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BY THE U.S. GENERAL ACCOUNTING OFFICE
Report To The Secretaries
Of Energy And Transportation

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The Federal Government Should More Actively Promote Energy Conservation By Heavy Trucks

Substantial energy savings are possible by improving the fuel efficiency of trucks weighing over 10,000 pounds. Truck manufacturers and motor carriers have done much to achieve savings, but more could be realized with Federal Government help through the Voluntary Truck and Bus Fuel Economy Program.

The program is based on the concept that economic forces will drive voluntary conservation efforts. Although this approach appears to be working, the program can be made more effective.

This report identifies weaknesses in the program and makes several recommendations to strengthen it.



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ENERGY AND MINERALS
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To the Secretary of Energy and the
Secretary of Transportation

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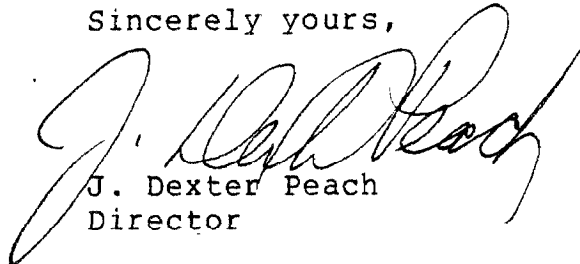
The potential for trucks weighing over 10,000 pounds to save energy is substantial. The Voluntary Truck and Bus Fuel Economy Program is the primary Federal effort to increase fuel efficiency in the trucking industry. This report presents our evaluation of the program and makes recommendations to make it more effective.

This report contains recommendations to you on pages 29 and 30. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We would appreciate being advised of the actions taken on the matters discussed in this report.

We are sending copies of this report to the Administrator of the Environmental Protection Agency, the four committees mentioned above and to the chairmen of energy-related congressional committees.

Sincerely yours,



J. Dexter Peach
Director



GENERAL ACCOUNTING OFFICE
REPORT TO THE SECRETARIES
OF ENERGY AND TRANSPORTATION

THE FEDERAL GOVERNMENT SHOULD
MORE ACTIVELY PROMOTE ENERGY
CONSERVATION BY HEAVY TRUCKS

D I G E S T

In 1977, there were nearly 6 million heavy trucks licensed--which accounted for about 6.6 percent of U.S. petroleum usage. There are a number of actions that can be taken by industry to improve fuel efficiency of trucks. Some depend on development and marketing of equipment and devices; others relate to the ways in which carriers operate their trucks.

Substantial energy savings are possible by improving the fuel efficiency of heavy trucks. Much has been done by industry to achieve savings; however, significant potential remains. The Federal Government can help maximize this potential through the Voluntary Truck and Bus Fuel Economy Program.

The voluntary program was created to increase the awareness of conservation opportunities in the trucking industry. It is a cooperative effort involving the Departments of Energy and Transportation, and the Environmental Protection Agency. The program operates under a memorandum of understanding entered into in 1975, which is now largely outdated. Much has changed since the memorandum was written: the Department of Energy was created, greatly altering the Federal energy structure; and world events have made conservation a more vital issue. In addition, recent changes in both the Departments of Energy and Transportation make a new memorandum necessary in order to more fully coordinate the roles of the Federal partners and maximize program results.

The voluntary program was founded on the basis that economic forces in the marketplace would drive voluntary conservation efforts.

gic The voluntary approach appears to be working. Within the trucking industry, carriers and manufacturers have sought ways to improve the fuel

efficiency of trucks. Manufacturers have made equipment available. Many carriers took actions to cut their fuel consumption. As fuel prices rise and supplies tighten, the incentive to act is increased--but industry needs the information on which to base its decisions concerning efficiency improvement.

Added
The voluntary program has been successful--to an extent--but significant potential savings remain. The program could be more effective if:

- 20*
- The Federal partners in the program were to develop a current memorandum of understanding to define and clarify their roles and responsibilities and to coordinate their efforts.
 - ~~--Adequate funding and personnel were committed to the program.~~
 - ~~--The Department of Energy were to place a higher priority on the program.~~

RECOMMENDATIONS

X GAO recommends that the Secretaries of Energy and Transportation

- Promptly execute a new memorandum of understanding. The Department of Energy should have a role which assures that the voluntary program achieves its full potential, consistent with overall energy policy goals and objectives. The Department of Transportation should maintain its existing role, utilizing the relationship that already exists between it and the trucking industry. This memorandum should include the relation to (or participation of) the Environmental Protection Agency and the role that research and development, particularly near-term applied research, is to play in support of program goals. The Department of Energy should have this research and development responsibility.

The Secretary should

--Commit adequate funding and personnel to the program to support the roles detailed in the memorandum of understanding, and which would support a level of effort to achieve the full potential of the program.

* Further, GAO recommends that the Secretary of Energy:

--Direct that the voluntary program receive a higher priority to maximize its effectiveness. In addition, the effectiveness of the program should be continuously monitored and assessed and alternative actions--such as increased staffing or funding, incentives, and/or legislative initiatives--proposed if the program does not produce increased levels of fuel efficiency by trucks. The Secretary may wish to consider how the Advisor to the Secretary for Conservation and Solar Marketing can assist in promoting the program. The Advisor is charged, in part, with emphasizing short-term and cost effective gains in public understanding and acceptance of conservation objectives.

and --Ensure, through the Federal Energy Management Program, that all Federal agencies purchasing or operating trucks are aware of the energy-saving measures available.

AGENCY COMMENTS

GAO provided a draft of this report to the Departments of Energy and Transportation and the Environmental Protection Agency. Officials of the Departments of Energy and Transportation expressed general agreement with GAO's findings and recommendations, particularly with respect to the progress made by the voluntary program and the potential that remains. They agreed that additional resources will be required to tap this potential. The Environmental Protection Agency had no comments.

Department of Transportation officials expressed concern over GAO's recommendation calling for a new memorandum of understanding and the respective roles of the Federal partners to the

voluntary program. They were concerned that the Department's role would be changed, making the program less effective by altering the relationship that exists between the trucking industry and the Department. GAO's recommendation has been clarified to indicate that the Department of Transportation should maintain its existing role.

Concerning monitoring and assessment, Department of Energy officials stated that they believe sales data on fuel-efficient components on new trucks provided adequate data on which to evaluate the voluntary program. While GAO agrees this is one indicator, it is not sufficient by itself. The extent of driver training and adherence to good driving practices and proper equipment use, effective fleet management, fuel-efficient components installed on existing trucks, and compliance with the national 55-mph speed limit, among other factors, must also be considered.

