National Commission on Energy Policy

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Good morning, Chairman Stevens and Members of the Committee. I speak to you today on behalf of the National Commission on Energy Policy (NCEP), a diverse and bipartisan group of energy experts that first came together in 2002 with support from the Hewlett Foundation and several other leading philanthropies. Last December, the Commission released a report entitled *Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges*. Oil security and biofuels figured prominently in our recommendations and I am pleased to be with you today to discuss policy approaches to encouraging alternative automotive fuel technologies.

Over the next few minutes I will attempt to explain the NCEP's rationale for promoting biofuels and the basis for our conclusion that cellulosic ethanol is the most promising gasoline alternative. I will conclude with some reflections on recent efforts to promote biofuels in the recently adopted Energy Policy Act of 2005 (EPAct 2005).

Oil Security

During our deliberations, Commission members actively debated the extent to which our oil dependence limits U.S. foreign policy, provides funding for terrorism and imposes burdens on our military. While members voiced a variety of passionate opinions on these questions, Commissioners were unanimous in the belief that oil dependence poses an unacceptable threat to the U.S. economy. To address this threat, we propose a variety of measures to increase global oil supply while simultaneously seeking to reduce domestic oil demand through increased vehicle efficiency and the diversification of our transportation fuels.

Events of the last few months highlight our vulnerability to disruptions in the petroleum supply chain. As Congress and ordinary Americans struggle to find economic relief, it has become clear that once a serious disruption occurs there are no good near-term options. In our collective frustration, many have sought to focus blame on price gouging, windfall profits or restrictive environmental laws as if our plight was somehow the result of a few bad people or poorly written statutes. While these assertions should not be dismissed out of hand, they should not distract us from the fundamental reality that our economy and very way of life are dependent upon a product that is beyond our control. The United States possesses less than three percent of the worlds proven oil reserves and consumes twenty-five percent of the world's annual oil production. At present, global spare capacity to compensate for supply disruptions has fallen to a mere 2% of global demand. In today's tight global oil market a

supply disruption anywhere can have a dramatic affect on price everywhere. It doesn't matter if the cause is labor unrest in Venezuela, civil unrest in Nigeria, terrorism in the Middle East, accidents or natural disasters affecting oil production anywhere in the world, our economy and consumers will suffer. While we have few options to mitigate the impact of the current gasoline price shock, we have an obligation to prepare for the inevitable future oil supply disruptions. That such disruptions will occur is a certainty. Our challenge is to minimize their harmful effects over the next several decades while we transition to a more secure and diversified transportation system.

All evidence suggests that absent a significant course correction, our economic vulnerability to oil disruptions is likely to get worse in the future. Both domestic and global demand for oil is projected to grow by roughly 50% over the next 20 years. This rate of growth is more than double the historical rate since 1980 (Figure 1-1.) Moreover, according to Chevron and others, the energy sector has for years experienced a consistent and growing gap between oil production and the discovery of replacement reserves. In addition, the rate of improvement in U.S. oil economic intensity has slowed in recent years. Oil economic intensity is a measure of how much oil is required for the U.S. economy to produce a dollar of economic output. This measure is important because the ability of the U.S. economy to weather oil price shocks improves as oil's share of our economic output decreases. Since 1970, the U.S. oil economic intensity has dropped by half -- a tremendous achievement -- largely due to CAFE standards and high oil prices in the late 1970s and early 1980s, and to a shift in the electricity sector away from the use of petroleum. Further improvements would further insulate the U.S. economy from oil price shocks (Figure 1-2).

The Commission firmly believes that we can neither produce nor conserve our way to energy security - - we must do both. At the same time, we recognize that oil is a global commodity with one global price. The vulnerability of our economy to oil price shocks is purely a function of how much oil we consume. In this regard, the origin of the oil makes no difference whatsoever. While oil production in the U.S. has important regional and national economic value, improves our balance of trade and improves global supply, the only way to reduce the impact of an oil price shock is to use less oil.

