Funding Transportation Energy Conservation Programs with Oil Overcharge Settlements

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Since 1986 states have been receiving restitution funds from oil companies and crude oil producers found to have overpriced or miscertified federally controlled crude oil to avoid price restrictions between 1975 and 1981. As of March 31, 1989, the states had more than $3.7 billion available for expenditure, including earned interest, and had received federal approval to spend about $2.2 billion (63 percent). These funds have been earmarked for a wide range of energy conservation programs in residential and commercial structures, industry, and transportation. Because there have been several court judgments and because of the complexities of the project approval process, it is not clear how much oil overcharge money is being used to support transportation energy conservation projects. However, available data suggest that the transportation sector is receiving less than 12 percent of these funds. In 1988, transportation accounted for more than 63 percent of U.S. oil use. Within the guidelines of the court settlements, a variety of transportation energy conservation programs are eligible for funding with oil overcharge funds. The U.S. Department of Energy's administration of oil overcharge funds is discussed and the kinds of projects that state and local officials should consider in successfully developing a conservation program are illustrated.

Since 1974, the United States has made significant progress in improving energy efficiency. The average new car travels more than 10 mi farther on a gallon of fuel, commercial aircraft fly the same number of passenger miles on 30 percent less fuel, and trucks and railroads transport the same number of ton-miles of freight on 20 percent less fuel.

One area of continuing concern, however, is transportation's almost total dependence on petroleum-based fuels. Between 1974 and 1988, transportation's share of U.S. petroleum consumption rose from 51 to more than 63 percent. As domestic oil production declines and the United States depends more on imported oil, this trend is becoming increasingly serious. Energy conservation may be the only feasible near-term alternative for reducing transportation's oil consumption and U.S. vulnerability to disruptions in oil supply. Further, because transportation vehicles are major sources of urban congestion, pollution, and so-called greenhouse gases, saving energy in transportation can have important social, economic, and environmental benefits.

This paper summarizes a report prepared for the U.S. Department of Energy (*1*). That report highlights nearly 50 innovative transportation projects, which portray a range of interesting and unique options that should be considered when states or localities review existing conservation programs or develop new ones. In many cases, the features that make the projects unique can be readily incorporated into existing programs or new initiatives with little disruption to continuing efforts. The report also provides (*a*) the name and telephone number of one or more persons who can provide additional information on each project; (*b*) "scorecards" highlighting the nonenergy benefits of different types of projects; (*c*) the address and telephone number of each state energy office and the name of the individual responsible for administering the programs that have transportation components; (*d*) names, affiliations, addresses, and telephone numbers of individuals who can be contacted for information and assistance on particular types of transportation projects (e.g., transportation demand management); and (*e*) procedures for submitting proposals under the Stripper Well settlement agreement (see below).

Most of the projects described in the report have been supported by or are eligible for support from "oil overcharge" funds. Since 1986, all 50 states have been receiving funds from crude oil producers found to have overpriced or miscertified federally controlled crude oil to avoid price restrictions. As of March 31, 1989, states had received more than $3.7 billion, a total that includes earned interest. Federal approval has been received to spend about $2.2 billion, or 63 percent of these funds. Within the guidelines of the court settlements, a variety of transportation energy conservation programs are eligible for funding with oil overcharge funds. Because of the side benefits mentioned above, even more funding may be available from sources focusing on environmental quality, economic development, or congestion relief.

TRANSPORTATION ENERGY PICTURE

The United States enjoys perhaps the finest transportation network the world has ever seen. In particular, the Interstate highway and aviation networks provide an unrivaled source of reliable and inexpensive transportation. The cost of this system, however, is national dependence on petroleum fuels for all but a fraction of U.S. transportation needs.

The implications of this dependence on imported oil were driven home during two exceptional periods—the Arab oil embargo in 1973–1974 and the Iranian revolution in 1979. The unprecedented oil price increases and the market dislo-

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cations that accompanied them spurred major efforts in the industrialized world to reduce energy consumption, increase energy efficiency, and develop alternative energy sources. As a result, significant progress has been made in using energy resources more wisely.

