State Leadership and the National Clean Cars Program

Reducing Oil Dependence and Cutting Global Warming Pollution

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Summary

America's dependence on oil threatens our economy and harms our environment. Roughly half of all the oil we use in the United States goes into the gas tanks of our cars and light trucks.[1] The oil we use in our vehicles is also a major contributor to global warming.

The Obama administration is slated to unveil new standards for automobile fuel economy and global warming emissions by the end of March. These new standards—based on the "clean cars program" developed by California and adopted by 13 other states—will make a significant contribution toward reducing America's dependence on oil and reducing the impact of our vehicles on the environment.

The new standards **will reduce gasoline consumption by as much as 11.6 billion gallons per year in 2016**—nearly as much as is consumed by all the vehicles in Texas in a year and equal to half the oil we import from Saudi Arabia annually. Cutting gasoline consumption by this much would **save consumers up to $31.8 billion annually** at the pump in 2016.

Meanwhile, the new standards will reduce global warming pollution from vehicles by **108 million metric tons per year in 2016**. By 2016, the new vehicle standards will eliminate as much global warming pollution annually as is produced by 28 500-MW coal-fired power plants or 21.4 million of today's vehicles.

The standards will continue to deliver benefits well beyond 2016 as the cars sold over the next several years continue to be driven for years to come.

Inefficient, Polluting Vehicles Contribute to Oil Dependence and Global Warming

Both oil dependence and global warming are serious problems for the U.S., and inefficient and polluting light-duty vehicles have worsened these challenges.

Cars and light trucks consume the lion's share of petroleum used in the U.S.: 45 percent of all oil consumed in the U.S. in 2007 was used in passenger vehicles.[2] Consumers spent $381 billion buying gasoline for their vehicles.[3] Because America remains dependent on imports for 56 percent of our oil supplies, oil purchases represent a direct transfer of wealth from American consumers to oil companies and foreign governments.[4]

Roughly one-sixth of total global warming emissions in the U.S. come from light-duty vehicles like cars and light trucks.[5] Combustion of fossil fuels such as gasoline is the leading contributor to global warming, which is already causing environmental damage, including rising sea level, more intense hurricanes, and more frequent extreme rain and snow events.[6] If global warming emissions continue unabated, future impacts could include sea level rise of 6.5 feet by the end of the century, the extinction of as much as 70 percent of all species on earth, widespread drought, more intense wildfires and hurricanes, and extreme heat waves with temperatures reaching 120° F in the central, southern, and western United States.[7]

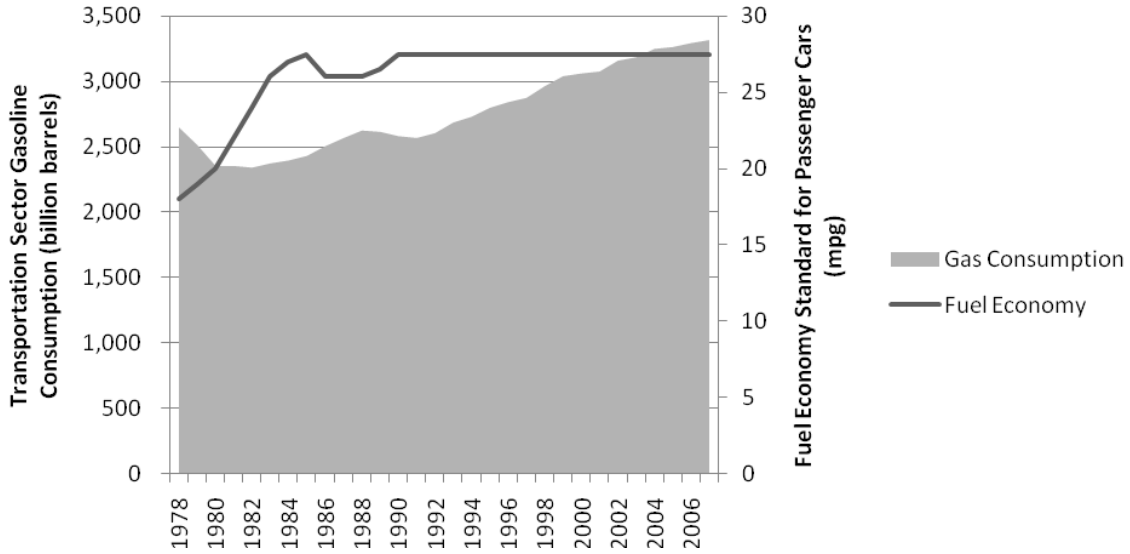
The Clean Cars Program: States Moving America Forward

The new national clean cars program is the direct result of leadership by states across the country.

