the key questions in designing a cap-and-trade system to reduce greenhouse gas emissions is how to allocate tradable allowances.*** This was the subject of the Select Committee's January 23, 2008 hearing entitled "Cap, Auction, and Trade: Auctions and Revenue Recycling Under Carbon Cap and Trade." As a general matter, allowance allocation does not affect the achievement of the program's environmental goal; the emissions cap must be met regardless of how allowances are distributed. However, allowance allocation does significantly affect how costs and benefits are distributed, and it can also affect the system's overall cost. In addition, allocation is relevant to environmental performance insofar as auctioning and revenue recycling (or allocation of allowances for public benefit purposes) can be used to achieve reductions in emissions by sources not covered by the overall emissions cap—for example, by providing financial incentives for agricultural or forestry practices or projects that sequester carbon.

***The government has long experience in auctioning public resources, whether radio spectrum or mineral rights. The ability to pollute is another public resource, and Congress, as the steward of that resource, should obtain fair value for it through auctions.***

[254] Tristram West and Naomi Pena, Determining Thresholds for Mandatory Reporting of Greenhouse Gas Emissions, 37 Environmental Science and Technology 1059 (2003).
[255] California EPA/Air Resources Board, State Report: Initial Statement of Reasons for Rulemaking, Proposed Regulation for Mandatory Reporting of Greenhouse Gas Emissions at 52 (Oct. 19, 2007).

***Furthermore, economic theory and real-world experience indicate that—except in certain contexts such as utilities subject to cost-of-service regulation—free allocation of allowances may lead to windfall profits for polluters***.[256] This is so because, even where polluters receive allowances for free, these allowances have substantial value. As a result, a firm's decision to produce a marginal unit of electricity or other product carries with it an opportunity cost—the cost of having to submit allowances to the government equivalent to the emissions generated in producing that marginal unit, rather than selling those allowances on the open market. Many economists conclude that, except in limited circumstances, polluters can be expected to incorporate this cost into the product's price, even though they received the allowances for free. This results in a net transfer of wealth from consumers to polluters. There is growing evidence that, consistent with these predictions, free allocation under Phase I of the EU Emissions Trading System (ETS) led to windfall profits in some sectors.[257]

***Auctions avoid this problem and have a number of other potential advantages as well.*** Auctioning eliminates the need to come up with rules for allocating allowances among incumbent polluters and accommodating new entrants into the market—and avoids "rent seeking" behavior among polluters seeking to secure free allocations. Auctioning can also provide an earlier, stronger, and clearer price signal to reduce emissions. Finally, auctions generate revenues that can be used for a variety of beneficial public purposes. Such purposes could include rebates or tax credits to reduce the program's economic impacts on consumers, reduction of distortionary taxes on labor or capital, transitional support for workers in adversely affected industries, investment in research, development, demonstration, and deployment of technologies such as renewables and carbon capture and sequestration (CCS), efficiency policies, policies that reduce emissions from sectors not subject to the cap, and investment in adaptation to the impacts of climate change.[258]

***Existing market-based systems are moving towards full auctioning.*** The European Commission has proposed that, for Phase II of the EU ETS (2013-2016), the ETS should shift to 100 percent auctions for utilities and greatly increased reliance on auctions for industrial sources.[259] In the United States, most of the states participating in the northeastern Regional Greenhouse Gas Initiative (RGGI) have adopted full or near-full auctioning of allowances.

***Auction design is critically important to ensuring market liquidity and stability.*** To optimize liquidity and stability, auctions should be held on a quarterly basis using forward

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[256] Testimony of Dallas Burtraw, Robert Greenstein, and Peter Zapfel before the Select Committee on Energy Independence and Global Warming, hearing on "Cap, Auction, and Trade: Auctions and Revenue Recycling Under Carbon Cap and Trade" (Jan. 23, 2008).

[257] Testimony of Peter Zapfel before the Select Committee on Energy Independence and Global Warming, hearing on "Cap, Auction, and Trade: Auctions and Revenue Recycling Under Carbon Cap and Trade" (Jan. 23, 2008).

[258] Testimony of Dallas Burtraw, Robert Greenstein, and John Podesta before the Select Committee on Energy Independence and Global Warming, hearing on "Cap, Auction, and Trade: Auctions and Revenue Recycling Under Carbon Cap and Trade" (Jan. 23, 2008).

[259] Testimony of Peter Zapfel before the Select Committee on Energy Independence and Global Warming, hearing on "Cap, Auction, and Trade: Auctions and Revenue Recycling Under Carbon Cap and Trade" (Jan. 23, 2008); Commission of the European Communities, Proposal to Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gasemission allowance trading system of the Community (Jan. 23, 2008), available at http://ec.europa.eu/environment/climat/emission/pdf/com_2008_16_en.pdf.

auctioning of allowances—up to four years prior to the date of compliance obligations. Providing a regular and frequent supply of allowances to the market, some well in advance of compliance obligation deadlines, will help to reduce volatility, contain costs, increase liquidity, and increase certainty for regulated entities. A broad range of auction formats are possible, but two—the single-round, sealed-bid, uniform price format and what is known as an "ascending clock" multiple round format—have garnered support from economists working in this area.[260] RGGI's initial auction utilized the former, but future RGGI auctions may employ the latter if necessary to address evolving market conditions.[261] Auction design should incorporate mechanisms—such as bidding limits and publication of bid information, among others—to enhance transparency and reduce the potential for collusion or manipulation.[262]

***4. Return a substantial portion of the auction proceeds to low- and middle-income households to help compensate for any increase in energy costs as a result of climate legislation.***

***Auctioning allowances allows the government to transfer the value of the allowances (i.e., auction proceeds) to low- and middle-income households to compensate for any increase in energy costs due to climate legislation.*** Federal climate legislation can and should avoid burdening low-income households, which spend a greater share of their income on energy costs in comparison with higher-income households. Research by the Center for Budget Policies and Priorities (CBPP) demonstrates that setting aside 14 percent of allowance value would be sufficient to compensate for increased energy costs for the 20 percent of American households with the lowest incomes.[263] The "Climate Change Rebate Act of 2008" (H.R. 7194), introduced by Select Committee member Rep. Hilda Solis, compensates households in the bottom two income quintiles for reductions in purchasing power associated with increased energy costs under climate legislation. However, middle-class households can and should be protected as well. For example, Chairman Markey's iCAP bill (H.R. 6186), which sets aside 55 percent of allowance value for this purpose, compensates virtually all increased energy costs for 66 percent of U.S. households (including all households of four earning under $70,000 per year) and provide benefits to over 80 percent of U.S. households (including all households of four earning up to $110,000 per year).

***Refundable tax credits and rebates should each play a role in transferring funds to low- and middle-income households.*** For those households that file tax returns, refundable tax credits are a simple, efficient way to deliver funds. It is possible to design a tax credit that, like the earned income tax credit (EITC), phases in with earnings and is adjusted for family size, but would be available to households with higher incomes. There is a good case for designing a

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[260] See Charles Holt et al., Auction Design for Selling CO2 Emission Allowances under the Regional Greenhouse Gas Initiative (Oct. 2007), available at http://www.rggi.org/docs/rggi_auction_final.pdf; Peter Crampton, "Comments on the RGGI Market Design" (Nov. 15, 2007), available at http://www.cramton.umd.edu/papers2005-2009/cramton-rggi-market-design-comments.pdf.

[261] Regional Greenhouse Gas Initiative, Design Elements for Regional Allowance Auctions under the Regional Greenhouse Gas Initiative (Mar. 17, 2008), available at http://www.rggi.org/docs/20080317auction_design.pdf.

[262] Holt et al., supra note 260.

[263] Testimony of Robert Greenstein before the Select Committee on Energy Independence and Global Warming, hearing on "Cap, Auction, and Trade: Auctions and Revenue Recycling Under Carbon Cap and Trade" (Jan. 23, 2008).

separate tax credit for seniors, whose needs are likely to be smaller since they receive Social Security benefits with automatic cost-of-living-adjustments that account for any increases in consumer prices. Credits for seniors could phase in with the sum of their Social Security benefits, pension income, and veterans' benefits. For lower-income households that do not always file taxes and may need benefits on a more frequent basis, monthly cash rebates can be provided using the Electronic Benefit Transfer system already used for food stamps.[264] H.R. 6186 and H.R. 7194 include each of these elements: a refundable tax credit, a senior tax credit, and a rebate program for low-income households.

***Direct compensation has some important advantages over providing consumer-relief funds to utilities or other entities.*** First, compensating households directly ensures that consumers will still receive the signal of higher energy prices, thus incentivizing greater efficiency and a transition to lower-carbon energy sources, yet will ultimately not suffer financially as a result of climate legislation. In addition, direct consumer relief provides a mechanism to address energy costs other than those related to electricity (such as gasoline).

***5. Make substantial investments to spur energy efficiency, develop low-carbon technologies, and help American workers to transition to the new, low-carbon economy.***

***A significant portion of auction proceeds should be used to spur the development of zero- and low-carbon energy technologies in the United States.*** These investments will speed the commercialization of new technologies, reduce the overall cost of climate legislation, and grow the U.S. economy by positioning us to be able to sell these technologies around the world.

***First, a cap-and-invest program can provide a crucial funding source for programs to increase energy efficiency—particularly in the electric power and transportation sectors.*** As discussed at greater length below, such programs can deliver major reductions in GHG emissions, greatly enhance our energy security, and substantially reduce the cost of achieving our climate goals. H.R. 6186 proposes an innovative approach to the promotion of efficiency measures, by establishing a pay-for-performance program under which States receive funding from auction proceeds based on their performance in increasing efficiency in the electric power sector and buildings. Competitive grants supporting State and local programs to reduce vehicle miles traveled—thus increasing the efficiency of the transportation sector—are also authorized. These provisions have been incorporated into the Dingell-Boucher discussion draft circulated in October 2008.

***Second, cap-and-invest legislation should focus on strategic investments in research, development, demonstration, and deployment of renewable energy technologies and CCS.*** Congress has authorized a range of important RD&D programs under EISA and other recent legislation, but these programs have not yet received adequate funding. To speed the widespread early deployment of renewable electricity generation—which will help renewable technologies to mature quickly to cost parity with fossil fuel technologies—cap-and-invest legislation should

[264] See Center on Budget Policy and Priorities, Fact Sheet: How a "Climate Rebate" Would Work (June 3, 2008), available at http://www.cbpp.org/6-3-08climate-fact.htm; Testimony of Robert Greenstein; Testimony before the Select Committee on Energy Independence and Global Warming, hearing on "Cap, Auction, and Trade: Auctions and Revenue Recycling Under Carbon Cap and Trade" (Jan. 23, 2008).

provide a long-term funding stream for incentive programs. Incentives can be designed as tax credits (such as the current Production Tax Credit and Investment Tax Credit) or as a package of production payments (perhaps awarded through a reverse auction) for commercial-scale operations and rebates for the purchase and installation of distributed generation technologies such as solar panels. Climate legislation should provide cost-sharing grants to cover incremental costs of implementing CCS technology at coal-fired power plants in order to bring this technology to market before a carbon price signal alone will. Other priorities for technology funding under a climate proposal, many of which are discussed in the sections that follow, include electric transmission and distribution efficiency (including smart-grid technologies), low-carbon renewable fuels, low-emission vehicles, and building efficiency.

***Finally, the proposal should include robust programs to assist American workers with the transition to a low-carbon economy.*** Green jobs training programs, such as those enacted under EISA, should be supported. In addition, a program should be established to provide training, income support, and tax credits for health care insurance for up to two years to any workers affected by the transition to a low-carbon economy. Both S. 3036 and H.R. 6186 provide models for such a program.

***6. Include "carrots" and "sticks" to ensure that major-emitting developing countries, like China and India, take comparable action on global warming—and to avoid negative effects on the competitiveness of U.S. industry.***

***It is imperative that any proposal include provisions to encourage international action to combat climate change.*** Without international action, dangerous global warming cannot be avoided.

***First, a climate proposal should encourage the President to work proactively under the United Nations Framework Convention on Climate Change, and in other appropriate forums, to establish binding agreements committing all major greenhouse gas-emitting nations to contribute equitably to the reduction of global greenhouse gas emissions.***

***Second, a climate proposal should create "carrots" to encourage our trading partners to take action that is comparable to that of the United States to combat climate change.*** Carrots could include access to funding for deployment of clean energy technologies in developing countries and assistance for countries that take actions to reduce emissions from deforestation. The ability to sell offset credits into the U.S. carbon market should also be conditioned upon a country taking comparable action. (This restriction could be lifted, however, for countries that are among the least developed of developing nations or countries with very low greenhouse gas emissions.)

***Third, a climate proposal must include "sticks" to prevent adverse impacts on U.S. competitiveness.*** A border adjustment mechanism should be put in place to assign an additional cost to imports from countries that have not taken comparable action to reduce greenhouse gas emissions. Countries that have not taken comparable action should be required to purchase special "international reserve allowances" to accompany their imports and account for the greenhouse gas emissions from the production of those goods. The pool of international reserve

allowances should be separate from the domestic allowance pool, so that the program will not affect domestic emission levels or the price of domestic emission allowances. Proceeds from the sale of international reserve allowances can be used to supplement clean technology transfer and international adaptation programs. Least-developed countries and countries with very low greenhouse gas emissions may be exempted from this requirement. A number of proposals, including S. 1766, S. 3036, H.R. 6186, and the Dingell-Boucher discussion draft have included border measures of this type.

***In designing the international reserve allowance program, Congress must be cognizant of World Trade Organization restrictions and design the program carefully to maximize chances of withstanding legal challenges.*** In addition, a time lag between the beginning of the U.S. cap and trade program and the implementation of an international reserve allowance program will be necessary, as international negotiations may take a number of years. To prevent production shifting abroad and thus resulting in loss of U.S. jobs and an undermining of the environmental objective of the legislation, a proposal should provide assistance to trade-exposed U.S. manufacturing industries during this interim period. This interim program should be designed carefully to encourage early reductions in greenhouse gas emissions and avoid windfall profits to polluters. To do this, allocation of assistance within a sector should be based upon production levels rather than emissions levels.

***7. Establish rigorous standards governing the award of offset credits and provide robust financial incentives for supplemental reductions in "uncapped" emissions not eligible to generate offset credits.***

***Comprehensive climate legislation should contain thoughtful use of both "offsets," which can reduce the overall cost of a cap-and-invest system, and targeted financial incentives that can deliver supplemental reductions in emissions or increases in sequestration.***

***Offset credits should be awarded for reductions in "uncapped" emissions or increases in biological sequestration that can be clearly demonstrated to be real, verifiable, additional, permanent, and enforceable.*** EPA should develop standard measurement methodologies for project types eligible for offset credits and put in place rigorous standards for project development and approval. The risk of allowing offsets into the market is that if they are not real, verifiable, additional, permanent, and enforceable, they will compromise the United States' overall emissions cap. For this reason, caution dictates that only a short list of "uncapped" emissions or biological sequestration opportunities be allowed to earn offset credits. These include reductions in emissions from sources difficult to cap, such as oil and gas systems, livestock operations, and abandoned coal mines, and increases in biological carbon sequestration through afforestation and reforestation. As for international offset credits, there has been substantial concern in recent years about the integrity of some categories of credits issued under the Kyoto Protocol's Clean Development Mechanism. It is essential that a rigorous regulatory screening mechanism be established to determine which, if any, international offset credits should be allowed to be used in a U.S. cap-and-invest system. Finally, appropriate quantitative limits should be placed on the use of both domestic and international offset credits, to avoid flooding the market and to ensure that adequate investment is directed towards the transformation of our energy economy.

***Because financial incentives are less risky in that they cannot compromise the emissions cap, Congress should consider a proposal providing direct financial support, but not offset credits, for projects where the climate benefits are less certain.*** These include projects that increase biological sequestration of carbon or reduce greenhouse gas emissions through improved agricultural soil management and forest management practices. Providing financial incentives for U.S. farmers and foresters to achieve greenhouse gas reductions through such projects can deliver substantial climate and other environmental benefits, while channeling income and jobs to rural areas.

On the international level, massive supplemental reductions are possible through the provision of incentives to encourage developing countries to implement national policies to slow deforestation and forest degradation—which account for 20 percent of global greenhouse gas emissions. Incentives can also be used to encourage deployment of clean energy technologies—including American-made technologies—in developing countries, helping to bridge the financial gap between clean and "dirty" technologies in these countries. As explained above, access to such incentives can be made contingent upon these countries taking comparable action to combat climate change, providing important "carrots" to encourage such action.

***8. Establish a rigorous market oversight regime to ensure transparency, fairness, and stability in the market for emission allowances, offset credits, and the derivatives thereof.***

***Economy-wide climate legislation will establish a market in tradable emission allowances and offset credits—and related derivatives, such as futures and options—that is likely to be valued in the hundreds of billions of dollars annually.*** The recent subprime mortgage meltdown on Wall Street, excessive speculation in the oil and natural gas markets, and manipulation of the electricity markets—among other historical examples—all underscore the critical need for vigorous government oversight of this new carbon market. Avoiding manipulation of the carbon market takes on a special importance for at least two reasons: First, consumers will bear the burden of price volatility in the carbon markets resulting from excessive speculation or market manipulation, in the form of higher energy prices, just as they have in the case of the oil markets. Second, the carbon market is one of the few examples in which the government is effectively requiring private parties to participate in a new market.

***The carbon market created under a cap-and-invest system can be divided into three components: (1) auctions of emission allowances, (2) a secondary market involving trading of emission allowances and offset credits, and (3) a market in derivatives, such as futures and options, based on emission allowances and offset credits.*** Oversight of the auction market should be assigned to the agency charged with conducting auctions (EPA in most legislative proposals), which should be given adequate authority for that purpose. It is possible that, under recent legislation amending the Commodities Exchange Act, the Commodity Futures Trading Commission will have some authority over futures and options contracts based on emission allowances or offset credits—to the extent that such contracts serve a "significant price discovery function."[265] However, there is no existing regulatory authority over the secondary market in

[265] Renee Johnson et al., The 2008 Farm Bill: Major Provisions and Legislative Action, Congressional Research Service Report No. RL34696, at 38 (Oct. 3, 2008).

allowances and offsets themselves, except to the extent that such trading is conducted on already-regulated exchanges.

***While further work needs to be done on the design of an appropriate regulatory oversight system for the carbon market, it is apparent that several core principles should govern that system:***

- Immediate New Authority: First, robust oversight system needs to be authorized by Congress *concurrently* with the establishment of the carbon market through climate legislation.
- Unitary Regulator: Second, regulation over the secondary market in emission allowances and offset credits, on the one hand, and derivatives based on these instruments, on the other, should not be divided among multiple agencies. These markets operate in an integrated fashion, and it is imperative that a unitary regulator have authority to oversee both the spot market and the futures market.
- Relationship with Energy Markets: Third, because of the close interrelationship between the carbon market and markets in energy commodities like electricity, coal, and natural gas, there is some value to assigning oversight of the carbon markets to an entity, like the Federal Energy Regulatory Commission, that already has oversight responsibilities in the energy markets.
- Maximize Transparency and Oversight: Fourth, one means of maximizing transparency and oversight and enforcement authority over carbon market trading would be to require, to the greatest extent possible, that trading occur on federally regulated exchanges. There may be important benefits to over-the-counter (OTC)—meaning off-exchange—trading in derivatives for legitimate hedging purposes. But if OTC trading is to be permitted, alternative oversight mechanisms such as large-trader reporting requirements, may be appropriate.
- Robust Anti-Manipulation and Enforcement Authority: Fifth, whatever the mechanism for regulatory oversight, the federal regulator should be given robust authority to monitor the market, ensure public reporting of price and other transaction data, and to prevent fraud, manipulation, and excessive speculation—including strong enforcement authorities.

