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Before the Joint Economic Committee

A Hearing on

Oil Bubble or New Reality:
How Will Skyrocketing Oil Prices Affect the U.S. Economy?

June 25, 2008

Summary

This testimony responds to an invitation from the Joint Economic Committee to explore the economic potential of cost-effective investments in more energy-efficient technologies, especially as those investments favorably impact petroleum prices and improve the robustness of the American economy. As discussed in this testimony, there is a huge potential for cost-effective investments in energy efficiency: on the order of 46 billion barrels of oil equivalent between now and 2030. That magnitude of further gains in energy efficiency could generate a significant downward pressure on oil prices and increase both the resilience and robustness of the American and the international economies — if we choose to encourage those more productive investments.

Policy solutions will play a pivotal role in strengthening the continued development, dissemination, and widespread adoption of energy-efficient industrial and transportation technologies and systems. In that regard, ACEEE recommends 10 policy actions that might be undertaken by this Congress to immediately provide that signal, and more critically, to change the direction of energy usage through increased energy efficiency.

The set of 10 proposals offered here is intended to accomplish two specific objectives. The first is to provide an immediate catalyst by launching an effort over the next few months that can "save oil in a hurry." If undertaken with sufficient robustness, these initial proposals might generate an immediate downward pressure on oil prices to the benefit of consumers and businesses. The second is to begin the process of fundamentally restructuring our transportation infrastructure — a step that will be necessary if we are to change the energy use path that our transportation system is currently on. Many of these suggestions lay the groundwork for a shift in the larger transportation policy, an opportunity that is afforded the next Congress by next year's reauthorization of the transportation bill.

Introduction

My name is John A. "Skip" Laitner. I am the Director of Economic Analysis for the American Council for an Energy-Efficient Economy (ACEEE), a nonprofit organization dedicated to increasing energy efficiency as a means of promoting economic prosperity, energy security, and environmental protection. I am here today at the invitation of the Joint Economic Committee to explore the role of productive investments in more energy-efficient technologies, as well as energy conservation behaviors, as both might positively improve the robustness of the U.S. economy. I thank you for the opportunity to testify here today. Indeed, I applaud the Committee for its willingness to more closely examine (and hopefully act on) the potential contribution of energy efficiency as it strengthens the productivity of our economy. What might we conclude in this regard? As we shall see, there is a huge potential for cost-effective investments in energy efficiency: on the order of 46 billion barrels of oil equivalent between now and 2030. That magnitude of further gains in energy efficiency could generate a significant downward pressure on oil prices and increase both the resilience and robustness of the American and the international economies — if we choose to encourage those more productive investments.

Despite the potential for significant improvements in energy productivity, most of the current policy assessments and economic modeling exercises fail to adequately capture the ways in which individual or business energy consumption patterns might change in response to both economic and noneconomic policies and programs. Therefore, policy reviews that have been based on those kinds of assessments and models have consistently overlooked the energy saving benefits that can be achieved through changing social preferences, the accelerated adoption of energy-efficient technologies, and more energy-aware behaviors. As such, assessments have tended to underestimate the energy savings that can be achieved while generally overestimating the costs of achieving increased levels of energy efficiency and larger gains in energy productivity.

The inaccuracy of these past assessments has large and important implications for both energy and climate change mitigation policies. In the remainder of my testimony here today, I will expand on these notions as I try to answer three questions in response to the Committee's invitation:

1. What is the magnitude of recent gains in energy efficiency and how do they compare to ongoing investments in conventional energy resources? Perhaps more importantly, what might be the approximate scale of both near-term and mid-term efficiency opportunities? And especially, what might we say about opportunities for immediate reductions in the demand for petroleum resources in ways that enhance overall economic productivity?

2. What are the kinds of policies that might be encouraged to shape more productive behaviors and patterns of investments in cost-effective, more energy-efficient technologies?

3. Can we say anything about the economic returns associated with the accelerated adoption of energy-efficient technologies and more energy-aware behaviors?

In responding as fully as I can to each of these questions, let me divide up my remaining testimony into five major parts. The first section following this introduction provides an energy and economic context that I hope will be helpful in responding to the Committee's request. The next three sections will deal specifically with each of the questions posed — especially in the context of our transportation system and its potentially beneficial impacts on oil prices. The last section will provide a summary and conclusions.