The clean cars program has its roots in efforts dating back to the 1970s to deal with America's dependence on oil and the impact of automobile pollution on the environment. Corporate Average Fuel Economy (CAFE) standards were authorized by Congress in 1975 to improve the efficiency of America's light-duty vehicle fleet. The federal Clean Air Act set national standards for tailpipe emissions of smog-forming and other pollutants. One provision of the Clean Air Act gave California, which had implemented its own vehicle emission standards in advance of federal action, the right to adopt stronger emission standards for vehicles sold in that state, and gave other states with air pollution problems the option to follow California's standards to achieve their air pollution reduction targets.

The CAFE program and the Clean Air Act resulted in immediate and dramatic improvements. Thanks to the CAFE program, by 1987, the average American new vehicle was getting 22.6 miles to the gallon, compared with 13 mpg in 1975.[8] As late as 1992, Americans were using less gasoline in our cars and trucks than we were in 1978, despite driving 45 percent more miles each year.[9] (See Figure 1.) Meanwhile, the air in many American cities—while still unhealthy—was improving.

Figure 1. Transportation Sector Gasoline Consumption Versus Fuel Economy Standards for Passenger Cars[10]



By the early 2000s, however, progress toward improved fuel economy had stalled. In fact, by 2002, new vehicles sold in the United States were getting worse gas mileage than those sold during the early 1980s.[11] Meanwhile, emissions of global warming pollution from vehicles remained unaddressed.

In 2002, the California Legislature adopted legislation directing the state's air regulator, the California Air Resources Board (CARB), to implement regulations to achieve the "maximum feasible and cost-effective" reductions in global warming pollution from automobiles. In 2004, CARB proposed standards that would reduce global warming pollution from cars and light trucks by 30 percent by 2016 compared with 2002 levels.

Automakers have a variety of options for reducing global warming pollution from their vehicles, but because the vast majority of those emissions come from fuel combustion, it is expected that the program will result in automakers manufacturing vehicles that are significantly more fuel efficient—saving consumers money. CARB's analysis of the standards found that consumers would experience a net

savings under the program due to reduced gasoline consumption—even at an assumed gasoline price of $1.74 per gallon, well below today's prices.[12]

Many states outside of California, frustrated with federal inaction to address automobile emissions, soon moved to adopt the new program themselves. Thirteen states—Arizona, Connecticut, Maine, Maryland, Massachusetts, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Rhode Island, Vermont and Washington—all adopted the clean cars program.

Automakers and auto dealers lobbied hard in state legislatures and before state environmental agencies against the program. They also filed numerous legal challenges, none of which ultimately prevailed. During this same period, the Bush administration EPA delayed a decision on whether to grant the waiver needed under the Clean Air Act for California and other states to implement the standards. Following the Supreme Court's 2007 ruling in *Massachusetts v. EPA* that the agency possessed the authority to regulate global warming pollution, and two years after California's initial request, the Bush administration EPA finally denied the waiver in December 2007.

As one of his first acts in office, President Obama instructed the EPA to reconsider California's waiver request and the agency granted the waiver. In May, the Obama administration announced an agreement with the automakers and the state of California that enabled the creation of a single, national fuel economy/global warming emissions program for cars based on the California standards. These standards significantly strengthen federal fuel economy rules and establish the first national limits on global warming pollution from vehicles.

Impact of the National Clean Cars Program

Starting with the 2012 model year, cars and light trucks will have to comply with both a fuel economy standard (expressed in miles per gallon) and a global warming emissions standard (expressed in grams per mile). Whereas model year 2009 passenger cars had to meet an average fuel economy standard of 27.5 mpg, cars sold in 2016 will have to achieve an average of 38 mpg.[13] For global warming pollution, passenger car emissions will drop from 323 grams per mile for model year 2009 to 224 grams per mile in model year 2016, a 34 percent decrease.[14] Light trucks will be subject to smaller changes in both fuel economy and global warming pollution limits. The actual reductions that will be achieved will be slightly lower due to flexibility granted to manufacturers as to how they will comply with the standards.