These principles are reflected in Title II of Chairman Markey's iCAP bill (H.R. 6186), the most detailed proposal to date for carbon market oversight, which charges the Federal Energy Regulatory Commission with regulating the carbon market. The iCAP carbon market oversight provisions are incorporated into the Dingell-Boucher discussion draft circulated in October 2008.

### *9. Build resilience to unavoidable impacts of climate change.*

***Unfortunately some impacts from climate change are now unavoidable, regardless of the path we choose to take.*** As discussed above, these impacts will be borne most heavily by vulnerable communities, both here in the United States and abroad.

***Climate legislation should include funding to aid communities in the United States and in vulnerable developing countries in adapting to these impacts of climate change.*** Domestically, climate legislation should include the following elements:

- Regional and National Assessments: Establish a federally-led process to periodically assess the United States' vulnerability to climate change impacts in the near-, medium-, and long term, at a regional and national levels. This process should capitalize on the economies of scale for scientific observation and research at the federal level, while involving researchers, institutions, public officials, and other stakeholders at the State and local level in developing "down-scale" assessments of climate impacts.
- National Climate Service: Establish a National Climate Service to provide research products and decision tools to federal, State, local, and tribal decision-makers, to enable them to assess and appropriately respond to predicted climate change impacts.
- National Adaptation Strategy: Establish an interagency group at the federal level to develop and periodically update, in coordination with federal, State, local, and tribal stakeholders, a national strategy to protect our infrastructure, public health systems, and our natural resources, wildlife, and fisheries from climate change impacts.
- Federal Agency Adaptation Plans: Require federal agencies to develop and implement plans to address climate change impacts within their respective jurisdictions.
- Fund State, Local, and Tribal Adaptation Projects: Provide a mechanism to fund State, local, and tribal government programs and projects to build resilience to climate change impacts.

***These policies will require a substantial federal investment in policy-relevant climate monitoring, observational, modeling, and research capacity to provide a robust Earth observation and prediction system.*** Chairman Markey's iCAP bill (H.R. 6186) provides the most detailed legislative proposal thus far on domestic adaptation programs, and the domestic adaptation provisions of iCAP are incorporated into the Dingell-Boucher discussion as one potential option for use of allowance value.

***Internationally, climate legislation should provide aid to the most vulnerable developing nations to increase their resilience to the impacts of climate change.*** As explained above, lower-income countries in the developing world that are least responsible for climate change are likely to suffer some of the worst impacts and have the least capacity to respond to those impacts. The United States, as one of the wealthiest countries and one of the largest contributors historically and currently to climate change, has a moral obligation to help these countries build their resilience. Moreover, it is in our national security interests to do so—to lessen the impacts discussed above, which can destabilize developing countries and act as threat multipliers that undermine U.S. interests abroad. International adaptation programs should receive robust funding and may be implemented through the U.S. Agency for International Development (USAID), through multilateral mechanisms set up through the United Nations Framework Convention on Climate Change, through other international entities, or some combination of the foregoing.

***10. Integrate the cap-and-invest program with complementary policies to overcome market barriers and reduce the overall cost of climate legislation, and permit appropriate continuing state and local action.***

***An economy-wide cap-and-invest program must be the keystone of the United States' climate and energy security policy.*** To a greater extent than any other policy option, such a

program will provide an overarching, strategic policy requiring cuts in greenhouse gas emissions and investment in the transition to a prosperous, low-carbon economy.

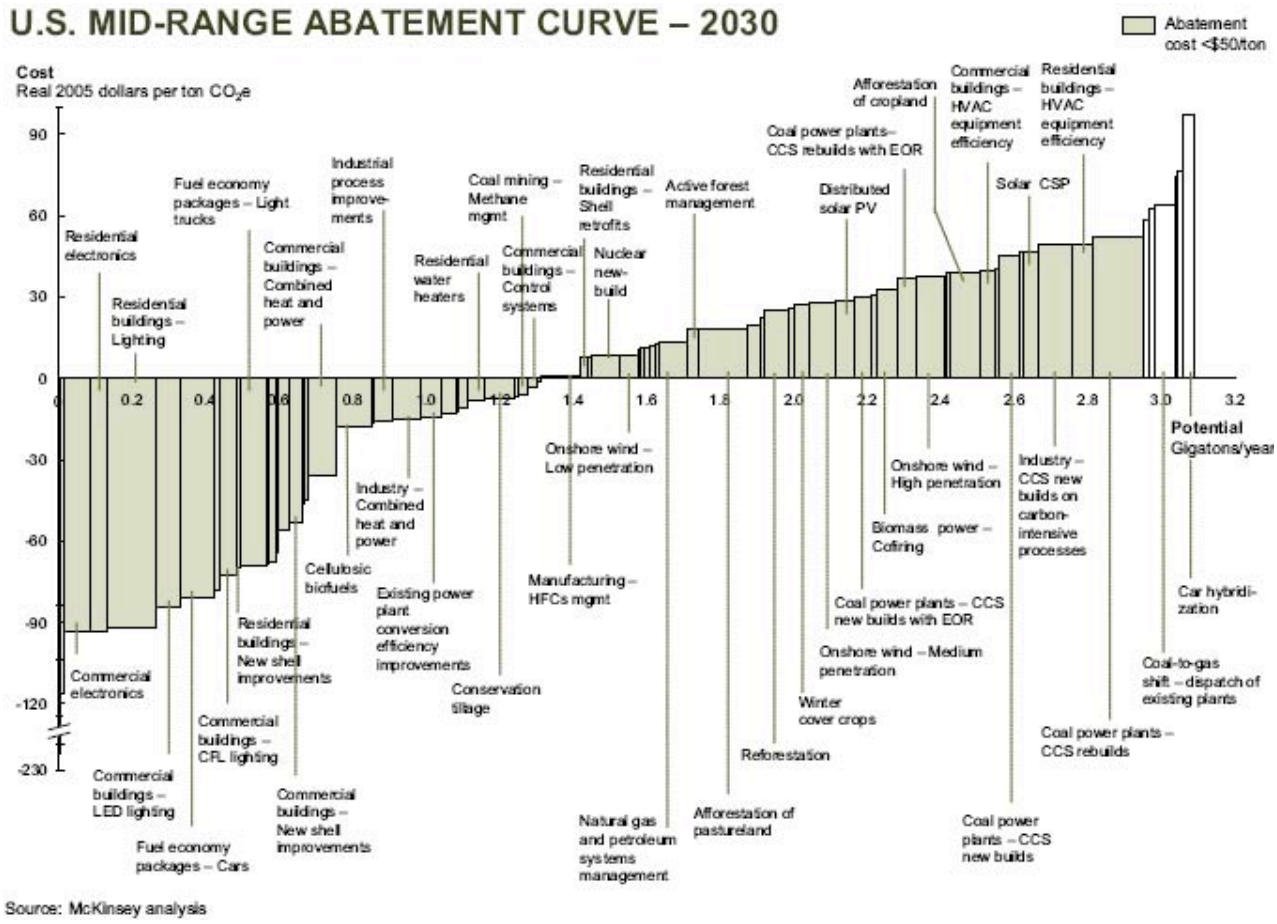
***However, further policies external to a cap-and-trade program may be required to achieve emissions reduction targets in a cost-effective manner.*** Complementary policies will be especially important in the transportation sector, where reducing greenhouse gas emissions requires changes in vehicles, fuels, and consumer behavior, and in the built environment, where reducing direct and indirect greenhouse gas emissions requires changes in buildings, appliances, lighting, heating, cooling, and consumer behavior. A range of such policies is discussed in the following sections.

***In addition, while it is imperative that the federal government take the lead on national climate and energy policy, State and local governments should continue to play a critical role in these areas.*** That is particularly so in areas of traditional state or local preeminence, such as land-use and smart-growth planning to increase the efficiency of our transportation system, efficiency policies in the electricity and natural gas sectors, building efficiency standards, policies to promote deployment of renewable electricity generation such as state renewable electricity standards, and programs to increase resilience to climate change impacts. State and local governments have helped to catalyze federal action on energy and climate issues, and it is important that they be given space to continue to do so.

## B. BOOST EFFICIENCY OF THE ELECTRICITY SECTOR AND BUILDINGS

***The largest and least expensive way to expand electricity supply and reduce greenhouse gas emissions is by improving energy efficiency.*** Numerous studies have confirmed the basic notion that the best and cheapest power plant is the one we never have to build—because greater efficiency leads to reduced demand. For example, a December 2007 McKinsey & Company analysis found that the United States could reduce greenhouse gas emissions in 2030 by 3 to 4.5 billion tons of carbon dioxide equivalent using currently available approaches and high-potential emerging technologies at a marginal cost of $50 per ton or less.[266] However, nearly 40 percent of this abatement potential could be achieved at *a net savings*. Investments in these areas would yield positive economic returns over their lifecycle, by reducing total energy costs, and thus substantially offset the overall social cost of a climate program. The vast majority of these profitable abatement options exist in the area of energy efficiency.[267]

**Estimated Cost and Magnitude of Greenhouse Gas Emission Abatement Options**




[266] For reference, total U.S. greenhouse gas emissions for 2006 were approximately 7.1 billion tons carbon dioxide equivalent.

[267] McKinsey & Company, Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost? (Dec. 2007), available at: http://www.mckinsey.com/clientservice/ccsi/pdf/US_ghg_final_report.pdf

*Source: McKinsey & Company, Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost? (December 2007).*

***Studies show that, in the electricity sector, efficiency measures can deliver nearly a 25 percent reduction in demand over then next 20 years—providing a highly cost-effective means of meeting rising demand.*** A 2004 survey by the American Council for an Energy Efficiency Economy (ACEEE) of 11 different studies showed that the median achievable potential for electricity efficiency gains was 24 percent over the next 20 years (an average of 1.2 percent per year).[268] Remarkably, that is nearly equivalent to EIA's prediction for electricity demand growth between now and 2030—though that prediction already incorporates some expected efficiency gains. The same study found that a 9 percent reduction of natural gas consumption is achievable through efficiency measures in the next 15 to 20 years.[269]

***In addition to being the cleanest way of meeting that demand, efficiency is also the cheapest.*** Even without including carbon prices, efficiency measures can increase available resources at a cost of roughly $0.03/kWh, as compared with nearly $0.07/kWh for coal- or gas-fired generation. A May 2006 study found that, for the ten northeastern states participating in RGGI, 20-30 percent of the reference forecast for electricity demand could be achieved through cost-effective improvements in energy efficiency.[270]

***Several studies have shown that investment in complementary efficiency programs can substantially reduce the overall cost of climate legislation.*** A 2006 ACEEE analysis of RGGI showed that, by doubling current efficiency investments in the region, wholesale power market prices could be kept flat through 2020 and then would rise by less than 0.5 percent through 2024.[271] A doubling of energy efficiency investment would also reduce carbon allowance prices by about one-third below baseline allowance prices in 2024, and would increase regional economic growth by 0.6 percent in 2021 relative to the base case. Recent modeling by Resources for the Future predicts that use of 100 percent of RGGI auction proceeds in efficiency measures reduces allowance prices by 25-30 percent as compared with use of only 25 percent for efficiency. Based on similar analyses, most RGGI states have opted to auction virtually all allowances and to invest most of the auction proceeds in State-led efficiency programs.

***Because of a host of market barriers, the carbon price provided by a cap-and-trade program—standing alone—will not lead to optimal adoption of efficiency measures.*** For example, the buildings and appliances sectors are characterized by split incentives—where buyers or users would achieve lifecycle cost savings from more efficient homes or appliances, but builders and manufacturers have a disincentive to improve efficiency because it would increase sticker prices. Consumers generally do not have adequate information to distinguish between different homes or products on the basis of efficiency. In addition, consumers may apply irrationally high discount rates in making purchasing decisions—requiring that a more

[268] Steven Nadel et al., "The Technical, Economic and Achievable Potential for Energy-Efficiency in the U.S. – A Meta-Analysis of Recent Studies," Proceedings of the 2004 ACEEE Summer Study on Energy Efficiency in Buildings (2004).
[269] Id.
[270] William Prindle et al., Energy Efficiency's Role in a Cap-and-Trade System: Modeling Results from the Regional Greenhouse Gas Initiative, ACEEE Report Number E064 (May 2006).
[271] Id.

efficient home or product "pay back" the increased cost within a very short time frame, even though the consumer would be financially better off in the medium- to long-term with the more efficient home or product. In the power sector, electric utilities often are the actor best positioned to increase demand-side efficiency, but have a disincentive to do so because revenues are based on the volume of electricity sold. Because a cap-and-trade program does not address these and other market barriers, on its own such a program is not likely to achieve the full cost-saving benefits of efficiency measures. The result is that, absent coherent policies, achievement of the environmental objectives of the cap-and-trade system will be more expensive than is necessary.

***To ensure optimal deployment of efficiency measures, and achieve the cost savings that they provide, complementary policies are necessary.*** These policies can include both regulatory drivers and financial incentives.

**Buildings and Appliances**

***Improving energy efficiency in buildings and appliances is the area of greatest emission abatement and energy- and cost-saving potential.*** Efficiency improvements in this category include lighting retrofits, higher performance for appliances, improvements in heating, ventilation and air conditioning systems, as well as better building envelopes and building control systems. Over the next 30 years, the built environment in the United States is expected to increase by an amount roughly equal to 70 percent of today's existing building stock—providing a crucial opportunity for energy savings and emission reductions.[272]

***Buildings, not transportation, are the largest single source of greenhouse gas emissions.*** Buildings contribute up to 48 percent of U.S. greenhouse gas emissions.[273] In 2007 over three-quarters of the electricity generated by U.S. power plants was used in commercial, residential, and industrial buildings,[274] and roughly one-third of the natural gas consumed was used for residential and commercial use.[275] Most of this energy consumption, and resulting emissions, stem from the energy used to operate lighting, heating, and cooling in buildings, and could be considerably decreased. The IPCC found that by 2030, 29 percent of global projected baseline emissions could be cost-effectively reduced in the residential and commercial building sectors.[276]

***Federal, State, and local governments can lead by example.*** For several years, State and local governments have incorporated green building guidelines in municipal, residential, and

[272] Marilyn A. Brown, Toward a Climate Friendly Built Environment at 3-4 (Pew Center on Global Climate Change, June 2005).
[273] American Institute of Architects, Architects and Climate Change, available at http://www.aia.org/SiteObjects/files/architectsandclimatechange.pdf.
[274] Energy Information Administration, Annual Energy Review 2007, Table 2.1a (Energy Consumption by Sector, Selected Years, 1949-2007). Approximately 40 percent of energy consumed in 2007 was used in residential and commercial buildings alone.
[275] Energy Information Administration, Natural Gas Consumption by End Use 2007, available at http://tonto.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm.
[276] Intergovernmental Panel on Climate Change, Fourth Assessment Report, Climate Change 2007: Mitigation of Climate Change at 389 (2007).

commercial buildings. At the Select Committee's May 14, 2008 hearing entitled "Building Green, Saving Green: Constructing Sustainable and Energy-Efficient Buildings," San Francisco Mayor Gavin Newsom testified about the success San Francisco enjoyed as one of the first cities to require the United States Green Building Council's Leadership in Energy and Environmental Design's (LEED) standard certification for all new municipal construction and major renovation projects. The city offers expedited building permits for energy-efficient building projects, saving contractors time and money as they build more efficiently. Other cities have adopted some form of LEED or Green Globes certification for large or new municipal buildings. At the federal level, EISA included rigorous energy efficiency performance standards for new federal buildings and major retrofits costing over $2.5 million, including a 55 percent reduction in fossil fuel-generated energy consumption by 2010 (relative to a 2003 baseline) and a 100 percent reduction by 2030. Among other measures, EISA also established an Office of Federal High-Performance Green Buildings within the General Services Administration, charged with promoting green building standards in federal building construction and management.

***Building codes are critically important in driving energy efficiency.*** Building and energy codes prescribe the minimum standards for a building to be declared structurally sound and habitable. Though these codes were originally implemented to protect the safety of inhabitants, they can also improve energy and water efficiency. Once these codes are adopted by law, they become building standards. The International Code Council (ICC) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) have developed commonly adopted building and energy codes formed with the consensus of various building sector professionals. As States and localities adopt more recent building codes they improve the baseline energy efficiency of buildings. The House on September 16, 2008 passed H.R. 6899, The Comprehensive American Energy Security and Consumer Protection Act, which included provisions to encourage adoption of updated codes. Specifically, these provisions require DOE and States to update energy codes for new buildings by 30 percent by 2010 and 50 percent by 2020 and for States to adopt the federal model codes or efficiency-equivalent codes. Incentive funding is offered for adopting the code and training officials to implement the codes. These building codes could avoid 1.5 billion metric tons of $CO_2$ per year by 2030 and reduce the need to build more than 30 new large coal-fired power plants over the coming decades. The Senate did not act on this legislation.

***Improving building energy efficiency is profitable and creates jobs***. The IPCC has stated that appliance standards and building energy codes could reduce energy use profitably by 2030 through existing technology and government support.[277] The Weatherization Assistance Program (WAP) is one example of such government support. The program leverages government and other community resources to improve the energy efficiency of low-income family homes. For every $1 invested in WAP, the program returns $1.53 in energy savings. Each WAP family saves an average of $358 per year, [278] and the program supports 8,000 local

[277] Intergovernmental Panel on Climate Change, Fourth Assessment Report, Climate Change 2007: Mitigation of Climate Change at 389 (2007).
[278] U.S. Department of Energy, Weatherization Assistance Program Fact Sheet (June 2006), available at http://www1.eere.energy.gov/office_eere/pdfs/wap_fs.pdf.

jobs nationally.[279] Energy efficient buildings are profitable to owners *and* builders. The cost of a green building can fall within an initial "non-green" budget, or with minimal cost difference, and this cost is offset by avoided utility expenses.[280] As consumers become aware of the cost benefits of efficient buildings, developers are seeing an increased demand and premiums for energy efficient buildings.[281]

**Electric Power Sector Efficiency**

***Within the electric power sector, one key policy option for incentivizing efficiency is restructuring the way utilities are motivated to make profits.*** As noted above, the only incentive in most markets currently is for utilities to drive demand and produce the greatest quantity of electricity as cheaply as possible to meet that demand. In some States, however, the direct link between electricity generation and profits has been broken. In these "decoupled" markets, utilities submit their revenue requirements and estimated sales to regulators. The State's public utility commission sets the rates by regularly applying adjustments to ensure that utilities collect no more and no less than is necessary to run the business and provide a fair return to investors. Decoupling ensures that utilities maintain their expected earnings even as energy efficiency programs reduce sales. It bears mention that many State public utility commissions adopted a somewhat similar "incentive regulation" scheme in the telecommunications sector a decade or more ago, with great benefit to telephone utilities and consumers alike. Five States have adopted decoupling for some or all of their electricity markets, and at least nine others are considering doing so. Approximately 13 States have adopted decoupling for natural gas.

