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BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

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Mr. Chairman, I am happy to appear before this Committee to discuss the feasibility and possible impacts of increasing the standards for fuel economy of cars produced after 1985. In my comments, I would like to discuss four questions raised by the adoption of such standards:

- What level of average fuel economy is technologically feasible for new cars by 1995?

- Would increased standards after 1985 be of benefit to consumers, bearing in mind the additional costs of producing vehicles that are more fuel-efficient?

- How significant a contribution might increased standards for automotive fuel economy make to the nation's efforts to conserve petroleum?

- How would production of more fuel-efficient vehicles affect the domestic automobile industry? In particular, would it be able to meet the capital requirements?

Technological Feasibility

In the 15 years between now and 1995, many improvements in automotive fuel efficiency are likely. Only several years ago, fuel economy

of at least 27.5 miles per gallon by 1985, as required by current legislation, appeared to be very difficult to attain. Technological progress, together with increasing fuel prices and consumer acceptance of smaller cars, now makes it likely that this standard will be achieved.

Since the Energy Policy and Conservation Act of 1975, a variety of fuel-saving technologies have already been incorporated into new cars. Others are planned for production in the next few years. Even so, most of these improvements will generally apply to less than half of all cars manufactured in 1985. Significant further gains in fuel economy could be scored after 1985 by incorporating these same technological improvements in a greater proportion of new cars.

At the request of the Senate Subcommittee on Science, Technology, and Space and the Senate Committee on Energy and Natural Resources, the Congressional Budget Office has reviewed existing studies of fuel-saving technological changes to automobiles. This review is the basis of both my testimony this morning and a report on this subject being prepared by the Congressional Budget Office for the two Committees expected to be final in June. This review did not develop original estimates of the cost and performance of technological options; rather, it reviewed a variety of estimates developed by the automobile industry, research institutions, and

government agencies. These studies show considerable consensus regarding which technologies are likely to be applied to produce more fuel- efficient vehicles. They are also fairly consistent in their predictions of the effects each of these technologies will have on fuel economy. Their estimates of the associated costs tend to be somewhat more varied, but they are close enough to permit some rough approximations.

On the basis of these analyses, it appears that the technologies that will yield the greatest improvements in fuel economy during the post-1985 period are reductions in vehicle weight, front-wheel-drive design configurations, turbocharged diesels, and improved lubricants (see Appendix Table 1). Weight reductions and front-wheel-drive design configurations together account for over one-third (2.7 miles per gallon) of the projected fuel economy gains. The fuel-saving advantages of front-wheel drive stem largely from the further reductions in weight that this design makes possible through substitution of smaller engines and lighter components. Turbocharged diesel engines would increase the average fuel economy of new cars by about 7 miles per gallon. Under our projection, turbocharged diesels could be mounted on 25 percent of all new cars by 1995, resulting in an increase in average new-car fuel economy of 1.4 miles per gallon. This projection assumes enactment of the relatively strict (1.0 gram per mile) standard for emissions of oxides of nitrogen; even greater fuel economy benefits could be realized if these strict environmental standards continue

to be waived. A fourth technological advance, that of improved lubricants, would bring fuel economy benefits ranging from 0.5 to 2.8 miles per gallon. These lubricants are also relatively inexpensive, particularly with respect to the amount of capital investment required.

The balance of the estimated fuel economy benefits will be derived from improvements in aerodynamics, accessories, tires and brakes, transmissions, and electronic controls.

In coming years, as gasoline prices continue to rise, sales of small cars will probably increase relative to sales of intermediate and large cars. Such market shifts promise to add about 2 miles per gallon to the average fuel economy of new cars in 1995, on top of the 35 miles per gallon that appears technologically feasible. Thus, new cars in 1995 could achieve an average performance of around 37 miles per gallon. While this is less than the 40 miles per gallon required by the Jackson-Magnuson proposal, it represents the low end of what will be technologically feasible, since it excludes any new technologies that might be developed during the next 15 years.

Effect on Consumers

The additional price of a car achieving 37 miles per gallon has been estimated at approximately $567 per car--less than 10 percent of the cost

of a new car. 1/ This additional cost appears small relative to the implied fuel savings. For example, a car rated at 27.5 miles per gallon would consume 5,673 gallons of gasoline throughout its life, assuming continuation of the present average vehicle life of 120,000 miles. On the same basis, a car rated at 37 miles per gallon would consume 4,216 gallons--a lifetime savings of 1,457 gallons. The value of these savings in 1995 is obviously uncertain; nevertheless, assuming that the gasoline tax recently proposed by the President is enacted, and that the price of crude oil grows at 2 percent a year above the rate of inflation, gasoline would cost around $1.75 per gallon in 1995. At this price, the fuel savings would be worth $1,262 when discounted over the life of the vehicle. This means that consumers would experience a saving of more than twice the cost of the improvements.

While there is considerable uncertainty about the exact size of the benefit to consumers, it is clear that consumers would experience some net benefits from these fuel-saving technologies under almost any combination of factors. For example, if we construct a worst case by selecting, for each technology, the lowest estimate of fuel economy and the highest estimate of cost from the studies reviewed, the sum of the discounted fuel savings still outweighs the additional cost of the new cars. A similar exercise shows that

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1/ All dollar figures herein are expressed in constant 1978 dollars.

the fuel savings estimated earlier exceed the associated increment in vehicle cost as long as gasoline prices are above $1 per gallon.