While I will focus today on opportunities to enhance the use of biofuels, it is important to recognize that the transition toward alternative fuels is unlikely to succeed absent a commensurate effort to increase vehicle fuel economy. First, the effort to diversify our fuel supply will take decades. Increased vehicle fuel economy can essentially buy us time while this effort progresses. Second, biofuels and most other alternative fuels suffer from a lack of available feedstock, a lower energy density than gasoline, or both. Unless our vehicle fleet becomes more fuel efficient, the transition to a greater reliance on alternative fuels will likely falter due to inadequate supply or inadequate driving range of alternatively fueled vehicles. I have attached a copy of the full Commission Report in which we recommend significantly reforming and strengthening the current CAFE program and offer specific ideas to address the cost, domestic competitiveness, safety and performance issues that have caused our nation's fuel economy to remain essentially stagnant for nearly two decades.

Biofuel Attributes and Challenges

We burn nearly 140 billion gallons of gasoline each year in the U.S. In order to meaningfully improve our nation's energy security, alternative fuels must be capable of being economically and reliably produced on a truly massive scale. The Commission identified four criteria that characterize a promising alternative fuel: 1) they can be produced from ample domestic feedstocks; 2) they have low carbon emissions during production and use; 3) they can work in existing vehicles and with existing infrastructure and 4) they have the potential to become cost-competitive with petroleum fuels given sufficient time and resources dedicated to technology development. Among the variety of alternative fuel options potentially available for the light-duty vehicle fleet, the Commission believes that ethanol produced from cellulosic biomass (i.e. fibrous or woody plant materials) should be the focus of near-term federal research, development, and demonstration efforts. Let me briefly discuss the attributes of traditional corn-based ethanol and then turn to cellulosic ethanol.

Corn-based ethanol is far and away our most successful non-petroleum transportation fuel. The Renewable Fuels Standard adopted in the 2005 Energy Policy Act imposes an annual ethanol sales requirement that grows to 7.5 billion gallons in 2012. Current ethanol sales were roughly 4 billion gallons last year. Despite the beneficial sales-volume credits given to producers of cellulosic ethanol, virtually all of this mandate will be met with traditional ethanol. A requirement to sell 250 million gallons of cellulosic ethanol takes effect in 2013.

For years, detractors of corn ethanol have asserted that it takes as much energy to produce a gallon of ethanol as the gallon generates. The Commission's analysis disputes this assertion finding that corn ethanol on average provides nearly a 20% more energy than it takes to produce. A more recent study by Argonne National Labs finds a 35% benefit. The fundamental liability of corn based ethanol is there's simply not enough corn to begin to keep pace with the expected growth in gasoline demand let alone reduce our current dependence. It takes roughly 4% of our nation's corn supply to displace 1% of our nations gasoline supply. Even organizations devoted to ethanol advocacy agree that it will be difficult to produce more than 10-12 billion gallons of ethanol a year without imposing unacceptable demands on corn supply and significant upward pressure on livestock feed prices.

The 2005 Energy Policy Act also made progress toward ensuring that the increased use of ethanol will not undermine air quality and public health standards. Eliminating the opportunity for ethanol blended gasoline to meet less protective evaporative emission standards remains necessary to ensure that our efforts to increase energy security do not undermine our clean air goals. Finally, car makers will have to take some steps to better accommodate ethanol blended gasoline. The Coordinated Research Council, which is supported by both automotive and petroleum industries and the State of California, have been conducting research examining the extent to which automobile evaporative emissions increase in cars using ethanol blended fuels. The research appears to indicate that when a small quantity of ethanol is blended into gasoline, the resulting mixture escapes more readily through the hoses and seals in the vehicles fuel system leading to more smog forming emissions. The problem appears less prevalent in newer vehicles but demonstrates the type of challenges that will arise as we begin to transition toward a more diverse suite of transportation fuels. One of the many reasons for interest in promoting flexible fueled vehicles capable of running on up to 85 percent ethanol blends is that when

ethanol is the dominant constituent, the overall volatility of the fuel is reduced and evaporative problems go away. Efforts by Senators Lugar, Obama and others to increase the number of flexible fueled vehicles sold over the next decade deserve serious consideration.