C o n t e n t s

		<u>Page</u>
DIGEST		i
CHAPTER		
1	INTRODUCTION	1
	Scope of review	2
2	SIGNIFICANT ENERGY SAVINGS AVAILABLE TO HEAVY TRUCKS	4
	Significant savings are available	4
	How trucks can save fuel	5
	Manufacturers are promoting fuel economy	6
	Motor carriers are conserving energy	8
	Why more conservation efforts have not taken place	11
	Potential exists to save additional fuel	13
3	VTP: GOOD PROGRESS MADE, MUCH POTENTIAL REMAINS	16
	Background	16
	The VTP promotes fuel conservation	18
	Impact of the VTP	21
	The VTP can be strengthened	23
4	CONCLUSIONS AND RECOMMENDATIONS	28
	Conclusions	28
	Recommendations	29
	Agency comments	30
APPENDIX		
I	List of private companies, Government agencies, and others contacted during our review	31

ABBREVIATIONS

DOE	Department of Energy
DOT	Department of Transportation
EPA	Environmental Protection Agency
GAO	General Accounting Office
SAE	Society of Automotive Engineers
VTP	Voluntary Truck and Bus Fuel Economy Program



CHAPTER 1

INTRODUCTION

The 1970s saw rapid price increases for petroleum coupled with periods of uncertain supply. The cost of motor fuel has climbed sharply, from about 30 cents a gallon in 1972 to about \$1 by mid-1979. Further supply shortages seem likely in coming years, and the price is certain to rise even more. All of this has served to focus attention on the efficiency with which fuel is used, especially in the transportation sector, which is largely dependent on petroleum. Trucks are a major fuel user, and there are numerous ways to improve the efficiency with which they use fuel.

The transportation sector consumes about 26 percent of all energy used in the United States. In 1978, petroleum supplied almost all of the energy used for transportation (over 97 percent), and accounted for over half of U.S. petroleum consumption. Given this nearly total dependency on petroleum, substantial potential exists for energy conservation.

Heavy trucks (vehicles that weigh over 10,000 pounds) are a major user of fuel. They account for 12.6 percent of petroleum used for transportation. In 1978, this amounted to 18.2 billion gallons--about 6.6 percent of all U.S. petroleum used.

Over the last several years, fuel consumption by heavy trucks has continued to rise. As the economy has expanded and freight volume has grown, capacity of the trucking industry has grown faster than other transportation modes. In addition, there has been some shifting of freight transportation from railroads to trucks. Studies have predicted that the trucking share will increase even further. ^{1/} Energy consumption by heavy trucks will rise as additional freight is hauled by trucks.

In 1977 over 29.5 million trucks were licensed in the United States; nearly 6 million of them were heavy trucks of over 10,000 pounds. About 1.25 million of these were truck tractors designed to pull truck trailers.

1/R. W. Foster, Alternative Fuels and Intercity Trucking, Escher Technology Associates Rept. No. P.R.-82, Apr. 1978; Jack Faucett Assoc., Inc., Truck Fuel Conservation Policy Avenues and Monitoring Mechanisms, Oct. 15, 1976.

There has been a rising trend in truck sales over the past decade. Data compiled by the Motor Vehicle Manufacturers Association of the United States ^{1/} shows that sales of heavy trucks increased from about 424,000 units in 1974 to nearly 440,000 units in 1978. Manufacturers categorize their production in terms of gross vehicle weight. The following table shows 1978 sales data for trucks over 10,000 pounds.

<u>Gross vehicle weight</u>	<u>Number of trucks</u>
10,001 - 14,000	73,119
14,001 - 16,000	5,792
16,001 - 19,500	2,699
19,501 - 26,000	155,616
26,001 - 33,000	41,032
Over 33,000	<u>161,608</u>
Total	<u><u>439,866</u></u>

The administration has promoted and continues to promote conservation as an important element--even the cornerstone--of national energy policy. Although existing energy conservation legislation and recent proposals by the administration do not specifically mention heavy trucks, they point up the need for increased energy conservation in the transportation sector. Although the trucking industry has taken actions to improve the efficiency with which fuel is used, significant conservation potential still exists.

SCOPE OF REVIEW

We reviewed the efforts of private industry and Government to improve the fuel efficiency of heavy trucks. We held discussions with industry officials and reviewed research studies and other documents. We visited a diversified group of motor carriers; this included large and small fleets, firms which employed their own drivers, and firms which contracted with owner-operators, intercity and city pickup and delivery carriers, and carriers hauling general freight, household goods,

^{1/}A trade association of automobile and truck manufacturers.

agricultural products, and other items. We also visited six truck manufacturers (producers of more than three-quarters of the heavy trucks manufactured annually), two engine manufacturers (that accounted for 70 percent of all heavy truck diesel engines produced), and a trailer manufacturer. Additionally, we met with trade associations and reviewed literature relating to truck equipment and fuel conservation.

We reviewed Federal Government activities applicable to energy conservation in the trucking industry. Our work focused on the Voluntary Truck and Bus Fuel Economy Program which is jointly carried out by the Departments of Energy and Transportation. We met with officials of both agencies to obtain pertinent documents and to discuss their activities. Our review did not include energy conservation by busses because of the relatively small conservation potential. Nor did we consider regulatory issues relating to the trucking industry, which have been the subject of prior reviews by us. (See p. 12.)

The following chapters present our findings, conclusions, and recommendations concerning energy conservation by heavy trucks. Chapter 2 discusses efforts by truck manufacturers and motor carriers to improve efficiency and what has been accomplished to date. Chapter 3 deals with the Voluntary Truck and Bus Fuel Economy Program, the primary Federal effort to improve truck fuel efficiency. Our conclusions and recommendations are presented in chapter 4.

CHAPTER 2

SIGNIFICANT ENERGY SAVINGS

AVAILABLE TO HEAVY TRUCKS

Events of the past few years have sharpened the focus on energy conservation and have made the trucking industry, because of its dependence on petroleum, receptive to conservation opportunities. There are a number of actions that can be taken to improve fuel efficiency of trucks. Some depend on the development and marketing of equipment and devices, and others relate to the ways in which carriers operate their trucks. Manufacturers and carriers have taken action to improve truck fuel efficiency, and the potential exists to do more.

This chapter deals with private industry efforts, by both manufacturers and motor carriers, to increase the energy efficiency of heavy trucks. It discusses the types of devices and equipment and operations that can be used to improve fuel efficiency.

SIGNIFICANT SAVINGS ARE AVAILABLE

Fuel savings of 25 percent or more are available through the use of fuel-efficient components. The Department of Transportation (DOT) has estimated that fuel-efficient components purchased with new trucks from 1973 through mid-1979 have resulted in cumulative fuel savings of about 3.4 billion gallons of fuel--over 82 million barrels. By the first 6 months of 1979 the savings rate was over 100,000 barrels a day--a significant conservation accomplishment.

Trucks over 33,000 pounds, as a group, use the largest quantity of fuel. And sales of this weight class have been growing faster than overall heavy truck sales. For these reasons, trucks over 33,000 pounds offer the greatest potential to capitalize on the conservation actions and opportunities described in this report. However, trucks in other weight classes offer proportionate or greater fuel economy improvement.

Truck fuel economy varies significantly by type of truck and service--city pickup and delivery, intercity, or long-haul. The typical long-haul tractor-trailor combination gets in the range of 3.5 to 5 miles per gallon. Use of fuel economy equipment as discussed in this chapter can

significantly improve a vehicle's performance. Although most of the opportunities discussed lend themselves more readily to new-vehicle purchases, many also offer significant fuel savings through retrofitting.

HOW TRUCKS CAN SAVE FUEL

Several devices are available that offer fuel savings to the trucking industry. Diesel engines, aerodynamic devices, fan clutches, and radial tires presently offer the best potential. These devices, singly or in combination, can reduce consumption by from 2 to as much as 33 percent. The extent of savings depends on the specific device being used and the type of service the truck is performing.