Figure 2. Fuel Economy Standards Will Rise With the National Program

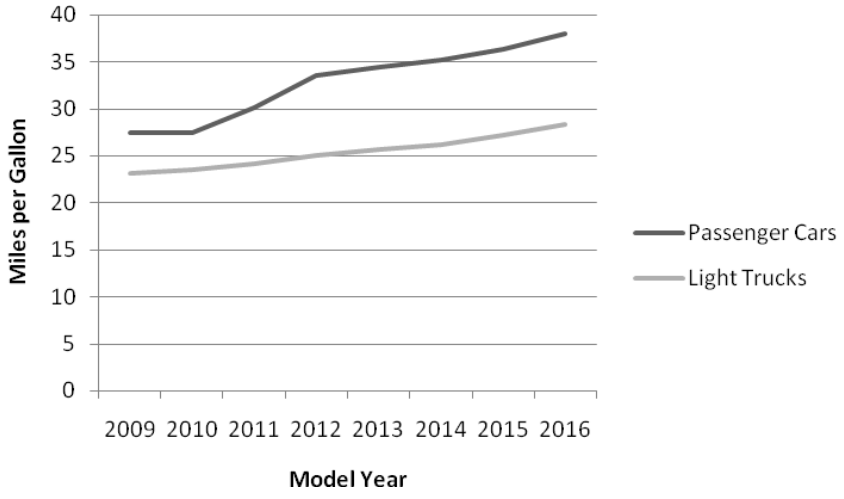
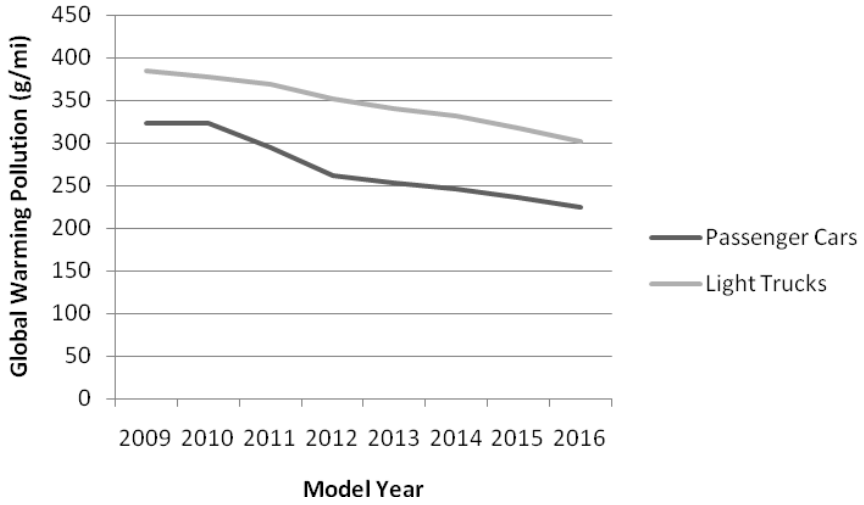


Figure 3. Global Warming Pollution Will Decline With the National Program[15]



As a result of the national clean cars program, every state in the country will use less oil and produce less global warming pollution in the years to come.

Nationally, oil consumption will be 11.6 billion gallons lower in 2016, nearly equal to the amount of motor gasoline consumed in Texas in a year. (See Table 1 for state-by-state gasoline savings.) Looked at another way, that's equal to half the oil we import from Saudi Arabia each year, and more oil than Alaska produces onshore annually.[16]

Reducing gasoline consumption saves money for consumers. At today's prices ($2.75 per gallon), 11.6 billion gallons would cost consumers $31.8 billion at the pump.[17] These savings would more than offset the additional cost of vehicles complying with the program.[18]

Cutting gasoline consumption confers other benefits, too. Lower demand for oil improves national security.[19] It also helps protect the environment by reducing pressure to expand oil drilling into more of the nation's ecologically sensitive areas.

Thanks to the new national clean cars standard, not only will gasoline use decline, but global warming pollution will also fall, declining by 108 million metric tons per year by 2016. This level of savings is significant at a global level. The annual savings are equal to the national global warming emissions from all but 36 of the world's countries today.[20] These savings are also equal to the amount of pollution produced by 28 500-megawatt coal-fired power plants in a year.[21] That many plants generate enough electricity to serve 9.7 million homes annually.[22] Measured another way, that is the same amount of pollution as is produced by 21.4 million of today's vehicles.[23] (See Table 1 for state-specific global warming emission savings.)