Cellulosic ethanol is chemically identical to corn-based ethanol and is equally compatible with existing vehicle technology and fueling infrastructure. The added advantages of cellulosic ethanol lie in its significantly lower energy inputs and greenhouse gas emissions, much larger base of potential feedstocks and its greater potential to become cost-competitive with gasoline at very large production scales. For cellulosic ethanol to succeed on a large scale, important concerns about land requirements must be overcome and production costs must be reduced. The central challenge is producing enough feedstocks without disrupting current production of food and forest products. Some cellulosic ethanol can be produced from currently available waste products such as corn stalks, sugar cane bagasse and wheat straw. However, production scales on the order of fifty billion gallons per year, will require improved high-yield energy crops like switchgrass, integration of cellulosic ethanol production into existing farming activities and improved process efficiency for converting cellulosic materials into ethanol.

An examination of the land requirements to produce enough cellulosic ethanol to fuel half of the current U.S. passenger fleet reveals the importance of advancements noted above. Using status quo assumptions for crop yields, conversion efficiency and fuel economy, it would take 180 million acres or roughly 40% of the land already in cultivation in the U.S. to fuel half the current vehicle fleet. However with steady but unremarkable progress over two to three decades, it should be possible cut the required land down to 30 million acres by doubling the per acre yields of switchgrass, increasing conversion efficiency by one third and doubling the fuel economy of our vehicle fleet. As a point of reference, there are roughly 30 million acres in the Conservation Reserve Program (CRP).

Another central challenge is reducing production costs for cellulosic ethanol. The lack of fertilizer, pesticide and herbicide needed to grow energy crops like switchgrass offers obvious economic benefits as does producing ethanol from materials that would otherwise be treated as waste. The National Renewable Energy Labs and a separate analysis sponsored by the NCEP both suggest that mature cellulosic ethanol production could compete economically with gasoline. However, these studies are projections. At this time, there is no fully commercial scale production of cellulosic ethanol anywhere in the world. Until cellulosic ethanol is produced in a variety of commercial facilities, it will not be possible to prove or disprove these cost estimates. These are serious challenges, but achievable if we dedicate ourselves to a serious, coordinated, and sustained research, development and commercialization effort. The Energy Policy Act of 2005 offers promise in this critical direction

Energy Policy Act of 2005

The Energy Policy Act of 2005 (EPACT 2005) contains at least ten major programs to promote ethanol derived from cellulosic feedstocks. These programs include explicit authorizations for more than $4.2 billion over the next decade to support critical R&D and “first-mover” commercial facilities through a combination of grants, loan guarantees and production incentives. While these programs demonstrate Congress’ clear intention to promote biofuels, it will require continued vigilance by Congress and the Administration to ensure that this vision

is achieved. Historically, efforts to promote biofuels have been undermined by a lack of appropriations, inconsistent funding year to year, and an unusual degree of Congressional earmarks. These factors, if continued, will make it difficult to achieve the critical objective of diversifying our nation's fuel supply.

We encourage Congress to make every effort to fund the research and demonstration projects authorized in the Energy Policy Act of 2005. While it is clear that all discretionary programs must come under continual budget scrutiny, inconsistent funding year to year can be devastating to long term research efforts by making it impossible to hire and train experts, build infrastructure, and amass knowledge based on iterative experimentation. The Commission recognizes that Congress alone is responsible for appropriations, but can't help but note that the high level of non-competitive earmarks is undermining the strategic goals of our nation's bioenergy programs. For example, in 2004, of the $94 million in appropriations for the DOE's Bioenergy program, nearly $41 million was directed to earmarked projects. In 2005, earmarks accounted for nearly 50 percent of the program's budget. Paradoxically, this high level of earmarks reflects the enthusiasm that many members of Congress maintain for promoting domestic alternatives to petroleum. However, an effective national effort that coordinates the efforts of federal state and private institutions cannot be mounted under these circumstances.

