

**ENERGY POLICY RECOMMENDATIONS  
TO THE  
PRESIDENT AND THE 110TH CONGRESS**



NATIONAL  
COMMISSION  
ON ENERGY  
POLICY

**APRIL 2007**

## **Disclaimer**

These recommendations are the product of a bipartisan Commission of 19 members of diverse expertise and affiliations, addressing many complex and contentious topics. It is inevitable that arriving at a consensus document in these circumstances entailed innumerable compromises. Accordingly, it should not be assumed that every member is entirely satisfied with every formulation in this document, or even that all of us would agree with any given recommendation if it were taken in isolation. Rather, we have reached consensus on these recommendations as a package, which taken as a whole offers a balanced and comprehensive approach to the economic, national security, and environmental challenges that the energy issue presents our nation.

## **Acknowledgements**

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# TABLE OF CONTENTS

<b>NCEP COMMISSIONERS .....</b>	<b>4</b>
<b>SUMMARY OF RECOMMENDATIONS .....</b>	<b>5</b>
<b>INTRODUCTION .....</b>	<b>9</b>
<b>OIL SECURITY .....</b>	<b>10</b>
<b>CLIMATE CHANGE .....</b>	<b>12</b>
Program Targets .....	12
Price Cap or Safety Valve .....	15
Linkage to International Action .....	17
Other Key Program Design Issues .....	18
Allowance Allocation .....	18
Point-of-Regulation .....	18
Emissions Offsets .....	18
<b>ENERGY EFFICIENCY AND SUPPLY DIVERSITY .....</b>	<b>20</b>
Energy Efficiency.....	20
Natural Gas .....	20
Advanced Coal Technologies.....	21
Nuclear Energy.....	22
Renewable Energy .....	23
Biofuels .....	24
<b>ENERGY TECHNOLOGY INNOVATION .....</b>	<b>27</b>

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## **SUMMARY OF RECOMMENDATIONS**

### **1. Oil Security**

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- **Establish a national average new-vehicle fuel-economy improvement target of 4 percent per year, while retaining the full discretionary authority of the National Highway Traffic Safety Administration (NHTSA) to modify the presumptive target up or down if safety, technology, or economic considerations warrant.**
- **Encourage and empower NHTSA to implement reforms aimed at making the existing CAFE program more cost-effective, market-oriented, and responsive to the jobs and competitiveness concerns of the automobile industry.**
- **Provide targeted consumer and manufacturer incentives to promote the domestic development, production, and deployment of advanced automotive technologies such as hybrid, plug-in hybrid, and advanced diesel vehicles.**
- **Pursue cost-effective opportunities to further reduce transportation energy use by improving heavy-truck fuel economy and by adopting efficiency standards for light-duty vehicle replacement tires.**

### **2. Climate Change**

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- **Adopt legislation this Congress to implement a mandatory, market-based program to limit economy-wide U.S. greenhouse gas emissions.**
- **Strengthen key parameters of the original NCEP climate proposal, including:**
  - **defining program targets to aim for stabilizing emissions at current (2006) levels by 2020 and reducing emissions 15 percent below current levels by 2030;**
  - **raising the starting price of the safety valve to \$10 per ton of carbon-dioxide equivalent emissions; and**
  - **increasing the rate of escalation in the safety-valve price to 5 percent per year in real (rather than nominal) terms.**
- **Address other program design issues by (1) allocating emission allowances in a manner that effectively directs substantial resources to aid in the transition to a low-carbon economy and that fairly compensates major affected industries for short-term economic dislocations incurred as a result of the policy, while also avoiding the potential for significant windfall gains; (2) placing the compliance**

obligation (point of regulation) at or near primary energy suppliers; and (3) including a well-designed offsets provision.

- Create stronger incentives for comparable action on the part of key trading partners by providing technical and financial resources for the transfer of low-carbon technology, by signaling that the United States will work with other countries to forcefully address trade and competitiveness concerns in the event other major emitting nations fail to take action within a reasonable timeframe, and by linking future U.S. emission-reduction commitments to progress in the international arena.

### **3. Energy Efficiency**

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- Enhance and extend tax incentives for efficiency investments introduced under the Energy Policy Act of 2005 (EPA05).
- Ensure that the Department of Energy (DOE) follows through on its recent commitment to issue efficiency standards for 22 categories of appliances and equipment that capture all cost-effective and technically feasible energy savings.

### **4. Natural Gas**

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- Continue to focus on assuring future supply adequacy by following through on EPA05 commitments with respect to the Alaska pipeline, LNG infrastructure, market transparency, and permitting and leasing. The Commission reiterates its call for a comprehensive inventory of on- and off-shore resources to inform future policy decisions and urges Congress to address concerns about the adequacy of related provisions in EPA05 (both in terms of the relatively short timeframe specified for completing the inventory and in terms of constraints on the use of federal resources to conduct inventory-related activities in certain areas).

### **5. Advanced Coal**

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- Direct greater resources toward accelerating the commercialization of carbon capture and storage (CCS) by providing substantial deployment incentives. Specifically, the Commission believes CCS projects should be eligible for bonus allowances under a greenhouse gas trading program that are at least equal in value to incentives provided under the renewable energy production tax credit.
- Condition eligibility for public funding or subsidies on the actual inclusion of CCS with any new IGCC and other advanced coal projects going forward. CCS must be included from the outset in any taxpayer supported efforts to develop coal-to-liquids technology.

- **Explore carbon capture options for non-IGCC plants.**
- **Ensure that the U.S. Environmental Protection Agency (EPA) completes a rigorous, formal public process to formulate effective regulatory protocols governing long-term carbon storage as soon as possible (recognizing that midcourse corrections will likely be needed as experience is gained).**
- **Ensure that new coal plants built without CCS are not “grandfathered” (i.e., awarded free allowances) in any future regulatory program to limit greenhouse gas emissions.**

## **6. Nuclear Energy**

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- **Take action to address the current impasse on nuclear waste disposal, while reaffirming the ultimate objective of siting and developing one or more secure geologic disposal facilities, by amending the Nuclear Waste Policy Act (NWPA) to:**
  - **Align its requirements with human engineering and scientific capabilities, while adequately protecting public health and safety and the environment.**
  - **Require DOE to site and operate consolidated national or regional interim storage options.**
  - **Undertake R&D to explore technological alternatives to the direct geologic disposal of waste from a once-through cycle that meet commercial requirements and non-proliferation objectives, reduce the challenge of waste disposal, ensure adequate protection of public health and safety, and extend fuel supply.**
  - **Codify that interim storage and federal responsibility for disposal of nuclear waste is sufficient to satisfy the Nuclear Regulatory Commission’s waste confidence requirement.**
  - **Require the Secretary of Energy to take possession of and/or remove fuel from reactor sites that have been, or are in the process of being fully decommissioned.**