Energy Consumption in Context

As one of the richest and more technologically advanced regions of the world, the United States has expanded its economic output by more than three-fold since 1970. Per capita incomes are also twice as large today compared to incomes in 1970. Notably, however, the demand for energy and power resources grew by only 50 percent during the same period.[1] This decoupling of economic growth and energy consumption is a function of increased energy productivity: in effect, the ability to do more with less consumption. In today's testimony I would like to reaffirm the compelling evidence that suggests that even greater energy productivity gains can be achieved. At the same time, the evidence suggests that there is significant room for improvement in the policies that shape our demand for energy. In short, there is good news in all of this; but as we shall see, there is also some serious work ahead.

The Success of Energy Efficiency to Date

The members of this Committee may be surprised to learn how big a role energy efficiency has already played supporting the growth of our economy over time. In the figure shown on the following page, we examine the historical context of efficiency gains estimated through 2008 as they might compare to the development of new energy supplies since 1970. In effect, the figure compares the projected level of energy consumption in 2008 to that which might have been necessary had the economy continued to rely on 1970 technologies and market structure.[2]

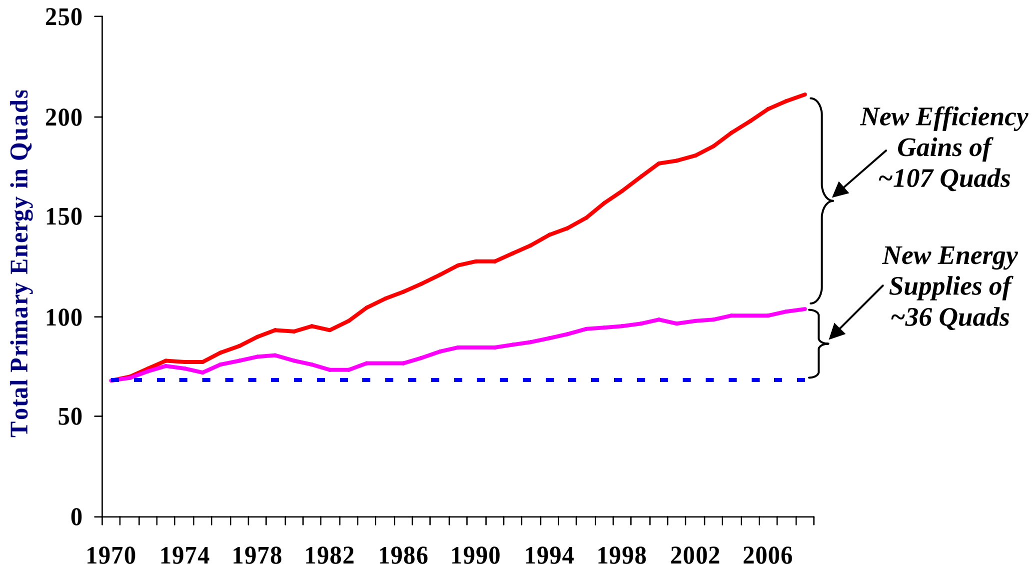
In 1970 Americans consumed an estimated 68 quadrillion Btus (quads) for all uses of energy — whether heating and cooling our homes, schools, and businesses; powering our many industrial processes; or transporting both people and freight to the various places they needed to go. If we converted all forms of energy consumed in 1970 to an equivalent gallon of gasoline, it turns out

[1] These and other specific energy-related data cited in the testimony are the author's calculations as they are drawn from the Energy Information Administration's *Annual Energy Review 2007*, Report No. DOE/EIA-0384(2007), Washington, DC: U.S. Department of Energy, June 2007; and Energy Information Administration's *Short-Term Energy Outlook — June 2008*, Washington, DC: U.S. Department of Energy.

[2] Strictly speaking, the term energy efficiency as used here today can be more broadly defined as a reduction in energy intensity; that is, a reduction in the number of Btus needed to support a dollar of economic activity. This change results from two key drivers. This first is a change in market structure as we move away from energy intensive industries as a source of income to higher value-added services. The second is what we typically think of as energy efficiency — more efficient lighting and consumer products, greater fuel economy in our vehicles, and more efficient power plants and industrial processes. The United States has benefited from both economic drivers; and both were made possible by a combination of behaviors, innovations, and productive technology investments. From a macroeconomic perspective the evidence suggests that anything we can do that positively reduces energy use while maintaining incomes and economic prosperity can be termed "energy efficiency." It is in that larger sense that I use the term here today.

that the U.S. economy required about 2,700 gallons of gasoline equivalent for each man, woman, and child living in the U.S. at that time. Had the United States continued to rely on 1970 market structure and technologies to maintain its economic growth, we would today be consuming an estimated 211 quads of energy. That would have been about 5,500 gallons of gasoline per person equivalent. But in fact, the consumption estimated for 2008 appears to be just under 104 quads of energy (in rounded numbers). Again on a per capita equivalent, this means that the U.S. economy still requires no more than about 2,700 gallons of gasoline per resident.