Conclusion

Since the late 1980's, the U.S. has pursued a stated policy of promoting alternatives to petroleum-based transportation fuels as a means of diminishing our vulnerability to oil price shocks and supply reductions and reducing emissions from passenger vehicles. Despite these efforts, gasoline and diesel fuel still account for roughly ninety-eight percent of our transportation fuels. Biofuels offer an important opportunity to lower energy prices, protect the economy from oil price shocks and minimize greenhouse gas emissions. These homegrown, renewable fuels are also major source of income for America's farmers and rural communities. By following through on the critical path set forth in the 2005 Energy Policy Act, we have the potential to develop cost-competitive biofuels that will strengthen our economy and protect our environment.

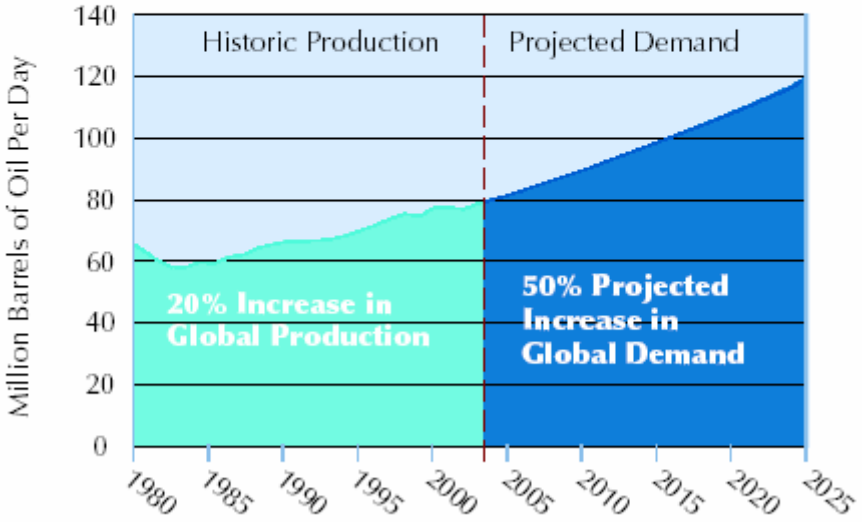
I thank the Committee for focusing its attention on this important topic.

Figures from *Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges*, National Commission on Energy Policy (2005).

Figure 1-1

Trends in Global Oil Production and Future Demand

Future demand for oil is projected to grow at more than double the historical rate since 1980.

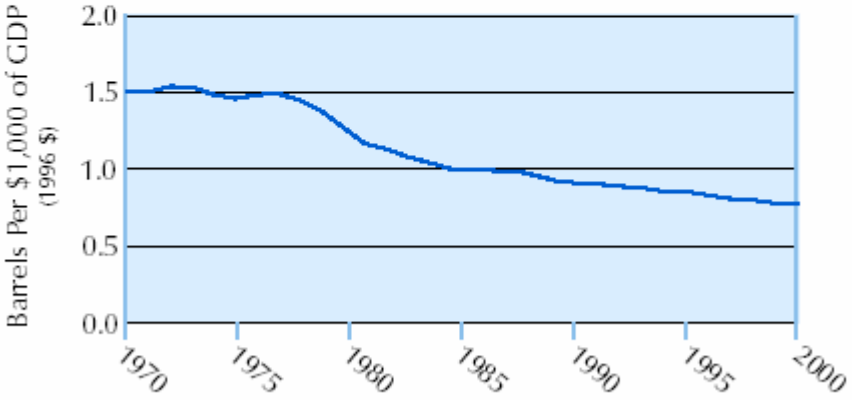


Data Source: Energy Information Administration, 2004

Figure 1-2

Oil and the Economy

The ability of the U.S. economy to weather oil price shocks improves as oil's share of GDP decreases. This share has declined over the past several decades, although the rate of decline has slowed in recent years.



Resources for the Future, 2004