## **7. Renewable Energy**

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- **Continue to provide investment certainty by extending the eligibility period for federal production tax credits in five-year, rather than two- or one-year, increments.**
- **Adopt a federal renewable portfolio standard that increases the share of electricity generated by renewable resources nationwide to at least 15 percent by 2020.**

## **8. Biofuels**

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- **Re-evaluate ethanol subsidies and tariffs in light of current fuel mandates and rationalize existing policies to direct a greater share of public resources to more promising options, such as cellulosic ethanol; biobutanol; and clean, high-quality diesel fuel from organic wastes.**
- **Address other hurdles to biofuels deployment, including hurdles related to the deployment of critical supporting infrastructures (including gathering systems, distribution systems, and refueling facilities) and compatible vehicle technologies.**
- **Take steps to ensure that policies aimed at reducing U.S. oil dependence do not promote environmentally unsustainable fuel alternatives. The Commission believes that California's recently introduced low-carbon fuel standard suggests a useful direction for future policy and deserves consideration at the national level.**

## **9. Energy Technology Innovation**

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- **Double annual direct federal expenditures on energy-technology research, development, and demonstration, corrected for inflation, with increases emphasizing public-private partnerships, international cooperation, and energy-technologies that offer high potential leverage against multiple challenges. Substantially increasing public investment in energy technology innovation is critical to the achievement of oil security and climate change objectives and can be funded using revenues generated by the proposed greenhouse-gas trading program.**
- **Triple federal funding specifically for cooperative international efforts in energy research, development, and deployment (where this proposed increase is within the overall expansion of federal expenditures recommended above).**

## INTRODUCTION

Since the National Commission on Energy Policy (NCEP) released its December 2004 report, *Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges*, energy issues have remained at the top of the nation's domestic policy agenda. Although Congress passed major energy legislation in the summer of 2005, concerns about oil dependence and climate change, in particular, have not only lingered but grown more urgent. The result is a growing sense—found across political parties and increasingly shared by corporate leaders and the public alike—that our nation has yet to muster an adequate response to the central energy challenges of the coming century.

Over the last two years, the Commission has continued to explore options for closing that gap. This document summarizes the results of those efforts and seeks to update the Commission's previous proposals in light of recent developments, while identifying a subset of high-priority policy options that merit immediate and focused attention from political leaders. In brief, this short list of priority items calls for addressing the demand as well as the supply side of the oil security equation; advancing a timely and meaningful response to the problem of global climate change; expanding on current efforts to promote both increased energy efficiency and a greater diversity of domestic energy supply options; and substantially increasing federal investment in energy technology research, development, demonstration, and early deployment. Going forward, the Commission intends further work in all of these areas as part of an ongoing effort to refine its understanding of key issues and to continue informing the public policy debate.

It must also be stressed at the outset that the focus of this document is on specific areas where the Commission (a) believes that additional policy interventions, or in some cases an expansion or extension of current commitments, are called for and (b) we have new or additional recommendations to offer. Thus, we do not attempt here to review the full suite of topics and proposals included in our 2004 report. Nevertheless, we believe that all of the needs identified in that report remain extremely important.

## OIL SECURITY

In its 2004 report, the Commission emphasized the importance of a balanced approach to enhancing oil security. Thus, the Commission's recommendations included a number of supply-side measures—aimed at nurturing a greater diversity of foreign and domestic suppliers, promoting a more robust global network of strategic reserves, and developing long-term alternatives to petroleum, such as biofuels—while also stressing the importance of concerted efforts on the demand side. In particular, the Commission called on Congress to “significantly strengthen” and “simultaneously reform” the existing Corporate Average Fuel Economy (CAFE) program, while providing targeted manufacturer and consumer incentives to accelerate the deployment of advanced vehicle technologies and to address the competitiveness concerns of the U.S. auto industry.

Two years later, despite promising advances on the technology front—including substantial progress in developing vehicles, such as hybrid electric and “plug-in” hybrids, that could radically reduce gasoline consumption per mile traveled—improving the efficiency of the nation's light-duty vehicle fleet remains the most important and as-yet-untapped area of policy opportunity for reducing oil dependence and making the nation more energy secure. The Commission therefore applauds President Bush's recent call for a significant improvement in average new-vehicle fuel economy and urges Congress to move quickly to adopt legislation that would:

- **Establish a 4 percent per year fuel-economy improvement target (the same target is contained in bipartisan legislation recently introduced in the U.S. Senate);**
- **Retain the full discretionary authority of the National Highway Traffic Safety Administration (NHTSA) to implement the CAFE program, including discretion to modify the presumptive annual average fuel-economy improvement target up or down upon demonstrating that safety, technology, or economic considerations warrant such modification;**
- **Encourage and empower NHTSA to implement reforms aimed at making the CAFE program more cost-effective, market-oriented, and responsive to the jobs and competitiveness concerns of the automobile industry (e.g., by adopting attribute- or size-based standards, allowing trading or averaging across manufacturers, establishing multi-year compliance periods, and rationalizing incentives within the CAFE program for alternative fuel vehicles);**
- **Promote the domestic production of advanced automotive technologies and boost consumer demand for more efficient vehicles by providing targeted consumer and manufacturer incentives, as recommended in the Commission's 2004 report. The Commission notes that a market-based program to limit greenhouse gas emissions (as discussed in the next section) could provide a secure revenue stream to support such incentives.**

The Commission believes that the approach outlined above will produce substantial fuel-economy improvement over time and greatly accelerate the adoption of transformative vehicle technologies. At the same time, the Commission recognizes that efforts toward this objective must be responsive to jobs and competitiveness concerns given the vulnerable state of the domestic auto industry. In our view, a well-designed package of CAFE program reforms and manufacturer and consumer incentives can mitigate these concerns. For example, an attribute- or size-based system could significantly address the disadvantages some automakers would otherwise face as a result of the mix of vehicles in their product line. With a thoughtful combination of policies, the Commission is confident that progress toward more efficient cars and a more robust and globally competitive U.S. auto industry are achievable at the same time.<sup>1</sup>

Here, as in other major policy areas, the importance of a comprehensive approach is worth emphasizing. Incentives for the production and sale of more efficient vehicles alone will not do the job: absent a change in standards, average fuel economy will continue to stagnate so long as gains from more efficient models can be offset by a larger market share for less efficient vehicles. And even though consumers' vehicle choices are affected by substantial changes in gasoline prices, the magnitude of the price signal generated by any politically viable, near-term program to regulate greenhouse gas emissions is unlikely—by itself—to be sufficient to effect a significant shift in driving patterns or consumer preferences for more efficient automobiles. Thus, as the Commission has argued in the climate context, a combination of regulation and incentives that generates a simultaneous market pull and market push for new technologies is likely to be more effective than either approach in isolation. By essentially “flipping” the regulatory presumption in favor of steady progress absent a finding to the contrary, we seek to alter the dynamic that has enabled fuel economy to stagnate for over twenty years, while retaining NHTSA's full authority to adjust the rate of improvement based on its expert judgment. Moreover, the Commission sees great merit in establishing a system that achieves constant, incremental, and relatively predictable improvement compared against the current system, which has produced long periods of inaction interrupted by erratic and potentially disruptive changes in fuel-economy requirements that occur only once every ten to twenty years.