Table 1. Gasoline Savings and Global Warming Pollution Reductions from National Clean Cars Program in 2016[24]

State	Gasoline Saved (millions of gallons)	Avoided Global Warming Pollution (million metric tons)	Reduced Gasoline Use Will Save Consumers This Much at the Pump (million $)	Global Warming Savings Are Equal to Emissions from This Number of Today's Cars
Alabama	209	2.0	$576	387,017
Alaska	19	0.2	$52	35,183
Arizona	228	2.1	$629	422,200
Arkansas	114	1.1	$314	211,100
California	1,561	14.5	$4,295	2,885,034
Colorado	171	1.6	$471	316,650
Connecticut	133	1.2	$367	246,283
Delaware	38	0.4	$105	70,367
Dist. of Columbia	10	0.1	$26	17,592
Florida	705	6.6	$1,938	1,301,784
Georgia	409	3.8	$1,126	756,442
Hawaii	38	0.4	$105	70,367
Idaho	48	0.4	$131	87,958
Illinois	419	3.9	$1,152	774,034
Indiana	257	2.4	$707	474,975
Iowa	124	1.2	$340	228,692
Kansas	95	0.9	$262	175,917
Kentucky	181	1.7	$498	334,242
Louisiana	190	1.8	$524	351,833
Maine	57	0.5	$157	105,550
Maryland	219	2.0	$602	404,608
Massachusetts	228	2.1	$629	422,200
Michigan	409	3.8	$1,126	756,442
Minnesota	219	2.0	$602	404,608
Mississippi	133	1.2	$367	246,283
Missouri	257	2.4	$707	474,975
Montana	38	0.4	$105	70,367
Nebraska	67	0.6	$183	123,142
Nevada	95	0.9	$262	175,917
New Hampshire	57	0.5	$157	105,550
New Jersey	352	3.3	$969	650,892
New Mexico	76	0.7	$210	140,733
New York	467	4.3	$1,283	861,992
North Carolina	352	3.3	$969	650,892
North Dakota	29	0.3	$79	52,775
Ohio	419	3.9	$1,152	774,034
Oklahoma	152	1.4	$419	281,467
Oregon	124	1.2	$340	228,692
Pennsylvania	419	3.9	$1,152	774,034
Rhode Island	29	0.3	$79	52,775
South Carolina	200	1.9	$550	369,425

State	Gasoline Saved (millions of gallons)	Avoided Global Warming Pollution (million metric tons)	Reduced Gasoline Use Will Save Consumers This Much at the Pump (million $)	Global Warming Savings Are Equal to Emissions from This Number of Today's Cars
South Dakota	29	0.3	$79	52,775
Tennessee	257	2.4	$707	474,975
Texas	943	8.8	$2,593	1,741,575
Utah	86	0.8	$236	158,325
Vermont	29	0.3	$79	52,775
Virginia	324	3.0	$890	598,117
Washington	219	2.0	$602	404,608
West Virginia	67	0.6	$183	123,142
Wisconsin	209	2.0	$576	387,017
Wyoming	29	0.3	$79	52,775
National Total	**11,577**	**107.8**	**$31,848**	**21,391,472**

Savings presented here are compared to the approximate fuel efficiency of vehicles on the road today. CARB calculated emissions in 2016 under old federal rules assuming vehicles continued to comply with CAFE standards in 2002 of 29.0 mpg for passenger cars and 21.4 mpg for light-duty trucks.[25] *Because fuel economy standards have changed so little since 2002, this is a reasonable and familiar baseline against which to compare the benefits of the new national program.*

Conclusion

Adoption of the national clean cars program represents a major step toward breaking America's dependence on oil and cleaning up our environment. It also represents another example of state leadership on environmental issues "trickling up" to the federal level. Federal officials should ensure that the new standards are implemented on schedule and preserve states' authority to develop further innovative approaches to address America's dependence on fossil fuels and contribution to global warming.

Methodology

We present savings from the new national clean cars program against a baseline that is equal to the approximate fuel efficiency of vehicles on the road today, a reference point that is familiar to drivers. The California Air Resource Board (CARB) calculated what emissions would be in 2016 under old federal rules, using the assumption that vehicles would continue to comply with CAFE standards in 2002 of 29.0 mpg for passenger cars and of 21.4 mpg for light-duty trucks.[26] Because fuel economy standards have changed so little since 2002, CARB's calculation is a reasonable and familiar baseline against which to compare the benefits of the new national program.

Our estimate of greenhouse gas emission reductions and gasoline savings from the new national clean cars program (the "national program") was based on calculations provided by CARB, *Addendum to the February 25 Technical Assessment (Addendum)*, May 2008, and CARB, *Comparison of Greenhouse Gas Reductions for the U.S. and Canada Under U.S. CAFE Standards and California Air Resources Board Greenhouse Gas Regulations (Comparison)*, February 2008. CARB calculated emissions savings in 2016 from California's standards (referred to here as the "Pavley" standards).