U.S. Energy Service Demands, Energy Efficiency Gains, and Energy Supplies, 1970-2008



Source: Author calculations based on EIA data referenced in footnote 1.

In examining these numbers more closely, several insights might pop into mind. First, energy efficiency has allowed us to hold per capita energy use to about the same level we used in 1970 while still enjoying an expanded set of goods and services. Second, instead of doubling our energy use with the expanded economy, in effect, the gains in energy efficiency have allowed us to reduce total energy use by the equivalent of 107 quadrillion Btus in 2008, relative to what our energy use would have been absent those efficiency gains. As such, energy efficiency has "fueled" roughly 75 percent of the new growth demands in the United States since 1970. The new conventional energy resources, on the other hand, have provided only one-fourth of the demands (or about 36 Quads, as shown in the above figure). In fact, energy efficiency may be the farthest-reaching, least-polluting, and fastest-growing U.S. energy success story of the last 50 years. It is also the most invisible, the least understood, and in serious danger of missing out on needed future investments.

In a report published only last month, ACEEE noted that in 2004 the U.S. invested an estimated $300 billion in energy efficiency (Ehrhardt-Martinez and Laitner 2008). This was about three times the amount invested in traditional energy infrastructure, whether power plants or oil and gas wells. Those energy productivity investments are estimated to have generated approximately 1.7 quads of energy savings in 2004 alone — roughly the equivalent of the energy required to operate 40 mid-sized coal-fired or nuclear power plants. Yet the analysis suggests that the many contributions of energy efficiency often remain invisible and go unrecognized. The report also notes that although efficiency is a proven resource, it remains seriously underdeveloped. In other words, there are substantially further gains that might be available if we pick up the pace of efficiency investments.

The Magnitude of Future Efficiency Potential

American economist Kenneth Boulding once commented that "Images of the future are critical to choice oriented behavior." In effect, Boulding was suggesting that unless we are able to visualize future opportunities, we are less likely to realize their full potential. In that same spirit, therefore, ACEEE believes it is important to visualize the larger potential of energy efficiency to enable the development of policies and technologies that might enhance our overall energy productivity. While our preliminary assessment indicates that the efficiency market is already large, the more important questions are how large can the market ultimately be, and how rapidly can it be developed?

The recent United Nations Foundation study called energy efficiency both the largest and least expensive energy resource, suggesting that the G-8 and other nations could double historical rates of efficiency improvement by 2030 (Expert Panel on Energy Efficiency 2007). If the United States were to follow that course — and other ACEEE studies suggest this can be a cost-effective policy path, U.S. energy consumption in 2030 could be reduced to the level of energy consumed in the years 1996-1997. Assuming that policies, market forces, and new financing mechanisms facilitate substantial investments in energy productivity, we might have an economy in the year 2030 that is about 70 percent larger than it is today, but one that uses no more energy than was required in the mid-1990s.[3] That would be a clear benefit for consumers, for business, and for the global climate. But, again, this would be the outcome only if we choose to develop that more productive investment path. And that is the huge task ahead. . . .

[3] In December 2007 the Energy Information Administration's forecast, the *Annual Energy Review 2008* indicated that energy consumption would increase to about 124 quads by 2030. With the passage of the Energy Bill by Congress earlier this year, EIA subsequently revised its forecast to 118 quads by 2030. Building on that trend, an additional 20 percent savings by 2030 would imply a total energy use in a high-efficiency scenario would be on the order of 94.4 quads. EIA data suggests that actual energy use was about 94.2 quads in 1996. The difference between those projected values (i.e., 118 quads in the reference case versus 94.6 quads in the energy productivity case) is 23.6 quads. The cumulative savings over the 2008 through 2030 time horizon would be just under 269 quads compared to the reference case consumption pattern. With each barrel of oil equal to 5.8 million Btus, this level of savings is comparable to 46 billion barrels of energy efficiency equivalent. This is the figure cited at the beginning of this testimony. This comparative scenario analysis draws on a study and modeling analysis by Laitner et al. (2006).