***Demand-side management (DSM)—referring to an array of programs and mechanisms to reduce or manage electricity demand—can greatly increase efficiency.*** In many states, utilities or state government entities manage DSM programs that provide technical assistance and incentives to energy consumers to deploy more efficient lighting, appliances, building shells, and other technologies. DSM programs are also used to shift demand in response to supply conditions, for example, having electricity customers reduce their consumption at critical times or in response to market prices. Reducing summer peak demand—those times when utilities face the greatest strain on their electricity generation, transmission, and distribution systems—is important in reducing overall electricity consumption but also for reducing the need to run costly peak generating units, which typically run on natural gas. Energy efficiency initiatives, along with expanded demand response programs, have the potential to reduce summer peak demand significantly. A February 2008 study by ACEEE found that the state of Maryland could use DSM to reduce summer peak demand by 32 percent below baseline levels in 2015 and 47 percent in 2025.[282]

***Another policy option for increasing energy efficiency is an energy efficiency resource standard (EERS)—a market-based mechanism that encourages more efficient generation,***

[279] U.S. Department of Energy, Weatherization Assistance Program website, http://apps1.eere.energy.gov/weatherization/improving.cfm (last visited Oct. 20, 2008).
[280] Lisa Fay Matthiessen & Peter Morris, Costing Green: A Comprehensive Cost Database and Budgeting Methodology at 25 (July 2004), available at http://www.usgbc.org/Docs/Resources/Cost_of_Green_Full.pdf.
[281] McGraw-Hill, Green Building Smart Market Report 2006 at 4 (2006).
[282] Maggie Eldridge et al., Energy Efficiency: the First Fuel for a Clean Energy Future: Resources for Meeting Maryland's Electricity Needs, ACEEE (Feb. 2008).

***transmission, and use of electricity.*** An EERS establishes electric and/or gas energy savings targets for utilities, often with flexibility to achieve the target through a market-based trading system. Currently, 15 States have some type of EERS in place or in development.[283] State public utility commissions typically oversee these programs and are responsible for verifying energy saving improvements. As part of the original energy bill (H.R. 3221) that passed the House last July, the 15 percent renewable electricity standard (RES) allowed 4 percent to be achieved through energy efficiency. This 4 percent requirement was effectively an EERS. Stand-alone EERS policies have long been proposed at the federal level.

***Combined heat and power (CHP) could greatly improve efficiency by capturing the vast resource of "waste heat" produced by industrial, commercial, and residential facilities.*** CHP, also known as cogeneration, is the simultaneous production of electricity and heat from a single fuel source, such as natural gas, biomass, biogas, coal, waste heat, or oil. CHP technology can be used by industrial facilities and commercial and large residential buildings to increase energy efficiency and reliability, as well as reduce air pollution and greenhouse gas emissions.[284] A study commissioned by the Department of Energy assessing the market potential for CHP applications estimates that, in the industrial sector alone, smaller CHP technologies (known as distributed generation) could provide 33,000 megawatts of power generating capacity using currently available technologies—over 3 percent of current U.S. capacity.[285] EISA included a number of programs to spur installation of CHP systems, such as the Waste Energy Recovery Incentive Grant Program and the Energy-Intensive Industries Program, established under Section 451 of the Act. But these programs have not yet received funding and additional assistance may be necessary to meet the potential for these technologies. Further assistance for these projects could be provided in the form of direct financial grants, tax incentives, low-interest loans, or utility and environmental policies that increase the financial prospects for a project.[286]

***Fuel cells are another important tool for advanced energy storage, increased energy efficiency, reduced emissions, and an opportunity for increasing domestic energy supply and energy security.*** Fuel cells are highly reliable and flexible in installation and operation, and energy, when stored as hydrogen in the form of a gas or a liquid, will never dissipate until it is used, making it a good application for emergency generators and other critical energy applications. When using hydrogen from a renewable source, fuel cells offer a multi-purpose renewable energy source. They have the potential to replace the internal combustion engine in vehicles and provide power for stationary and portable power applications. Many portable devices can be powered by fuel cells, such as laptop computers and cell phones. They can also be used for stationary applications, such as providing electricity to power homes and businesses. Fuel cells can be used in transportation applications, such as powering automobiles, buses, and other vehicles. Moreover, they offer a cleaner and more efficient alternative to traditional

[283] American Council for an Energy Efficient Economy, Energy Resource Standards Around the World (Sept. 2007), available at http://www.aceee.org/energy/state/6pgEERS.pdf.
[284] Environmental Protection Agency, Combined Heat and Power Partnership: Basic Information, at http://www.epa.gov/chp/index.html (last visited Oct. 20, 2008).
[285] Resource Dynamics Corporation, Cooling, Heating, and Power for Industry: A Market Assessment at 2, prepared for U.S. Department of Energy and Oak Ridge National Laboratory (Aug. 2003), available at http://www.eere.energy.gov/de/pdfs/chp_industry_market_assessment_0803.pdf.
[286] Environmental Protection Agency, Combined Heat and Power Partnership: Funding Resources, at http://www.epa.gov/chp/funding/index.html (lasted visited Oct. 20, 2008).

combustion-based engines and power plants. Currently, most internal combustion engines operate with around 25 percent efficiency and power plants achieve about 35 percent efficiency; however, a stationary fuel cell when used in a combined heat and power system can have an efficiency level of greater than 85 percent.[287]

***Modernization of the electricity transmission and distribution system—particularly through "smart grid" investments—promises substantial benefits in increased system efficiency, reliability, and flexibility, and reduced peak loads and electricity prices.*** Smart grid technologies essentially involve the use of digital communications and information technology for a variety of grid functions, including monitoring, measuring, and responding to electricity demand and congestion; sensing and locating system disruptions or security threats and deploying automated protective responses; implementing "smart" meters in homes and businesses that allow consumers to receive time-of-use pricing information and to communicate consumer preferences to the grid; and implementing "smart" appliances that can be programmed to respond to communications from the grid regarding pricing or load. Collectively, these technologies can substantially increase the efficiency of the grid and can reduce peak load demand, both of which reduce the need for construction of new generation.[288] In addition, an array of other grid modernization technologies—such as the deployment of high-efficiency superconductor power distribution cables—can further enhance grid efficiency and reliability.[289]

***The 110th Congress has taken some significant steps forward on smart grid development.*** Title XIII of EISA established a Smart Grid Advisory Committee to advise the Secretary of Energy on grid modernization issues and requires the Secretary to report to Congress biennially on the state of grid modernization efforts, including recommendations for Congressional action. In addition, EISA requires DOE to establish a program of regional demonstration projects for smart grid technologies, as well as a Smart Grid Investment Matching Grant Program to reimburse 20 percent of qualifying smart grid investments. Finally, Section 306 of the Energy Improvement and Extension Act of 2008 (enacted as part of H.R. 1424, the economic rescue legislation enacted in October 2008), provides for accelerated depreciation (for purposes of the tax code) of investments in smart meters and other smart grid technologies.

* * * * *

***Recommendations:*** The 111th Congress and the next Administration should prioritize the following actions:

- **Cap and Invest:** Congress should make funding for performance-based incentives for State and local efficiency programs, including adoption and implementation of building efficiency programs, a centerpiece of cap-and-invest legislation. As noted above, Chairman Markey's iCAP bill (H.R. 6186) provides a model for the incorporation of such

[287] See, e.g., Connecticut Hydrogen Fuel Cell Coalition, Hydrogen Fuel Cell Benefits, at http://www.chfcc.org/Resources/benefits.asp.
[288] See, e.g., testimony before the House Committee on Energy and Commerce, hearing on "Facilitating the Transition to a Smart Electric Grid," May 3, 2007.
[289] See Testimony of Greg Yurek before the Select Committee on Energy Independence and Global Warming, hearing on "Renewing America's Future: Energy Visions of Tomorrow, Today," July 31, 2008.

incentives into climate legislation, and these provisions have been incorporated into the discussion draft introduced by Chairmen Dingell and Boucher in October 2008.

- **National Model Building Efficiency Standards for New Buildings:** Congress should enact the national building efficiency standards that were included in H.R. 6449, the "Comprehensive American Energy Security and Consumer Protection Act"—which would require States to adopt and enforce building codes requiring a 30 percent improvement in new building energy efficiency by 2010 and a 50 percent improvement by 2020.

- **Efficiency Labeling Programs for Existing and New Buildings:** Congress should support measures to provide consumers with transparent information on the energy efficiency of existing and new buildings. For example, Chairmen Dingell and Boucher's climate legislation discussion draft outlines an Energy Performance Labeling Requirement for buildings, grouped according to use and labeled based on their energy efficiency and performance. This requirement builds on the existing Energy Star qualified new homes label by additionally considering the efficiency of existing buildings.

- **Energy Efficiency Tax Credits:** Congress should make the Energy Policy Act of 2005 tax credits for qualified energy efficiency improvements permanent. These credits allow homeowners to recoup some of the costs of making approved energy efficient improvements to their primary home or business.

- **New Efficiency Standards for Federal Buildings:** The federal government should adopt the recently adopted International Energy Conservation Code of 2008 for new federal buildings, even those that fall under exceptions outlined in EISA. The new IECC code will achieve an approximate 15 percent increase in energy efficiency compared to the 2005 IECC energy code.

- **Appliance Efficiency Standards:** Congress should enact legislation requiring the Department of Energy to establish new efficiency standards for appliances and equipment not yet covered by current legislation, such as flat-screen televisions, computers, and data servers. The Department of Energy should move forward aggressively with promulgation of new appliance efficiency standards pursuant to its existing authority under the Energy Policy and Conservation Act, and Congress should provide close oversight of this process.

- **National Energy Efficiency Resource Standard:** Congress should enact a market-based federal energy efficiency resource standard requiring electric utilities to achieve gradually increasing annual improvements in efficiency—either in tandem with a national Renewable Electricity Standard, or independently thereof.

- **Combined Heat and Power:** Congress should fully fund the Energy-Intensive Industries Program established under Section 451 of EISA.

- **Fuel Cells:** Congress should study the potential role of the federal government in promoting hydrogen fuel cell development and deployment in service of increased energy efficiency, for example through large-scale federal procurement programs.

- **Smart Grid Development and Deployment:** Congress should fully fund the smart grid research, development, and demonstration program under Section 1304 of EISA and the Smart Grid Investment Matching Grant Program established under Section 1306 of EISA. Congress should prioritize consideration and potential adoption of the grid modernization recommendations of the Secretary of Energy and the Smart Grid Task Force submitted pursuant to Section 1303 of EISA. Finally, Congress should consider establishing a dedicated funding source to promote smart grid and transmission investments, either through a set-aside under cap-and-invest legislation or through a national "wires charge".

## C. DRAMATICALLY EXPAND RENEWABLE ELECTRICITY GENERATION

***Renewable sources can become a major contributor to the U.S. electricity supply within the foreseeable future.*** Renewables currently generate 8.4 percent of the country's electricity, with non-hydro renewables responsible for just 2.5 percent.[290] Reaching 20 percent of total generation by 2020 is an ambitious—but achievable—target for renewables based on the current state of the technologies and the available renewable resources. Reaching this target would require around 200,000 megawatts of new renewable generation, depending significantly on how large a role electricity plays in fuelling the transportation sector and the extent to which energy efficiency can reduce demand growth.

***Adoption of a national renewable electricity standard (RES) requiring that 20 percent of electricity generated in the United States come from renewable sources by 2020 should be a centerpiece of our national energy strategy.*** A key driver of renewable energy growth in the United States has been state-level RES's. Twenty-six States along with Washington, DC, now have RES's, and more than 46 percent of nationwide electrical load is covered under these mandatory policies. The types and quantities of renewable electricity required under these programs vary widely among the states, but it has become clear that States with RES's are deploying more renewable electricity generation than States with them. While only 11 States have had these programs in place for at least four years, more than half of the non-hydro renewable electricity generating capacity added in the United States over the last decade has occurred in States with RES programs. Current mandatory State RES policies will require the addition of more than 60,000 megawatts of new renewable electricity capacity by 2025. At the same time, RES policies are having little or no impact on consumer electricity rates and in many markets the renewable electricity is priced competitively with fossil fuel-based generation.[291] During the 110th Congress, the House twice passed a national RES of 15 percent by 2020—with the option to meet up to 4 percent with efficiency—but the Bush Administration threatened to veto the measure and the Senate was unable to pass it.

***Tax incentives—including the Production Tax Credit (PTC) and the Investment Tax Credit (ITC)—will also play a key role in deploying renewable electricity generation.*** These two policies have been a major driver of renewable energy development over the past several years by giving individuals, businesses, and utilities incentives to invest in renewable energy generation. These tax credit programs help renewables to be deployed at sufficient scale to begin to move down the cost curve and become more competitive with traditional fossil fuel-based generation. Moreover, they provide a policy "bridge" that is helping the renewable energy industry survive in an environment where the benefits of low- and zero-carbon emissions are not properly valued by the market. Unfortunately, between 1999 and 2004, the PTC has expired on three separate occasions which has led to a boom-bust cycle of development, especially in the wind industry.

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[290] Energy Information Administration, Annual Energy Review 2007, Table 8.2b Electricity Net Generation: Electric Power Sector, Selected Years, 1949-2007 (2007).

[291] Ryan Wiser & Galen Barbose, Renewables Portfolio Standards in the United States: A Status Report with Data Through 2007, Lawrence Berkeley National Laboratory (April 2008), available at http://eetd.lbl.gov/ea/EMS/reports/lbnl-154e-revised.pdf.

In conjunction with the economic rescue package enacted into law in October 2008 (H.R. 1424), the 110th Congress extended the ITC for eight years and the PTC for two years for electricity derived from biomass, geothermal, hydropower, landfill gas and solid waste, and one year for electricity derived from wind. For the first time, renewable energy projects harnessing river and ocean currents, waves, tides, and thermal energy conversion are also eligible for the PTC. However, because of the current financial crisis, there are concerns as to whether project developers will be able to take full advantage of the tax credits in 2009. Moreover, a longer-term extension of the production tax credit is crucial to provide investors with the certainty needed to move forward with sustained investments in renewable electricity generation and in the underlying technologies.

***Feed-in tariffs provide another potential option for encouraging expansion of renewable electricity generation.*** Over 40 countries, States, and provinces around the world use so-called feed-in tariff policies to promote deployment of renewable electricity generation. Feed-in tariffs—often called renewable energy payments (REP) policies in the United States—require utilities to purchase electricity from renewable electricity generators on a priority basis through long-term (5-25 year), fixed-rate power-purchase agreements. The rates are generally set by the government on a cost basis to provide for a reasonable rate of return on investment, with cost recovery guaranteed through system benefits charges to electricity customers. As opposed to RES policies that set deployment levels (e.g., 20 percent by 2020) and allow the market to determine the price for renewable energy, feed-in tariff policies provide broad support for a diverse range of renewable energy technologies by setting different rates for different technologies. Germany's Renewable Energy Sources Act of 2000 has been successful in using feed-in tariff policies to spur record rates of investment and job growth in the renewable energy sector. There is now a growing interest in adopting feed-in tariff policies in the United States with several States now considering such policies, including Michigan, Illinois, Minnesota, Rhode Island, Hawaii, Washington, and California.

***Transmission has quickly become recognized as one of the most prominent barriers to the wide-scale deployment of renewable electricity.*** Building the generation where renewable resources are strongest and most abundant will require the construction of transmission lines to move the power out of rural areas where it is generated to population centers where it can be used. In addition to expanded transmission access, smart-grid technologies—discussed above—can help to reliably integrate renewable electric power generation while enabling electric vehicles to store electricity and provide enhanced demand response capabilities. Where possible, States are taking important steps to address this barrier. For example, the Western Governors' Association is working with the Department of Energy to identify "renewable energy zones" and conceptual transmission plans for delivering renewable energy from these zones to load centers. However, federal leadership will be critical in helping to ensure that adequate new transmission is built, establishing streamlined procedures and standards for interconnection, and encouraging deployment of smart-grid technologies to enable full utilization of renewable resources.

***The federal government has an important role to play in eliminating regulatory barriers to the expansion of renewable electricity generation.*** Despite the success of State-level initiatives to promote renewables, the balkanized structure for electricity regulation and the

inconsistency of federal and State incentive programs have created a relatively unstable investment climate for the domestic renewable electricity market, limiting financing opportunities for individual projects and domestic manufacturing capacity. The federal government has a key role to play in helping to rationalize these programs and regulatory regimes to encourage expanded renewable electricity generation.

***While in no way a comprehensive list, the renewable resources outlined below are most likely to contribute significantly to the U.S. and global electricity supply over the next two to three decades.***

**Wind**

***More than 20,000 megawatts of new wind capacity was installed worldwide in 2007, more than a quarter of which was installed in the United States.*** Germany is the global leader in installed wind capacity, with the United States now second. Wind generating capacity has been growing at more than a 30 percent annual rate in the United States since 2000. In 2007 wind power accounted for 35 percent of all new generating capacity in the United States.

***Department of Energy research suggests generating 20 percent of electricity from wind in the United States is an ambitious yet feasible scenario if certain challenges are overcome.***[292] With policy support, the United States is protected to have more than 60,000 megawatts of wind installed by 2012 and by 2016 it could reach 112,000 megawatts, surpassing nuclear capacity in the United States. To meet this goal, wind turbine production capacity would have to ramp up to 16,000 new megawatts per year by around 2018—up from current production capacity of approximately 7,000 megawatts per year.

***As wind technology continues to improve, prices are falling and capacity factors are increasing.*** The cost of wind energy over the past 20 years has dropped from 40 cents per kWh to 4 to 6 cents per kWh at good sites. While most new wind turbines in the United States produce 1.5 to 2 megawatts of power, superconducting materials may enable the construction of 10 megawatt turbines in the near future.[293] Increases in the capacity factor of the turbines—or the percentage of time in which they are producing at their full capacity—have grown 11 percent over the past two years and will continue to increase as the technology improves.

**Solar**

***With more energy in the form of solar radiation striking the Earth's surface in an hour than humanity uses in an entire year, the available solar resource is enormous.*** Capturing this energy and converting it into electricity is primarily done through photovoltaic cells that convert sunlight into direct electrical current and concentrating solar power, which concentrates the sun's energy using huge mirrors or lenses and then uses this heat to run a conventional turbine.

[292] U.S. Department of Energy, 20% Wind Energy By 2030: Increasing Wind Energy's Contribution to the U.S. Electricity Supply (July 2008), available at http://www1.eere.energy.gov/windandhydro/pdfs/41869.pdf.
[293] Testimony of Greg Yurek before the Select Committee on Energy Independence and Global Warming, on "Renewing America's Future: Energy Visions of Tomorrow, Today" (July 31, 2008).

***Solar photovoltaics (PV) have experienced explosive growth over the last several years—but, unfortunately, the United States is falling behind in this lucrative emerging market.*** World capacity grew 62 percent in 2007 alone[294] and installed capacity has grown from 1,200 megawatts in 2000 to 9,200 megawatts in 2007.[295] Solar PV installations in the United States grew by over 80 percent in 2007.[296] Nevertheless, the United States fell to the fourth largest PV market in the world, behind Germany, Japan, and Spain. Technology advances and increases in the scale of production in the solar industry have exceeded those of any other renewable energy sector as prices for PV modules have fallen to around $4 per watt from almost $100 per watt in 1975. Solar PV prices have declined an average of 4 percent per year over the past 15 years.[297] The Department of Energy's Solar America Initiative seeks to make solar PV cost-competitive with conventional forms of electricity by 2015. With huge investments in new production of polysilicon (the critical input for most PV cells) ready to come online in 2009, the materials shortage that plagued the industry for the last few years will likely be alleviated. Production costs—and PV module prices—are expected to continue falling.