Petroleum Conservation

Improved automotive fuel economy can yield significant reductions in national petroleum consumption. Adoption of the technologies described above would yield savings of 138,000 barrels per day during the first year. After 10 years, when cars averaging 37 miles per gallon were fully phased in, the nation's automobile fleet would consume more than a million barrels per day less than if cars continued to average 27.5 miles per gallon. This represents a 25 percent reduction in the nation's consumption of petroleum products by automobiles, or savings equivalent to 5 percent of the nation's total consumption of petroleum.

Automobile Industry

The improvements in automotive fuel economy discussed here would require substantial capital investment. Several of the studies that we reviewed included estimates of capital expenditures. These indicated that the costs of the special tooling needed to produce vehicles getting 37 miles

per gallon would be around $20 billion; additional investment would also be required for related plant and equipment. In sum, about $40 billion in additional capital expenditure would be required to increase average new-car fuel economy from 27.5 to 37 miles per gallon. On an annual basis, this would be about $4 billion *a* year from 1985 to 1995. Such an increase in capital expenditure would be roughly equal to the profits of the domestic automobile industry in recent years (see Appendix Table 2). While it represents less than 4 percent of the gross sales revenue of the industry, it corresponds to approximately a 50 percent increase in capital investment for the industry.

On the other hand, if the domestic auto industry does not make additional fuel economy improvements between 1985 and 1995, it is likely to lose sales to foreign manufacturers. The decline of domestic new-car sales relative to imported new-car sales during recent months is at least partially attributable to the generally superior fuel economy of imported autos. If the decline were to continue after 1985, the industry's gross sales receipts in 1995 from new cars without further improvements in fuel economy could be substantially less than the corresponding revenues it would have received if further fuel economy improvements had been made. In short, past investment practices in the domestic automobile industry are unlikely to persist in any case, since the threat of increased competition from imports may force

domestic manufacturers to make large investments merely to hold their market share. The ability of the nation's auto companies to support this huge increase in capital expenditures is questionable.

Conclusion

The 1995 fuel economy standard contained in the legislation introduced by Senator Jackson and Senator Magnuson appears to be technologically achievable during the next 15 years. Increased use of fuel-saving technologies that are currently in production or that are slated for production within the next five years could increase the average fuel economy of new autos to about 35 miles per gallon by 1995. Additional fuel economy increases of about 2 miles per gallon are also likely to occur as buyers shift toward smaller, more fuel-efficient autos in response to continued increases in gasoline prices. This means that, even without further innovations that may occur during the post-1985 period, an average fuel economy of about 37 miles per gallon appears technologically feasible for new cars in 1995. Given that further innovations are likely during the next decade, an average fuel economy of 40 miles per gallon is probably technologically within reach by 1995.

But such improvements may not be economically achievable by the industry. The additional capital required to produce such vehicles could

prove prohibitive, although various forms of capital relief from the government in the form of tax credits, accelerated depreciation, loan guarantees, or direct grants could help overcome capital constraints. The type, amount, and conditions of such aid raise complex questions that would need careful consideration.

APPENDIX TABLE 1. CBO ESTIMATES OF FUTURE FUEL ECONOMY IMPROVEMENTS AND ASSOCIATED COSTS

Technology	Market Penetration			Fuel Economy Improvement				Consumer Cost		
	1985 (percent)	1995 (percent)	Change in Percent Market Penetration Between 1985 and 1995	Per Car (percent)	Increment Over 27.5 mpg Per Car (mpg)	New-Car Fleet (percent)	Increment Over 27.5 mpg for New-Car Fleet (mpg)	Base Cost Per Unit (dollars)	Escalated Cost Per Unit a/ (dollars)	Average Increase Per Car (dollars)
4-Speed Automatic Transmission	23	50	+ 27	6	1.7	1.6	0.4	180	261	70
Weight Reduction b/	0	100	+ 100	5	1.4	5.0	1.4	86	129	129
Turbocharger	10	30	+ 20	10	2.8	2.0	0.6	175	184	55
Electronic Controls	75	100	+ 25	4	1.1	1.0	0.3	100	115	29
Diesel	5	25	+ 20	15	4.1	3.0	0.8	550	605	121
Proco	0	10	+ 10	12	3.3	1.2	0.3	350	403	40
Front-Wheel Drive	50	90	+ 40	12	3.3	4.8	1.3	150	225	90
Aerodynamics	50	100	+ 50	5	1.4	2.5	0.7	14	15	8
Lubricants	0	80	+ 80	5	1.4	4.0	1.1	15	15	12
Improved Accessories	50	100	+ 50	2	0.6	1.0	0.3	14	15	8
Reduced Rolling Resistance	10	30	+ 20	4	1.1	0.8	0.2	25	25	5
Total							7.4			567

a/ The escalated cost per unit takes account of the recent increase in interest rates and the associated increase in the cost of capital. See Congressional Budget Office, "Preliminary Assessment of Post-1985 Automotive Fuel Economy Standards," draft report, April 29, 1980.

b/ Assumes second round of weight reduction.

APPENDIX TABLE 2. FINANCIAL STATISTICS FOR THE U.S. AUTO INDUSTRY: IN BILLIONS OF CONSTANT 1978 DOLLARS

	1975	1976	1977	1978	1979 a/
Total Sales	88.8	102.0	115.6	122.2	115.1
Capital Spending	4.4	4.3	6.7	7.8	8.8
Net Income	1.6	4.9	5.6	4.9	2.8

SOURCE: U.S. Department of Transportation, based on corporation annual reports.

NOTE: Total sales income was deflated using the implicit price deflator for auto output, final sales. Capital spending was deflated using the implicit price deflator for nonresidential fixed investment. Net income was deflated using the GNP deflator.

a/ Does not include data for American Motors.