The national program differs in some respects from the Pavley standards. To estimate the benefits of the national program, we modified CARB's calculations using information provided in the notice of proposed rulemaking, 74 Federal Register 49453 *(NPRM)*.

Carbon Dioxide-Equivalent Savings

The NPRM presents information on the proposed new national program and then estimates how the credits for electric vehicles and flex fuel vehicles, trading of credits, and other flexibility mechanisms in the program could affect implementation. These additional credits and flexibility mechanisms will result in actual emission levels from 2012 to 2015 being higher than the nominal emission standard. By 2016, actual emission standards will converge with the nominal standard of 250 grams of carbon dioxide equivalent per mile (g/mi).

To estimate the impact of the credits and flexibility mechanisms on fleet emissions under the national program in 2016, we adjusted figures on emissions under Pavley by model year of vehicles on the road in 2016 from Table 10 of *Comparison*, based on the difference between the annual g/mi standards in the NPRM and the annual g/mi standards in the Pavley program. Prior to model year 2012, we assumed the national program would follow the trajectory of the CAFE standard presented by CARB in Table 12 of *Comparison*. Using this method, we calculated that, in California, the national program would produce savings 11.4 percent lower in 2016 than would the Pavley standards. We then applied this percentage reduction to CARB's state-by-state calculation of emissions savings presented in *Addendum* to arrive at the state global warming emission reduction figures presented here.

Gasoline Savings

After we calculated emissions savings, we used that information as the basis of estimated gasoline savings. For several reasons, the amount of gasoline saved under the national program is not directly related to the amount of global warming pollution avoided by the program. Though a vehicle that produces 250 g/mi of carbon dioxide from fuel consumption would be averaging 35.5 mpg, vehicle manufacturers have enough flexibility in how they meet the standard that the new cars will average 32.7 mpg in 2016, per Table I.D.2-2 in the NPRM. The reasons for the difference between expected greenhouse gas and gasoline savings include the fact that manufacturers can achieve a portion of the global warming emission reduction by improving the efficiency of and reducing leakage from air conditioning units (which curtails global warming pollution without reducing gasoline use). Manufacturers can also receive credit toward an improved fuel economy average by producing vehicles that operate on biofuel, and may shift credits between cars and light trucks, which are held to different standards. Other credits also exist.

To obtain the 2016 savings from the new national program, we converted estimated savings in metric tons of carbon dioxide to gallons of gasoline. A gallon of gasoline produces 19.4 pounds of carbon dioxide when burned.

We then calculated a conversion factor to account for the difference between the mileage and emission standards in the national program. We obtained the difference between the mpg standards in the federal rules and the mpg that would be equivalent to the carbon standards in the federal rules for each model year. We used this difference to reduce the savings projected in the modified version of Table 10 from *Comparison* that we created to estimate global warming emission reductions from the national program. For California, total gasoline savings would be 5.3 percent lower than a direct conversion of carbon dioxide-equivalent savings into gasoline savings. We applied this 5.3 percent to the state by state estimate of gasoline savings obtained in the first step.

