STRATEGIES FOR REDUCING OIL IMPORTS: EXPANDING OIL PRODUCTION VS. INCREASING VEHICLE EFFICIENCY

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EXECUTIVE SUMMARY

U.S. oil imports have more than doubled over the past 15 years, from 4.3 million barrels/day (MBD) of net imports[1] in 1985 to 9.6 MBD in 1999. Net imports now exceed domestic oil production and account for over 50 percent of petroleum products supplied. And with oil prices on the rise, the cost of petroleum imports soared to about $110 billion or one-quarter of the total U.S. trade deficit in 2000.

Danger of Growing Oil Imports

Policymakers should be concerned that our oil imports are high and growing. If the world oil price averages $25–30/barrel (bbl) due to monopoly price control or future Middle East crises, our annual oil import bill could reach $150–200 billion within a decade or so. The U.S. trade deficit, already at record high levels, would further deteriorate should oil imports or prices significantly rise.

The United States now has 22 billion barrels or about 2% of the proved oil reserves in the world. U.S. oil reserves declined over the past 50 years as oil companies discovered and pumped as much domestic oil as possible. World oil supplies are becoming increasingly concentrated in a few Middle Eastern countries, namely Saudi Arabia, Iraq, Iran, Kuwait, and the United Arab Emirates. Oil production from these Middle East OPEC nations is expected to grow from about 20 MBD (26% of global supply) in 1997 to 47 MBD (41% of global supply) by 2020. This level of dependence on a cartel and a few nations in a region with high potential for political or military conflict is dangerous.

Previous oil price shocks cost the United States **trillions** of dollars due to transfer of wealth to countries that maintained monopolistic control over oil prices. Even though U.S. oil consumption per dollar of gross domestic product fell by 50% during 1973–99, our economy remains vulnerable to another oil price shock. The recent run-up in oil prices illustrates the price of our high and growing oil import dependence. With gasoline costing about $1.60/gallon on average instead of the approximately $1.20/gallon paid a short time ago, the United States sent an additional $50 billion (or about $500/household) to foreign oil producers in 2000 relative to what was sent the preceding year.

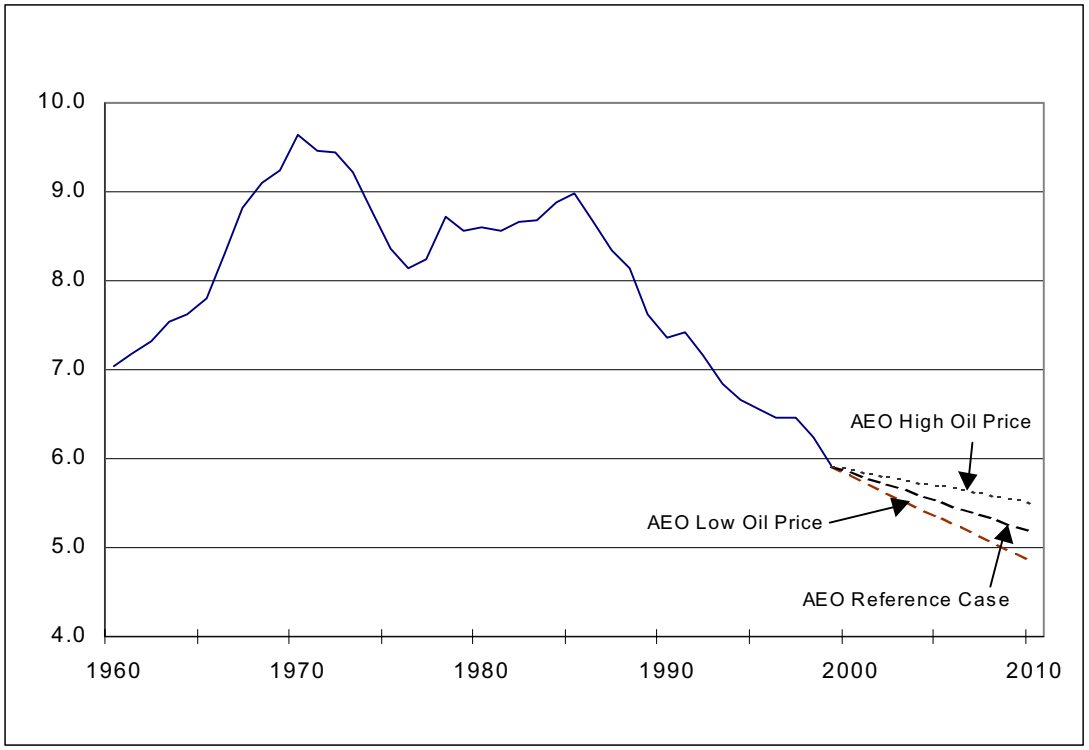
Prospects for Increasing Domestic Oil Production