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<sup>1</sup> For example, in its 2004 report, the Commission encouraged policy makers to consider establishing cost certainty for the vehicle industry by incorporating a cost-containment mechanism in the CAFE program (the idea was first proposed in a 2002 National Academy of Sciences study of fuel-economy regulation). The Commission has not undertaken further analysis of specific cost-containment options, but continues to believe that this and other approaches to managing technology and cost uncertainty merit further exploration.

## CLIMATE CHANGE

Among the most prominent and controversial recommendations put forward by the Commission in 2004 was a proposal that the United States adopt a mandatory, economy-wide program to limit future greenhouse gas emissions. Two years later, as the scientific case for action has grown steadily more compelling and more urgent, the Commission remains convinced that a combination of market signals and technology policies (including substantially increased R&D investments, enhanced deployment incentives, and well-designed mandates) provides the most promising and ultimately most effective path forward. We therefore reiterate our call for a comprehensive approach that will generate the market signals and investment certainty needed to spur the development and deployment of lower-carbon technologies, recognizing that the market signal generated by any politically viable, near-term proposal is unlikely to be adequate—on its own—to overcome existing deployment barriers for certain key technologies (such as carbon capture and storage), at least in the early years of program implementation. Thus, a critical element of the Commission's original approach was and remains the inclusion of a complementary package of technology policies and incentives (where the latter are funded by new revenues generated under a greenhouse gas trading program).

In sum, the Commission urges Congress to act without further delay to implement a comprehensive, mandatory, market-based program to limit emissions of greenhouse gases in a manner that does not significantly harm the U.S. economy and that encourages comparable action by other major emitting nations. Core elements of the program architecture described in the Commission's 2004 report remain, in our view, central to crafting sound, politically viable legislation consistent with this objective. As momentum for a change in national policy has grown and as Congress has begun to consider a number of competing proposals, three program design issues—stringency of program targets, inclusion of a price cap or safety valve mechanism, and linkage to developing country participation—have provoked intense debate among stakeholders and extensive further deliberation within the Commission itself. Our current thinking in each of these areas is summarized below. In each case, the Commission has come to the view that its original recommendations should be strengthened while preserving the basic approach we proposed in 2004.

### ***Program Targets***

The Commission has long been convinced that the best hope for timely action on climate change lies in formulating a “first step” policy that establishes moderate near-term targets while also providing a robust basis for long-term progress. Our original recommendations envisioned an initial ten-year implementation period during which program targets would first aim to slow the rate of growth in U.S. emissions before proceeding to “stop” and “reverse” phases in which emissions would stabilize and then begin to decline.

The Commission has always recognized, of course, that responsibly managing climate risks will eventually require substantial reductions in absolute emissions. A graph prepared by the Intergovernmental Panel on Climate Change (IPCC) that relates future emissions trajectories to different stabilization levels for atmospheric carbon

dioxide concentrations suggests that stabilizing atmospheric concentrations of carbon dioxide at 550 parts per million (ppm)—fully *double* pre-industrial carbon levels—would require global emissions to stop growing and begin declining in absolute terms by 2050.<sup>2</sup> According to the same chart, achieving the more ecologically protective stabilization goal of 450 ppm—which scientists estimate would be necessary to limit the increase in global average surface temperatures to 2°C—implies reducing global emissions 30 percent below current levels by mid-century (2050) and on the order of 70 percent below current levels by 2100. By contrast, the latest reference-scenario projection issued by the International Energy Agency shows the continuation of a business-as-usual trajectory leading to a 55 percent increase in global carbon dioxide emissions over just the next quarter century (that is, by 2030).<sup>3</sup> Given the rapid industrialization that is now occurring in many parts of the world and given the long-lived and capital-intensive nature of much of the world’s energy infrastructure, the challenge of reversing global emissions trends is clearly enormous.<sup>4</sup>

At the same time, and notwithstanding the fact that many stakeholders now accept and expect that greenhouse gas emissions will eventually be regulated, the Commission is under no illusions about the continuing difficulty of reaching political consensus on the climate issue. It remains the case that efforts to advance policy must be responsive to political realities and to the inevitable trade-offs that exist between the timeliness and stringency of action. In view of the continuing disconnect between what is required in terms of emission reductions and what is politically feasible in the near-term, we conclude—as we did in 2004—that moving forward with initially moderate targets is more ecologically protective than continued delay in pursuit of more aggressive goals.

That said, the Commission believes it is appropriate and feasible to strengthen its original program targets in light of the additional time that has elapsed since 2004 and the scientific and technological developments that have occurred in the interim. Specifically, the Commission’s current recommendation is to:

- **Strengthen program targets to aim for stabilizing economy-wide greenhouse gas emissions at current (2006) levels by 2020 and achieving a 15 percent reduction below current emissions levels by 2030.**