Understanding the Transportation System

With this hearing focusing more specifically on oil prices, let me now highlight the efficiency potential within the transportation sector; and more specifically the implications for petroleum consumption.[4] When we climb into our cars or other vehicles to get where we want to go, we're really climbing aboard an incredibly extensive and highly diverse transportation system. It involves the obvious things like roads, bridges, tractor trailers and shipping containers, but it also includes a much larger array of elements — each with inefficiencies that if corrected, or even changed in reasonably minor ways, can help reduce the need for gasoline and other petroleum products. Among the less obvious aspects of the transportation system are traffic signals and controls, information and enforcement activities, and the scheduling, coordination, and management of facilities, goods, and services. Perhaps even less obvious is all the freight that must be hauled — to get the food from the farm to the processing plant and then to the grocery store; to get the lumber from the forests to the mills, from the mills to the lumber yards, and finally to our homes and offices; or to get the clothing, medicines, books, and consumer electronics to the stores for purchase by consumers and businesses.

Adding up all the energy required by these various transportation needs, it appears that we need about 14.7 million barrels of oil each day to maintain current levels of use (and inefficiencies). Cars and other light duty vehicles demand 9.2 million barrels per day, or about 63 percent of the total. While the average fuel economy for automobiles has grown from 13 miles per gallon in 1973 compared to perhaps 23 miles per gallon today[5] — a respectable 70 percent over that period — there are more and more cars which are driving more and more miles. The end result is that we are using more and more gasoline and other petroleum fuels. And the kinds of cars we are driving have also changed. In the mid-1970s only one out of five new light-duty vehicles sold was a pickup or other light truck. Today trucks, sport utility vehicles and minivans comprise nearly half of the total sales for new light duty vehicles (Davis and Diegel 2007). Their overall fuel economy is substantially less at 17.7 miles per gallon. As a result, all the gains in fuel efficiency have been eaten away by horsepower wars and the growing sales of less-efficient trucks, minivans, and SUVs. The result is an average fuel economy of 20.3 miles per gallon for all light-duty vehicles on the road today (EIA 2008).

There is some good news in this. Whether we are talking about passenger cars, railroad trains, trucks, aircraft or ships, over the next twenty years the potential for technology improvements that increase the fuel efficiency of individual vehicles is significantly greater than is generally imagined or appreciated. But an even larger "system gain" in energy efficiency is possible if we make wholly achievable cost-effective improvements in system operations, in infrastructure and in land use patterns –in addition to those vehicle efficiency improvements.

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[4] This section of the testimony draws heavily on a report released earlier this year through the Civil Society Institute (Laitner 2007).

[5] I might note that all of the gains in fuel economy occurred over the period 1975-1986, and that today new vehicles are still below the average reached in 1986.

The Many Efficiency Opportunities in Transportation

To gain some insight into the full opportunity for system efficiency improvements, let's start with the more familiar area of vehicle efficiency improvements. Even a cursory look at the "Best of 2008" cars makes it clear that gains in energy efficiency come from a wide range of technologies. Hybrid vehicles such as the Toyota Prius or the Honda Insight have been claiming the limelight when it comes to high miles-per-gallon vehicles, but fuel-efficient technologies are also being installed in more conventional cars as well. Intelligent engines with features such as cylinder deactivation, turbocharging, direct injection, and variable valve control; advanced transmissions, including 6-7 speed automatics or continuously variable transmissions (CVTs); and lightweight materials, engine-off-at-idle, friction reduction, and improved aerodynamic designs all do their part to help make these cars more energy-efficient. By extending these and other technologies to include more of the new car and new truck fleet (in effect, so that the best becomes the typical), there is a huge potential to improve the energy efficiency of conventional vehicle technology (IEA, 2005). A recent report of technology experts funded by the United Nations Foundation called for a 35 percent increase in fuel economy by 2020 and a 60 percent increase by 2030 for new light-duty vehicles (Expert Group on Energy Efficiency 2007).

These advanced technologies admittedly increase the manufacturing costs of vehicles but at the same time they also reduce the energy costs of operating them. DeCicco et al. (2001), for example, suggested that fuel economy standards could increase from 37 to 70 percent over a 15 year period with no more than a 4.5 to 6.6 percent increase in costs. In other words, a car that might cost an additional $1200 might also save 150 gallons of gasoline annually. With current gasoline prices in the range of $4 per gallon, this might imply a typical payback of two years. Similarly, a car that might cost an extra $3000 might save 190 gallons of gasoline which means that at $4 per gallon, the extra investment would pay for itself in about four years. Although a shorter payback period would be better, either of the technology upgrades would generate a positive return for a vehicle with an expected life of 17 years or more. Perhaps even more impressive and more recently, the California Air Resources Board estimates that meeting California tailpipe standards (which will result in vehicles that reach roughly 35 mpg in 2016) will cost on average $1000 per vehicle. At $4 per gallon of gasoline, this will save about $700 per vehicle per year, yielding a 1.5 year payback. (For other comparative estimates of costs and savings associated with vehicle efficiencies, see IEA 2006, tables 5.2 and 5.6; and Vattenfall 2007.)