Crude oil production in the United States peaked in 1970 at 9.6 MBD. Oil production in 1999 was about 5.9 MBD, 39% less than the peak output of 30 years ago (see Figure ES-1). The prospects for reversing this decline look very poor because the United States is running out of

[1] Net imports are imports minus exports.

economically recoverable oil. The U.S. Energy Information Administration (EIA), in its most recent Annual Energy Outlook "Reference Case" forecast (see Figure ES-1), projected that domestic crude oil production will fall to 5.2 MBD by 2010. Assuming that demand for oil products continues to grow, the import share is projected to reach 57% by 2005, 61% by 2010, and 64% by 2020.

Figure ES-1. U.S. Crude Oil Production (Million Barrels/Day)



President Bush and some members of Congress have proposed opening up the Arctic National Wildlife Refuge (ANWR) to oil production. This proposal is controversial due to the harm it could cause to this pristine wilderness area and the wildlife living there. While the magnitude and significance of the environmental impacts in ANWR are open to debate, one point is clear—oil production in ANWR would not make a significant contribution to curtailing our growing dependence on oil imports.

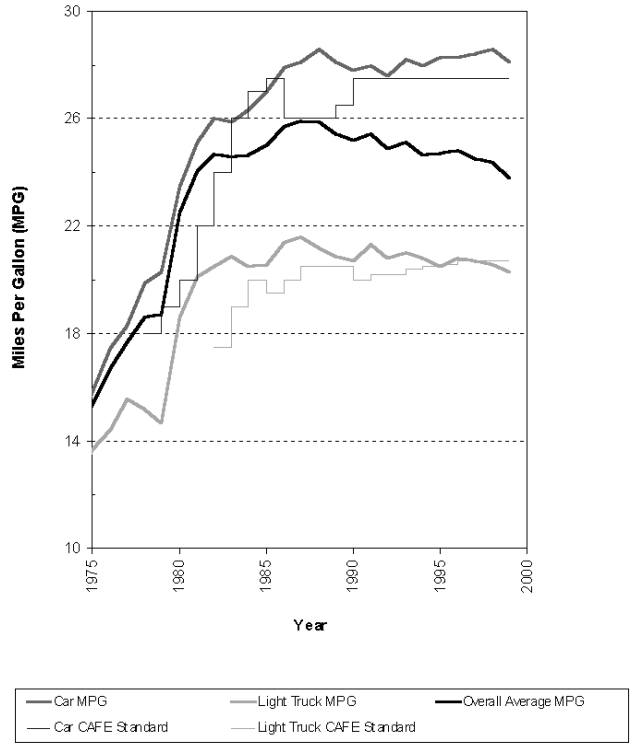
The U.S. Geological Survey (USGS) recently estimated that there is most likely to be 6.3 billion barrels of economically recoverable oil under the ANWR tundra at a $30/bbl market price in 1996 dollars. If this amount of oil is produced over a 30-year period, oil production from ANWR would average 0.58 MBD. Total domestic oil production in 2010 would still be less than in 1999 and oil imports would continue to rise during the next 20 years. If the world oil price is

below $30/bbl, then even less oil would be provided from ANWR, according to the USGS. In other words, U.S. domestic oil production is on a downward trajectory with or without permitting oil exploration and production in ANWR.

Potential for Reducing Oil Demand Through Vehicle Fuel Economy Improvement

The recent oil price run-up is due in no small part to the growth in consumption of petroleum products—mainly gasoline and diesel fuel—in the United States during the past 12 years. Cars and light trucks account for about 61% of transportation energy use and about 41% of total consumption of petroleum products in the United States. The average fuel economy of new passenger vehicles (cars and light trucks) declined from a high of about 26 miles/ gallon (MPG) in 1988 to 24 MPG in 2000, due to increasing vehicle engine size and power, the rising market share for light trucks, increasing vehicle weight, and lack of tougher fuel economy regulations (see Figure ES-2).