***Over the next two decades, solar PV will become a major source of power—both here in the United States and globally.*** Solar PV is projected to grow from a $20 billion industry in 2007 to a $74 billion industry within a decade. A study from the National Renewable Energy Laboratory found that installed capacity in the United States could climb to 10,000 megawatts by 2015, 26,000 megawatts by 2020, and ultimately more than 100,000 megawatts by 2030 with the passage of the critical 8-year extension of the investment tax credits included in the financial rescue package enacted in October, 2008.[298] Globally, research from the European Photovoltaic Industry Association and Greenpeace suggests that by 2030, global PV capacity could reach 1,864,000 megawatts and satisfy the electricity needs of 14 percent of the world's population.[299]

***Concentrating solar power (CSP) systems will deliver large-scale, centralized electricity generation from solar energy.*** CSP systems are generally utility-scale projects with many acres of mirrors and lenses that can produce dozens to hundreds of megawatts of electrical power. The National Renewable Energy Laboratory has identified the potential for nearly 7,000,000 megawatts of solar thermal power generation in the southwestern United States, roughly seven times current U.S. electric generating capacity. More than 4,000 megawatts of solar thermal projects are currently in development nationwide, and Environment America has projected

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[294] Solarbuzz, Marketbuzz 2008: Annual World Solar Photovoltaic industry Report (2008), available at http://www.solarbuzz.com/Marketbuzz2008-intro.htm.

[295] European Photovoltaic Industry Association and Greenpeace, Solar Generation V – 2008 Solar electricity for over one billion people and two million jobs by 2020 (2008), available at http://www.greenpeace.org/raw/content/international/press/reports/solar-generation-v-2008.pdf.

[296] Jonathan Dorn, Earth Policy Institute, Solar Cell Production Jumps 50 Percent in 2007 (Dec. 27, 2007), at http://www.earth-policy.org/Indicators/Solar/2007.htm.

[297] Solarbuzz. Fast Solar Energy Facts: Global Performance, at http://www.solarbuzz.com/FastFactsIndustry.htm (last visited Oct. 20, 2008).

[298] Robert Margolis, National Renewable Energy Laboratory, Quantifying the Benefits of Extending the Solar ITC (Feb. 2008)

[299] European Photovoltaic Industry Association and Greenpeace, Solar Generation V – 2008: Solar electricity for over one billion people and two million jobs by 2020 (2008), available at http://www.greenpeace.org/raw/content/international/press/reports/solar-generation-v-2008.pdf.

80,000 megawatts could be built by 2030 with investment tax credit support.[300] The cost of energy from solar thermal power plants is estimated to be approximately 14 to 16 cents/kWh.[301]

**Geothermal**

***The United States has about 35 percent of the world's installed capacity of geothermal energy, with about 2,500 megawatts connected to the grid across six States.*** While several new facilities are in construction around the country, the amount of electricity produced from geothermal energy has essentially been flat for the past two decades. New facilities are estimated to be able to produce base load electricity for 5 to 7 cents/kWh.[302]

***The United States has massive, untapped geothermal energy resources.*** Scientists with the U.S. Geological Survey (USGS) recently found that the electric generation potential from currently identified geothermal systems distributed over 13 U.S. states is more than 9,000 megawatts. Their estimated power production potential from yet to be discovered geothermal resources is more than 30,000 megawatts. An additional 500,000 megawatts may be available by harnessing geothermal reservoirs characterized by high temperature, but low permeability, rock formations.[303]

An MIT study estimated that recovering a small fraction of the available resource using conventional geothermal as well as enhanced (or engineered) geothermal systems, could feasibly yield 100,000 megawatts of electrical power in the United States by 2050.[304] And a study sponsored by the Western Governors Association found 5,600 megawatts of new geothermal capacity could be added through 2015 and 13,000 megawatts within the next 20 years in their 13-State region.[305]

**Biomass**

***Biomass currently supplies more electricity in the United States than wind, solar, and geothermal power combined, and the potential for additional generation from this energy source is vast.*** Biomass available for electricity generation includes residues from forests, primary mills, and agriculture, as well as dedicated energy crops and urban wood wastes. Biomass can be used as the sole fuel source for power plants, or it can be used in conventional

[300] Solar Energy Industries Association, U.S. Solar Industry: 2007 Year in Review (2007), available at http://seia.org/galleries/pdf/Year_in_Review_2007_sm.pdf.
[301] Bernadette del Chiaro et al., Environment America Research and Policy Center, On the Rise: Solar Thermal Power and the Fight Against Global Warming (Spring 2008), available at http://www.environmentcalifornia.org/uploads/EX/qu/EXqur2dJBZQbJESwUtulZA/On-The-Rise.pdf.
[302] California Energy Commission, Comparative Cost of California Central Station Electricity Generation Technologies, Final Staff Report (June 2003), available at http://www.energy.ca.gov/reports/2003-06-06_100-03-001F.PDF.
[303] U.S. Geological Survey, Fact Sheet: Assessment of Moderate- and High-Temperature Geothermal Resources of the United States (2008), available at http://pubs.usgs.gov/fs/2008/3082/pdf/fs2008-3082.pdf.
[304] Massachusetts Institute of Technology. The Future of Geothermal Energy: Impact of Enhanced Geothermal Systems on the United States in the 21st Century at 1-3 (2006), available at http://www1.eere.energy.gov/geothermal/pdfs/future_geo_energy.pdf.
[305] Martin Vorum & Jefferson Tester, "Potential Carbon Emissions Reductions from Geothermal Energy by 2030," in Tackling Climate Change in the U.S. at 153 (2007).

power plants to substitute for a portion of the traditional fuel, typically coal, in a process called co-firing. While most co-firing plants use biomass for between 1 and 8 percent of heat input,[306] biomass can effectively substitute for up to 20 percent of the coal used in the boiler.[307] In addition to reducing lifecycle greenhouse gas emissions, co-firing biomass also lowers fuel costs, avoids landfilling, and reduces emissions of sulfur oxide and nitrogen oxide.

An EIA analysis of the impacts of a 15 percent national renewable electricity requirement found that electricity production from biomass could grow by a factor of eight between 2005 and 2030.[308] Most of this generation would come in the southeastern United States, where nearly a third of the country's biomass feedstock potential exists.[309] The EIA found that the Southeast region could meet nearly its entire 15 percent renewable requirement through 2020 with indigenous biomass resources.[310] In a September 20, 2007 Select Committee hearing on renewable electricity standards, venture capitalist Nancy Floyd, founder and managing director of N$^{th}$ Power, agreed that a biopower industry could be jumpstarted in the South that would drive private investment and spur the regional economy. Using biomass for electricity would help the region create thousands of blue collar jobs, increase global export opportunities, and keep billions of dollars in the Southeast that would have otherwise left to import coal and other fuels from other States and countries.

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***Recommendations:*** The 111$^{th}$ Congress and the next Administration should prioritize the following actions:

- **Cap-and-Invest:** Enact a mandatory, economy-wide cap-and-invest system to provide a stable, long-term price signal for carbon and to correct the massive market failure currently putting renewable electricity generation at a competitive disadvantage with high-carbon electricity sources. Use allowance auction proceeds to fund early deployment of renewable electricity generation, either through extension of the production tax credit and investment tax credit or through an analogous rebate or grant program.

- **National Renewable Electricity Standard:** Enact a Renewable Electricity Standard (RES) to require utilities to meet a gradually increasing percentage of their generation with renewable sources. This technology-neutral approach allows utilities to meet the standard using the most cost effective renewable option in the area in which they operate.

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[306] Zia Haq, Energy Information Administration, Biomass for Electricity Generation, available at http://www.eia.doe.gov/oiaf/analysispaper/biomass/.
[307] Federal Energy Management Program (FEMP), Biomass Cofiring in Coal-fired Boilers, DOE/EE-0288. (2004), available at http://www1.eere.energy.gov/femp/pdfs/fta_biomass_cofiring.pdf.
[308] Energy Information Administration, Impacts of a 15-Percent Renewable Portfolio Standard at 9 (Table 2: Summary Results) (June 2007), available at http://www.eia.doe.gov/oiaf/servicerpt/prps/pdf/sroiaf(2007)03.pdf. .
[309] Marie Walsh et al., Oak Ridge National Laboratory, Biomass Feedstock Availability in the United States: 1999 State Level Analysis (Jan. 2000), available at http://bioenergy.ornl.gov/resourcedata/index.html.
[310] Energy Information Administration, Regional Generation Impacts of a 15-Percent Renewable Portfolio Standard (RPS) (Supplement to Report #: SR-OIAF/2007-03) (June 2007), available at http://www.eia.doe.gov/oiaf/servicerpt/prps/pdf/regional_generation.pdf .

- **Double Federal RD&D Spending:** Double federal investment in research, development, and demonstration to accelerate the pace of innovation and technology development and reassure private investors that this area is important to the public and worth their investment.

- **5-8 Year Extension of the Production Tax Credit:** Provide a five- to eight-year extension of the production tax credit for renewable electricity generation, to provide the investment certainty needed for manufacturers and developers of renewable energy systems—especially in the wind industry—to expand.

- **Develop a National Green Transmission Policy:** The Department of Energy and the Federal Energy Regulatory Commission, in collaboration with States, federal land management agencies, and industry and non-governmental stakeholders, should conduct a national assessment of transmission infrastructure needs to support an expansion of renewable electricity generation and should develop a comprehensive national policy to enable the construction of green transmission.

## D. DRIVE THE DEVELOPMENT OF CARBON CAPTURE AND SEQUESTRATION

***Carbon capture and sequestration (CCS) technologies will be crucial to reconciling our continued reliance on coal with the urgent need to reduce greenhouse gas emissions.*** This was the clear message of the Select Committee's September 6, 2007 hearing on "The Future of Coal," at which Governor Dave Freudenthal of Wyoming testified together with several leading industry and non-governmental experts. As foreshadowed above, this is both a domestic and a global issue because the United States has vast coal reserves and currently relies on coal for nearly 50 percent of its electricity generation, while China and India also have large reserves and are even more dependent on coal for power generation.

***CCS involves physical capture of $CO_2$ at power plants and other major point sources and compression and injection of $CO_2$ into deep geological reservoirs (or some other means of permanent sequestration, such as integration into concrete).*** There are three principal technology options for capturing $CO_2$ emissions at coal-fired power plants: (1) pre-combustion capture using integrated combined cycle (IGCC) technology; (2) pre-combustion capture using oxy-fuel combustion; and (3) post-combustion capture using solvents or membranes. Research indicates that it is possible to capture greater than 85 percent of the emissions stream generated by a power plant or other major industrial source, though implementation of currently available capture technology does impose a significant energy penalty.[311]

If captured $CO_2$ is to be injected, it is compressed into a dense fluid (supercritical) state for transport via pipeline to an injection site. Three types of geologic formations are well-suited to long-term storage of injected $CO_2$: depleted oil and gas fields, saline formations, and deep coal seams. Surveys indicate that both global and U.S. storage capacity is potentially vast. Even the IPCC's low-end estimate of 1680 gigatons of global capacity is equivalent to over 70 years of emissions from all global fossil fuel combustion at current levels, while the high-end capacity estimate would be over six times greater.[312] The Department of Energy projects that U.S. domestic geologic formations "have at least enough capacity to store several centuries' worth of point source emissions" from the United States.[313] There appears to be a good correlation between emissions sources and geological basins suitable for long-term storage, and preliminary assessments suggest that risks to human health and the environment from large-scale injection of $CO_2$ are limited.[314]

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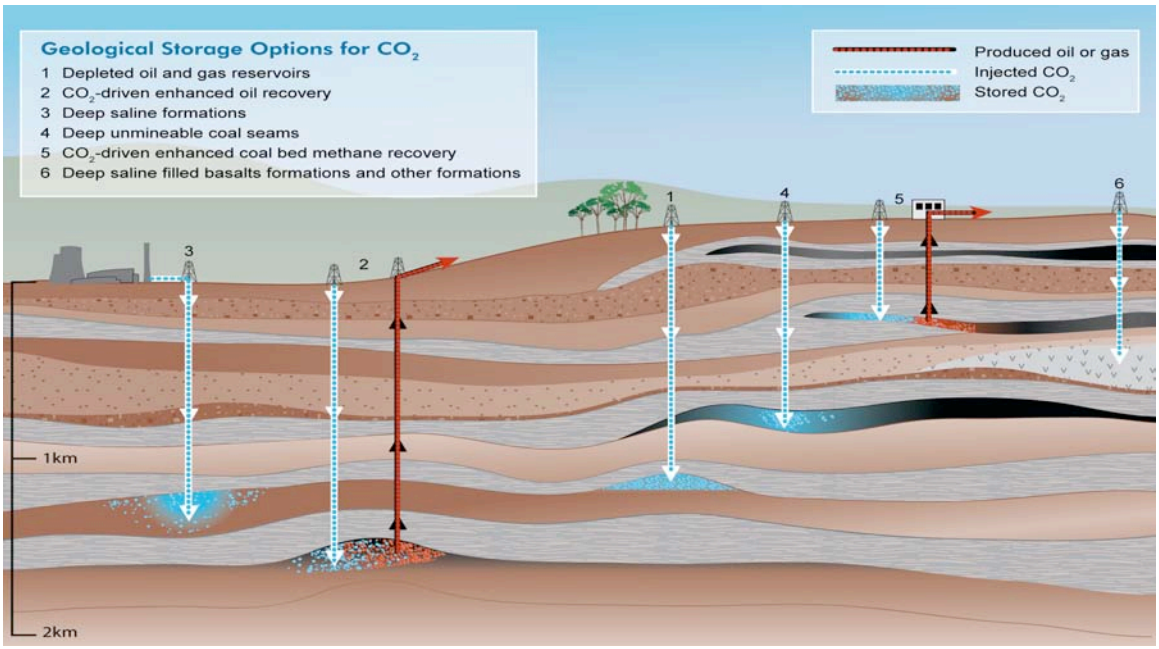
[311] For discussion of capture technologies, see, e.g., Massachusetts Institute of Technology, The Future of Coal at 17-40 (2007) [hereinafter "MIT Future of Coal"]; Intergovernmental Panel on Climate Change, Special Report: Carbon Dioxide Capture and Storage, Summary for Policymakers at 5-12 (2005) [hereinafter "IPCC CCS Report"].
[312] IPCC CCS Report, supra note 311, at 197.
[313] U.S. Department of Energy, Carbon Sequestration: Technology Roadmap and Program Plan 2005, at 4 (2005) available at http://fossil.energy.gov/programs/sequestration/publications/programplans/2005/sequestration_roadmap_2005.pdf.
[314] IPCC CCS Report, supra note 311, at 8; MIT Future of Coal, supra note 311, at 50.




*Source: Intergovernmental Panel on Climate Change, Special Report: Carbon Dioxide Capture and Storage, Summary for Policymakers (2005).*

***Although most of the technologies on which CCS is based are already proven, they have not yet been integrated or implemented at commercial scale.*** Underground injection of naturally produced $CO_2$ has been used since the early 1970s as part of enhanced oil recovery (EOR) projects, and there are several major commercial projects worldwide that inject captured $CO_2$ for underground storage, as well as a growing number of pilot-scale projects. However, successful commercial development of CCS requires that we move quickly to implement commercial-scale demonstration projects integrating capture and storage technologies.

***Because of the costs of implementing CCS technologies, they will not be deployed on a commercial scale without the establishment of appropriate regulatory drivers.*** For example, projected construction costs for IGCC plants using CCS are 32-47 percent greater than for conventional IGCC plants while supercritical pulverized coal plants using CCS have capital costs 60-73 percent greater than conventional supercritical pulverized coal plants.[315] Absent regulatory limits on $CO_2$ emissions, implementation of CCS is expected to increase the overall cost of electricity by 25 to 85 percent in comparison with an uncontrolled plant—at least for first-generation projects.[316] State utility regulation in most cases would prevent utilities from recovering this cost differential, making utilities highly unlikely to invest in CCS in the absence of regulatory requirements to do so.

[315] Testimony of Robert Sussman before the Select Committee on Energy Independence and Global Warming, hearing on "The Future of Coal," Sept. 6, 2007 (using studies conducted by the Massachusetts Institute of Technology, the Department of Natural Resources and the Public Service Commission of Wisconsin, and the U.S. Environmental Protection Agency).
[316] Id.

***In addition, substantial legal and regulatory obstacles must be resolved before widespread commercial deployment of CCS will be possible.*** EPA has recently promulgated a proposed rule governing regulation, under the Safe Drinking Water Act, of geological injection of $CO_2$ for sequestration.[317] However, as a recent Government Accountability Office report requested by the Select Committee emphasized, the proposed rule leaves unclear a host of regulatory issues—including how releases of $CO_2$ to the atmosphere will be addressed, and how geological injection of $CO_2$ will be treated under other environmental statutes such as CERCLA and RCRA.[318] In addition, there are substantial unanswered questions regarding who has ownership over injected $CO_2$ and who will be liable for any damage resulting from leakage of injected $CO_2$.[319] Some of these issues—particularly with regard to property rules—will likely be answered at the State level. The liability issue in particular may require the enactment of a federal legal framework governing these issues in future.

***Even enactment of economy-wide climate legislation, standing alone, likely would not result in widespread commercial deployment of CCS within the next two decades, because the price of carbon will not be high enough to justify CCS before that time.*** Multiple analyses have concluded that the price per ton of $CO_2$ necessary to make implementation of CCS economically rational is on the order of $25-50 or more.[320] Under the climate proposals currently under consideration, these carbon price thresholds may not be reached until far into the future, making commercial deployment of CCS unlikely in the next two decades without additional policy drivers.

***Complementary policies—including performance standards for new coal-fired power plants and financial incentives for early adopters of CCS technology for coal-fired power plants—will be necessary to ensure rapid development and deployment of CCS.*** Adoption of national performance standards requiring implementation of CCS technologies, by a date certain, on all new coal-fired power plants would provide the private sector with a strong signal and powerful incentives to move forward rapidly with development and deployment of such technologies. H.R. 6186 includes such performance standards, as does the Dingell-Boucher climate legislation discussion draft circulated in October 2008—the latter with later implementation deadlines than the former. Simultaneously, the federal government can provide support in the form of funding for early movers, under a cap-and-invest program, for the incremental costs of implementing CCS. Most proposed climate legislation has included such incentives in one form or another.

***Congress has taken some important preliminary steps to promote development of CCS-related technologies.*** Most importantly, Sections 702 and 703 of EISA require the Department

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[317] Environmental Protection Agency, Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO2) Geologic Sequestration (GS) Wells; Proposed Rule, 73 Fed. Reg. 43,492 (July 25, 2008).

[318] Government Accountability Office, Climate Change: Federal Actions Will Greatly Affect the Viability of Carbon Capture and Storage As a Key Mitigation Option, No. GAO-08-1080 (Sept. 2008).

[319] Id.

[320] Testimony Robert Sussman before the Select Committee on Energy Independence and Global Warming hearing on "The Future of Coal," Sept. 6, 2007 (Using studies conducted by the Massachusetts Institute of Technology, the Department of Natural Resources and the Public Service Commission of Wisconsin, and the U.S. Environmental Protection Agency).

of Energy to undertake 3-5 large-scale capture projects and 7 large-scale geological storage projects and authorizes nearly $2 billion over four years for that purpose. EISA Sections 711 and 714 require the Department of Interior to conclude a comprehensive assessment of geological storage opportunities in the United States and to make recommendations to Congress regarding a framework for geological sequestration on federal lands. In addition, as part of the "Energy Improvement and Extension Act of 2008" (enacted as part of H.R. 1424, the October 2008 economic rescue legislation), Congress provided tax credits for CCS projects: $20 per metric ton of $CO_2$ captured and disposed of in secure geological storage and $10 per ton captured and used for qualified enhanced oil or natural gas recovery projects.

***Despite these steps forward, the CCS demonstration program remains underfunded, and concerted action is necessary to speed the development and commercial deployment of CCS.*** The Department of Energy's current technology roadmap does not predict widespread commercial availability of CCS until 2020—by which time substantial new convention coal-fired generation capacity may already have been constructed in the U.S. and globally without CCS capability built in. The next Administration and Congress must make CCS demonstration and an urgent priority, so that the United States can both implement this technology domestically and export it to the remainder of the world.