Diesel engines offer a great opportunity for saving fuel. They use about one-third less fuel than comparable gasoline engines. However, the greatest potential for switching from gasoline to diesel is in trucks under 33,000 pounds, and increasing numbers of smaller trucks are using diesels. As the demand increases, more medium-sized diesels should become available for trucks below 33,000 pounds.

Engine manufacturers have introduced specialized versions of the diesel engine which are about 7 to 12 percent more efficient than standard diesels. Fuel efficiency was improved by modifications such as reducing engine operating speeds, increasing operating characteristics (torque), using turbochargers, 1/ and matching engines with transmissions and axles to maximize drive-train efficiency.

Aerodynamic devices reduce power requirements by decreasing air resistance. Air resistance works primarily against the front of the tractor, front of the trailer, or anything protruding from these, such as mirrors, air conditioners, or vertical external trailer ribs. The fuel savings potential from deflectors and related devices can range from 3 to 7 percent. Carriers contacted during our review reported fuel savings of about 2 to 8 percent for large fleets. We found that aerodynamic devices are beginning to receive fairly wide acceptance, especially for intercity, long-haul use.

1/Turbochargers are fans driven by exhaust gases that force air into the engine, thereby allowing the engine to gain optimal power when needed, which results in an overall more efficient use of fuel.

The most common aerodynamic device is the wind deflector mounted on top of the truck cab; however, this device is not suited to all uses, such as flat-bed trailers or tankers. Another popular aerodynamic device is one which is mounted on the front of van-type trailers. Other types of aerodynamic devices are available or under development which would reduce air resistance against the front of the tractor and in the gap between the tractor and trailer. In addition, trailers are being made more aerodynamic by rounding corners and eliminating exterior vertical ribs in favor of smooth sides.

Fan clutches, or variable fan drives, can yield 5- to 10-percent fuel economy improvement by reducing the power requirement to operate the engine's cooling fan. Fan clutches allow the fan to operate when needed, which is only 3 to 5 percent of the time the engine is running. Fan clutches came into wide use during the last 2 years. When new truck noise standards went into effect on January 1, 1978, various types of fan clutches were used to help meet these standards. Improved energy efficiency was a by-product.

Radial tires help reduce the rolling resistance of trucks, which decreases the power needs and increases fuel savings. Fleet representatives, research studies, and data from tire manufacturers indicate that switching from bias ply to radial tires can reduce fuel consumption by 5 to 10 percent. In addition to saving energy, the useful life of a radial is longer than that of a bias ply tire, and it can be recapped more times, further reducing costs. They also offer greater traction and reduce highway noise. However, radial tires are not adaptable to all uses.

Motor carriers have used, to some extent, the following and have found them economical and fuel efficient: road speed governors, ¹/ _{turbochargers, automatic transmissions, crank-case oil burned as fuel, and synthetic lubricants. Fuel savings in the range of 1 to 5 percent have been reported.}

MANUFACTURERS ARE PROMOTING FUEL ECONOMY

Manufacturers in the trucking industry have placed increased emphasis on energy conservation features in recent years. According to manufacturing representatives, competition is an important factor that influences how much truck

¹/_{A governor is a device that limits the maximum speed of a vehicle by limiting fuel flow.}

manufacturers develop and promote energy-efficient devices. As user interest in fuel efficiency has grown, most truck manufacturers have responded by developing and promoting fuel-efficient options; a few manufacturers have made concerted efforts along these lines. With the increasing cost and potential scarcity of fuel, it is important that manufacturers continue to actively develop and promote more energy-efficient vehicles and that carriers purchase and use them.

The industry as a whole is actively promoting fuel-efficient trucks with such options as fuel-efficient engines, fan clutches, and aerodynamic devices. In fact, some manufacturers now offer these as standard items.

The truck manufacturers use various methods to promote fuel-efficient components. Much more literature is now available and fuel economy has become a major selling point. Computer analyses are available which will allow dealers to use showroom terminals to promote the sale of fuel-efficient components. The computer analysis can be used to find the optimal fuel-efficient equipment package for a trucker's generalized driving needs, based on type of service, road conditions, and other factors.

Manufacturers have also hosted fuel economy fairs, organized test demonstrations of vehicles in actual use, and distributed films and literature for use in driver training. Tips were given on the importance of a tuned engine, proper tire inflation, and alignment. The relationship of air resistance, fan clutches, single-drive axles, ^{1/}and turbochargers to engine performance and resulting fuel economy was explained. Engines with reduced power requirements which operated at lower revolutions per minute were advocated. Reducing road speed through the use of governors was also stressed as a means of saving fuel.

Because the engine industry had traditionally promoted high-power, high-performance engines, largely due to consumer demand, it was ill-prepared for the 1973-74 oil embargo. Soon after the embargo, the industry began building fuel efficiency into its products. It promoted these products to improve fuel economy without loss of performance or reliability. It advocated improved axle and transmission combinations for new equipment purchases to capitalize on the benefits of the improved engines. Savings of up to 10 percent, or over 800 gallons of fuel for every

^{1/}Fuel savings result from the decrease in friction from driving one axle rather than two.

50,000 miles, were projected with the new engine technology. Today, engine manufacturers are placing major emphasis on developing and promoting energy-saving products. They are continuing to improve earlier fuel-efficient versions, which is expected to increase efficiency.

We also found that manufacturers of fan clutches, radial tires, transmissions, air deflectors, trailers, etc., also promote the fuel-efficiency benefits of their products. Energy conservation, as a means to reduce operating expense, has thus become a common selling technique. This trend should continue in the near- and mid-term because the price of fuel is expected to keep rising.

MOTOR CARRIERS ARE
CONSERVING ENERGY

Between 1973 and mid-1979, purchases of fuel-saving equipment by truck operators increased. DOT estimates that about 3.4 billion gallons of fuel were saved through the use of this equipment. The following table shows the percentage of fuel-efficient diesels, aerodynamic devices, radial tires, and variable fan drives sold during this period.

	Model Year						
	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u> (6 mos.)
	(Trucks weighing over 33,000 lbs)						
All trucks sold	176,358	186,597	105,240	122,528	170,433	188,949	114,783
	(percent)						
Diesel	82.3	83.0	81.9	86.6	89.0	88.3	89.2
Fuel-efficient diesels	15.4	18.2	28.6	30.5	50.1	57.3	61.5
Aerodynamic devices	.8	1.1	3.2	13.0	11.2	11.9	12.0
Radial tires	3.2	3.8	7.8	24.0	23.2	29.5	30.1
Variable fan drives	4.0	3.8	24.0	39.1	47.7	75.1	78.7

Source: Department of Transportation.

Industry sales figures show significant gains in adopting fuel-efficient components:

- Fuel-efficient diesels quadrupled from 15.4 percent to over 60 percent.
- Aerodynamic devices increased from less than 1 percent to 12 percent.

--Radial tires increased almost tenfold to 30.1 percent.

--Fan clutches increased from 4 to almost 79 percent of the units sold.

There are a number of actions being taken to improve the fuel efficiency of trucks. Some depend on the use of fuel-efficient equipment and devices; others relate to the ways in which carriers operate their trucks. These fall into the broad categories of technological conservation opportunities and operational conservation opportunities.