At the same time, the actual fuel economy that is achieved while driving those motor vehicles can be greatly affected by how they are operated and how they are maintained. Whether in the form of speeding and aggressive driving, excessive engine idling, improper tire pressure, and even poor choice of motor oil, the behavior and maintenance decisions of drivers can also affect the on-road fuel economy. One recent study concluded that programs which promote improvements in driving style through training and technology aids could generate a 10 percent reduction in typical fuel consumption and therefore in greenhouse gas emissions (ECMT/IEA 2004).

Even though automobiles now use about two-thirds of the transportation fuel consumed in the United States, large savings are also possible in the movement of freight as well as the movement of passengers in business, air, and train travel. One professor of transportation logistics has suggested that heavy trucks might save 32 percent of energy use through a combination of improved fuel efficiencies, and better coordination to reduce empty backhauls and unnecessary travel (McKinnon 2007). Still another ACEEE study lists tractor-trailer technologies that can reduce fuel consumption by 39 percent across the fleet of those heavy duty vehicles. The paper as a whole shows the potential to reduce oil consumption through efficiency gains across many different sectors (See Elliott et al. 2006, especially Tables 10 and 11). Although rail transport is one of the more energy-efficient transportation modes, the IPCC suggests that substantial opportunities for further efficiency improvements remain. These include reduced aerodynamic drag, lower train weight, regenerative breaking and higher efficiency propulsion systems, all of which can make significant reductions in rail energy use. While passenger jet aircraft produced today are 70 percent more fuel efficient than equivalent aircraft produced 40 years ago, the IPCC notes that a 20 percent improvement over 1997 aircraft efficiency is likely by 2015 and "possibly 40 to 50% improvement is anticipated by 2050. Still greater efficiency gains will depend on the potential of novel designs such as the blended wing body, or propulsion systems such as the unducted turbofan" (Kahn et al. 2007).

Emergence of Information Technologies

One especially interesting opportunity that is emerging is the use of broadband and information and communication technologies (ICT) to increase transportation efficiencies by decreasing travel demands and increasing transportation system efficiencies (Laitner and Ehrhardt-Martinez 2008). A new study released just last week by the Climate Group (2008), with assistance from McKinsey and Company and on behalf of the Global e-Sustainability Initiative (GeSI), found that ICT has the potential of reducing energy-related global greenhouse gas emissions by 15 percent by 2020 through a combination of smart buildings and smart grids and also smart transportation and travel reduction/dematerialization.

Smart vehicle technologies, for example, provide a range of innovative means for reducing transportation-related energy consumption while maintaining the services on which we depend. Vehicles are increasingly integrating sophisticated communications and information technologies that collect and communicate information regarding vehicle performance, routes and maps, road and traffic conditions, energy consumption, and environmental variables. As more and more vehicle manufacturers integrate on-board wireless technology, smart cars will increasingly be able to communicate with regional data centers as well as other vehicles on the road to share road data, travel information, traffic conditions, and other information. Moreover, on-board display devices will make this information readily accessible to drivers through the use of networks of sensors and communications devices. Maximum energy-efficiency gains can be provided through a combination of intelligent transportation systems (ITS) and smart vehicle systems that rely on a variety of sophisticated electronic technologies including GPS, sensors, processors and on-board communications equipment. In the future, these technologies will enable automated management of traffic flows, allow drivers to avoid congested roads, and locate and map the shortest routes to specified destinations — resulting in shortened drive times, reduced energy consumption, and lower greenhouse gas emissions.

Governments and businesses are also looking to integrate high-tech supply chain logistics and warehousing technologies. Advanced logistics technologies can help companies reduce fuel use, costs, and carbon emissions through:

- Intermodal shipping strategies that utilize a variety of shipping modes including rail resulting in reduced traffic congestion and idling time and increased shipping mode flexibility allowing shippers to choose the most fuel-efficient, cost-effective, reliable and timely mode of transportation.

- Improved truck tracking and logistics management to improve scheduling the pickup and delivery of goods so as to reduce wait times, maximize the size of truck loads, and reduce the number of wasted "backhaul" of empty trailers.

- Improved routing of traffic by providing real-time information about the quickest routes to reduce travel time and idling.

- Improved tracking and management of store and warehouse inventories to improve the management and flow of goods and increase the viability of intermodal shipping opportunities.

These strategies can minimize inefficient freight operations, saving fuel, increasing revenue for trucking companies, and reducing carbon dioxide emissions. For example, according to the US Environmental Protection Agency, the use of intermodal shipping for long distance shipments (over 1000 miles) cuts fuel use and greenhouse gas emissions by 65 percent, relative to truck transport alone (EPA 2004).