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***Recommendations:*** The 111th Congress and the next Administration should prioritize the following actions:

- **Fund CCS Demonstration Projects and R&D Activities:** Congress should fully fund the CCS demonstration program authorized by EISA and the Administration should move expeditiously to implement that program. In addition, Congress should dramatically increase federal spending on CCS research and development activities authorized under the Energy Policy Act of 2005.

- **Performance Standards for New Coal-Fired Power Plants:** Congress should enact legislation, either in tandem with economy-wide cap-and-invest legislation or (if necessary) independently of it, mandating that all new coal-fired power plants implement CCS within a reasonable period after commencing operation.

- **Fund CCS Deployment Through Cap-and-Invest:** Congress should include funding for CCS demonstration projects and deployment incentives in comprehensive cap-and-invest climate legislation.

- **Establish an Interagency CCS Task Force:** The next Administration should promptly establish an interagency task force to address – in a proactive and coordinated fashion – the legal and regulatory obstacles to commercial deployment of CCS. This effort should include:
    - Completing a detailed national assessment of geological storage opportunities

- Completing EPA's underground injection regulations under existing legal authority, and providing recommendations to Congress regarding any additional regulatory authority needed to address $CO_2$ injection activities.
- Making comprehensive recommendations to Congress regarding the appropriate legal framework needed to address financial responsibility and other issues associated with CCS.

## E. TRANSFORM THE U.S. TRANSPORTATION SYSTEM THROUGH FUEL EFFICIENCY, ELECTRIC-DRIVE VEHICLES, LOW-CARBON FUELS, AND TRANSPORTATION CHOICES

The U.S. transportation sector produces roughly a third of total U.S. greenhouse gas emissions, accounts for nearly 70 percent of total U.S. oil consumption, and is 95 percent dependent upon petroleum. To reduce both oil consumption and emissions in the transportation sector will require the United States to address three interrelated issues—the efficiency of our vehicles, the fuels that power them, and how much we drive them.

### 1. Vehicles—Increase Fuel Economy and Transition to Electric Drive

***Implementing higher fuel economy standards is one of the single most important means to increase the United States' energy independence.*** After Congress first increased fuel economy standards for automobiles from 13 miles per gallon (mpg) to 27.5 mpg starting in 1975, imported oil as a percentage of total U.S. consumption fell from 47 percent in 1977 to 27 percent in 1985. However, after Congress in the mid-1990s blocked both the Clinton Administration's authority to increase fuel economy standards and Chairman Markey's repeated legislative efforts to do so, U.S. dependence on imported oil skyrocketed to 60 percent by 2005.

***The 110th Congress scored a major achievement on this front by mandating that fuel economy standards increase by at least 40 percent by 2020.*** With the passage of EISA, Congress for the first time since 1975 mandated an increase in fuel economy standards for the nation's fleet of cars and light trucks to achieve the maximum feasible standard for each model year beginning in 2011 such that the average of the fleet achieves at least 35 mpg by 2020. This will save at least 2.5 million barrels of oil per day by 2030—more than all the oil currently imported from the Persian Gulf. In addition, it will reduce U.S. greenhouse gas emissions by more than 500 million metric tons of carbon dioxide equivalent per year by 2030 and will save consumers almost $22 billion annually by 2020 in gasoline that they will not have to buy, even after paying for the new fuel efficient technologies.

***In addition, Congress has provided substantial support for research, development, demonstration, and deployment of technologies to improve vehicle efficiency.*** In addition to setting new CAFE standards, EISA authorized a number of research, development, demonstration, and deployment programs for plug-in hybrid, advanced vehicle battery, and other advanced vehicle technologies. EISA also authorized $25 billion in loans to support retooling of U.S. auto manufacturing facilities to produce more fuel efficient vehicles—a program that was fully funded under H.R. 2638, the Continuing Resolution enacted September 30, 2008.

***The future of transportation lies in the transition from internal combustion engines to electric vehicles.*** As the Select Committee learned during its July 2007 and June 2008 hearings focusing on efficient vehicles, the development of plug-in hybrid electric vehicles (PHEVs) and all-electric vehicles hold great potential to enhance America's energy independence and reduce greenhouse gas emissions. Electric motors are three to four times more efficient at turning their fuel into useful work than either gasoline or diesel engines. They also consume no energy while idling and utilize regenerative braking to recharge the vehicle's battery. The oil refining and

delivery process is also extremely inefficient and energy-intensive compared to back-end processes required to get electricity to its point of use.

General Motors, Chrysler, Toyota, and Nissan have all announced plans to produce all-electric vehicles or PHEVs for the U.S. market, with the Chevrolet Volt expected to be the first vehicle from the major manufacturers to hit the market in 2010. Plug-in models like the Volt are expected to have an all-electric range of around 40 miles. Since 75 percent of Americans drive less than 40 miles per day, these vehicles would allow most drivers to eliminate gasoline from their daily commutes altogether. An alternative, more transformative approach is currently being developed by California-based Project Better Place and Nissan in Denmark and Israel. Under this approach, a company maintains ownership of batteries—thereby substantially lowering the upfront cost of the vehicles—and car owners would substitute out or recharge batteries at stations around the country when the vehicle needs a fresh charge. If fully implemented, this approach would extend vehicle range indefinitely and thus makes electric vehicles more readily available to greater segments of the driving population. However, it requires government support to help build the infrastructure needed for drivers to switch batteries.

***The electric grid is an important and readily available piece of infrastructure that could power the transport sector in the United States.*** The electric infrastructure is currently designed to meet the highest expected demand for power, which only occurs for a few hundred hours a year. During the night more than 50 percent of generating capacity lies idle. By utilizing this idle generating capacity, the Department of Energy's Pacific Northwest National Laboratory found that up to 84 percent of U.S. cars, pickup trucks, and sport utility vehicles can be transitioned to electricity without building a single new power plant. Since only 1.6 percent of U.S. electricity comes from burning oil, an 84 percent level of electric vehicle penetration is estimated to eliminate the consumption of 6.5 million barrels of oil equivalent per day, more than all the oil currently imported from OPEC countries. With the cost of gasoline at $3.50 per gallon and the national average cost of electricity of 9.5 cents per kilowatt hour, an electric vehicle runs on an equivalent of around 84 cents per gallon.

***PHEVs slash greenhouse gas emissions, even with our current electricity fuel mix.*** As highlighted by Austin Texas Mayor Will Wynn in testimony before the Select Committee on July 12, 2007, a battery-powered electric vehicle generates only 40 percent of the greenhouse gases produced by an equivalent gasoline vehicle, despite nearly half of U.S. electricity coming from carbon-intensive coal combustion. Greenhouse gas benefits will improve in the future as renewable electricity generation ramps up.

***The 110$^{th}$ Congress has taken important steps towards the promotion of electric vehicles and domestic production of efficient vehicles.*** The tax credits passed in the economic rescue package (H.R. 1424) would range from $2,500 to $15,000, depending on the vehicle's size and battery capacity, and would be used against the purchase of a new plug-in vehicle until the total number of qualified vehicles sold in the United States reached 250,000. In addition, Congress appropriated $25 billion in loans to assist the auto industry retool existing manufacturing plants to build more fuel efficient vehicles, pursuant to Section 136 of EISA.

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***Recommendations:*** The 111th Congress and the next Administration should prioritize the following actions:

- **Ensure Rigorous Implementation of CAFE Standards:** Congress should encourage or require NHTSA to adopt realistic estimates of future gasoline prices in analyzing the economic feasibility of EISA's fuel economy standards, and should closely oversee NHTSA's development and implementation of those standards (for more on this, see the NHTSA oversight section below).

- **Grant the California Waiver Request:** EPA should grant the Clean Air Act waiver sought by California to impose more stringent tailpipe standards on its automotive fleet (standards which more than a dozen additional States also wish to adopt). This waiver was denied in December 2007 by the Bush Administration.

- **Expand Tax Credits for Efficient Vehicles and for PHEV Conversions:** Congress should continue to aggressively promote the development and deployment of plug-in hybrid and all-electric vehicles. In addition to the just-enacted tax incentives for the purchase or plug-in hybrid vehicles, Congress should support additional tax incentives for conversion of existing cars and trucks to electric vehicles and should consider tax credits for trading in less fuel efficient vehicles in order to purchase fuel efficient ones.

- **Expand Federal RD&D:** Congress should support a robust program of research, development, and demonstration of advanced automotive technologies – particularly advanced battery technologies that will support the transition to electric vehicles.

- **Fund Loan Guarantees for Advanced Battery Development:** Congress should fully fund Section 135 of EISA which authorizes loan guarantees for the development of advanced batteries for plug-in-hybrid and all-electric vehicles.

- **Oversee Loan Guarantee for Auto Plant Retooling:** Congress should aggressively oversee the implementation of the EISA Sec. 136 loan guarantee program for advanced technology vehicles.

- **Establish State Electric Vehicle Grant Program:** Congress should create a "State Electric Vehicle Grant Program," similar to other federal energy efficiency programs, to enable State and local governments to apply for grants to procure plug-in-hybrid or all-electric vehicle fleets as well as install any needed charging and/or battery swapping infrastructure.

### 2. Fuels—Promote Advanced Biofuels and Restrict High-Carbon Fuels

#### Biofuels

***Biofuels—and particularly advanced biofuels—can dramatically reduce our reliance on imported oil while at the same time cutting greenhouse gas emissions.*** Ethanol biofuels convert the starches and sugar in plant-based materials into ethanol, typically using either an

enzymatic or a gasification process. Current ethanol production uses corn, beets, cereals, or sugar cane for feedstock. Almost all U.S. ethanol is produced from corn starch. Cellulosic ethanol, by contrast, is produced from the non-edible parts of plants; it can be produced from algae waste biomass, switchgrass and other plants that require lower energy or water inputs compared to conventional feedstock. Cellulosic ethanol faces some remaining technical and economic hurdles, but offers great promise because it does not compete with food production for feedstock (as corn-based ethanol does) and has lower lifecycle greenhouse gas emissions. Biodiesel, made of fats from animal or vegetable oils, is virtually indistinguishable from traditional petroleum-based diesel.

Because they can be domestically produced, biofuels have become an integral element of efforts to reduce oil imports. Biofuels accounted for only four percent of total U.S. fuel consumption as of 2006, but EIA projects that they will account for nearly 16 percent of consumption by 2030.[321] A 2005 report prepared for the Department of Energy found that the United States could produce sufficient biomass to produce biofuels to displace 30 percent of current fuel consumption by 2030.[322]

Depending on the biofuel source, lifecycle greenhouse gas emissions from biofuels can be 12 to 71 percent lower than the greenhouse gas emissions from conventional petroleum-based fuel.[323] Some researchers and stakeholders have expressed concerns about so-called "dirty" biofuels, which have hidden lifecycle greenhouse gas emissions or other adverse environmental impacts attributable, for example, to clearing of tropical forests to produce palm oil for biofuels.[324] These concerns can be addressed through lifecycle emissions standards and sustainability standards, which are incorporated into the current U.S. renewable fuel standard (discussed below) and can be included in a future low-carbon fuel standard (also discussed below).

***U.S. biofuels development and production are surging, thanks to federal incentives and mandates***. After the 1979 oil embargo, a tax credit for blending ethanol with gasoline was introduced, and biofuels tax credits continue today. The May 2008 Farm Bill adjusted the tax credit for blending ethanol into gasoline down to $0.45 per gallon for corn ethanol and up to $1.01 per gallon for cellulosic ethanol. The tax credit for blending biodiesel is $1.00 per gallon.

The Energy Policy Act of 2005 created a Renewable Fuels Standard (RFS) under Section 211(o) of the Clean Air Act, establishing a national mandate to blend in an increasing volume of biofuels on an annual schedule, culminating in 7.5 billion gallons of ethanol by 2012. In 2007, EISA expanded and restructured the RFS—requiring the U.S. fuel supply to include 36 billion gallons of biofuels by 2022, with subsidiary mandates for production of non-corn-based

[321] EIA AEO 2008, supra note 191, at 81.
[322] See generally Robert D. Perlack et al., Oak Ridge National Laboratory Technical Report, Biomass as Feedstock for A Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion-Ton Annual Supply (2005), available at http://feedstockreview.ornl.gov/pdf/billion_ton_vision.pdf.
[323] Environmental Protection Agency, Fact Sheet: Greenhouse Gas Impacts of Expanded Renewable and Alternative Fuel Use, Doc. No. EPA420-F-07-035 (April 2007), available at http://www.epa.gov/OMS/renewablefuels/420f07035.pdf.
[324] Worldwatch Institute, Biofuels for Transport: Global Potential and Implications for Sustainable Energy and Agriculture. German Ministry of Food, Agriculture and Consumer Protection at 196-201 (2007).

"advanced biofuels," biomass-based diesel, and cellulosic biofuels. Lifecycle greenhouse gas emissions of advanced biofuels and biomass-based diesel must be 50 percent below the average emissions of the U.S. fuel supply in 2005, and a 60 percent reduction is required for cellulosic biofuels. In addition, 35 states have some form of RFS or financial incentives for biofuel production. Ethanol is currently blended into about 46 percent of U.S. gasoline, the majority as a 10 percent blend in gasoline (E10). Every automobile in the United States can run on E10. Flex-fuel vehicles, which are more widely available in Brazil and other parts of the world than in the United States, can operate on fuel blends of up to 85 percent ethanol (E85). New engine designs and technology are being developed to capitalize on ethanol's higher octane and reduce its fuel economy penalty.

U.S. production of fuel ethanol jumped from 175 million gallons in 1980 to an estimated 6.5 billion gallons in 2007.[325] Biodiesel has also enjoyed phenomenal growth in the last few years, growing from U.S. sales of 2 million gallons in 2000 to 250 million gallons in 2006.[326] The National Biodiesel Board reported in January 2008 that the existing production capacity for biodiesel stands at 2.24 billion gallons per year, with another 1.23 billion gallons of annual capacity planned for development by the end of 2008. [327]

***Biofuels lack a strong infrastructure for fuel transportation.*** Biofuels are largely transported via railway, tanker truck, and barge. The increasing supply and demand of ethanol may require new infrastructure to supply biofuels. Biodiesel can travel through the existing diesel fuel pipeline and storage systems, but ethanol faces challenges. Ethanol picks up excess water and petroleum sludge in existing gasoline pipelines, which can compromise ethanol fuel integrity. Furthermore, existing pipelines require additional maintenance to prevent corrosion of pipe joints. Ethanol storage tanks differ from conventional fuel tanks, though a conventional fuel tank can be converted for ethanol for approximately $1,000.[328] These differences may partially explain the low number of ethanol fuel stations. Currently, over 1,800 locations in the United States have E85 pumps, but these are primarily located in the Midwest.[329] Nationwide, there are 700 major commercial fleets using biodiesel and 1100 retail filling stations.[330] To help improve the availability of biofuels, EISA included provisions that prohibited corporate bans on installing E85 pumps and mandated an ethanol pipeline feasibility study and grants to assist with the conversion of infrastructure and storage for renewable fuels.

***Although the United States is the largest producer of biofuels, other countries are developing and promoting them vigorously.*** The global biofuels market will expand from $20.5 billion in 2006 to $80.9 billion in 2016, driven by increasing government mandates and

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[325] Renewable Fuels Association, Changing the Climate: Ethanol Industry Outlook 2008 at 2 (2008).
[326] Miguel Carriquiry, U.S. Biodiesel Production: Recent Developments and Prospects, 13(2) Iowa Ag Review 8 (Spring 2007), available at http://www.card.iastate.edu/iowa_ag_review/spring_07/IAR.pdf.
[327] National Biodiesel Board, U.S. Biodiesel Production Capacity (Jan. 25, 2008), available at http://www.biodiesel.org/pdf_files/fuelfactsheets/Production_Capacity.pdf.
[328] Worldwatch Institute, Biofuels for Transport: Global Potential and Implications for Sustainable Energy and Agriculture at 241 (2007).
[329] See National Ethanol Vehicle Coalition, E85 Refueling Locations by State, at http://www.e85refueling.com/states.php?PHPSESSID=9924807cbc680ae06ce6c66004859b75.
[330] National Biodiesel Board, National Trucking Company's Biodiesel Study Shows Positive Results (Mar. 21, 2007), available at http://www.biodiesel.org/news/07clicktrhrus/20070321_decker.shtm.

continuing high oil prices.[331] The United States is a large contributor to this effort, leading the world in fuel ethanol production. Brazil is the second-largest producer by a slim margin (41.1 percent of the market compared to the 47.9 percent U.S. share) and relies on ethanol from domestic sugarcane (a non-food crop) for 40 percent of their auto fuel supply.[332] Brazil's biofuels industry is discussed at greater length in the section below on the Select Committee's Congressional delegation to Brazil in February 2008. Germany, Sweden, France and Spain are the largest European Union ethanol producers, primarily using beets and cereals as feedstock.[333] Biodiesel production is led by Germany, followed by the United States, France and Italy.

***Concerns about the impact of biofuels production on U.S. food prices are likely overstated, but provide another reason to move towards greater reliance on cellulosic biofuels.*** Currently, most biofuels in the United States and Europe are made from food crops. Natural disasters, high commodity prices, and other factors have caused concern that biofuel feedstocks are becoming too valuable to sell as food supplies to poor communities. However, less than a third of U.S. retail food contains corn as a major ingredient and rising prices for corn-related products raises overall U.S. retail food prices less than 1 percentage point per year above the normal rate of inflation.[334] Although the United States is not severely impacted by higher ethanol feedstock costs, low-income developing nations may face a greater challenge.

Greater development of cellulosic biofuels allays concerns that biofuels may raise food prices. Developing cellulosic fuels from non-food sources such as switchgrass, corn stover, and bamboo weakens the link between food and fuel. Furthermore, advances in biofuel technology could help developing nations meet their own energy needs while bolstering agricultural communities abroad. This would require investment in agricultural communities and developing cellulosic biofuel infrastructure, something that is already occurring in the United States and abroad. Dr. Susan Lechine, Founder and Chief Scientist of SunEthanol, spoke of cellulosic ethanol development before the Select Committee hearing entitled "The Gas is Greener: The Future of Biofuels" on October 24, 2007. She noted that cost-effective cellulosic ethanol production is achievable in the near term, that it requires significant resources for research and development, and that it will have enormous positive impacts on the environment and the economy, especially for rural economies. At the Select Committee's July 31, 2008 hearing entitled "Renewing America's Future: Energy Visions of Tomorrow, Today," Dr. Aristides Patrinos, President of Synthetic Genomics Inc., discussed his work with Dr. Craig Venter to design and synthesize microbial cells with far superior capabilities in converting biomass feedstocks into fuels. Utilizing cutting-edge genomic technology, this company is pursuing a wide range of next generation fuels that, if feasible, will be superior to traditional biofuels (ethanol and biodiesel), more adapted to the existing infra-structure and compete successfully with gasoline and other fossil fuels.

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[331] Joel Makower et al., Clean Edge Research, Clean-Energy Trends 2007 at 3 (2007), available at http://www.cleanedge.com/reports/Trends2007.pdf.
[332] Worldwatch Institute, supra note 324, at 6.
[333] Id. at 7, 26.
[334] Ephraim Leibtag, Corn Prices Near Record High, But What About Food Costs?, 6 Amber Waves 11 (Feb. 2008), available at http://www.ers.usda.gov/AmberWaves/February08/PDF/CornPrices.pdf.