Improved driving practices

Drivers can significantly influence fuel economy by the way in which they operate trucks. For this reason, motor carriers have included fuel economy as a part of various training programs and company literature.

Steps taken by carriers to promote good driving habits include:

- Encouraging drivers to use fuel-efficient diesel engines properly.
- Scheduling daily and weekly meetings of supervisors and drivers to exchange ideas.
- Setting miles-per-gallon goals for fleets.
- Emphasizing that engines should be well maintained.
- Showing energy conservation movies.

Whether drivers are company employees or operators who work under contract agreements, however, affects how or if a company monitors its drivers. Trucking officials told us that fleets with company drivers can effectively influence and monitor vehicle operations and driver practices. These fleets can purchase fuel-efficient vehicles and use trip logs, tachographs, ¹/_A and other techniques and devices to monitor speed and driving habits. However, companies have little control over contract drivers, particularly when truck drivers are in short supply. In addition

¹/_A tachograph is a device that continuously records engine speed versus time.

to developing their own driving habits, contract drivers generally supply their own equipment, which is not always selected to maximize fuel efficiency.

55 miles per hour saves fuel

The national maximum speed limit was reduced to 55 mph in 1974 in a national effort to save fuel. A DOT study shows an average of 2.2 percent improvement in fuel use can be made for each mile per hour a trucker reduces his speed closer to 55 mph. The biggest drawback to achieving energy savings under the 55-mph speed limit is obtaining a high level of compliance. In a 1977 report, ^{1/} we examined the issues involved with enforcing the 55-mph speed limit. DOT estimated that if all heavy trucks had complied with the national speed limit, 1 billion gallons of fuel could have been saved in 1975; only 400 million actually were saved.

Manufacturers, carriers, and trade associations we visited all support the 55-mph speed limit as a fuel-efficient practice. Fleets owning their own trucks and employing company drivers generally encourage their drivers to keep within the speed limit. Many fleet officials interviewed said that they knew driving at 55 mph was more fuel-efficient than driving at higher speeds, but they were not able to measure the difference precisely. To encourage compliance with the 55-mph speed limit some carriers are

- installing governors and tachographs,
- instituting driver education and safety programs, and
- paying drivers on the basis of preestablished trips, not mileage.

Nonetheless, an informal sampling by DOT in 1978 showed that the average speed of heavy trucks appears to have increased from 56.3 mph in 1974 to 58.3 mph in 1978.

Piggyback

Piggyback, the transportation of truck trailers and containers on rail flatcars, has the potential to increase transportation efficiency in the United States and to save

^{1/}"Speed Limit 55--Is it Achievable?," CED-77-27, Feb. 14, 1977.

fuel. Most of the trucking company officials we interviewed, however, stated that their firms were not using piggyback because it did not have the potential to improve the efficiency of their operations. Some officials stated that their routes were too short or that the location of existing rail service was not conducive to the use of piggyback. Most representatives stated that piggyback was too slow, freight damage and pilferage too great, and revenues were not high enough to be beneficial to their companies.

In some instances, carriers we talked with make limited use of piggyback during peak periods or for bulky freight or goods that do not have to be delivered promptly. One large carrier with nationwide operations uses piggyback extensively; but only between certain large metropolitan areas. And company employees work with the railroads to ensure satisfactory and prompt handling.

WHY MORE CONSERVATION EFFORTS HAVE NOT TAKEN PLACE

The primary barriers to optimizing the use of fuel-efficient equipment identified by the carriers and manufacturers we visited were (1) the lack of good data, (2) the poor dissemination of data, (3) the lack of capital for purchasing devices, and (4) the diversity in payback periods for devices. In addition, several areas of Federal regulation of nonenergy issues also affect energy conservation.

Many of the larger motor carriers, manufacturers, and research institutions, along with the Government, have developed statistics on fuel conservation based on each group's individual experiences. However, truckers' needs vary, and no widely accepted data applicable to a variety of types of truck operations is available from which all groups can draw information. The Society of Automotive Engineers (SAE), under the Federal Voluntary Truck and Bus Fuel Economy Program, is presently developing test procedures by which such data can be generated. (See p. 19.)

Once good information is available, it must be widely disseminated. Information can be dispersed to the larger fleets through various affiliated organizations, trade shows, and other channels. The owner-operators, however, must be reached individually.

Although many carriers have already been convinced that certain conservation devices are beneficial, costs can be high and capital is not always available for investment in

energy conservation. When investment capital is limited, energy-efficient equipment must compete with other investment options, and it may not always be the optimal use of the capital. For example, one carrier was phasing in radial tires over a 3-year period.

Assuming capital is available, some carriers will not purchase conservation devices because the return on the investment is not considered large enough. We found that carriers differ in their concept of what a reasonable payback period is: some expect paybacks within a few months to 2 years, and others accept longer periods. Also, because of the industry's diversity, each device's payback period will vary according to its use. Therefore, what is economically attractive to one carrier may not be attractive to another.

In addition to data needs and economic issues which limit efforts toward fuel efficiency, there are several areas of Federal regulation which, while not directly related to energy, affect the efficiency with which the trucking industry uses energy. Obviously, there are many national goals, priorities, and issues, and not all are complementary. However, we believe that to the extent possible, energy issues and Federal regulatory activities should be closely coordinated to maximize the goals and objectives of each. These issues relate to

- restrictions on the size and weight of tractor-trailer combinations, in terms of both safety and road maintenance requirements;
- regulations controlling engine emissions and noise;
- the use of routes required by operating permits, rather than the most direct routes;
- the use of piggyback;
- trailers that must travel empty; and
- safety issues.

Some of these regulations were relaxed after the 1973-74 oil embargo; some groups within the trucking industry believe still other regulations should be relaxed now.

Many of these issues have been the subject of previous reports by us. 1/

POTENTIAL EXISTS TO SAVE ADDITIONAL FUEL

We believe that there is significant potential for additional fuel savings by heavy trucks. Although it is difficult to estimate this potential, several factors support this belief--data on sales of fuel-efficient components, discussions with manufacturers and carriers, and results of comparative tests, as discussed below.

Fuel-efficient components are not installed to the maximum extent possible on new trucks. The table on page 8 shows that while the use of fuel-efficient components has made gains over the past 6 years, there is room for much additional market penetration to occur. As more and more new trucks are equipped with fuel-efficient components, and older trucks without them are retired, an ever-increasing portion of the national fleet becomes more fuel efficient. While not all components are suited for use on every truck--due to use-related limitations--the potential for additional market penetration is great.

Savings on a truck-by-truck basis can amount to 25 percent, or even more based on research and our discussions with carriers and manufacturers. Expanded use of available components--fuel-efficient diesels, aerodynamic devices, radial tires, variable fan drives, and other conservation devices--would probably yield some of the greatest and easiest savings available in any energy-consuming sector. Moreover, there is also a direct financial benefit which accompanies the improved energy efficiency--saving fuel also saves money. The availability of equipment and the direct benefit enhance the appeal of voluntary conservation actions in the trucking industry.