Figure ES-2. **New Car and Light Truck Fuel Economy in the United States**



As a result of decreasing vehicle efficiency and rising vehicle use, consumption of gasoline and diesel fuel increased 19 percent during 1988—2000.

Unlike the poor prospects for increasing domestic oil production, there are very good prospects for reducing oil demand and cutting future oil imports by raising the efficiency of our vehicle fleet. A wide range of technologies are technically proven and readily available, including engine modifications such as variable valve control or friction reduction, weight reduction, better engine and transmission controls, aerodynamic drag reduction, and tire improvements (see Table ES-1). Many of these technologies are already used to some degree but only in a relatively small fraction of new vehicles. Widespread adoption of these commercially available measures could improve the average fuel economy of new vehicles by 40–65% within a decade.

Table ES-1. Technologies for Passenger Vehicle Fuel Economy Improvement

Technology	Fuel Economy Improvement (Percentage)[1]
Weight reduction	10–30
Aerodynamics	4–10
Variable valve control	12–16
Direct injection spark ignition	5–23
Other engine refinements	5–10
Improved transmissions	6–14
Hybrid powertrain—near and mid-term	40–80
Hybrid powertrain—longer term	100–200

[1]Improvements relative to an average mid-1990s passenger vehicle at 25 MPG.

In addition these evolutionary improvements, vehicle manufacturers around the world are developing and starting to manufacture innovative hybrid electric vehicles such as the Toyota Prius and Honda Insight. These vehicles feature a relatively small internal combustion engine along with an electric drivetrain including an electric motor and battery for storing electrical energy. The hybrid electric vehicles produced so far exhibit 50–85% greater fuel efficiency compared to typical new cars in their size class, although not all of this improvement is due to the hybrid drivetrain.

Improving fuel economy does add to the first cost of a vehicle. But the value of the fuel savings usually more than offsets this first cost premium. For example, the U.S. Department of Energy (DOE) recently estimated that increasing the average rated fuel economy of new cars from 27.6 MPG to 39 MPG by 2010 would increase the retail price by $811 but would provide annual fuel savings of $308 and lifetime fuel savings of $1,285 on a present value basis. Other studies by public interest groups show that increasing fuel efficiency by 50–100% could be even more cost-effective than indicated by DOE.

Policies for Improving the Efficiency of New Vehicles

As noted above, the average fuel economy of new passenger vehicles is declining, not rising. A combination of policies including: tougher regulations; financial incentives; continued research and development (R&D); and consumer education and marketing should be adopted to ensure that vehicles sold during the next few decades are “gas sippers” rather than “gas guzzlers.”

Fuel Economy Standards or Fuel Use Caps

Tougher corporate average fuel economy (CAFE) standards or fuel use caps are essential for significantly increasing new vehicle efficiency across the fleet. Independent analyses (including those from our national laboratories) have concluded that the initial CAFE standards were largely responsible for the near doubling in the average fuel economy of cars and more than 50% increase in light truck fuel economy from 1975 to 1987.

ACEEE recommends increasing the current fuel economy standards by 60% to 44 MPG for cars and 33 MPG for light trucks by 2012, with further increases at the rate of about 3% per year beyond this date. The average fuel economy of all new cars and light trucks would increase from about 24 MPG in 2000 to 35 MPG by 2010 and nearly 50 MPG by 2020 (see Table ES-2). Car manufacturers will protest and say "it can't be done" or "it will cost a fortune," as they did when the original CAFE standards were debated. But the car manufacturers complied with the original standards at reasonable cost and with high consumer acceptance.

Table ES-2. Proposed Fuel Economy Standards and Resulting Oil Savings

Year	CAFE Standard[1] (MPG)	Oil Savings[2] (MBD)
2005	28.1	0.28
2010	35.2	1.47
2015	42.4	3.12
2020	49.5	4.75
2025	56.6	6.17
2030	63.8	7.37

Notes:
[1] Average fuel economy for cars and light trucks combined.
[2] Assumes that the fuel economy of new vehicles remains constant at about 24 MPG in the absence of new standards.

The Ford Motor Co. has said it will voluntarily increase the fuel economy of its sport utility vehicles (SUVs) by 5% per year during 2000–2005 . General Motors also has indicated that it will voluntarily increase the fuel economy of its SUVs by a similar amount. If Ford and GM can do this in their SUVs, they can do it in all their new vehicles. Fuel economy improvements should be realized in cars as well as light trucks, achieved by all manufacturers, sustained for a decade or more, and "locked in" through tougher CAFE standards or fuel use caps.