Still another transportation option is the use of telecommuting and videoconferencing. The emergence of information and communication technologies enables high quality work to be completed from a home office location in a way that saves gasoline — even after other energy uses are considered. For example, while a telecommuter may save gasoline as a result of a net reduction in commuter travel, there is some increased energy use associated with working in the home office. But even with a full accounting of those increased uses, a new estimate by the Consumer Electronics Association indicates that the regular telecommuting of some 4 million workers is now saving an estimated 840 million gallons of gasoline equivalent. More critically, the report suggests that the potential could grow to 25 or even 50 million workers which would significant increase current levels of energy savings (TIAX LLC 2007). By the time we include other ICT-enabled services ranging from expanded videoconferencing to increased electronic banking and other retail and entertainment services, the suggestion is that "normal" transportation efficiency gains could be greatly complemented by new patterns of working and living enabled by information and communication technologies.

The Need for a New Policy Framework

Even with all this good news about the potential for greater system efficiencies, however, transportation energy use is likely to increase by another 16 percent between now and 2030 — in the absence of additional policy intervention that might otherwise guide an optimal mix of technology improvements and new services demands.[6] This result is driven, in large part, by an increase in vehicle and air miles traveled. Despite the run up in oil prices, the Energy Information Administration estimates that travel demands may double the rate of growth of our population more generally over that same period of time (EIA 2008). One significant downside of the continued demand for petroleum resources is that this will likely push even harder on the rising energy prices faced by businesses and consumers. That same growth in energy use will also increase the burden associated with continued emissions of greenhouse gases.

A more successful outcome, one that achieves an optimal configuration of transportation technology systems, will require smartly crafted policy solutions to overcome important social, economic and structural barriers. Yet, at a recent transportation policy forum sponsored by the U.S. General Accounting Office (described as the audit, evaluation, and investigative arm of the United States Congress), participants said that "the nation's transportation policy has lost focus and that the nation's overall transportation goals need to be better defined." They further noted that "the federal share of total transportation spending continues to decline" (U.S. Controller General 2007). The evidence certainly seems to point in that direction.

Despite the availability of highly cost-effective measures to substantially raise fuel economy standards for both cars and heavy trucks at least since the early 1980s, we have not done so until very late last year. The Energy Independence and Security Act (EISA) enacted by Congress in December 2007, among other things, will increase the average fuel economy of new cars and light trucks combined from 25 to 35 miles per gallon by 2020. This is a positive step that will increase the average fuel economy of our national fleet of cars and light trucks over time. Unfortunately, this modest gain in average fuel economy is unlikely to offset the growth in overall travel within the United States. A more realistic focus on both climate change and world energy policies will require a more aggressive improvement in our system-wide energy and transportation efficiencies. Hence, a meaningful set of long-term policies should address an even greater level of fuel economy improvements, as well as significantly reducing overall travel demands, while maintaining a higher quality of life.

Following the recommendations of the United Nations Foundation panel of experts, for instance, a longer-term focus would increase fuel economy standards for light cars, trucks and heavy duty freight vehicles by at least 60 percent by the year 2030. There is an emerging consensus that — with the right set of policies, and with further investment in research and development activities directed toward transportation systems — a 60 percent improvement is still an economically achievable target (Expert Group on Energy Efficiency 2007; and Langer 2007). At the same

[6] It's worth noting that before passage of the Energy Independence and Security Act (EISA) in December 2007, the Energy Information Administration projected a 28 percent growth in transportation energy between 2008 and 2030. With the anticipated improvements in fuel economy under EISA, as well as a somewhat slower economy coupled with significantly higher energy prices, EIA has moderated that growth to only 16 percent as noted above.

time there should also be an emphasis on reducing the demand for travel through a combination of funding for alternative transportation systems as well as changes in land use and economic development policies.

Initial thinking suggests that, with supportive policies, a 20 percent (or greater) reduction in total vehicle travel might be possible by the year 2030 (Ewing et al. 2007 and Langer 2007). Alternative transportation technologies would include rail and mass transit systems as well as a greater emphasis on improving the logistics of freight shipments. Both approaches would either reduce travel or encourage the use of more fuel efficient modes of transport (e.g., piggybacking truck shipments with rail transport). A smarter transportation policy would also embrace greater reliance on telecommuting and videoconferencing in ways that reduce both automobile and air travel. Economic development and land use policies might encourage production technologies that can be located closer to where new goods and services are actually needed. In this way travel demands can be reduced even further (Laitner and Ehrhardt-Martinez 2008, and The Climate Group 2008).