Moreover, future improvements by truck and equipment manufacturers are expected to increase fuel economy even more. Manufacturers we visited anticipated that near-term

1/"Energy Conservation Competes With Regulatory Objectives For Truckers," CED-77-79, July 8, 1977; "The Federal Government Should Establish and Meet Energy Conservation Goals," EMD-78-38, June 30, 1978; "Combined Truck/Rail Transportation Service: Actions Needed To Enhance Effectiveness," CED-78-3, Dec. 2, 1977; and "Excessive Truck Weight: An Expensive Burden We Can No Longer Support," CED-79-94, July 16, 1979.

improvements in the areas of aerodynamics, weight reduction, fuel-efficient engines, and transmissions could reduce consumption by about an additional 5 to 10 percent for motor carriers.

To determine potential fuel savings, one manufacturer we visited used its computer capability to analyze the impact various devices had on fuel economy. Two vehicles were compared, a standard vehicle and a fuel-efficient one.

--The standard vehicle included a 350-horsepower engine, 13-speed transmission, and bias ply tires.

--The fuel-efficient vehicle included a 290-horsepower engine, 9-speed transmission, wind deflector, and radial tires. The engine, transmission, and axle were matched to maximize efficiency.

The results of this analysis showed that an improvement of just over 30 percent could be attained by using fuel-efficient components, assuming that the type of operation and horsepower requirements were compatible with the equipment change.

Another comparison of fuel-efficient and standard vehicles is being made by the Society of Automotive Engineers for DOT. This is an actual comparison based on operation of test vehicles in normal fleet operations. It compares a standard vehicle to a fuel-efficient vehicle.

--The standard vehicle includes a standard diesel engine, standard fan, bias ply tires, no aerodynamic devices, and external ribs on the trailer.

--The fuel-efficient vehicle includes a fuel-efficient diesel engine matched with transmission and axle, a clutch drive fan, radial tires, aerodynamic devices, and a smooth-sided trailer.

Although this test was still in progress at the time of our review, preliminary data shows that the fuel-efficient package is about 28 percent more efficient than the standard configuration.

While it is not possible to estimate exactly the overall potential for fuel savings by the trucking industry, a general conclusion can be reached. Based on the market penetration of fuel-efficient components (see table, p. 8), it is apparent that ample opportunities exist to increase sales of specific components. As this happens, more and more of the existing fleet of commercial vehicles will be equipped with fuel-efficient components. And although the diversity of truck types and uses affect the potential savings for each vehicle--what will benefit one will not necessarily result in savings for another--nearly all vehicles can make some improvement.

We believe that the potential for additional savings is at least as great as what has been achieved to date, and most likely even in excess of that. Data developed by DOT indicates that savings resulting from fuel-efficient components purchased on new vehicles since 1973 have accrued to a daily rate of over 100,000 barrels per day by mid-1979. The DOT figures do not include savings attributable to improvements in speed control and driver practices or retrofit of components to existing trucks. Accordingly, we believe it is reasonable to assume that additional potential savings can reduce consumption by another 100,000 barrels or more per day.

CHAPTER 3

VTP: GOOD PROGRESS MADE,

MUCH POTENTIAL REMAINS

The primary Federal effort to promote increased fuel efficiency in the trucking industry is the Voluntary Truck and Bus Fuel Economy Program (VTP). The VTP has made progress in promoting fuel efficiency by trucks. But much potential remains, and it could be realized sooner if

- the Federal partners in the program were to develop a current memorandum of understanding to define and clarify their roles and responsibilities,
- higher levels of funding and staffing were committed to the program by the Federal partners, and
- The Department of Energy (DOE) were to place a higher priority on the program.

BACKGROUND

At the time the Congress was considering mandatory automobile fuel economy standards, 1/ a number of studies were undertaken dealing with various aspects of the practicality of fuel economy improvement. One of these studies dealt with the potential for truck and bus fuel economy improvement. 2/ That study identified technology options with the most significant savings potential and provided the basis for the VTP. Possibly the most significant conclusion of that study was that the fuel economy program should be a voluntary program, driven by economic factors, rather than by legislation or regulation. The belief was then, and remains now, that financial consid-

1/Standards for automobile fuel efficiency were subsequently established by the Energy Policy and Conservation Act, P.L. 94-163, Dec. 22, 1975.

2/Truck and Bus Panel, "Study of Potential for Motor Vehicle Fuel Economy Improvements," Jan. 10, 1975. The overall study and the panel reports were prepared pursuant to sec. 10 of the Energy Supply and Environmental Coordination Act of 1974, by a task group composed of Federal agencies, chaired jointly by DOT and EPA.

erations provide adequate incentive to the trucking industry to adopt measures which improve fuel efficiency.

Following the report on truck and bus fuel economy, DOT, at the direction of the Energy Resources Council, 1/ together with the Federal Energy Administration 2/ and the Environmental Protection Agency (EPA), initiated a joint industry/Government voluntary truck and bus fuel economy program. Public comments were obtained on the proposed program and a contract was entered into with the Society of Automotive Engineers to develop standards and procedures to measure heavy-duty truck fuel economy. In early 1976 manufacturers, motor carriers, trade associations, and labor associations were invited to participate in the program.

How the VTP works

The VTP has no legislative base, but operates through the joint efforts of the Federal participants under a memorandum of understanding, which was finalized in mid-1975. This memorandum established the roles of the Federal partners, under the auspices of the Energy Resources Council. DOT was given the leadership role for the program; the Federal Energy Administration was primarily responsible for information dissemination; and EPA was to develop measurement techniques and to review regulations along with DOT and the Federal Energy Administration. This memorandum is still the sole basis for the program.

The VTP is a cooperative, voluntary effort in which each member makes specific commitments for participation. These commitments include the following:

- Manufacturers develop and offer more fuel-efficient products; plan for and invest in production of fuel-efficient vehicles and components;
- conduct and report on fuel economy testing;
- and provide fuel economy product information, advertising, and training programs.

1/The Energy Resources Council, in the Executive Office of the President, was responsible for securing communication and coordination among Federal energy agencies, and making recommendations on the improvement of energy policy implementation and resource management. It was abolished when DOE was created.

2/As of Oct. 1, 1977, all functions of the Federal Energy Administration were transferred to DOE.

- Motor carriers report success/failure of fuel economy devices in service, specify fuel-efficient new vehicles, purchase fuel-efficient add-on or replacement components, and develop and conduct driver training programs.
- Manufacturer and user associations provide forums for information exchange, provide aggregate data from members, and provide clearinghouse service for product information and training opportunities.
- Labor associations support driver and mechanic training for fuel economy, cooperate with motor carrier management in seeking the national goal of fuel conservation, and provide information to and feedback from individual members.
- The Federal Government publicizes fuel-saving ideas and technology; develops methods to test and measure the fuel economy effectiveness of devices and vehicles; monitors program effectiveness; provides a forum for information exchange and mutual help; and reviews, evaluates, and where appropriate, seeks revisions to existing regulations which may not reflect a balance of national objectives.

THE VTP PROMOTES
FUEL CONSERVATION

To the extent that the VTP has brought fuel economy practices and technology to the attention of motor carriers and operators, it has been effective. The program's primary appeal is that those who adopt the recommended practices and technology will save money through reduced fuel costs. The program has used a variety of outreach activities, relying on the voluntary cooperation of the industry, to influence the growth of fuel efficiency in the industry.

Simply stated, the VTP's primary responsibility is to get the right information into the right hands. This involves developing accurate data concerning the benefits of fuel-efficient technology and ensuring that this information gets distributed to carriers and operators who can benefit from it. Even before the program began to enroll members, it addressed the need to develop data and measurement techniques.