## Natural Gas

***Natural gas provides some benefits as a transportation fuel, but there are concerns that substantially expanding transportation demand for natural gas will raise prices—to the detriment of industrial and other consumers.*** Transportation currently accounts for less than 1 percent of U.S. natural gas consumption, and is used primarily to replace diesel in urban bus, truck, and auto fleets. According to EIA, the United States has only about 119,000 natural gas vehicles on the road, which displace the equivalent of about 200 million gallons of gasoline annually.[335] Currently, Honda makes the only natural gas passenger vehicle available for purchase in the United States—with sales of 500 to 1000 vehicles annually. They have also designed a home-fueling station so car owners can fill up their vehicles in their own garages. At current natural gas prices, home refueling with natural gas costs the equivalent of $1.00 to $1.50 per gallon of conventional gasoline.[336] Some analyses have concluded that lifecycle greenhouse gas emissions from natural gas vehicles are lower than for plug-in hybrids, depending on the fuel source for the electricity used to power them.[337] The United States imports only about 20 percent of the natural gas it consumes (almost exclusively from Canada), as compared with nearly 60 percent for oil.

Based on these factors, some stakeholders, such as oil billionaire T. Boone Pickens, have urged Congress to promote expanded reliance on natural gas as a transportation fuel. At the same time, however, industrial consumers of natural gas have emphasized the adverse impacts of already high natural gas prices on U.S. industry and competitiveness—and have cautioned against creating another source of demand that could drive prices yet higher.[338]

## High-Carbon Fuels

***"High-carbon" transportation fuels—such as those derived from tar sands, oil shale, or coal—present unacceptably high costs in the form of greenhouse gas emissions and production-related environmental impacts.*** While some look to these fuels as potential substitutes for imported oil, increased reliance on them will undermine our security in the long-term by greatly exacerbating the climate challenge.

***Tar sands are a mixture of clay, sand, water, and bitumen, a heavy black viscous oil that can be mined and processed to extract the oil-rich bitumen, which is then refined into oil.*** The bitumen in tar sands cannot be pumped from the ground in its natural state. Instead, the tar sand deposits are mined using strip mining or open pit techniques, or the oil is extracted by

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[335] Energy Information Administration, Alternatives to Traditional Transportation Fuels 2006 (Part II - User and Fuel Data), Tables VI (Estimated Number of Alternative Fueled Vehicles in Use in the United States, by Fuel Type, 2003 – 2006) and C1 (Estimated Consumption of Vehicle Fuels in the United States, by Fuel Type, 2003 – 2006) (May 2008), available at http://www.eia.doe.gov/cneaf/alternate/page/atftables/afvtransfuel_II.html.

[336] Testimony of John German (American Honda Motor Company), before the Select Committee on Energy Independence and Global Warming, hearing on "What's Cooking with Gas: The Role of Natural Gas in Energy Independence and Global Warming Solutions," July 30, 2008.

[337] Id. at Appendix A.

[338] Testimony of Rich Wells (Dow Chemical Company), before the Select Committee on Energy Independence and Global Warming, hearing on "What's Cooking with Gas: The Role of Natural Gas in Energy Independence and Global Warming Solutions," July 30, 2008.

taking huge amounts of water, using energy to convert it to steam, injecting the steam underground to "cook" the sands, and then pumping the melted bitumen to the surface.[339] Around 80 percent of the world's known tar sand resources are in Alberta, Canada,[340] and tar sands currently are used to produce 40 percent of Canada's oil supply.[341]

***The process of retrieving and processing tar sands is extremely energy-, land-, and water-intensive.*** Between two and four tons of tar sand-laden earth, along with three barrels of water, are required to produce just one barrel of oil. In Alberta's Beaver Basin, 9 percent of total surface water is consumed by the region's tar sand operation.[342] Most of this waste water ends up in toxic tailings ponds that now cover over 50 square miles of what was once boreal forest in Alberta.[343] The great amounts of energy needed for extraction and processing mean that oil sands produce three to four times the pre-combustion emissions compared to conventional petroleum oil extraction and refining.[344] Total lifecycle greenhouse gas emissions are nearly three times those of conventional petroleum.[345] The mining and processing of tar sands are Canada's fastest growing source of greenhouse gas emissions, currently accounting for 4 percent of the country's total emissions (without including the actual combustion of the fuel).[346]

***Oil shale production technology remains unproven and presents very serious environmental risks.*** By far the largest deposits of oil shale in the world are found in the United States in the Green River Formation, which covers portions of Colorado, Utah, and Wyoming. There is an estimated 800 billion barrels of recoverable oil from oil shale in the area, more than 70 percent of which is on federally owned and managed lands.[347] At present, fundamental uncertainty remains about the technology that could ultimately be used for large-scale extraction, as well as the larger cost and environmental implications.[348] Even optimistic estimates predict it will take 20 years for tar shales to produce 1 million barrels of oil per day and 30 years to produce 3 million barrels of oil per day.[349] Moreover, oil shale's low energy content combined with its complex, expensive, and energy intensive extraction and refining requirements make it a problematic energy option. Large-scale tar shale processing is estimated to produce five times

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[339] Bureau of Land Management, Oil Shale & Tar Sands Programmatic Environmental Impact Statement Information Center website, at http://ostseis.anl.gov/guide/tarsands/index.cfm (last visited Oct. 21, 2008) [hereinafter "BLM Oil Shale & Tar Sands EIS"].
[340] Intergovernmental Panel on Climate Change, Climate Change 2007: Mitigation of Climate Change at 268 (2007).
[341] BLM Oil Shale & Tar Sands EIS, supra note 339.
[342] Alberta Department of Energy, Fact Sheet: Oil Sands Consultation: Multistakeholder Committee Interim Report at Page 12 (Nov. 30, 2006), available at http://www.oilsandsconsultations.gov.ab.ca/docs/InterimReport_Appendix_FactSheet.pdf.
[343] Rob Gillies, Environmentalists weigh costs of Alberta oil sands, International Herald Tribune, Aug. 25, 2008, available at http://www.iht.com/bin/printfriendly.php?id=15617946.
[344] Intergovernmental Panel on Climate Change, Climate Change 2007: Mitigation of Climate Change at 268 (2007).
[345] Ann Bordetsky et al., Natural Resources Defense Council, Driving it Home: Choosing the Right Path for Fueling North America's Transportation Future at 7 (June 2007).
[346] Canadian Association of Petroleum Producers, Canada's oil sands: Greenhouse Gas Emissions, at http://www.canadasoilsands.ca/en/issues/greenhouse_gas_emissions.aspx.
[347] BLM Oil Shale & Tar Sands EIS, supra note 339.
[348] Michael Toman et al. Unconventional Fossil-Based Fuels: Economic and Environmental Trade-Offs at xiii (Oct. 2008) (RAND study sponsored by the National Commission on Energy Policy), available at: http://www.rand.org/pubs/technical_reports/2008/RAND_TR580.pdf
[349] James Bartis et. al., Oil Shale Development in the United States at 23 (2005), available at http://www.rand.org/pubs/monographs/2005/RAND_MG414.pdf.

the pre-combustion emissions of conventional petroleum, making it even more energy intensive than tar sands.[350] If coal plants were used to power tar shale development in the Green River Formation, there would be an 80 percent annual increase in $CO_2$ emissions in Colorado, Utah and Wyoming.[351]

***Coal-to-liquid fuels are similarly problematic from a climate and environment perspective.*** Coal-to-liquid (CTL) fuels are produced using the Fischer-Tropsch process to gasify coal and then convert it to liquid fuel. The production process for CTL generates twice as much $CO_2$ emissions per gallon than as conventional petroleum-derived fuel.[352] CCS technologies have not yet been fully developed and sequestration of emissions from coal-fired power plants should be given priority in use of limited geological and other resources. But even with CCS, lifecycle greenhouse gas emissions from CTL are likely to be higher than those from comparable petroleum-based fuels.[353] Like tar sands and tar shale, CTL production requires massive quantities of water—5 to 7.3 gallons for each gallon of CTL.[354] Moreover, to produce enough CTL to substitute even 10 percent of the current U.S. fuel supply would require a 36 percent increase in current coal production[355]—which, because of unsustainable mining practices like mountaintop removal, would result in severe negative environmental impacts.

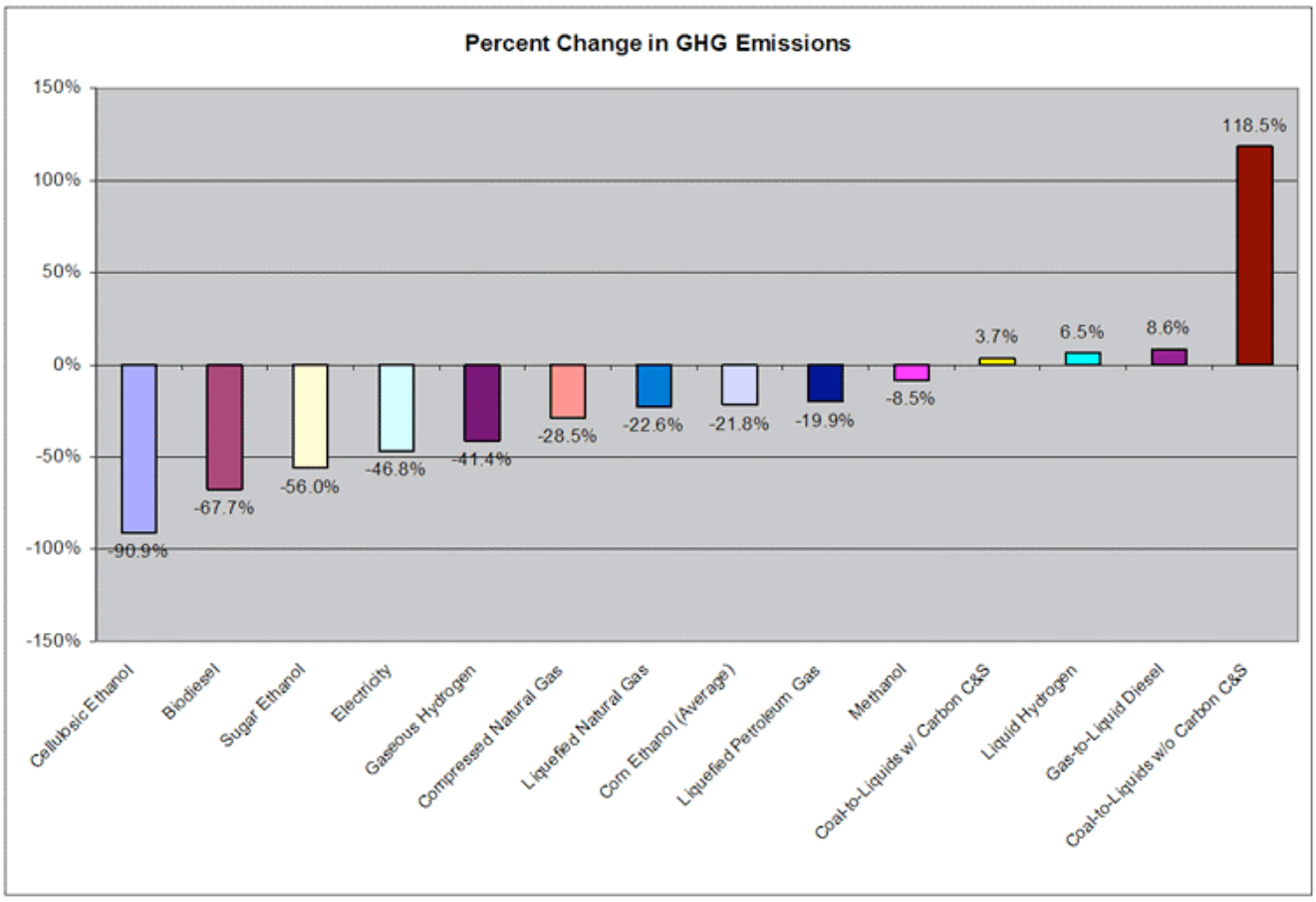
**Low-Carbon Fuel Standard**

***A low carbon fuel standard (LCFS), which requires that the average lifecycle greenhouse gas emissions of fuels be gradually reduced from some baseline over time, provides an important mechanism for reducing fuel-related emissions.*** A LCFS provides an important policy mechanism for pushing low-carbon technology development and emission reductions in the transportation sector. A LCFS has certain advantages over a renewable fuel standard, because it focuses on the goal of emission reductions without regard to specific fuel type. As such, it advantages comparatively "clean" biofuels and also promotes electricity as a vehicle fuel. A LCFS can be adopted in complement with vehicle fuel economy or emission standards, as the State of California has done. California's LCFS requires a 10 percent reduction in lifecycle GHG emissions by 2020.[356] But even if a cap-and-invest system is adopted that covers transportation fuels, a LCFS serves at least two important purposes. First, it captures "upstream" emissions associated with fuel production, including overseas production, which might not otherwise be accounted for in a cap-and-invest system. Second, it helps to push the development of new fuel technologies more rapidly than the price signal of a cap-and-invest system alone would do—helping to bring advanced biofuels and electric vehicles to market more

[350] Intergovernmental Panel on Climate Change, Climate Change 2007: Mitigation of Climate Change at 268 (2007).
[351] The Wilderness Society, Oil Shale Fact Sheet, at http://www.wilderness.org/Library/Documents/upload/Oil_Shale_Tar_Sands_FS_global_warming.pdf.
[352] Toman et al. supra note 348, at 44.
[353] Id.
[354] National Energy Technology Laboratory, Emerging Issues for Fossil Energy and Water: Investigation of Water Issues Related to Coal Mining, Coal to Liquids, Oil Shale and Carbon Capture and Sequestration. At 20 (June 2006), available at http://www.netl.doe.gov/technologies/oil-gas/publications/AP/IssuesforFEandWater.pdf.
[355] Toman et al., supra note 348, at 39.
[356] For analysis of the California LCFS, see, e.g., Alex Farrell et al., A Low-Carbon Fuel Standard for California, Part 2: Policy Analysis (Aug. 1, 2007), available at http://www.energy.ca.gov/low_carbon_fuel_standard/UC_LCFS_study_Part_2-FINAL.pdf.

quickly. Third and relatedly, to the extent that a LCFS promotes development of *domestic* clean fuel sources, it can contribute to reducing oil imports at the same time that it helps reduce transportation sector emissions.

**Lifecycle Greenhouse Gas Emissions of Fuels Relative to Conventional Gasoline**




*Source: Environmental Protection Agency, Fact Sheet EPA420-F-07-035, Greenhouse Gas Impacts of Expanded Renewable and Alternative Fuels Use (April 2007), available at* http://www.epa.gov/oms/renewablefuels/420f07035.htm.

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***Recommendations:*** The 111th Congress and the next Administration should prioritize the following actions:

- **Establish a National Low-Carbon Fuel Standard:** Congress should enact a low carbon fuel standard (LCFS) that would set a mandatory schedule for reducing the lifecycle greenhouse gas emissions attributable to the U.S. fuel supply. This LCFS should be harmonized with the existing RFS through 2022 and should effectively replace the RFS from 2023 and thereafter.

- **Expand Federal RD&D:** Congress should increase funding for biofuel research, development, and demonstration programs established under Title II, Subtitle B of EISA, and should support research and development of genomics-driven technologies that produce fuels from renewable feedstocks and from $CO_2$.

- **Renewable Fuel Infrastructure Grants:** Congress should support expanded storage and dispensing infrastructure for biofuels through the Renewable Fuel Infrastructure Grant program under Section 244 of EISA.

- **Renewable Fuel Infrastructure Tax Credits:** Congress should consider extending the Alternative Fuel Vehicle Refueling Property Credit, under which fueling stations can claim a 30 percent credit for the cost of installing clean-fuel vehicle refueling equipment. H.R. 1424 extended the credit until December 31, 2010, but Congress should consider expanding the credit to 2015 or increasing the percentage of the credit to 50 percent.

### 3. Reduce Vehicle Miles Traveled While Improving Quality of Life

***The United States cannot meet its oil- and greenhouse gas reduction goals through vehicle efficiency improvements and low-carbon fuels alone. We must also reduce how much we drive in a way that preserves mobility and improves quality of life.*** The amount we drive is typically measured in "vehicle miles traveled" or VMT. Per capita VMT in the United States is dramatically higher than in other advanced industrial countries—5,700 miles a year compared with 2,368 in Japan and 3,961 in Germany as of 1997.[357] VMT in the United States is not only high in comparison with other countries; it is also growing at a dramatic rate. In 2000, VMT reached 2.8 trillion vehicle-miles, almost four times VMT in 1960.[358] It is projected that VMT will increase another 60 percent by 2030, in step with the growing U.S. population.[359] If left unchecked, this projected VMT growth will substantially reduce the oil consumption and greenhouse gas reduction benefits of EISA—while at the same time contributing to increases in conventional air pollution, auto fatalities, and increased traffic congestion.

***VMT is expected to continue to rise both because the U.S. population is expected to increase by a third of its present size by 2050 and because housing size is steadily increasing, creating greater space between destinations as a result.***[360] Since 1977, the size of the average U.S. home has increased over 46 percent (from 1,720 to 2,521 square feet)[361] while the average

[357] Federal Highway Administration, Our Nation's Highways – 2000, Office of Highway Policy Information. Publication No. FHWA-PL-01-1012 (2000), at http://www.fhwa.dot.gov/ohim/onh00/bar4.htm.
[358] Federal Highway Administration, Our Nation's Highways – 2000, at 24 (2000), available at http://www.fhwa.dot.gov/ohim/onh00/our_ntns_hwys.pdf.
[359] U.S. Department of Transportation, Transportation Vision 2030 at 5 (Jan. 2008), available at http://www.rita.dot.gov/publications/transportation_vision_2030/pdf/entire.pdf.
[360] For the 2050 estimate see Jeffrey Passel and D'Vera Cohn, Pew Research Center, Immigration to Play Lead Role in Future U.S. Growth: U.S. Population Projections 2005-2050 (Feb. 11, 2008), available at http://pewresearch.org/pubs/729/united-states-population-projections. For the July 2008 estimated U.S. population, see Central Intelligence Agency, The World Factbook: United States (last visited Oct. 20, 2008), available at https://www.cia.gov/library/publications/the-world-factbook/print/us.html.
[361] U.S. Census Bureau, Highlights of Annual 2007 Characteristics of New Housing, at http://www.census.gov/const/www/highanncharac2007.html.

household size in the United States dropped from 3.67 members in 1940 to 2.62 in 2002.[362] Houses built in 1950 had 290 square feet per family member; houses built in 2003 provided three times more space—893 square feet—per person.[363] As these larger houses and housing developments are built, sprawl increases and open spaces begin to shrink. It is estimated that up to 5.8 million acres of farmland and open space will be converted to commercial or residential uses by 2025.[364]

***A broad array of policies can help communities to "grow smarter," while reducing VMT.*** Increasing mass transit and creating more pedestrian and bicycle-friendly infrastructure can encourage people to travel without using a car. Planning roads and pathways to create shorter, direct links to destinations can limit car distances. Such planning is often referred to as "smart growth" or "green communities." Communities that use smart growth principles offer environmental and financial benefits. By reducing time spent in cars, global warming pollutants are lessened. Smart growth planning also lowers the costs of road maintenance, highway expansion, and infrastructure needed to deliver utilities. These lower infrastructure costs allow states and localities to redirect budget funds to other fiscal priorities or lower taxes.

***Although most of these policies are implemented at the local, State, or regional level, federal policy can play a substantial role in supporting them***. Federal funding for transportation and housing and urban development have important impacts on transportation infrastructure and driving patterns and can support smart growth. Brownfield revitalization funding can transform unused, contaminated industrial urban land into viable communities without undue strain on existing infrastructure.