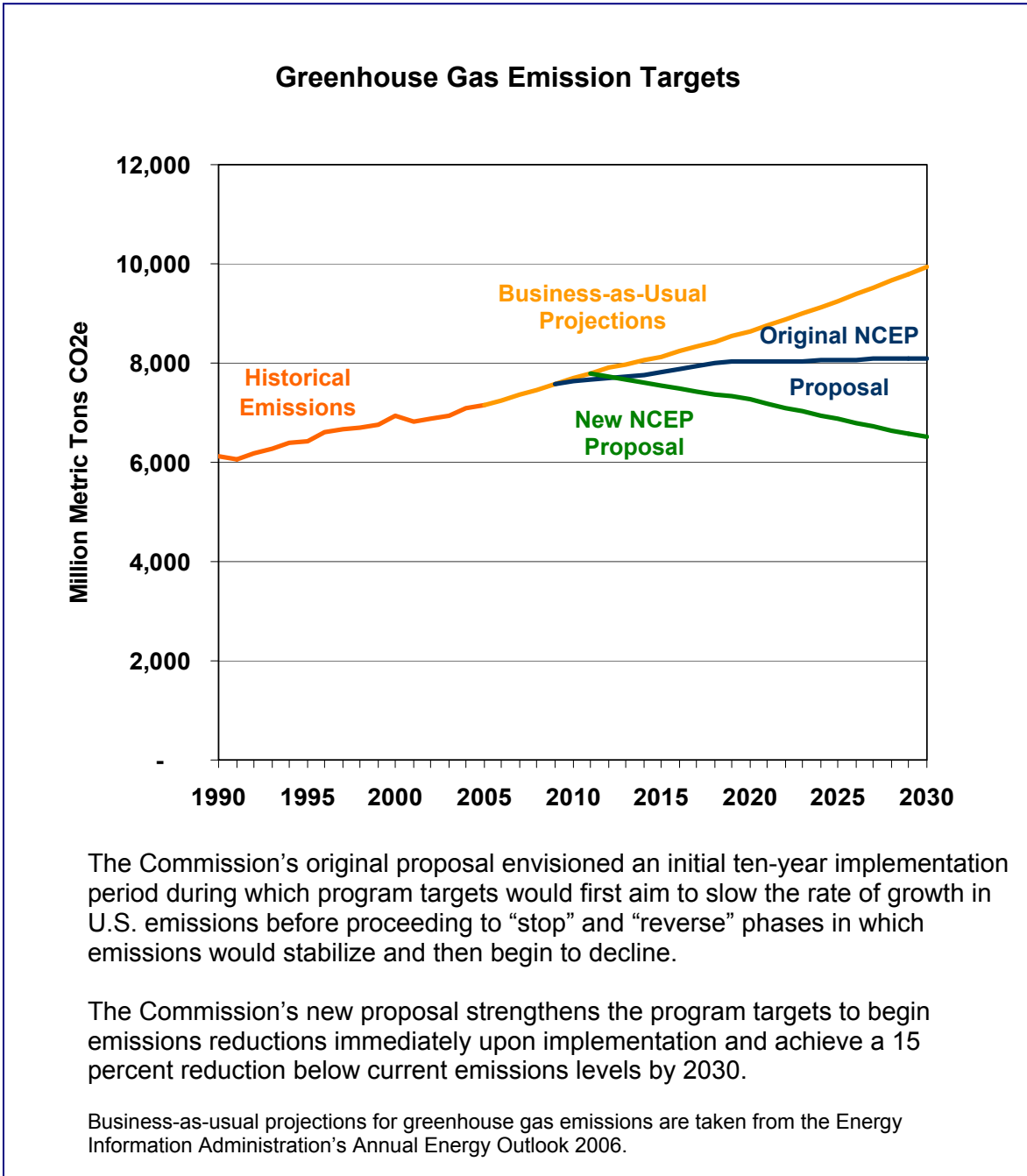
We recognize that even this revised reduction target remains considerably less aggressive than several proposals now before Congress. Therefore it is important to

<sup>2</sup> See: <http://www.ipcc.ch/present/graphics/2001syr/large/02.18.jpg>. According to the recently approved “Summary for Policymakers” Working Group I contribution to the IPCC’s Fourth Assessment Report, (available at <http://ipcc-wg1.ucar.edu/>) the global average surface warming that would be expected to result from a doubling of carbon dioxide concentrations is “*likely* to be in the range of 2 to 4.5°C with a best estimate of about 3°C.” (p 12) The same report describes a number of impacts likely to be associated with continued warming.

<sup>3</sup> See: <http://www.energybulletin.net/22042.html>. The reference-scenario projection is from the IEA’s 2006 World Energy Outlook; it is intended to provide a baseline vision of how energy markets are likely to evolve absent new government measures to alter underlying trends. The U.S. Energy Information Administration’s 2006 reference case projection is even more pessimistic, indicating a nearly 75 percent increase in global emissions between 2003 and 2030 (see: <http://www.eia.doe.gov/oiaf/ieo/ieorefcase.html>).

<sup>4</sup> By one estimate, global energy-related carbon emissions grew by approximately 18 percent between 1990 and 2003 (Marland, et al., 2006. See [http://cdiac.ornl.gov/ftp/ndp030/global.1751\\_2003.ems](http://cdiac.ornl.gov/ftp/ndp030/global.1751_2003.ems)). Moreover, the annual rate of increase in global emissions seems to have accelerated in recent years, as has the rate at which carbon-dioxide levels in the atmosphere are rising.

stress that the Commission continues to support a significant acceleration in the rate of domestic reductions once Congress determines that all major emitting nations are joined in an equitable and effective global response to climate change. The five-year review provision included in our original proposal provides a mechanism for adjusting program targets over time and remains critical to charting an ecologically and economically responsible course for U.S. policy well beyond the initial years of program implementation.



## **Price Cap or Safety Valve**

The price cap or safety valve has emerged as perhaps the single most contentious element of the Commission's 2004 proposal. More than two years later, we continue to believe that the cost certainty provided by this mechanism is critical to forging the political consensus needed to move forward without further delay. Cost debates inevitably turn on technology assumptions: greater optimism about the development of low-carbon technologies will result in lower cost projections while greater pessimism produces the opposite result. Since there is no objective way to adjudicate different views of the future to the satisfaction of all parties, cost debates are inherently intractable. Even within the Commission, a wide range of opinions exists about the likely cost and pace of technology improvements. By including the safety valve—and thereby insuring society against the possibility that current assumptions are too optimistic—our diverse group has been able to reach consensus on a common emissions reduction target while maintaining differing expectations about the rate of technological progress. Other proposals currently before Congress use other mechanisms to address economic uncertainty, but in our view the safety-valve still provides a uniquely effective and decisive response to the cost and competitiveness concerns that continue to motivate opposition to mandatory action.

Recognizing that the emissions target and safety valve together determine the overall stringency of the program, the Commission has, in recent months, undertaken further analysis of options for strengthening both parameters. We have concluded that the combination of a somewhat higher safety valve price and more aggressive emissions targets, coupled with major incentive programs for new technology and complementary policies that have recently begun to attract widespread political support—specifically, an increase in vehicle fuel-economy (CAFE) standards and a federal renewable portfolio standard (RPS)—will produce significantly larger environmental benefits over the next two decades while still meeting the economic test of “no significant harm.”