Development of a data base

In 1975, DOT contracted with the Society of Automotive Engineers to conduct a Truck and Bus Fuel Economy Measurement Study. This is a cooperative engineering effort between industry and Government to identify factors which affect the measurement of fuel economy in heavy trucks and buses. It is expected to provide the needed data that will aid manufacturers, fleet owners, and independent truckers in developing and buying more fuel-efficient vehicles.

Specifically, SAE's contract has three objectives: to develop standards and procedures for measuring fuel economy, to verify these procedures by collecting in-service test data, and to communicate the results. One phase of this involves in-service verification testing--gathering "real world" data through extensive road tests of fuel-saver and standard vehicles, operating under normal company conditions. Some specific items being analyzed and tested are driving cycles, basic engine modifications, fans and accessories, aerodynamics, rolling resistance, and vehicle categorization. Because trucks and their uses are so diverse, a tool to predict fuel consumption of vehicles by type of truck is under development. This will also be used in computer simulation and correlation of road test data and manufacturers' test results.

Work under the contract is continuing. An SAE engineer indicated that the manufacturers' test results appear to support SAE's component test results. The in-service tests are planned to be completed in early 1980, and SAE's final report is scheduled to be released later in the year. The results of this study will provide the VTP with a set of standards and procedures by which to gather and evaluate performance data.

Information dissemination

The VTP's primary function is to make information available on technological and operational methods of reducing energy use. VTP members receive information directly from the program through a quarterly newsletter, Fuel Economy News; exchange of correspondence; and studies and other data distributed by the program. The DOT program manager believes that one key to the success of the program is the personal contact between his office and VTP members--through correspondence, telephone conversations, and meetings at various industry functions. Reaching nonmembers, particularly small fleets and independent owner-operators, is perhaps VTP's most difficult task.

There are an estimated 100,000 to 300,000 independent owner-operators in the country today. Few belong to any formal organization; consequently, it is difficult to reach them with data pertinent to fuel economy. Moreover, for a variety of reasons, fuel efficiency is not a major concern to them. These include:

- A lack of confidence in published statistics on conservation.
- A belief that higher speeds make more payloads possible.
- The primary interest is in the comfort, power, style, and prestige of the vehicles.

In order to reach independent owner-operators, DOT sponsored the "Double Nickel Challenge" ^{1/} to demonstrate that reduced speed can save fuel. Thirty-two owner-operators participated in a demonstration which compared fuel economy at 55 mph to whatever speed above 55 mph the operators thought would get the best fuel economy. The comparison was made by driving around an oval track for a total distance of 45 miles at 55 mph and then repeating the run at whatever higher speed was chosen. This demonstration was held in August 1978 and received wide support from manufacturers and equipment suppliers. Overall, drivers experienced greater fuel efficiency at 55 mph. Individual results varied greatly depending on make, type, and weight of the trucks. Future phases of the Double Nickel Challenge will examine the productivity of the 55-mph limit and its effect on maintenance costs, accidents, insurance, and injuries. The final phase will weigh the cumulative costs and benefits of all these considerations.

Another planned outreach activity will address training for truck salesmen on fuel-efficient components. One problem in promoting fuel-efficient components has been that dealers were generally not familiar with the equipment and its advantages. This program will aid salesmen in providing information, advice, and guidance to prospective customers, especially owner-operators.

^{1/}"Double nickel" is citizen's band radio slang for the national 55-mph speed limit.

Other program activities designed to reach out and attract new members are:

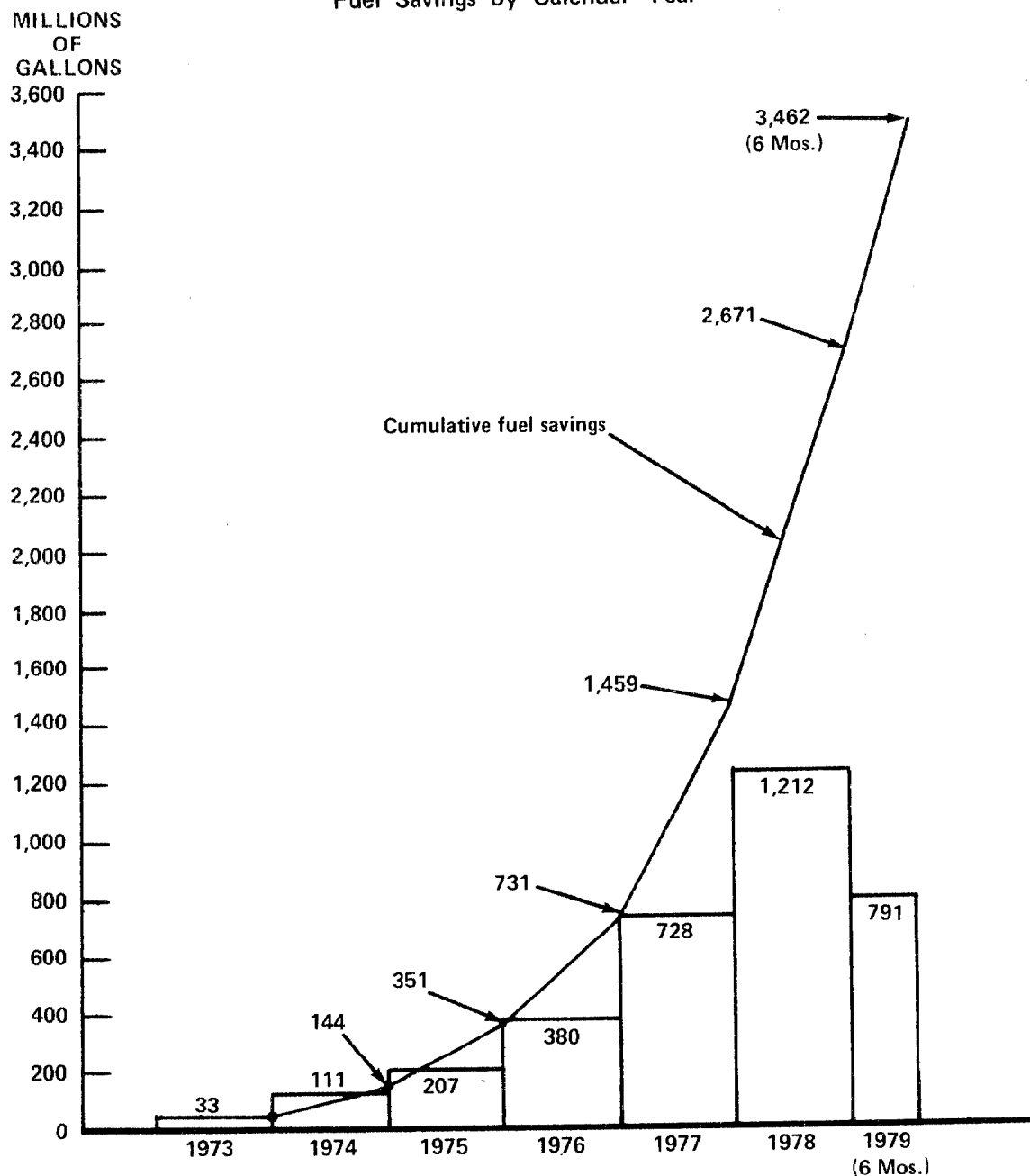
- Participation in trade shows.
- Distribution of Fuel Economy News and other program literature to nonmembers.
- Display of materials and movies at truck stops.
- Encouraging more State energy offices to participate in the program (19 States are members of the VTP).