***Reducing VMT saves consumers and taxpayers money.*** The high cost of infrastructure associated with spreading development can strain government budgets. Personal budgets are also impacted by sprawl. Access to transit can reduce the need of a car in a two-worker household, resulting in roughly $6,000 yearly savings and a 30 percent reduction in transportation-related carbon emissions.[365] In 2007, Americans took 10.3 billion trips using public transportation, a 32 percent increase since 1995.[366] Many believe that this increase is due to rising gas prices.[367]

***Americans support expanding smart growth planning and mass transit.*** A 2007 Smart Growth America poll conducted in conjunction with the National Association of Realtors

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[362] U.S. Census Bureau, Table HH-6, Average Population Per Household and Family: 1940 to Present, Internet release date September 15, 2004, at http://www.census.gov/population/socdemo/hh-fam/tabHH-6.pdf.
[363] Alex Wilson and Jessica Boehland, Small is Beautiful: U.S. House Size, Resource Size, and the Environment, 9 Journal of Industrial Ecology 277 (2005).
[364] Predicting Urban Sprawl in Top 20 U.S. Coastal Cities, The Helm (Fall 2000), available at http://www.iisgcp.org/news/helm/fall2000.pdf.
[365] American Public Transit Association, 2008 Public Transportation Fact Book at 10 (June 2008), available at http://www.apta.com/research/stats/factbook/documents08/2008_fact_book_final_part_1.pdf .
[366] Id. at 7.
[367] Id. at 13; see also KFH Group, Inc. for the American Public Transportation Association, How Transit Agencies are Addressing the Impact of Fuel Price and Ridership Increases at 3 (Sept. 22, 2008), available at http://www.apta.com/research/info/online/documents/impact_of_fuel_price.pdf

revealed broad public support for pedestrian friendly communities that employed a mix of residential and commercial uses. At the Select Committee's June 18, 2008 hearing entitled "Planning Communities for a Changing Climate," Smart Growth America director David Goldberg cited a 2007 Growth and Transportation Survey that revealed three quarters of Americans believe that being smarter about development and improving public transportation are better long-term solutions for reducing traffic congestion than building new roads. Half of those surveyed think improving public transit would be the best way to reduce congestion.

***Both urban and rural areas can benefit from smart growth.*** Two witnesses at the Select Committee's "Planning Communities for a Changing Climate" hearing provided very different examples of how to implement smart growth strategies through economic development. Dr. Sultan Al-Jaber discussed the development of Masdar City, a carbon neutral, zero-waste city being built in Abu Dhabi for 50,000 people. Masdar will utilize public transportation and 100 percent renewable energy to develop and market commercially viable products to reduce energy, waste, and water consumption. Steve Hewitt, City Administrator of Greensburg, Kansas, testified about his small rural town's decision to reduce their carbon footprint. After a tornado destroyed 95 percent of Greensburg, the community decided to rebuild their main-street based town using the principles of smart growth community planning and building efficiency standards. By focusing on "greener" development, they expect to create a sustainable local industry and a stronger economic base.

***The 110th Congress has taken some initial steps to promote mass transit and smart growth.*** It passed H.R. 6052, "The Saving Energy Through Public Transportation Act of 2008," which offers grants to assist with the costs of transit fare, facilities, and operations for public transit, including intercity bus services. It also supports commuter alternative programs. In addition, the House passed H.R. 6899, "The Comprehensive American Energy and Security Consumer Protection Act," which provides incentives to lenders and financial institutions to provide lower interest loans to consumers who live in mixed use, dense areas by accounting for money saved by living in less car-dependent areas. The Senate did not take up this bill.

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***Recommendations:*** The 111th Congress and the next Administration should prioritize the following actions:

- **Cap and Invest:** Congress should provide funding, on a competitive basis, through cap-and-invest legislation for State and local efforts to reduce VMT—for example through mass transit and smart growth planning and policies. For example, H.R. 6186 and the Dingell-Boucher climate legislation discussion draft provide for such funding.

- **Prioritize Smart Growth in Transportation Reauthorization:** Encouraging smart growth and expanding mass transit should be a central focus on the transportation reauthorization process in the 111th Congress. The next transportation reauthorization bill should encourage transit-oriented development and discourage actions to convert open spaces without regional or statewide land use plans.

- **Provide Smart Growth Support to State and Local Governments:** Congress should enact H.R. 6495, the "Transportation and Housing Choices for Gas Price Relief Act of 2008," sponsored by Select Committee member Rep. Earl Blumenauer. This legislation provides grants to state and local governments and rural and metropolitan planning organizations for the purpose of reducing VMT, technology upgrades to make public transportation systems more efficient, and establishes a location efficient mortgage goal for Fannie Mae and Freddie Mac of 15 percent by 2019.

- **Support "Complete Streets":** Congress should enact the "complete streets" principles in H.R.5951, the "Safe and Complete Streets Act of 2008." This bill requires all federally-funded transportation projects to accommodate complete streets principles to ensure that pedestrians, the disabled and cyclists, among others, are accommodated.

### 4. Move Towards a Lower-Carbon Aviation Sector

***Aviation is an increasingly significant factor in transportation greenhouse gas emissions worldwide.*** Aviation emissions generate 12 percent of U.S. transportation $CO_2$ emissions and 3 percent of total U.S. $CO_2$ emissions.[368] Experts predict an increase in aviation and its impact on the environment. The Federal Aviation Administration (FAA) estimates that U.S. aviation demand will double or triple by 2025[369] and worldwide aviation emissions are expected to increase 3 to 5 percent per year.[370] Emissions from international aviation rose 48 percent from 1990-2000.[371]

***Aviation emissions have a unique impact on the environment.*** Airplanes emit $CO_2$, nitrous oxide, particulate matter, and water vapor. The release of aviation emissions in high levels of the atmosphere change the properties of clouds and contrails and can change ozone levels. Inflight emissions particles freeze, forming new clouds which could impact weather patterns.[372] While the effects of $CO_2$ on the atmosphere are well known, the combined effect of $CO_2$ and other gases at high altitudes are not as well understood and could double or quadruple the warming effect of $CO_2$ alone.[373]

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[368] Energy Information Administration, U.S. Carbon Dioxide Emissions from Energy Use in the Transportation Sector, 1990-1998. http://www.eia.doe.gov/oiaf/1605/archive/gg99rpt/tbl8.html; Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, Table A-108 at p. A-128 and Table ES-2 at p. ES-6 (April 15, 2007).

[369] Federal Air Administration, Next Generation Air Transportation System Integrated Plan at 8 (Dec. 2004), available at http://www.jpdo.gov/library/ngats_v1_1204r.pdf.

[370] Intergovernmental Panel on Climate Change, Aviation and the Global Atmosphere, Summary for Policymakers, How are Aviation Emissions Projected to Grow in the Future? (1999), available at http://www.grida.no/publications/other/ipcc_sr/.

[371] United National Framework on Climate Change, Executive Summary of the Compilation and Synthesis Report on Third National Communications from Annex I Parties at 6 (May 16, 2003), available at http://unfccc.int/resource/docs/2003/sbi/07.pdf.

[372] Intergovernmental Panel on Climate Change, Aviation and the Global Atmosphere: A Special Report of IPCC Working Groups I and III in Collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer, Section 3.3, 3.4, 6.1.2 (1999).

[373] Royal Commission on Environmental Pollution, The Environmental Effects of Civil Aircraft in Flight at 11-15 (Mar. 22, 2007), available at http://www.rcep.org.uk/aviation/av04-s2.pdf.

***Aviation emissions are under greater scrutiny than ever before.*** Foreign countries, States, and members of Congress are taking note of aviation's role in global warming. The European Union has recently included aviation in its Emissions Trading Scheme. Six States and the District of Columbia, in conjunction with five environmental groups, have petitioned the EPA to regulate aircraft greenhouse gas emissions under the Clean Air Act.

***Decreasing aviation emissions requires a three-fold emphasis on improving aircraft technology, increasing operational efficiency, and developing low-carbon fuels***. The aviation industry and governments around the world will need to support more efficient technology and operations as well as lower-carbon fuel for airplanes. Technology has been developed to improve fuel use and associated emissions. On existing planes, lighter equipment and winglets can be attached to improve air drag. At the April 2, 2008 Select Committee hearing entitled "From the Wright Brothers to the Right Solutions: Curbing Soaring Aviation Emissions," witness Jim May, President and CEO of the Air Transport Association, testified that new engines and planes would greatly improve fuel efficiency. He additionally noted the high cost of fuel has strained the ability of airlines to purchase new equipment.

***Changes in aviation operations proposed in the FAA NextGen program can streamline flights to reduce emissions.*** Incorporating continuous descent approaches, improved plane location technology, and decreasing the vertical distance between planes can streamline flights and prevent fuel-burning holding patterns, take-offs, and landings. Dan Elwell, Assistant Administrator for Aviation Policy, Planning, and Environment for the FAA testified at the Select Committee hearing about the importance of employing these operations as well as others.

***There are several jet fuels being developed that may reduce the need for oil-based jet fuel and emit fewer global warming pollutants when burned.*** Virgin Airlines had a successful commercial test flight using a mix of conventional jet fuel and biofuel in February 2008, and other airlines have announced similar intentions. The Virgin flight used jet fuel developed from sustainable coconut and babassu oil, but companies are also developing a jet fuel from algae, which would use less water and natural resources than other plant-based biofuels. EISA Section 202 (amending Section 211(o) of the Clean Air Act) provided an incentive for jet biofuel production by giving jet biofuel producers "additional renewable fuel" credits, which can be used to help satisfy refiners' obligations under the Renewable Fuel Standard (RFS). However, jet fuels are not directly subject to the RFS mandate.

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***Recommendations:*** The 111th Congress and the next Administration should prioritize the following actions:

- **FAA Reauthorization:** As part of the FAA reauthorization bill, Congress should enact the policies included in Title V of H.R. 2881 and S. 1300, which include the CLEEN—Continuous, Low Energy, Emissions, and Noise program—to develop lower energy, decreased emissions and noise technology for aircraft, and the NextGen program that outlines operations systems to eliminate unnecessary emissions.

- **Support Low-Carbon Aviation Fuels:** Congress should include aviations fuels in the low-carbon fuel standard described above and should expand support for the development of first and second generation jet biofuel, by enacting a gradually increasing mandate for the production of jet biofuel and by offering tax incentives for such production.

- **Reform NextGen:** The FAA should reform the NextGen program to place a stronger emphasis on reduction of aviation-related greenhouse gas emissions.

- **Clean Air Act Petition for Rulemaking:** In response to the State and local governments' petition for rulemaking, EPA should promptly issue a determination as to whether aircraft greenhouse gas emissions should be regulated pursuant to the Clean Air Act.

## F. SUPPORT GREEN JOBS AND CLEAN TECH GROWTH

***The win-win energy and climate solutions set forth above present an unprecedented opportunity for an innovation-driven economic revival in which clean energy solutions—built by American workers—are marketed around the world.*** In an April 2008 Select Committee hearing entitled "Green Capital: Seeding Innovation and the Future Economy," representatives from some of the country's leading venture capital firms testified that unabated climate change is one of the greatest risks facing humanity and that mitigating it constitutes one of the greatest investment and job creation opportunities in history. The business opportunity presented by clean energy technologies was echoed time and again at Select Committee hearings throughout the past 18 months. Recent investment and growth in the clean energy sector echoes this outlook. Solar, wind, biofuels, geothermal, hybrid- and all-electric vehicles, advanced batteries, green buildings, and other clean-energy technologies provided bright spots in an otherwise sluggish economy in 2007. As the U.S. economy struggled with plummeting housing prices, rising foreclosure rates, record oil prices, and creeping unemployment, the clean energy sector continued to demonstrate robust growth, attract large private sector investment, and create many new jobs.

***Declining costs, coupled with State renewable electricity standards and federal tax incentives, have led to a dramatic expansion in renewable electricity generation.*** Renewable technologies experienced a record-breaking year in the United States in 2007. A world-leading 5,244 megawatts of new wind capacity was installed in the United States, enough to power 1.5 million homes. This amounts to 35 percent of the new electricity generating capacity installed nationwide.[374] Public policies that put these technologies on an even playing field with their fossil fuel counterparts will further drive down their costs and accelerate deployment.

***As mature industries increasingly move overseas to access cheaper labor, technology and innovation-driven sectors will become the key to sustaining economic growth and creating good jobs.*** The $26 billion invested by venture capitalists across all sectors in 2006 represented 0.2 percent of U.S. GDP, but the $2.3 trillion in revenues these firms generated made up 18 percent of U.S. GDP. The U.S. semiconductor industry—the focus of U.S. venture capital through the 1980s and early 1990s—now employs 240,000 people in high-wage manufacturing jobs and had sales totaling $102 billion in the global market in 2000, around half of total worldwide sales. In 1999, this sector was the largest value-added industry in manufacturing in the United States, larger than the iron, steel, and motor vehicle industries combined.[375] The recent infusion of significant venture capital into clean energy indicates the sector's potential for similar growth and job creation over the coming decade.

***The clean tech sector is booming.*** U.S.-based venture capital investments in the clean energy sector rose to nearly $3 billion in 2007, a 70 percent increase over 2006. The clean

[374] American Wind Energy Association, supra note 218.
[375] Testimony of Bill Unger (Environmental Entrepreneurs), Testimony before the Select Committee on Energy Independence and Global Warming hearing on "Blowing in the Wind: Renewable Energy as the Answer to an Economy Adrift," March 6, 2008.

energy sector now receives around 10 percent of all U.S. venture capital investments.[376] Worldwide revenue of solar photovoltaics (PV), wind, biofuels, and fuel cells grew 40 percent in 2007, up from $55 billion in 2006 to $77.3 billion in 2007.[377] New global investments in energy technologies—including venture capital, project finance, public markets, and research and development—have expanded by 60 percent from $92.6 billion in 2006 to $148.4 billion in 2007.[378] Most investment in clean energy innovation is occurring outside the established energy industries. The five major independent oil companies, for example, invested less than one hundredth of one percent of 2007 revenues in research and development. Companies in innovation-oriented sectors like the biotech, information technology, and semiconductors routinely invest 15 to 18 percent of revenues in R&D.

***The renewable energy and efficiency technology sector has already become a major engine of job creation and numerous studies confirm that adoption of supportive public policies will yield substantial job growth.*** Research commissioned by the American Solar Energy Society found that in 2006 the energy efficiency industry had revenues of $933 billion and created 8 million jobs, 50 percent of these in manufacturing. Aggressive investment in energy efficiency would result in the creation of 32 million new jobs and nearly $4 trillion in revenues by 2030.[379] Analyses of state-level efficiency programs similarly have found that such programs have substantial benefits in terms of job creation and economic growth.[380] For example, a recent study showed that California's energy efficiency programs resulted in a net increase of nearly 1.5 million jobs from 1977 to 2007.[381] Moreover, State efficiency programs have been shown to produce savings at a rate of two dollars or more for every dollar invested.[382]

***Investments in renewable energy create, on average, three to five times as many jobs as similar investments in fossil-fuel energy systems.***[383] Analysis by the Union of Concerned Scientists finds that if utilities were to generate an average of 20 percent of their electricity from renewable sources, 185,000 new jobs would be created by 2020.[384] A report by Navigant

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[376] Joel Makower, et al., Clean Energy Trends 2008 (Mar. 2008), available at http://www.cleanedge.com/reports/pdf/Trends2008.pdf.
[377] Id.
[378] Chris Greenwood, New Energy Finance, slide presentation on Global Trends in Clean Energy Development at 6 (2008), available at http://www.eia.org.au/files/78V73UGICR/Greenwood.pdf.
[379] Roger H. Bezdek, Renewable Energy and Energy Efficiency: Economic Drivers for the 21st Century (2007), available at http://www.ases.org/ASES-JobsReport-Final.pdf.
[380] See Maggie Eldridge et al., Energy Efficiency: the First Fuel for a Clean Energy Future: Resources for Meeting Maryland's Electricity Needs, ACEEE (Feb. 2008); California Public Utilities Commission and California Energy Commission, Energy Efficiency – California's Highest Priority Resource (Aug. 2006), available at ftp://ftp.cpuc.ca.gov/Egy_Efficiency/CalCleanEng-English-Aug2006.pdf.
[381] Felicity Barringer, Green Policies in California Generated Jobs, Study Finds, New York Times, Oct. 20, 2008, available at http://www.nytimes.com/2008/10/20/business/20green.html.
[382] See, e.g., California Public Utilities Commission and California Energy Commission, Energy Efficiency – California's Highest Priority Resource (Aug. 2006), available at ftp://ftp.cpuc.ca.gov/Egy_Efficiency/CalCleanEng-English-Aug2006.pdf.
[383] Testimony of Daniel Kammen before the Select Committee on Energy Independence and Global Warming, hearing on "Investing in the Future: R&D needs to meet America's Energy and Climate Challenges," Sept. 10, 2008; see also Daniel Kammen et al., Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Generate? (2004), available at http://socrates.berkeley.edu/~rael/papers.html#econdev.
[384] Union of Concerned Scientists, Cashing in on Clean Energy, July 2007 Update, available at http://ucsusa.org/assets/documents/clean_energy/cashing-in-national.pdf.

Consulting concluded that expiration of the tax credits for renewable electricity generation would have resulted in the loss of 116,000 job opportunities and $19 billion in private investment in the U.S. in 2009.[385]

***Biofuels production has substantial benefits for domestic economic growth and job creation, particularly in rural areas.*** In the United States, the ethanol industry is estimated to employ between 147,000 and 200,000 people from farming to biofuels plant construction and operation.[386] The Department of Energy has noted conservative projections of 10,000 to 20,000 additional jobs for every billion gallons of ethanol production.[387] In Brazil, it is estimated that support for biofuels production has saved almost $50 billion in imported oil and created as many as one million rural jobs.[388]

***Investment in efficiency and clean energy technology can be an engine of economic stimulus and job creation for the flagging U.S. economy.*** This was the focus of the Select Committee's September 18, 2008 hearing entitled "The Green Road to Economic Recovery." For example, the Center for American Progress and the University of Massachusetts-Amherst's Political Economy Research Institute found that $100 billion targeted investment in five energy efficiency and renewable energy production strategies could generate 2 million new jobs, roughly 800,000 of which would be in the construction sector.[389] Such an approach would outperform an economic stimulus approach focused on increasing household spending, such as through rebate checks, by creating 300,000 more jobs.

Over the 12 months ending August 31, 2008, the number of unemployed persons increased by 2.2 million and the unemployment rate increased to 6.1 percent, the highest level in more than five years. Manufacturing and construction were the hardest hit sectors.[390] Putting American workers back to work on retrofitting buildings to improve energy efficiency, expanding mass transit and freight rail, constructing a "smart" electrical grid, building and installing wind and solar energy systems, as well as developing next-generation biofuels will ensure the clean energy technology revolution brings working Americans along with it. The extension of the Production Tax Credit and Investment Tax Credit for renewable electricity sources, the FY 2009 expansion of funding for the Weatherization Assistance Program (which funds building efficiency retrofits for low-income households), and the recently funded $25 billion loan program for domestic auto industry to retool facilities to produce more high-tech, fuel efficient vehicles represent some strong first steps in this direction.

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[385] Navigant Consulting, Economic Impacts of the Tax Credit Expiration, Final Report prepared for the American Wind Energy Association (AWEA) and the Solar Energy Research and Education Foundation (SEREF) (Feb. 13, 2008), available at http://www.awea.org/newsroom/pdf/Tax_Credit_Impact.pdf.
[386] Worldwatch Institute, supra note 224, at 124.
[387] U.S. Department of Energy Office of Science Genomics: GTL, Cellulosic Ethanol: Benefits and Challenges at http://genomicsgtl.energy.gov/biofuels/benefits.shtml (last visited Oct. 20, 2008).
[388] Worldwatch Institute, supra note 224, at 11.
[389] Robert Pollin et al., Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy, Center for American Progress and Political Economy Research Institute (Sept. 2008), available at http://www.americanprogress.org/issues/2008/09/pdf/green_recovery.pdf.
[390] U.S. Bureau of Labor Statistics, The Employment Situation: September 2008, at http://www.bls.gov/news.release/empsit.nr0.htm.