Accordingly, the Commission's current recommendation is to:

- **Raise the starting price of the safety valve to \$10 per ton of carbon-dioxide equivalent emissions (compared to \$7/ton in the Commission's original proposal) and increase the rate of escalation in the safety-valve price to 5 percent per year in real (rather than nominal) terms.**

The results of recent Commission modeling to analyze the impacts of a higher safety valve price and more aggressive program targets are described in a separate document available at [www.energycommission.org](http://www.energycommission.org). On the whole, the analysis confirms that predictions about program impacts are highly sensitive to input assumptions concerning both technology development and the implementation of additional policies. Without supplemental policies and without accelerated deployment of new technologies like carbon capture and storage, the Commission's modeling results suggest that imposing a 15 percent emissions reduction target over the next two decades could—absent a safety valve mechanism—result in allowance prices as high as \$50 per ton of carbon dioxide equivalent in 2030. On the other hand, with the supplemental policies, significant energy-efficiency improvements, and a more optimistic view of the effect of increased R&D investment in terms of driving down future technology costs, the same

target can be achieved—according to the modeling analysis—without ever triggering the Commission’s proposed safety valve price.

Given inherent uncertainty about future technology and policy developments, the Commission believes these results highlight the usefulness of a predictable and well-defined cost-containment mechanism. Many Commission members are optimistic about the level of innovation likely to occur in response to a concrete carbon price signal and about the prospects for implementing important supplemental policies like CAFE, RPS, and incentives for carbon capture and storage. Moreover, our analysis indicates that including these policies is central to achieving more ambitious emission reduction targets without triggering the safety valve.<sup>5</sup> At the same time, the Commission believes it is appropriate and instructive to assess the economic impacts of combining stronger program targets with a higher safety valve price *absent* accelerated technology assumptions and supplemental policies. In that case, modeling analysis indicates that the safety valve price will be triggered relatively early in the program but the overall impact on the economy is very small; indeed the estimated reduction in U.S. GDP relative to the base case totals just 0.12 percent in 2020 and 0.25 percent in 2030. This cost estimate is only very slightly greater than the 0.2 percent reduction in 2030 GDP estimated for the Commission’s original proposal and deemed at that time by EIA to constitute “no material impact” on the nation’s economy.

Two additional points about the Commission’s approach are worth emphasizing. First, our current proposal—by combining a stronger price signal with additional deployment incentives—is designed to overcome estimated price differentials for advanced coal systems with carbon capture and storage. Given the urgent necessity of speeding the transition to more climate-friendly coal technologies, the Commission believes this is a key test for any near-term climate policy package.

Second we wish to stress that while a cost-containment mechanism such as the safety valve remains, in our view, essential to building the bipartisan support needed to advance a timely and meaningful domestic climate policy, we also anticipate that ecological considerations will argue for an eventual phase-out of this mechanism in favor of greater emissions certainty once a truly international response to global warming is underway. Our hope, consistent with our emphasis on encouraging comparable action by other nations, is that near-term leadership by the United States will hasten progress toward that objective.

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<sup>5</sup> Because supplemental policies like CAFE and RPS have the effect of limiting emissions from specific sectors—in this case transportation and electric power production—their inclusion as part of a comprehensive package of policies reduces demand for allowances within a greenhouse gas trading program, thereby driving down allowance prices. Of course, the supplemental policies also impose costs—costs that, along with the policies, themselves, may be justified by additional public-interest rationales. Vehicle fuel-economy standards, for example, may be justified largely on the basis of energy security considerations, while the chief purpose of an RPS may be to provide sufficient investment certainty for the successful commercialization of technologies that will continue to face substantial deployment hurdles, even in the context of initial carbon constraints.

## ***Linkage to International Action***

The Commission has always recognized the necessity of engaging other countries in any sustained and ultimately successful effort to manage climate risks—indeed it is precisely for this reason that we assign great urgency to re-asserting a leadership role for the United States. Our original recommendations therefore sought to create a direct linkage between future U.S. emission-reduction commitments and comparable action by other major emitting nations. The primary mechanism included in our 2004 recommendations for this purpose was a periodic review by the President and Congress—to be conducted every five years—for the express purpose of assessing progress both internationally and domestically and for adjusting U.S. policy accordingly. In addition, the Commission specifically called for a tripling of federal expenditures to promote and participate in cooperative international efforts to advance energy research, development, demonstration, and deployment.

Over the last two years it has become clearer than ever that any successful national policy must place considerable emphasis on promoting wider international cooperation. By some accounts, China is now adding new coal capacity at the rate of one large power plant every week to ten days and is set to surpass the United States in total carbon emissions as early as 2009.<sup>6</sup> Though some will argue that this sobering development weakens the case for action by the United States, the Commission draws the opposite conclusion. Our view remains that rapidly industrializing but still far poorer nations are likely to accept emissions limits only after the United States and other wealthy countries have demonstrated a willingness to take the lead. The current trajectory of global emissions not only underscores the liabilities of continued paralysis (in terms of prolonging business-as-usual trends in places like China and India), it argues for concerted measures to bring other countries along as quickly as possible.

Thus, in addition to strengthening key parameters of its proposed domestic policy, the Commission believes it is appropriate to place greater emphasis on accelerating the diffusion of low-carbon technologies to countries like China and India. Specifically, the Commission's current recommendation is to:

- **Create stronger incentives for comparable action on the part of key trading partners by using a share of the public revenues generated by a greenhouse-gas trading program to provide technical and financial resources for the transfer of low-carbon technology. In addition, the United States should signal its intention to work with other countries to develop forceful and coordinated responses to international trade and competitiveness concerns if major emitting nations fail to adopt comparable climate policies in a reasonable timeframe.**

In sum, while the Commission remains firmly convinced that the United States should and must lead by example, we are equally clear that ecological and economic imperatives demand the participation of China, India and all major trading partners in implementing meaningful long-term emission reduction commitments. If other major emitting nations do not participate in future efforts to limit global climate risks, the United

<sup>6</sup> See <http://select.nytimes.com/search/restricted/article?res=F50B12F83A5B0C748CDDA80994DE404482>

States must be prepared to respond effectively to trade and competitiveness concerns and to consider a variety of options for doing so.