Policy solutions will play a pivotal role in strengthening the continued development, dissemination, and widespread adoption of energy-efficient transportation technologies and systems. Without a sensible framework of policy objectives and targets, the unfolding of these many technologies and their efficiency gains might follow any number of less productive paths.

Specific Policy Recommendations

At a minimum, the market needs a strong, clear, and persistent signal to help it organize and direct its own efforts and resources toward a more productive pattern of economic activity. To that end, ACEEE therefore suggests the following 10 policy actions that might be undertaken by this Congress to immediately provide that signal, and more critically, to change the direction of energy usage through increased energy efficiency. These proposals are intended to accomplish two specific objectives. The first is to create an immediate catalyst by launching an effort over the next few months which can "save oil in a hurry."[7] If undertaken with sufficient robustness, these initial proposals might generate an immediate downward pressure on oil prices to the benefit of consumers and businesses. The second is begin the process of fundamentally restructuring our transportation infrastructure — a step that will be necessary if we are change the energy use path that our transportation system is currently on. Many of these suggestions lay the groundwork for a shift in transportation policy that is afforded the next Congress by next year's reauthorization of the transportation bill.

1. Enact an Immediate Joint Resolution.

An immediate joint resolution, quickly followed by the other policy actions described below, would send a clear and strong signal to consumers, businesses, and the energy market in ways

[7] In fact, this phrase references a 2005 workshop convened by the International Energy Agency and a resulting book by that same name. The book identified a series of immediate measures that might save up to 1.7 million barrels of oil per day, at a cost ranging from $1 to $100 per barrel, if such measures were implemented by all members of the IEA. (2005). This effort might provide an immediate model of effort for the U.S. as well

that would help organize a more productive pattern of economic activity. The resolution should affirm the nation's energy efficiency potential and direct all agencies to immediately implement all cost-effective gains in energy efficiency — consistent with their current authority and funding.

2. Enact Emergency Transit Supplemental Funding.

Mass transit represents one of the few short-term alternatives to driving personal vehicles for many consumers, and we have seen recent surges in rider-ship since gas prices have surged. However, many transit agencies are struggling to close budget gaps created by dramatic increases in fuel, forcing them to curtail service at the time when demand is on the increase. The congress should pass an emergency funding supplemental to assist transit agencies with meeting their increased fuel bills, and make available funds at 80 percent federal match to supplement local and state investments in expanded capacity.

3. Establish a Crusher Credit for Inefficient Low-Mileage Cars.

This provision would accelerate retirement of the most fuel-inefficient and polluting light trucks when coupled with additional incentives for clean and efficient new vehicles. Under rules to be issued by the Secretary of the Treasury, owners of vehicles presented for destruction (crushing, shredding) will receive a voucher redeemable upon the purchase of a new vehicle meeting the eligibility requirements of the Alternative Motor Vehicle Credit contained in the Energy Policy Act of 2005. The recommended offset for the cost of the program is the extension of the federal "Gas Guzzler Tax", currently applicable only to passenger cars, to light trucks, at a level sufficient to fully offset anticipated program costs.

4. National Telecommuting and Videoconferencing Initiative.

Direct the appropriate agencies to immediately launch a campaign to encourage and enable immediate cost-effective telecommuting and videoconferencing. In addition, all federal agencies should be directed to establish telecommuting and videoconferencing to the maximum extent possible.

5. Develop Policies to Expand Alternative Modes of Freight Movement.

In preparation for next year's Transportation Bill reauthorization, Congress should commission a study of the potential fuel savings potential of expanding alternative modes of freight movement and identify policies that could be implemented to realize these savings

6. Co-Funding of Local Land Use Planning.

Congress should establish a program to co-fund local governments' efforts to update zoning and land use regulations in such a way as to encourage compact development compatible with transit service.

7. Study of Role of Information and Communications Technologies in Improving Transportation System Efficiency.

Direct the National Academies to undertake a study into the role that Information and Communication Technologies (ICT) could have in reducing travel delays and improving the efficiency of transportation infrastructure.

8. Establish a National Energy-Efficient Driver Education Program.

To improve the efficiency of new drivers, it will be critical to change behavior. Congress should direct the Department of Transportation to develop information regarding driving practices, car maintenance, and fuel efficiency that can be incorporated into driver education programs.

9. Direct the Collection of Energy Efficiency Data and Indicators.

The role of energy efficiency is largely invisible in the US economy. Congress should direct and fund the Departments of Commerce and Energy, and the Environmental Protection Agency (among others) to collaborate in the development of a National Energy Efficiency Data Center (NEEDC). The purpose of this new center will be to collect, organize, disseminate and archive energy efficiency and social science statistics and technology costs, particularly those related to public policies and programs.