An alternative regulatory approach would be to establish a cap on the use of petroleum products by light-duty vehicles and then adopt policy mechanisms, including but not limited to stronger fuel economy standards, that would enable the cap to be met. This approach has the

advantage of allowing greater flexibility in terms of actions taken and policy mechanisms adopted in order to reduce fuel use. A fuel use cap was proposed in March 2001 in legislation introduced in the U.S. Senate (S. 597, The Comprehensive and Balanced Energy Policy Act of 2001). This proposal caps use of petroleum products by light-duty vehicles at 105% of consumption in 2000, starting in 2008. It would save about 1.5 MBD of oil by 2010 and 3 MBD by 2020, compared to business-as-usual trends.

Financial Incentives

Tougher CAFE standards or fuel use caps should be complemented by financial incentives that facilitate compliance. Financial incentives should provide both positive and negative signals—helping to build consumer demand for high-efficiency vehicles while penalizing those who purchase inefficient vehicles.

Relatively inefficient cars—those with a composite fuel economy rating below 22.5 MPG—are already subject to a "gas guzzler tax." The tax, phased in during 1980–91, starts at $1,000 for vehicles with 21.5–22.5 MPG and increases to a maximum of $7,700 as fuel economy drops. However, millions of light trucks with a fuel economy rating below 22.5 MPG are sold and used mainly as passenger vehicles. These vehicles are not subject to the gas guzzler tax, creating a loophole that encourages production and marketing of inefficient sports utility vehicles and other light trucks. This loophole should be closed by having the current gas guzzler tax apply to all new passenger vehicles. The additional revenue could be used to pay for incentives offered to buyers of high-efficiency vehicles.

High first cost is a major obstacle to the widespread production and sale of hybrid and fuel cell vehicles. ACEEE recommends providing tax credits in order to stimulate mass production and support initial sales of these innovative vehicles. The amount of the tax credit (or most of the credit) should be based on the fuel economy achieved. Also, vehicles should have relatively low pollutant emissions as well as high fuel efficiency in order to be eligible for a tax credit.

Labeling and Promotion

Complementing stronger standards and financial incentives, the federal government could extend ENERGY STAR® labeling to high fuel efficiency and low-emitting cars and light trucks. This would make it easier for consumers to identify "greener vehicles," and for manufacturers or others to promote "buying green." ACEEE recommend that the ENERGY STAR designation be based on a combination of fuel economy and tailpipe emissions, recognizing the best vehicles in each category but also giving all vehicles an absolute score so that buyers could compare vehicles across categories.

Research and Development

DOE is spending about $170 million on R&D related to improving passenger vehicle fuel economy in 2001. Most of these funds are going to projects in the areas of hybrid systems, fuel cells, engine R&D, and lightweight materials. Since 1994, R&D on energy-efficient cars has been carried out mainly through a government-industry cooperative venture known as the Partnership for a New Generation of Vehicles (PNGV). The objective of PNGV is to develop technologies that significantly improve automobile fuel economy, including developing family-size cars up to three times more fuel efficient than those now produced, without compromising utility, performance, safety, or emissions.

Given the importance of dramatically improving new vehicle fuel economy in the coming decades, R&D on highly efficient vehicles and technologies such as fuel cells, hybrid-electric drivetrains, and lightweight materials should be expanded. Moreover, PNGV should expand its focus to developing both cleaner and more efficient vehicles by adopting aggressive emissions goals to complement its fuel economy goals.