### ***Other Key Program Design Issues***

The Commission has also developed more detailed positions on other specific aspects of designing a trading program to limit greenhouse gas emissions:

#### **Allowance Allocation**

- On allowance allocation, the Commission has come to the view, based on further economic analysis, that the number of allowances available on an economy-wide basis under a greenhouse gas trading program will be more than adequate to both compensate major energy-related industries for any short-term economic dislocations incurred as a result of the program, while also providing substantial resources to address other policy concerns arising from the transition to a lower-carbon economy. Accordingly, we have proposed an initial allocation where roughly half of overall allowances are auctioned or otherwise directed to investment in advanced energy technologies and to mitigating impacts on low-income consumers. The remaining half of the allowance pool should be distributed in a manner that fairly addresses the cost concerns of affected industries (including suppliers of primary fuels, the electric power sector, and energy-intensive manufacturers).<sup>7</sup> We believe this basic approach provides an appropriate balance of public and private interests in the early years of program implementation and avoids the potential for significant windfall gains. Over time, the share of allowances distributed at no cost should diminish in favor of a more complete auction. The Commission recently published a staff paper that discusses the issue of allocation in some detail; this document, entitled "Allocating Allowances in a Greenhouse Gas Trading System," can be found at [www.energycommission.org](http://www.energycommission.org).

#### **Point-of-Regulation**

- On point-of-regulation, the Commission recommends that the compliance obligation be placed at or near primary fuel producers or suppliers. Besides reducing administrative complexity and the potential for emissions "leakage," we believe this approach will facilitate efficient pass-through of the carbon price-signal and reduce the potential for distortions introduced by, among other factors, different models of electric utility regulation around the nation.

#### **Emissions Offsets**

- On emissions offsets, the Commission has concluded that a carefully designed offsets provision can provide a critical catalyst for cost-effective measures not otherwise covered by the trading program. The Commission is concerned,

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<sup>7</sup> Importantly, this recommendation should not be misinterpreted to imply that each sector is limited to a direct allocation equivalent to 50 percent of its emissions obligation. On the contrary, we propose that the distribution of allowances should roughly follow the actual distribution of net cost burdens imposed on different sectors and industries as a result of the policy. As explained at some length in the Commission's detailed staff paper, this approach would lead to an initial allocation in which some sectors receive substantially more than 50 percent of their emissions obligation and some sectors receive considerably less than 50 percent.

however, by proposals that rely on offsets as a principal means of near-term cost containment. While there is enormous potential for cost-effective carbon sequestration in the agriculture and forestry sectors, relatively little long-term experience exists for measuring, monitoring, and verifying the permanence of emission reductions achieved through terrestrial sequestration. Proposals that expect to achieve significant (>10 percent) compliance through offsets in the near term will be obligated to create a substantial enforcement bureaucracy or risk an influx of illegitimate credits. Either of these outcomes would badly undermine the viability of a meaningful domestic offset program. The Commission believes that the ability to implement a well-functioning offsets program must not be jeopardized by overstating its near-term potential. Rather, a credible program must reflect the differing levels of certainty and verifiability associated with different types of projects and should initially provide allowances from a set-aside within the overall pool of available allowances to encourage harder-to-verify offsets without undermining program objectives. Using a dedicated set-aside from within the program's overall allocation will guarantee the agriculture and forestry sectors the incentives necessary to accelerate learning for this important set of greenhouse-gas mitigation options. By reducing the need for long administrative review processes and expensive reporting requirements, the proposed approach would also provide investors with greater certainty and lower transaction costs. A recent NCEP-commissioned paper on emissions offsets is available at [www.energycommission.org](http://www.energycommission.org).

## ENERGY EFFICIENCY AND SUPPLY DIVERSITY

One of the Commission's founding premises has been that America's energy challenges call for a comprehensive response—that efforts to address oil security or climate change will fail if they do not also include complementary measures to promote improved efficiency and assure ample, reliable, and affordable energy supplies. As noted in the introduction to this update, progress has been achieved in a number of areas over the last two years, in many cases as a result of provisions introduced under the Energy Policy Act of 2005 (EPA05) and in some instances through other regulatory or legislative initiatives. This section identifies remaining areas where the Commission believes additional or expanded efforts are called for.

### *Energy Efficiency*

On energy efficiency, EPA05 established a number of tax incentives for energy efficiency and solar energy technologies. These incentives expire, however, at the end of 2008—too soon to realize their full benefits. The Commission urges Congress to:

- **Enhance and extend tax incentives for efficiency investments introduced under EPA05.**
- **Ensure that the U.S. Department of Energy (DOE) fully meets its recent commitment to issue 22 new efficiency standards for major appliance and equipment categories, following an extended period of sluggish progress. DOE must dedicate the necessary administrative resources to establish rigorous standards that capture all cost-effective and technically feasible savings.**

Recognizing that many of the most urgently needed advances in energy-efficiency policy will occur at the state level, the Commission also wishes to note the July 2006 release of a National Action Plan for Energy Efficiency.<sup>8</sup> Developed by a broad-based group of state regulators, utilities, consumer advocates, business interests, and environmental groups, the Action Plan includes a number of useful policy recommendations and deserves close attention from policy-makers and regulators at the state and federal level.

### *Natural Gas*

On natural gas, the Commission's 2004 recommendations stressed the importance—for economic and environmental reasons—of assuring the adequacy of future supplies. At that time we proposed concerted efforts to move forward with the Alaska natural gas pipeline, expand LNG infrastructure, provide additional resources to expedite environmentally responsible leasing and permitting decisions, and conduct a comprehensive inventory of on- and off-shore resources. The Commission therefore welcomes a number of provisions in EPA05 that should facilitate progress in many of

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<sup>8</sup> The Action Plan is available at: <http://www.epa.gov/cleanenergy/actionplan/report.htm>.

these areas, along with action taken by Congress and the Administration in 2006 to expand access to known reserves in the eastern Gulf of Mexico.

Notwithstanding these important developments, however, the Commission remains concerned about the potential for a growing gap between U.S. demand for natural gas and access to domestic and imported supplies in the years ahead. Given the importance of natural gas as a bridge to an era of lower-carbon electricity production, we believe policy makers must continue to give priority to assuring supply adequacy for this critical fuel. For example, concerns have recently been raised about the adequacy of inventory provisions included in EPAAct05: specifically, whether the short timeframe specified for completing the inventory and constraints on the use of federal resources to conduct inventory-related activities in certain areas will hamper efforts to fill in important data gaps. Since rational resource decisions cannot be made absent good information, the Commission urges Congress and the relevant agencies to focus on addressing these concerns and on moving forward to complete a truly comprehensive inventory.

### ***Advanced Coal Technologies***

On advanced coal technologies, significant incentives were provided under EPAAct05 for integrated gasification combined-cycle (IGCC) coal technology. Recognizing that the future of coal depends on pairing future coal systems with actual carbon capture and storage (CCS), the Commission urges Congress and DOE to ensure that adequate attention and funding is being focused on the CCS side of the equation. The Commission further notes that several states and utilities have adopted or are considering specific constraints on long-term investment in baseload coal generation that lacks provision for responsible disposal of its global warming emissions; given potential costs associated with future regulation of these emissions, such precautions deserve consideration by all generation investors and regulators as a simple matter of fiscal prudence.