10. Explore Other Incentive Mechanisms.

The Automotive X Prize is a $10 million inducement price and was announced in March of 2008. It is sponsored by the X Prize Foundation and Progressive Insurance. The prizes will be awarded to teams with cars that can win a staged race while maintaining a fuel efficiency rating of 100 miles per gallon and better.[8] In that same spirit Congress might direct appropriate agencies to explore ways to complement this initiative, but also to look for other inducements and prize incentives (both within and outside of government) which might encourage a more entrepreneurial and smarter use of our investment and energy resources across the many dimensions of our economy.

Likely Economic Returns

At this point we might ask how all of these energy efficiency policies, behaviors and investment decisions could reduce the economic damage of high fuel prices. Generally energy efficiency reduces the toll taken by high energy prices in two ways: first, by reducing consumption, and therefore the amount of energy for which consumers must pay; and second, by reducing prices. As but one example of the possible impacts, ACEEE estimates that the U.S. could reduce oil consumption by 9-13% by 2015 and 15-21% by 2020 through energy efficiency (Elliott et al. 2006). The measures to accomplish this are all cost-effective; that is, the efficiency improvements typically cost less than half what they save in petroleum costs. With regard to price reduction, the complex and global nature of oil and petroleum markets makes predicting

[8] The X PRIZE Foundation, best known for the successful $10 million Ansari X PRIZE for private suborbital spaceflight, is an educational nonprofit whose mission is to bring about radical breakthroughs for the benefit of humanity by holding $10 million dollar (or larger) competitions to solve some of the world's greatest challenges." See, http://www.progressiveautoxprize.org/.

price nearly impossible. We can nonetheless be confident that by giving the market a greater ability to respond to the price signal and by increasing the supply margin, energy efficiency can only help to relieve the run-up in prices. To the extent that speculation in futures markets is responsible for high prices, the adoption of policies that cost-effectively ease inefficient consumption in the near term will serve to combat these rising price effects.

Drawing on a broader variety of related studies and assessments, we can say that as long as such energy efficiency investments are cost-effective — in effect, investments that pay for themselves over a 3-7 year period — the economy should be strengthened. This point was reinforced by another new study released by ACEEE earlier this month (Laitner and McKinney 2008). This latest report, *Positive Returns: State Energy-Efficiency Analyses Can Inform U.S. Energy Policy Assessments*, concluded that energy efficiency investments are likely to stimulate a small but net positive benefit for the American economy. The report’s conclusions were drawn from a review of approximately four dozen state- and regional-level efficiency potential studies that were undertaken over the past 16 years. Overall, the studies demonstrate the potential for an average of 23 percent efficiency gain with a nearly 2 to 1 benefit-cost ratio. Moreover, they suggest that a 20 percent additional gain in energy efficiency by 2030 could provide an estimated 800,000 net jobs while a 30 percent efficiency improvement might generate as many as 1.3 million net jobs. Finally, the report notes that efficiency-led policies that emphasize greater energy productivity are likely expand the nation’s economy (as measured by our Gross Domestic Product, or GDP) by about 0.1 percent by 2030.[9]

Conclusions

Given the full array of evidence, we can conclude that energy efficiency can provide a significantly large contribution toward stabilizing energy prices and strengthening the robustness of the U.S. economy. The good news is that there are large opportunities to promote an even greater level of productive investments in energy-efficient technologies — should we choose to develop and pursue those options. Policy solutions will play a pivotal role in strengthening the continued development, dissemination, and widespread adoption of energy-efficient transportation technologies and systems. The more quickly we act, the more quickly the benefits can accrue to both consumers and businesses.

[9] This result might make more sense when we realize that energy-related sectors of the economy contribute a significantly smaller rate of value-added per dollar of revenue received that almost all other sectors of the economy. Based on 2006 economic data for the U.S. economy, energy-related sectors contributed about 43 cents of value-added per dollar of revenue while all other sectors contributed about 54 cents per dollar of revenue. The same is also true for employment. Energy-related sectors of the economy support less that two jobs per million dollars of revenue while all other sectors support an average of seven jobs (IMPLAN 2008). The recent run-up in oil prices greatly lessens the rate of contribution the energy-related sectors provide the nation’s economy, especially as those energy dollars pull resources away from all other sectors. By the same token, any cost-effective change in the pattern of production away from energy should strengthen the nation’s overall economy. This is particularly true to the extent that the new production recipe reduces the levels of imported energy.

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