IMPACT OF THE VTP

While the VTP has had a positive impact on fuel savings, it is difficult to estimate. Many large carriers that are members of the program would have taken conservation measures as fuel costs rose, even if the program did not exist. Conversely, there are certainly truck owners who do not belong to the VTP but who have been influenced by the program, either indirectly through associates who are members or by literature obtained at trade shows or other places. Even though the fuel-saving effects of the VTP are not susceptible to measurement, they can be gauged by other means. One of these is the magnitude of fuel savings resulting from energy-saving components on new vehicles purchased.

DOT has calculated the fuel savings resulting from energy-savings components purchased with new trucks since 1973. The figure on page 22 shows this savings by year through mid-1979. For the first half of 1979, the rate was over 100,000 barrels per day.

Fuel Savings by Calendar Year



Source: Department of Transportation.

DOT points out that these savings are not all a result of VTP efforts. However, regardless of who receives credit for savings attributed to fuel-efficient new-vehicle purchases, there is a more important fact to consider--total fuel savings due to adoption of fuel-efficient practices and components are much greater than the DOT figure. This is because the following are not included in DOT's calculation:

- Equipment installed on new trucks by dealers and owner-installed devices.
- Equipment retrofitted on existing trucks.
- Improved driver practices, which can yield as great a savings as equipment.
- Improvements in fleet management, such as routing of vehicles to reduce total miles traveled.

Thus, while there is no means to attach a figure to it, the total industrywide fuel savings are obviously much greater than indicated by the DOT calculation for features on new vehicles.

Notwithstanding all of this, we believe that the full potential of the VTP is not being realized.

THE VTP CAN BE STRENGTHENED

The potential additional fuel savings for heavy trucks by using energy-efficient equipment and following efficient driving practices is significant. In an earlier report, ^{1/} we recommended that the Secretary of Energy develop a detailed energy conservation plan, and we suggested that a number of initiatives be considered to maximize conservation efforts in the trucking industry. Some of these actions have been taken, but others still remain as alternatives for Federal action. The significant conservation opportunity for heavy trucks dictates prompt action by both DOE and DOT to strengthen the VTP and maximize its results.

Memorandum of understanding

The 1975 memorandum of understanding still provides the basis for the VTP. DOT retains the lead role; DOE has the role held by the former Federal Energy Administration, and EPA is currently inactive in the program. In addition, research and development is not covered by the document. Much has changed since the memorandum of understanding was written. DOE was created, greatly altering the Federal energy structure, and world events have made conservation a much more vital issue in the Nation. Consequently, a new cooperative agreement

^{1/}"The Federal Government Should Establish and Meet Energy Conservation Goals," EMD-78-38, June 30, 1978, p. 79.

is needed to ensure that program activities are directed toward maximum results and to avoid any potential overlap or duplication of functions.

Officials at both DOT and DOE, responsible for the VTP, told us that a new memorandum of understanding had existed in draft form as early as November 1978, but that no agreement had been reached. It was, in fact, a dormant issue at the time of our review. Notwithstanding the recent personnel changes at the highest levels of both Departments, and DOE's recent reorganization, we believe that the Secretaries of Energy and Transportation should take steps to ensure that a new memorandum of understanding is entered into at the earliest possible date. This would serve to reaffirm the commitment to the VTP, clearly define roles, and avoid possible duplication of effort. Such an agreement is essential when Federal agencies are to share program responsibilities. In developing a new agreement, DOE and DOT should pay particular attention to:

- Defining their respective roles to avoid overlap of functions. DOE must more actively participate in the VTP--as the primary promoter of energy conservation in the Federal Government. It must assure that the VTP achieves its full potential, consistent with overall energy policy goals and objectives. DOT should maintain its present role, utilizing the relationship that already exists with the trucking industry to expand the impact of the VTP.
- How EPA's mission relates to the goals of the VTP and what EPA's appropriate role is (certainly with responsibilities for pollution and noise control, EPA must participate in at least an advisory capacity).
- How research and development activities can support the VTP. While long-term basic research may not lend itself to accomplishing short- and mid-term fuel efficiency goals, there would seem to be at least some applied research opportunities to support the program. DOE's present research and development efforts are centered around the automobile and related longer term technology.
- Securing full participation of all Federal agencies purchasing and operating heavy trucks. This would be a DOE responsibility under the Federal Energy Management Program (see p. 27).

Funding and staffing

DOE's commitment to the VTP is not concomitant with either the emphasis that the administration has placed on conservation or the magnitude of the potential savings. DOT has provided primary support both in terms of funds and staff. However, if the VTP is to achieve its full potential, both agencies must make more resources available.

According to a DOE official, staffing for the VTP at DOE has never exceeded two people, and, for the most part, has only consisted of the program manager. Likewise, funding has been very low compared to the potential of the program--in fact, there were no funds available at all for fiscal year 1977. A DOE official told us that DOE involvement with the program has been restricted by lack of funds.

In contrast, DOT has provided funding which permits it to carry out a higher level of program activity. The table below summarizes program funding from its inception.

<u>Fiscal year</u>	<u>Funding</u>	
	<u>DOE</u>	<u>DOT</u>
	(thousands)	
1975	\$ 40	\$168
1976	<u>a/300</u>	170
1977	0	530
1978	8	848
1979	45	500
1980	200	760

a/In 1976, the former Federal Energy Administration funded several studies related to heavy trucks, which accounted for the increase in funding that year.

The DOT program manager of the VTP noted that while a very good, cooperative working relationship has existed, DOE has not played a very large role.

The VTP can achieve its full potential only if each partner takes an active role, supported by staff and funding. When we discussed this issue with DOE officials in mid-1979, they told us that organizational startup in the Office of the Assistant Secretary for Conservation and Solar Applications had slowed progress. They had very recently briefed the Assistant Secretary, and some decisions were expected on the program. Since then, however, there have been changes in both DOE's structure and in top officials--and the VTP again occupies an uncertain position. DOE must make a commitment to the VTP and actively promote it.

The VTP is especially well suited to yield significant results for minimum Federal investment because of the strong financial incentive that exists for the trucking industry to adopt energy-conserving measures. As fuel prices rise and supplies tighten, the incentive to act is increased--but only if the industry has the information on which to base its decisions. The opportunity for the Federal Government to promote a program which will actually win popular support from the target group is rare and should be seized. Accordingly, both DOE and DOT must commit a level of support to the VTP which will allow it to achieve its full potential.

Membership

In order to increase the effect of the VTP, the membership must be expanded. The program cannot be effective if it does not achieve broad coverage. When the VTP solicited members in 1976, 106 manufacturers, carriers, trade associations, and other groups responded. At the time of our review, there were 267 members.

According to the DOT program manager, one of the key elements in the success of the VTP has been personal contact--through letters, telephone conversations, and meetings at various functions. He noted that the present membership level is about all the present DOT staff can handle and still maintain this contact. There are over 150,000 motor carriers in the Nation. Additional resources are required if the VTP is to reach more of them.