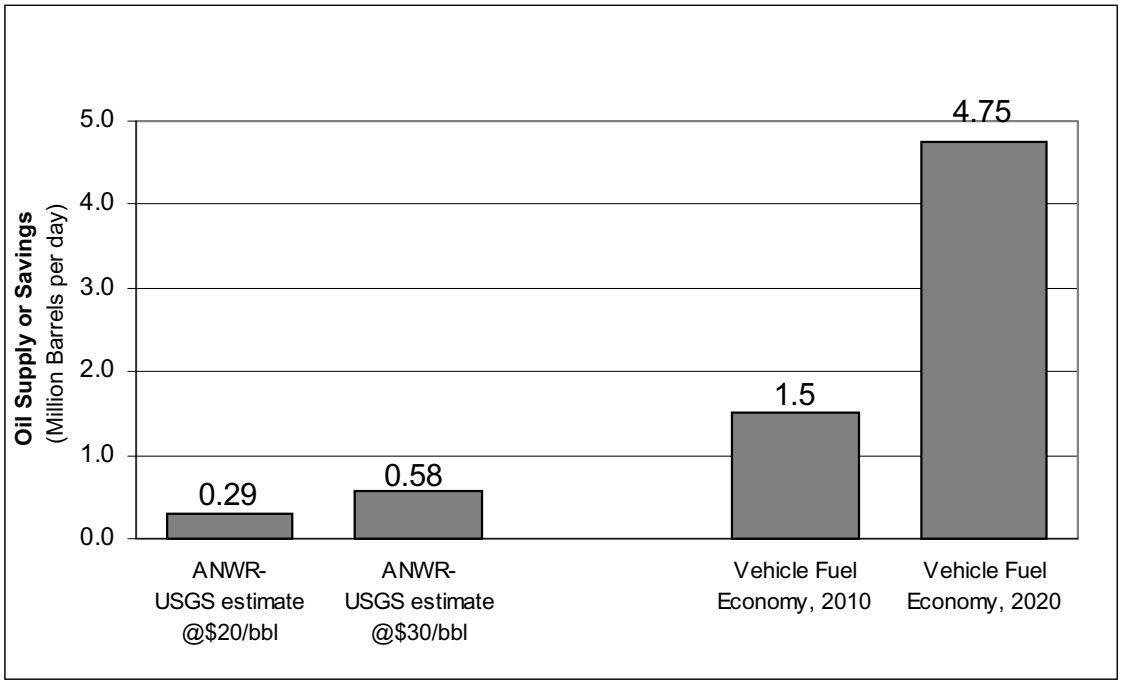
Potential Fuel Savings and Other Benefits

ACEEE estimates that the tougher fuel economy standards and the other policies recommended above would reduce gasoline consumption by 1.5 MBD by 2010, more than 4.7 MBD by 2020, and approximately 7.4 MBD by 2030 (see Table ES-2). With this level of energy savings, oil import growth would moderate during this decade and imports would fall after 2010. Relative to the EIA Reference Case forecast, oil imports would be reduced by 11% in 2010 and 27% in 2020.

The potential oil savings from vehicle efficiency improvements far exceed the potential oil supply from opening the Arctic Refuge to exploration and development (see Figure ES-3). Even at the more optimistic level of 6.3 billion barrels of economically recoverable oil, the Arctic Refuge would provide less than 0.6 MBD on average over a 30-year period. Improving vehicle fuel economy could provide this level of oil savings by 2007, around the time that oil production from ANWR might begin. By 2020, the oil savings from increasing vehicle fuel economy would be 8–16 times greater than the potential oil supply from ANWR.

On a cumulative basis, the vehicle fuel efficiency improvements assumed above could save 67 billion barrels of oil during 2005–2040 (see Figure ES-4). This amount of oil savings is 10–20 times greater than the potential additional oil supply from the Arctic Refuge over the same period. Furthermore, oil savings would continue to grow over time as new vehicle fuel economy improves and the vehicle fleet turns over, while the recoverable oil supply from the Arctic Refuge and other U.S. oil reserves is finite and limited.

Figure ES-3. Potential Oil Supply from Arctic National Wildlife Refuge vs. Oil Savings from Improved Vehicle Fuel Economy