Acknowledgments

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Notes

[1] U.S. Department of Energy, Energy Information Administration, *Petroleum Navigator: Product Supplied*, 29 June 2009.
[2] U.S. Department of Energy, Energy Information Administration, *State Energy Data 2007*, 28 August 2009.
[3] Ibid.
[4] U.S. Department of Energy, Energy Information Administration, *Annual Energy Review*, 26 June 2009.
[5] 74 Federal Register 49507.
[6] Intergovernmental Panel on Climate Change, "Summary for Policy Makers," in: *Climate Change 2007: The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, 2007. James Elsner, et al., "The Increasing Intensity of the Strongest Tropical Cyclones," *Nature* 455, 92-95, 4 September 2008.
[7] 6.5 feet: W.T. Pfeffer, et al., Institute of Arctic and Alpine Research, University of Colorado, Boulder, "Kinematic Constraints on Glacier Contributions to 21st-Century Sea-Level Rise," *Science* 321: 1340-1343, September 2008. Extinction: Intergovernmental Panel on Climate Change, *Fourth Assessment Report, Climate Change 2007: Synthesis Report*, 2007; Brian Walsh, "The New Age of Extinction," *Time*, 1 April 2009. Drought: E.J. Burke, S.J. Brown, and N. Christidis, "Modeling the Recent Evolution of Global Drought and Projections for the Twenty- First Century with the Hadley Centre Climate Model," *Journal of Hydrometeorology* 7: 1113–1125, 2006; Susan Solomon, et al., U.S. National Oceanic and Atmospheric Administration, "Irreversible Climate Change due to Carbon Emissions," *Proceedings of the National Academy of Sciences* 106: 1704-1709, 10 February 2009. Wildfires: Donald McKenzie, et al., U.S. Department of Agriculture, "Climatic Change, Wildfire, and Conservation," *Conservation Biology* 18(4): 890-902, August 2004. Hurricanes: Researchers at Florida State University calculate that for every 1° C increase in sea-surface temperatures, the frequency of severe hurricanes (category 4 and 5) increases by nearly one-third. James Elsner, et al., "The Increasing Intensity of the Strongest Tropical Cyclones," *Nature* 455: 92-95, 4 September 2008. Heat waves: Andreas Sterl, et al., Royal Netherlands Meteorological Institute, "When Can We Expect Extremely High Surface Temperatures?" *Geophysical Research Letters* 35, L14703(doi:10.1029/2008GL034071), 19 July 2008.
[8] U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide, and Fuel Economy Trends: 1975 Through 2009*, November 2009. Note that this figure is based on EPA adjusted mileage averaged across new vehicles, not the fuel economy estimates used for compliance with the CAFE standards.
[9] Gasoline consumption from U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2008*, 26 June 2009. Miles driven: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics* series of reports.
[10] Gasoline consumption from U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2008*, 26 June 2009. Fuel economy data from U.S. Department of Transportation, *Summary of Fuel Economy Performance,* 9 December 2009.
[11] See note 8.
[12] California Air Resources Board, *Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions from Vehicles*, 6 August 2004.
[13] 27.5 mpg: U.S. Department of Transportation, *Summary of Fuel Economy Performance,* 9 December 2009. 38 mpg: 74 Federal Register 49468.
[14] 323 g/mi: 27.5 mpg converted to grams assuming 8887 grams per gallon of gasoline. 224 g/mi: 74 Federal Register 49469.

[15] The global warming standard for model years 2009 through 2011, when there is no standard in effect, is calculated from the fuel economy standard assuming 8,887 grams of carbon dioxide per gallon of gas.
[16] Saudi Arabian imports equaled 560 million barrels in 2008, per U.S. Department of Energy, Energy Information Administration, *U.S. Imports by Country of Origin*, 29 June 2009. Alaskan onshore production was 250 million barrels in 2008, per U.S. Department of Energy, Energy Information Administration, *Crude Oil Production*, 29 June 2009.
[17] National average gasoline cost was $2.751 as of March 8, 2010, per U.S. Department of Energy, Energy Information Administration, *Weekly U.S. Retail Gasoline Prices, Regular Grade*, 8 March 2010.
[18] See note 12.
[19] General Charles F. Wald et al., Center for Naval Analyses, *Powering America's Defense: Energy and the Risks to National Security*, May 2009.
[20] U.S. Department of Energy, Energy Information Administration, *International Energy Annual 2006*, 8 December 2008.
[21] Assuming a 500-MW coal-fired power plants operates with a 90 percent capacity factor and produces 3.94 million MWh of electricity annually. In 2005, the average U.S. coal-fired power plant released 2,136 pounds of carbon dioxide for every MWh generated, per U.S. Environmental Protection Agency, *E-Grid2007 Database*, Version 1.1, 28 January 2009. That means a 500-MW coal-fired power plant releases 3.83 million metric tons of carbon dioxide annually.
[22] Annual household electricity consumption is 11.5 MWh, per U.S. Department of Energy, Energy Information Administration, *2005 Residential Energy Consumption Survey*.
[23] Average fuel economy of new model year 2008 vehicles was 21.0 mpg, per U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide, and Fuel Economy Trends: 1975 Through 2009*, November 2009. Calculation assumes a typical vehicle is driven 12,000 miles per year.
[24] See methodology for explanation of how global warming and gasoline savings were calculated. Global warming emissions equivalent calculated assuming average fuel economy of new model year 2008 vehicles was 21.0 mpg, per note 8. Calculation assumes a typical vehicle is driven 12,000 miles per year. Gasoline cost savings assume a fuel price of $2.751 per gallon, the national average as of March 8, 2010.
[25] California Air Resources Board, *Comparison of Greenhouse Gas Reductions for the US and Canada Under U.S. CAFE Standards and California Air Resources Board Greenhouse Gas Regulations*, February 2008.
[26] Ibid.