Another way that the impact of the program, as well as its membership, could be expanded is to include State energy offices and other Federal agencies. This would allow the VTP to reach more potential members. At the time of our review, 19 States were participating in the VTP. In this

connection, a DOE official told us that although DOE's Office of State and Local Programs lacked regional staff to service the VTP, a letter had been sent by the VTP to State energy offices soliciting their support of the VTP. Eighteen States responded.

Finally, there is the question of Federal in-house participation in the program. We found that while the Federal Government operates a large fleet of medium and heavy duty trucks (over 30,000 vehicles), it was procuring only a limited number of fuel-efficient components when it purchased new trucks. 1/ This was due to (1) Government procurement agencies not being fully aware of the benefits of using fuel-efficient components, (2) specifications precluding extensive use of fuel-efficient components, and (3) a need for improved procurement practices. The Federal Government must be an example-setter, and active participation in the VTP coupled with operation of a fuel-efficient fleet will help set this example.

1/"The Government Should Buy More Fuel-Efficient Trucks and Truck Tractors," EMD-80-27, Feb. 21, 1980.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

Substantial energy savings are possible by improving the fuel efficiency of heavy trucks. Much has been done by industry to tap these savings; however, significant potential remains. The Federal Government can help realize this potential through the VTP.

The VTP was founded on the basis that economic forces in the marketplace would cause voluntary conservation efforts. The transportation sector of the Nation's economy is heavily dependent on petroleum for fuel--petroleum provided more than 97 percent of transportation fuel in 1978. Within the sector, heavy trucks consume about one-eighth of all transportation fuel--about 6.6 percent of all petroleum used in the United States.

CONCLUSIONS

The voluntary approach appears to be working to encourage conservation in the trucking industry. As fuel has become a greater and greater portion of operating costs, the effect of market forces on fuel efficiency decisions has continued to increase. Within the trucking industry, carriers and manufacturers have sought ways to improve the fuel efficiency of trucks. Many took actions to cut their fuel consumption. In an effort to increase the awareness of conservation opportunities, the VTP was created to work with industry. The program has been successful--to an extent--but there is significant potential remaining. Both DOE and DOT need to make more resources--staff and funds--available to the VTP. In addition, as discussed on page 23, we previously recommended that the Secretary of Energy consider a number of initiatives, some of which had specific application to the VTP. Because DOE has not provided adequate support, the VTP has not achieved its full potential. The VTP could be more effective if:

- The Federal partners in the program had a current memorandum of understanding for coordinating their efforts and operating the program.
- DOE and DOT provided adequate staff and funding for the program.
- DOE placed a higher priority on the program and provided support through research and development activities.

- Program membership were expanded through aggressive promotion of the program, and if Federal agencies purchasing and operating heavy trucks participated in it.

RECOMMENDATIONS

We recommend that the Secretaries of the Departments of Energy and Transportation:

- Promptly execute a new memorandum of understanding. DOE should have a role which assures that the VTP achieves its full potential, consistent with overall energy policy goals and objectives. DOT should maintain its existing role, utilizing the relationship that already exists between it and the trucking industry. This memorandum should include the relation to (or participation of) EPA and the role that research and development, particularly near-term applied research, is to play in support of VTP goals. DOE should have this research and development responsibility.
- Commit adequate funding and personnel to the program to support the roles detailed in the memorandum of understanding, and which would support a level of effort to achieve the full potential of the VTP.

Further, because DOE in general and its conservation programs in particular have suffered from organizational uncertainty and changes in personnel, we recommend that the Secretary of Energy in implementing DOE's role pursuant to the new memorandum of understanding:

- Direct that the VTP receive a higher priority to maximize its effectiveness. In addition, the effectiveness of the VTP should be continuously monitored and assessed and alternative actions-- such as increased staffing or funding, incentives, and/or legislative initiatives proposed if the program does not produce increased levels of fuel efficiency by trucks. The Secretary may wish to consider how the Advisor to the Secretary for Conservation and Solar Marketing can assist in promoting the VTP. The Advisor is charged, in part, with emphasizing short-term and cost-effective gains in public understanding and acceptance of conservation objectives.

In addition, pursuant to the Federal Energy Management Program, for which DOE is responsible, the Secretary of Energy should:

- Ensure that all Federal agencies purchasing or operating trucks are aware of the energy-saving measures available. In a recent report (see p. 27) we recommended to the Office of Management and Budget that the primary Federal purchasers of trucks actively participate in the program. DOE should help ensure that this is effected at the earliest date, by close coordination with these agencies.

AGENCY COMMENTS

We provided a draft of this report to DOE, DOT, and EPA. DOE and DOT officials expressed general agreement with our findings and recommendations, particularly with respect to the progress made by the VTP and the potential that remains. They agreed that additional resources will be required to tap this potential. EPA had no comments.

DOT officials expressed concern over our recommendation calling for a new memorandum of understanding and the respective roles of the Federal partners to the VTP. They were concerned that DOT's role would be changed, making the program less effective by altering the relationship that exists between the trucking industry and DOT. We have clarified the intention of our recommendation to indicate our belief that DOT should maintain its existing role.

Concerning monitoring and assessment, DOE officials stated that they believed sales data on fuel-efficient components on new trucks provided adequate data on which to evaluate the VTP. While we agree this is one indicator, it is not sufficient by itself. The extent of driver training and adherence to good driving practices and proper equipment use, effective fleet management, fuel-efficient components installed on existing trucks, and compliance with the national 55-mph speed limit, among other factors, must also be considered.

LIST OF PRIVATE COMPANIES, GOVERNMENT AGENCIES, AND
OTHERS CONTACTED DURING OUR REVIEW

MOTOR CARRIERS

Brothers Transportation, Inc., Paramount, California
Consolidated Freightways Corporation of Delaware,
Menlo Park, California
G. I. Trucking Company, La Mirada, California
Global Van Lines, Inc., Anaheim, California
National Freight Lines, Inc., San Fernando, California
Pacific Intermountain Express Company, Walnut Creek,
California
Pacific Motor Trucking Company, Burlingame, California
Roadway Express, Inc., Akron, Ohio
Smiser Freight Service, South Gate, California
Sterling Transit Company, Inc., Montebello, California
System 99, Oakland, California
Transcon Lines, El Segundo, California
United Parcel Service of America, Inc., New York, New York

TRUCK, ENGINE AND TRAILER MANUFACTURERS

Cummins Engine Company, Inc., Columbus, Indiana
Detroit Diesel Allison, Division of General Motors,
Detroit, Michigan
Freightliner Corporation, Portland, Oregon
Fruehauf Corporation, Detroit, Michigan
Ford Motor Company, Dearborn, Michigan
General Motors Corporation, Detroit, Michigan
International Harvester Company, Fort Wayne, Indiana
PACCAR, Inc., Bellevue, Washington
White Motor Corporation, Eastlake, Ohio

GOVERNMENT AGENCIES

Oregon State Department of Transportation, Salem, Oregon
Washington State Department of Transportation, Olympia,
Washington

MISCELLANEOUS

American Trucking Associations, Washington, D.C.
Independent Truckers Association, Van Nuys, California
Motor Vehicle Manufacturers Association, Washington, D.C.
Society of Automotive Engineers, Inc., Troy, Michigan

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