***The shift to the green economy can be a broad-based economic program that benefits not only the holders of capital but also the low- and moderate-income Americans who are suffering disproportionately in today's economy.*** Green jobs expert Van Jones testified at the Select Committee's May 22, 2007 hearing entitled "Economic Impacts of Global Warming: Green Jobs," that jobs in the renewables and efficiency industries can provide pathways out of poverty for at risk youth and underserved communities, as well as for rural communities. At that same hearing, witnesses called for investments in training of workers for these jobs, including targeted training in underserved communities. Congress recognized this opportunity by including H.R. 2847, introduced by Rep. Hilda Solis, in EISA (Section 1002). This provision authorizes $125 million annually for a new jobs training program for the renewable energy and energy efficiency industries.

***If we are to make America a global leader in clean technology, we will need to dramatically increase federal RD&D funding.*** Federal funding for energy research and development has fallen to $3-4 billion a year, one third the levels of the late 1970s, in constant dollars. As President Susan Hockfield from the Massachusetts Institute of Technology described in testimony before the Select Committee on September 10, 2008, "In 1980, 10 percent of federal research dollars went to energy. Today, when we really need energy answers, it is an embarrassing two percent."[391] This trend must be reversed if America is to remain competitive in the global marketplace.

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***Recommendations:*** The 111th Congress and the next Administration should prioritize the following actions:

- **Green Jobs Training:** In addition to enacting the policies outlined above, fully fund the green jobs training program established under Section 1002 of EISA.

- **Federal RD&D Funding:** Congress should double federal research, development, and demonstration funding for clean energy technologies in order to help ensure the United States' role as a leader in the clean tech sector.

- **Encourage Private Financing of Clean Tech and Efficiency:** Congress should study the potential for alternative financing mechanisms, such as a federal clean energy bank, that will further encourage the entry of private capital into the clean tech and efficiency sectors.

[391] Testimony of Susan Hockfield before the Select Committee on Energy Independence and Global Warming, hearing on "Investing in the Future: R&D Needs to Meet America's Energy and Climate Challenges," Sept. 10, 2008.

## G. PROTECT AMERICAN CONSUMERS FROM HIGH ENERGY PRICES

### Increasing Funding for LIHEAP

***This winter, Americans throughout the nation are likely to face major challenges heating their homes.*** The Low Income Home Energy Assistance Program (LIHEAP) was established to help reduce the impact of home energy expenses on the nation's most vulnerable populations by providing assistance to help with their heating and cooling bills and weatherizing their homes. American families facing escalating home heating costs this winter are already coping with rising gasoline and food prices. At current prices, the average consumer at the top end of the lowest quintile income bracket is spending nearly 11 percent of their pretax income on gasoline.[392] Incredibly, many families will spend even more money heating their homes than they have spent this year paying record prices at the pump. Families receiving LIHEAP assistance will spend, on average, roughly 15 percent of their income on home energy bills.[393]

Around 8 million American households in the United States use heating oil to warm their homes. Of the 8.1 million households in the United States that use heating oil to heat their homes, 6.2 million households, or roughly 78 percent, are located in the Northeast region of the country.[394] The New England region, in particular, relies heavily upon heating oil, with more than half of homes—roughly 53 percent—dependent upon this fuel source for heating. According to EIA, an average household using heating oil should expect to pay $2,524 in heating costs this winter, an increase of 30 percent over last year.

More than 51 percent of households nationwide heat their homes with natural gas. These 58 million U.S. households should expect to pay around $1,017 to heat their home this winter, an increase of 19 percent over last year. Roughly 30 percent of homes, or nearly 39 million American households, use electricity for heat. These households will likely face heating costs of $944 this winter, a 10 percent increase over last year. Finally, the 6.5 million American households using propane to heat their homes should expect to pay $1,890 this winter, an increase of 13 percent over last year.

While the number of households receiving LIHEAP assistance has been increasing in recent years, the 5.3 million households served in Fiscal Year 2007 still represents only a small fraction—15 percent—of all households eligible for assistance.[395] Despite skyrocketing home heating prices and the importance of LIHEAP to millions of families, the Bush Administration's budget request proposed to cut total LIHEAP funding by 22 percent this year, to $570 million.

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[392] For figures on the average income of households in the lowest income quintile, see U.S. Census Bureau, Income, Poverty, and Health Insurance Coverage in the United States: 2006, at 38 (Table A-3: Selected Measures of Household Income Dispersion: 1967 to 2006) (2007), available at http://www.census.gov/prod/2007pubs/p60-233.pdf.

[393] National Energy Assistance Directors' Association, Issue Brief: The Low Income Energy Assistance Program. Providing Heating and Cooling Assistance to Low Income Families at 2 (Nov. 26, 2007).

[394] Energy Information Administration, Residential Heating Oil Prices, What Consumers Should Know (2008), available at: http://www.eia.doe.gov/bookshelf/brochures/heatingoil/index.html.

[395] Libby Perl, The Low-Income Home Energy Assistance Program (LIHEAP): Program and Funding, Congressional Research Service Report No. RL31865, at 14 (Table 3) (Sept. 18, 2008).

The Select Committee held a hearing on rising home energy costs and the future of LIHEAP funding on September 25, 2008, at which Massachusetts Governor Deval Patrick and other witnesses described the desperate need for an increase in LIHEAP funding. On September 30, 2008, President Bush signed into law H.R. 2638, a continuing resolution which included $5.1 billion in funding for LIHEAP and also expanded the eligibility requirements to allow states to provide assistance to people making up to 75 percent of state median income.

**Increasing Funding for the Weatherization Assistance Program**

***The Weatherization Assistance Program enables low-income families to permanently reduce their energy bills by making their homes more energy efficient.*** According to the Department of Energy, weatherization reduces heating bills by 32 percent by making homes more efficient, and according to the National Association for State Community Services Programs, homes weatherized in 2008 will save an average of more than $413. Analyses of State-level home efficiency programs have been found to produce savings at a rate of two dollars or more for every dollar invested.[396]

Weatherization not only permanently reduces families' energy bills by making their homes more efficient, it also spurs economic growth and job creation. Every one million dollars invested in weatherization creates between 40 and 45 jobs.[397] The Department of Energy's own estimates of the impact on job growth are even higher, projecting that 52 jobs are created for every $1 million invested. Nationwide, weatherization supports 8,000 jobs in low-income communities.[398]

On February 4, 2008, the day the President's budget for Fiscal Year 2009 was released, the Department of Energy website called the Weatherization Assistance program "this country's longest running, and perhaps most successful energy efficiency program." Nevertheless, the President's budget proposal released that day would have completely eliminated this program. In the September 2008 Continuing Resolution, Congress responded by increasing the funding for the Weatherization Assistance Program by $250 million to a total of $478 million—about twice the historical funding level.

**Managing the Strategic Petroleum Reserve**

***Even as oil and gas prices have skyrocketed over the past year, the Bush Administration was contributing to high prices and wasting taxpayer dollars by continuing to fill the Strategic Petroleum Reserve (SPR) during a time of record oil prices.*** On April 4, 2008, the Department of Energy announced that it would solicit bids for an additional 13 million barrels of oil for the SPR through the Royalty-in-Kind program. The Department also announced that it would increase the rate at which the SPR was being filled from 70,000 barrels per day to

[396] Roger H. Bezdek, Renewable Energy and Energy Efficiency: Economic Drivers for the 21st Century (2007), available at http://www.ases.org/ASES-JobsReport-Final.pdf.
[397] Northeast Midwest Coalition, "2008 LIHEAP Fact Sheet."
[398] U.S. Department of Energy, Weatherization Assistance Program website, at http://apps1.eere.energy.gov/weatherization/improving.cfm (last visited Oct. 20, 2008).

76,000 barrels per day beginning in August 2008 and continuing through December 2008.[399] With oil prices above $100 at the time, filling the SPR at the rate of 76,000 barrels per day could have cost the federal government more than $2.5 billion per year.

To call attention to the adverse impacts that continuing to fill the SPR during a time of record oil prices was having on consumers and the treasury, the Select Committee held a hearing entitled "Pumping up Prices: the Strategic Petroleum Reserve and Record Gas Prices" on April 24, 2008. Dr. Frank Rusco, Acting Director, Natural Resources and the Environment at the Government Accountability Office (GAO) testified before the Committee that "[t]aking barrels of oil off the market to put in the Reserve puts upward pressure on prices."[400] Dr. Rusco also noted GAO's recommendations that the Administration should "put fewer barrels into the Reserve when prices are higher and more when prices are lower. One way to do this is to buy a constant dollar amount of oil each month rather than buying a constant number of barrels."[401]

Members of Congress in both the House and Senate had called on the Bush Administration to temporarily halt the fill of the SPR in order to ease upward pressure on oil prices and save taxpayer dollars. Ninety-four Democratic House Members, led by Chairman Markey and the entire Democratic Leadership, called on the President to suspend the fill of the SPR in a letter on May 7, 2008. However, the Bush Administration signaled its intention to continue filling the reserve and go forward with the solicitation of 13 million barrels of additional oil to increase the fill rate for the remainder of the year.

As a result, Congress passed H.R. 6022, the "Strategic Petroleum Reserve Fill Suspension and Consumer Protection Act of 2008"—which President Bush signed into law on May 19, 2008. Chairman Markey was an original cosponsor of this legislation to temporarily suspend the acquisition of oil to fill the SPR during the remainder of calendar year 2008 unless the price of oil dropped below $75 per barrel for the most recent 90-day period.

***Deploying oil from the SPR has a proven record of driving down oil prices when it has been used in the past and could have helped prick the speculative bubble in the summer of 2008.*** Oil has been released or swapped from the reserve in significant quantities on a number of occasions.[402] In 1991, when President George H.W. Bush deployed oil from the reserve, oil prices fell 33.4 percent in a single day. In 2000, President Clinton loaned SPR oil to the market and prices again immediately dropped by 18.7 percent. And in 2005, when President Bush himself released oil following Hurricane Katrina, prices fell 9.1 percent.[403]

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[399] Department of Energy, Press Release**, "**SPR to Continue Royalty-in-Kind Fill Program" (April 4, 2008), available at http://www.doe.gov/news/6142.htm.
[400] Hearing of the Select Committee on Energy Independence and Global Warming, "Pumping up Prices: the Strategic Petroleum Reserve and Record Gas Prices," April 24, 2008, Transcript at 32.
[401] Id.
[402] Department of Energy, Office of Fossil Energy, Petroleum Reserves, at http://fossil.energy.gov/programs/reserves/index.html#Strategic%20Petroleum%20Reserve (last visited Oct. 20, 2008).
[403] See Energy Information Administration, Cushing, OK WTI Spot Price FOB, at http://tonto.eia.doe.gov/dnav/pet/hist/rwtcd.htm.

However, the Bush Administration refused to take this action when oil prices were spiking during the summer of 2008. At a hearing of the Select Committee on May 22, 2008, Chairman Markey pressed for Secretary of Energy Samuel Bodman to commit to releasing oil from the SPR to help consumers. As a result of the Administration's refusal to take action that could have immediately lowered prices, Chairman Markey drafted legislation with Rep. Nick Lampson to require a swap of 10 percent of the light oil currently in the reserve for heavier crudes. H.R. 6578, the "Consumer Energy Supply Act of 2008," would deploy 70 million barrels of light crude onto the market within six months of the bill's enactment. The legislation would then direct the Secretary of Energy to subsequently purchase an equivalent volume of heavy oil within five years in such a way as to maximize the financial return to the federal government.

Dr. Rusco of GAO described the effects of exchanging light for heavy oil in the reserve at the April 24, 2008 Select Committee hearing: "DOE has not, but should, put heavier grades of oil in the Reserve, because, a) many U.S. refineries run most efficiently using heavier oil than what is currently in the Reserve, and b) heavier oils are cheaper than light oils. [S]wapping some of the light oil in the SPR for heavier oils . . . would have a dampening effect on the price of these light oils by putting them on the market now rather than taking them off."[404]

Mr. Kyle Simpson, a former Department of Energy official, agreed at a later Select Committee hearing, noting: "History shows that strategically releasing oil from the SPR is good public policy and can have an immediately beneficial impact on crude oil and petroleum product prices." Mr. Simpson continued that the release of SPR oil "has had and should continue to have the effect of quelling speculation and calming markets, resulting in immediate crude oil and product price reductions."[405]

On July 8, 2008, Speaker Pelosi called on President Bush to swap out 10 percent of the SPR in order to help consumers facing record prices. The text of H.R. 6578 was included in the Comprehensive American Energy Security and Consumer Protection Act, H.R. 6899, which passed the House with strong bipartisan support on September 16, 2008 by a vote of 236-189. The Senate did not take action on the bill.

**Cracking Down on Speculation**

***Over the summer, there was mounting evidence that skyrocketing oil prices were at least in part attributable to excessive market speculation.*** Indeed, during an April 1, 2008 Select Committee hearing, J. Stephen Simon, ExxonMobil's number two executive worldwide, testified that based on market fundamentals of supply and demand, "the price [of oil] should be somewhere around $50-55 a barrel" and it was a weakening dollar, geopolitical instability, and speculation that was driving prices to their level above $100 per barrel at the time.[406] The House

[404] Hearing of the Select Committee on Energy Independence and Global Warming, "Pumping up Prices: the Strategic Petroleum Reserve and Record Gas Prices," April 24, 2004, Transcript at 32-33.
[405] Testimony of C. Kyle Simpson before the Select Committee on Energy Independence and Global Warming, hearing on "Immediate Relief from High Oil Prices: Deploying the Strategic Petroleum Reserve," July 23, 2008, at 2, 6.
[406] Select Committee on Energy Independence and Global Warming, hearing on "Drilling for Answer: Oil Company Profits, Runaway Prices, and the Pursuit of Alternatives," April 1, 2008, Transcript at 81.

considered multiple pieces of legislation in the 110th Congress to curb speculation in the oil markets. In May, Congress passed the farm bill over President Bush's veto that included language to help close the so-called "Enron Loophole" by bringing energy commodity trades under greater federal oversight. On September 18, 2008, the House passed H.R. 6604, the "Commodity Markets Transparency and Accountability Act of 2008." This legislation would have closed the so-called "London Loophole," which allowed traders to avoid regulation by offshoring their trades. It also would have increased transparency by requiring greater information be made public on trading activities in energy markets and subjecting index and swap dealers to strict reporting and record keeping requirements. In addition, it required the Commodity Futures Trading Commission to set position limits for energy futures markets.

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***Recommendations:*** The 111th Congress and the next Administration should prioritize the following actions:

- **Fully Fund LIHEAP and the Weatherization Assistance Program:** Congress should continue to fully fund LIHEAP and the Weatherization Assistance Program.

- **Manage the Strategic Petroleum Reserve to Protect Taxpayers and Consumers:** The Department of Energy should cut back on or stop filling the SPR when oil prices are high, and swap heavier, less expensive oil for light oil currently in the SPR, as recommended by the Government Accountability Office. In addition, the Department should manage the SPR to protect consumers against extreme gasoline price spikes.

- **Crack Down on Excessive Speculation:** Congress should pass legislation to permanently close remaining loopholes in energy market oversight that allow excessive speculation to occur, and should expand the Commodity Futures Trading Commission staff to enable more rigorous enforcement of existing regulation.

## H. RESPONSIBLY MANAGE DOMESTIC OIL AND GAS PRODUCTION

As explained above, expanding domestic oil and gas production is unlikely to have a significant impact on oil, natural gas, or gasoline prices or to substantially reduce U.S. dependence on foreign oil. It is therefore imperative that the United States move aggressively to develop alternative energy sources, as recommended above. However, as these alternative sources are expanded, oil and gas will of course continue to play an important role, and the United States should pursue responsible development of domestic resources.

Until this year, offshore oil and gas production off the East and West Coasts of the United States was largely prohibited by overlapping Executive and Congressional moratoria. Since FY 1982, Congress has included a moratorium on such drilling in annual appropriations bills. In 1990, President George H.W. Bush issued an executive order preventing OCS drilling in these areas, and President Clinton subsequently extended the executive moratorium through 2012. On July 14, 2008, President Bush issued a Presidential Directive rescinding the executive ban. On September 30, 2008, the 27 year-old Congressional moratorium on drilling in federal waters off the East and West Coast expired.

As a result, if the next Administration and the 111th Congress allow the status quo to continue, oil and gas drilling can occur as close as three miles to the shoreline—the limit of federal authority. Drilling that close to our nation's beaches would disrupt the tourism and commercial fishing industries and leave fragile environmental areas such as the Georges Bank off the coast of New England exposed to drilling. Northeast fishery landings are valued at approximately $800 million annually and Georges Bank is the key to the region's fishery. New Bedford, Massachusetts is by far the most productive fishing port in the United States, in terms of value of catch, and commercial fishing brought $350 million into Massachusetts in 2007. Allowing oil and gas drilling in Georges Bank could have severe adverse effects on this ecosystem and our nation's most important fishery.

Under Speaker Pelosi's leadership, the House has already gone on record in favor of a compromise offshore drilling plan—the "Comprehensive American Energy Security and Consumer Protection Act" (H.R. 6899)—which passed the House in a strong, bipartisan vote on September 16, 2008. This plan would allow for increased OCS production while at the same time protecting the areas within 100 miles of the coast. It would also have expanded support for renewable energy and increased efficiency. At Chairman Markey's urging, the bill protected sensitive marine areas such as Georges Bank and National Marine Sanctuaries from drilling.

In addition to OCS drilling, there are a number of other issues relating to domestic oil and gas production that demand attention. A strong majority of the 110th Congress supported the Drill Responsibly in Leased Lands Act of 2008, of which Chairman Markey was a lead sponsor, to require oil companies to diligently develop the 68 million acres of nonproducing leases they already hold. In addition, a series of Gulf of Mexico leases issued in 1998 and 1999 erroneously omitted price caps for royalty relief. Legislation drafted by Chairman Markey to fix the faulty leases has passed the House in the last two Congresses. Taxpayers stand to lose between $10 and

60 billion if legislation is not passed to correct this problem.[407] Finally, as explained above, construction of the Alaska Natural Gas Pipeline could could deliver 4.5 billion cubic feet per day of natural gas to the lower 48 States—equivalent to 7 percent of current domestic consumption.[408]

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***Recommendations:*** The 111th Congress and the next Administration should prioritize the following actions:

- **OCS Drilling Legislation:** Congress must work with the next President to pass comprehensive legislation dealing with offshore drilling to ensure that the nation's beaches and marine resources, as well as affected States' rights, are protected.

- **"Use It or Lose It":** Congress should enact legislation requiring oil and gas companies to diligently develop the leases they currently hold.

- **Fix 1998-1999 Gulf of Mexico Leases:** Congress should enact legislation correcting the faulty 1998-1999 Gulf of Mexico leases to protect American taxpayers from a $10 to $60 billion loss.

- **Encourage Construction of the Alaska Natural Gas Pipeline:** Congress should work with the new Administration to encourage development of the Alaska Natural Gas Pipeline.

[407] Government Accountability Office, Oil and Gas Royalties, Royalty Relief Will Likely Cost the Federal Government Billions but Final Costs Have Yet to Be Determined, Report No. GAO-07-369T, at 3 (Jan. 18, 2007), available at http://www.gao.gov/new.items/d07369t.pdf.
[408] William F. Hederman, The Alaska Natural Gas Pipeline: Status and Current Policy Issues, Congressional Research Service Report No. RL34671, at 5 (Sept. 12, 2008).