In sum, the Commission reiterates in the strongest possible terms its 2004 recommendation for a \$3 billion program to support the commercial-scale demonstration of sequestration projects in several different geologic settings. We also reiterate our call for immediate deployment incentives; for example, our 2004 report recommended that advanced coal with CCS be eligible for the same production tax credit currently available to renewable energy projects. The Commission's updated recommendations include:

- **Providing CCS systems with deployment incentives that are at least equal to those currently available under EPAAct05 for new nuclear power plants and (via the federal production tax credit) for renewable energy resources. In particular, the Commission strongly supports the concept of awarding bonus allowances under a greenhouse-gas trading program for projects with CCS. The financial incentives generated by such provisions could substantially exceed any direct increase in public R&D spending on CCS.**
- **Conditioning eligibility for taxpayer subsidies or public funds for any new coal projects going forward on the actual inclusion of CCS.**

- **Placing greater emphasis on exploring carbon capture options for non-IGCC plants.**
- **Ensuring that CCS is included from the outset in any publicly funded efforts to explore coal-to-liquids technology. Even with CCS, this fuel pathway generates—at best—roughly the same carbon emissions as conventional petroleum fuels; *without* CCS total fuel-cycle carbon emissions nearly double.**
- **Ensuring that the U.S. Environmental Protection Agency (EPA) completes a rigorous, formal public process to formulate effective regulatory protocols governing long-term carbon storage as soon as possible (recognizing that midcourse corrections will likely be needed as experience is gained).**
- **Ensuring that new coal plants built without CCS are not “grandfathered” (i.e., awarded free allowances) in any future regulatory program to limit greenhouse gas emissions.<sup>9</sup>**

## ***Nuclear Energy***

On nuclear energy, EPAct05 included substantial incentives for a new generation of nuclear power plants but did not address the unresolved problem of nuclear waste disposal. The Commission recognizes, of course, that significant additional hurdles with respect to cost, safety, and proliferation risk must also be addressed to allow for an expanded role for nuclear power in the future—all of these issues are addressed in some detail in our 2004 recommendations. Meanwhile, the fact that the licensing of the proposed nuclear waste repository at Nevada’s Yucca Mountain remains highly uncertain argues for refocused attention on effective management of spent fuel as an interim step towards permanent disposal. This would increase the probability that nuclear energy could make a significant contribution to the mitigation of climate change in this century. The expansion of nuclear power would enhance fuel and technology diversity in the electricity sector and could reduce vulnerabilities associated with reliance on petroleum and natural gas from unstable regions of the world.<sup>10</sup> Spent fuel can be safely managed with currently licensed and regulated technology for the period likely to be necessary to find disposal solutions. To that end, the Commission recommends that Congress consider several additional steps aimed at ending the current impasse on nuclear waste disposal, including:

- **Reforming the Nuclear Waste Policy Act (NWPA) to align its requirements with human engineering and scientific capabilities, while simultaneously ensuring adequate protection of public health and safety and of the environment.**

<sup>9</sup> A recent MIT study, *The Future of Coal: Options for a Carbon-Constrained World*, notes that “there is the possibility of a perverse incentive for increased early investment in coal-fired power plants without capture . . . in the expectation that the emissions from these plants would potentially be “grandfathered” by the grant of free CO2 allowances as part of future carbon regulations.” (p. xiv)

<sup>10</sup> Although only about 3 percent of U.S. electricity supply comes from oil, the emergence of plug-in hybrids and all-electric vehicles illustrates a potentially significant oil displacement opportunity for nuclear power and other low-carbon electricity sources.

- **Amending the NWPA to require DOE to site and operate consolidated national or regional interim storage options.**
- **Undertaking R&D investments to explore technological alternatives to the direct geologic disposal of waste from a once-through cycle that meet commercial requirements and non-proliferation objectives, reduce the challenge of waste disposal (by reducing heat load and/or transmuting long-lived radionuclides), ensure adequate protection of public health and safety, and extend fuel supply.<sup>11</sup>**
- **Amending the NWPA to codify that interim storage and federal responsibility for disposal of nuclear waste is sufficient to satisfy the Nuclear Regulatory Commission’s waste confidence requirement.<sup>12</sup>**
- **Amending the NWPA to require the Secretary of Energy to take possession of and/or remove fuel from reactor sites that have been, or are in the process of being fully decommissioned.**

## ***Renewable Energy***

On renewable energy, the primary national-level policy currently in place to promote electricity production using wind and other renewable resources remains the federal production tax credit (PTC). The eligibility period for projects to qualify for the PTC was renewed under EPAct05 and recently extended for an additional year—it now ends in 2008. A more recent and extremely important development has been the proliferation of state programs that require utilities—typically using a mechanism known as a renewable portfolio standard (RPS)—to provide a minimum percentage of electricity from renewable resources. Policies to promote renewable energy have now been adopted by 23 states and the District of Columbia, generating growing momentum for a national-level program. In this rapidly evolving policy context, the Commission recommends that Congress:

- **Continue to provide investment certainty by extending the eligibility period for federal production tax credits in five-year, rather than two- or one-year, increments. Given that the current window ends in 2008, this would imply extending the PTC eligibility period to at least 2013.**
- **Adopt a federal renewable portfolio standard aimed at increasing the share of electricity generated by renewable resources nationwide to at least 15 percent by 2020.**

<sup>11</sup> The recommended pursuit of R&D should not be interpreted as a change in NCEP policy with regard to the “long-standing U.S. moratoria on commercial reprocessing of spent nuclear fuel and construction of commercial breeder reactors.”

<sup>12</sup> Pursuant to 10 CFR 51.23. Generic NRC determination of 6 December 1999: 64 Fed.Reg. 68005.

In coming months, the Commission intends to examine a number of critical issues pertinent to the design of a federal portfolio requirement with the aim of offering more detailed recommendations in this important policy area. In our view, a number of issues warrant further exploration and analysis, along with further examination of the utility- and economic-policy dimensions of different technology and program options. Specific questions include: (1) whether a more ambitious target for non-carbon resources could be achieved by expanding eligibility to include new nuclear power and advanced fossil systems with CCS; (2) whether and how investments in energy efficiency and distributed power systems might be integrated in a broader portfolio requirement; (3) whether and at what level a safety valve or price cap mechanism should be incorporated in the program; and (4) how a portfolio requirement would interact with other policies, including state RPS requirements and other deployment incentives such as the PTC.