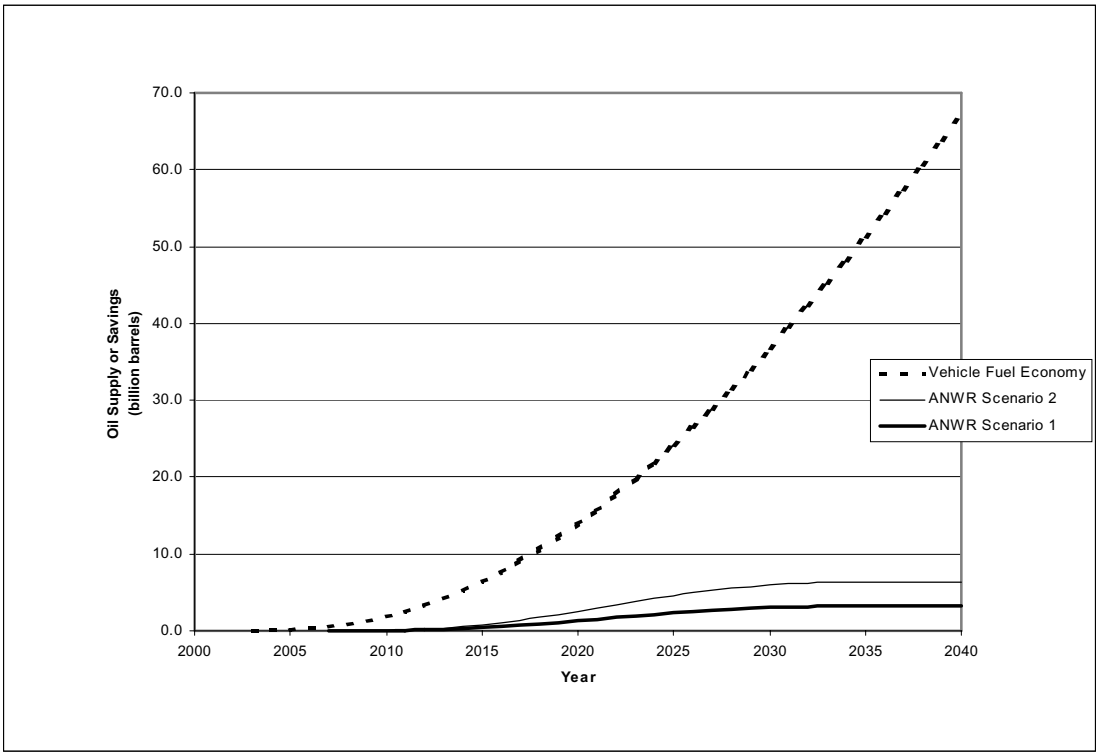


Tougher fuel economy standards and other complementary policies would provide a wide range of benefits in addition to lowering our oil import dependence. Consumers could save over $350 billion net (gasoline savings minus increased vehicle cost) through 2020. U.S. carbon dioxide emissions would drop by 79 million metric tons (MMT) of carbon equivalent by 2010 and 255 MMT by 2020. In addition, improving vehicle efficiency would reduce emissions of hydrocarbons and other air pollutants, making it easier for urban areas to meet ambient air quality standards.

Conclusion

Growing oil imports pose a serious threat to our national security and economic well-being. Imports now account for over 50% of our oil use and are expected to exceed 60% within a decade. High and growing oil import dependence adds to our trade deficit, leaves the U.S. economy vulnerable to oil price spikes, and increases our dependence on the OPEC cartel and unstable nations. The United States should take further steps to lower oil imports.

Figure ES-4. Cumulative Oil Supply from Arctic National Wildlife Refuge vs. Oil Savings from Improved Vehicle Fuel Economy



The best opportunity for cutting oil imports lies on the demand side, specifically by increasing passenger vehicle fuel economy. Adopting either tougher fuel economy standards or petroleum product consumption caps would be the most effective strategy for reducing our future dependence on oil imports. In addition, ACEEE recommends expanding taxes on gas guzzling vehicles, offering tax credits to buyers of efficient hybrid and fuel cell vehicles, increasing labeling and promotion of efficient and cleaner vehicles, and continuing vigorous R&D efforts. Steadily increasing passenger vehicle fuel efficiency could cut oil use (and oil imports) 1.5 MBD by 2010, over 4.7 MBD by 2020, and 67 billion barrels cumulatively over the next 40 years. This total oil savings is three times greater than all proved U.S. oil reserves today!

Increasing vehicle efficiency addresses the main cause of the oil import problem—unchecked growth in oil consumption—unlike other proposals (such as opening up ANWR) that represent partial and temporary responses. Improving vehicle efficiency through tougher fuel economy standards and other policies also will result in net economic savings for consumers and lower emissions of air pollutants, including gases causing global warming. Increasing vehicle fuel economy was our key response to the oil crises of the 1970s; this strategy can and should be applied again to avoid new oil crises in the 21st century.

*For copies of **Strategies for Reducing Oil Imports: Expanding Oil Production vs. Increasing Vehicle Efficiency**, contact the ACEEE publications office, phone: (202) 429-0063; email: ace3pubs@ix.netcom.com.*