Meanwhile, the Commission has identified a number of important principles as starting points for consideration as Congress begins debating various RPS proposals in the weeks ahead. We believe a sound federal policy should:

- **Apply to all retail electricity providers, not just electric utilities;**
- **Complement but not pre-empt state programs and recognize credits that are used for compliance with state RPS requirements (in other words, a federal RPS should not be construed as creating an *additive* requirement on top of whatever state RPS may be in place—where a state RPS also exists, retail providers should be able to use the same renewable energy commitments to meet both requirements);**
- **Be technology neutral—the program should be designed to treat all covered renewable sources equally;**
- **Provide credit for early action—utilities that have invested in renewable energy prior to the enactment of a federal RPS should not be penalized; and**
- **Allow for national trading, including efforts to standardize the monitoring, verification, and distribution of credits in a fair and efficient manner taking into consideration the significant variation that currently exists across state programs; and**
- **Include express provisions assuring retail electricity providers of cost recovery and a fair rate of return for approved renewable energy investments undertaken to comply with a federal RPS.**

## ***Biofuels***

On biofuels, EPL05 included a number of provisions to promote domestic alternatives to today's almost exclusively petroleum-based fuel supply for the transportation sector, most notably by establishing a first-ever, national-level renewable fuels standard (RFS). The current RFS is expected to translate to 7.5 billion gallons of

renewable fuel production—enough to displace roughly 4.3 percent of U.S. gasoline consumption on an energy-equivalent basis—by 2012. More recently, President Bush has called for boosting the use of domestic alternative fuels to 35 billion gallons by 2017.

The Commission strongly supports more ambitious goals for renewable fuels use, recognizing that such goals will require a significant push to commercialize cellulosic ethanol and other promising corn-ethanol alternatives such as biobutanol.<sup>13</sup> Feedstock constraints alone will likely limit the production of corn-based ethanol, which currently dominates the U.S. biofuels market, to less than 10 percent of the fuel requirements of the nation's light-duty vehicle fleet. Recent advances in molecular and systems biology and genetic engineering show great promise for developing improved feedstocks and much less energy-intensive means of producing biomass-based liquid fuels; in addition, promising technologies are emerging that can convert a wide variety of organic waste materials to clean, high-quality diesel fuel. As emphasized in our 2004 report, federal policies and R&D commitments must promote continued progress in these areas. At the same time, the Commission is concerned about the potential climate impacts of expanding fuel production from coal and other unconventional fossil sources, such as oil shale, tar sands, and heavy oil. While not of the view that all efforts to improve energy security must also contribute to climate goals, we believe it would be deeply irresponsible and ultimately counterproductive to pursue policies that are at direct cross-purposes, in the sense that they address one problem while exacerbating another. As noted above, current coal-to-liquids technologies generate nearly twice as much carbon dioxide as conventional petroleum on a full fuel-cycle basis; the climate impacts of existing methods for unconventional oil production are similar or even worse.

To promote needed advances toward commercializing a new generation of more plentiful and environmentally beneficial biomass fuels and to ensure rational policy outcomes from both an energy-security and climate-mitigation perspective, the Commission recommends that Congress:

- **Re-evaluate ethanol subsidies and tariffs in light of current fuel mandates and rationalize existing policies to direct a greater share of scarce public resources to more promising biofuels options, such as cellulosic ethanol; biobutanol; and clean, high-quality diesel fuel from organic wastes.**
- **Address other hurdles to biofuels deployment, including hurdles related to the deployment of critical supporting infrastructures (including gathering systems, distribution systems, and refueling facilities) and compatible vehicle technologies. For example, Congress should consider a combination of incentives and requirements to increase the number of gas stations that dispense fuels containing ethanol at levels up to 85 percent and should support aggressive R&D and engine certification testing to explore whether and how ethanol blends higher than 10 percent can be used in existing vehicle engines and distributed through existing fuel infrastructure.**

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<sup>13</sup> Biobutanol can be produced via fermentation from the same feedstocks as ethanol. It has the advantage of being more like gasoline; it is less corrosive than ethanol, better tolerates water contamination, and is more suitable for distribution through gasoline pipelines.

- **Take steps to ensure that policies aimed at reducing U.S. oil dependence do not promote environmentally unsustainable fuel alternatives. The Commission believes that California's recently introduced low-carbon fuel standard suggests a useful direction for future policy and deserves consideration at the national level.**

## ENERGY TECHNOLOGY INNOVATION

In its December 2004 report, the Commission recommended “doubling annual direct federal expenditures on energy-technology research, development, and demonstration corrected for inflation, over the period 2005–2010—with increases emphasizing public-private partnerships, international cooperation, and energy-technologies offering high potential leverage against multiple challenges.” Although the relatively low cost and relatively non-controversial character of government investments in RD&D compared to other elements of needed national strategy might lead one to suppose that recommendations in the vein might find ready acceptance, nothing like the recommended trajectory has materialized.

In fact, the President’s FY2007 request for Department of Energy RD&D on energy technologies (where about 95 percent of the government’s expenditures in this domain originate) was slightly less than the FY2005 appropriation in real terms. The corresponding FY2008 request is up 15 percent from the FY2005 appropriation in real terms, but essentially all of the increase is concentrated in the rapid ramp-up of a nuclear-fuel-cycle initiative aimed at early demonstration of large-scale reprocessing of spent nuclear fuel—a project considered by many, including this Commission, to be ill-advised. At the same time, the FY2008 request for RD&D on advanced fossil-fuel technologies is 29 percent below the FY2005 appropriation in real terms, and for RD&D on energy-efficiency technologies the decline is 21 percent.

Even if the question of appropriate allocation of energy RD&D monies is put aside, the increase in the FY2008 request compared to the FY2005 appropriation falls far short of the rate of increase recommended by the Commission in its 2004 report. A doubling of real expenditures over five years requires an average rate of increase of 14 percent per year in real terms, or 16–17 percent per year in current dollars for a 2–3 percent rate of inflation. If the President’s request is funded by Congress, the average rate of increase from FY2005 to FY2008 will end up being a third of what we recommended.

Taking all due account of enhanced incentives for private-sector energy-technology RD&D that were embodied in EPAct05 (many along lines recommended by this Commission), as well as the prospect of further such incentives that will materialize when an economy-wide price is established on carbon emissions, the current trajectory of federal expenditures on energy-technology RD&D remains wholly inadequate in relation to the energy challenges facing the United States and in relation to the identifiable relevant opportunities that are badly underfunded. The Commission is undertaking a more detailed analysis of this mismatch for release later this year.

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