In 1988, the United States used slightly more energy than in 1973 (see Figure 1). Almost 40 percent more energy, an amount equivalent to about 5 billion barrels of oil per year, would have been used if changes had not been made. Part of the reduction in U.S. energy use can be attributed to shifts in the industrial production mix and to changes in consumer awareness and behavior. However, most is related to technological improvements in vehicles, buildings, and equipment. The improvements are largely motivated by higher energy prices. In the transportation sector, factors other than higher prices have influenced current trends in energy use.

Transportation's Share of U.S. Oil Consumption

Figure 1 shows changes in energy consumption by sector; Figure 2 documents changes in petroleum (liquid fuel) consumption over the same period. Together these graphs indicate that all sectors have significantly improved energy efficiency. However, stationary energy consumers (buildings, industries, and utilities) have also rebuilt or replaced equipment to switch from petroleum to other, and perhaps more stable, fuels like coal and natural gas. The transportation sector has failed to switch to nonpetroleum fuels. In 1973 transportation consumed 8.4 million barrels of oil per day (MBPD); in 1988 the comparable figure was 10.2 MBPD, a 20 percent increase. All other sectors reduced their oil use over this period: residential and commercial consumption by 39 percent (from 2.1 to 1.3 MBPD); industrial consumption by 8 percent (from 4.3 to 4.0 MBPD); and electric utilities by 54 percent (from 1.7 to 0.8 MBPD). What emerges from these data is a clear picture of the transportation sector's almost total dependence on petroleum.

Oil consumption would have grown faster in the past and would grow faster in the future were it not for impressive fuel-efficiency gains. As new cars have replaced older "gas guzzlers," the average fuel economy of all cars on the road has increased from 13.3 mi/gal in 1973 to 20.0 mi/gal in 1988 (*3*,*4*). However, gains in fuel efficiency have been offset by increases in the number of vehicles on the highways. There

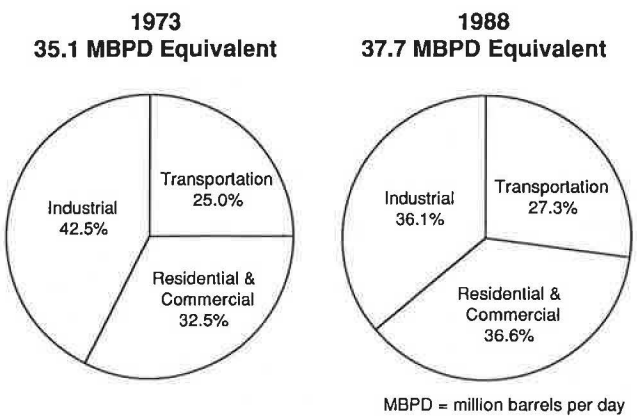

FIGURE 1 U.S. energy use by sector (*2*).

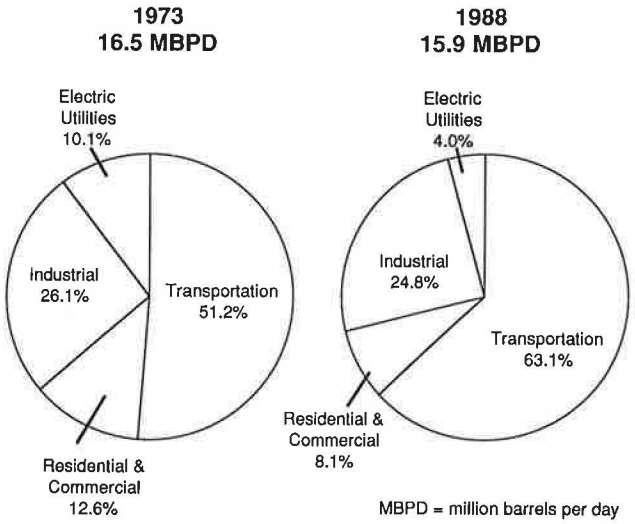

FIGURE 2 U.S. petroleum use by sector (*2*).

were 45 percent more vehicles registered in 1988 than in 1973. Further, the total number of miles traveled grew by more than 54 percent in that time.

Another development having a negative effect on fuel economy has been the increased popularity of light trucks. Light trucks accounted for 14 percent of all new car, van, pickup, and utility vehicle sales in 1971, but for nearly 32 percent of these sales in 1988. They are becoming a large part of the fleet, often being used in place of cars, but having fuel economies 30 to 40 percent less than those of the cars they are replacing. This substitution has significantly affected overall fuel economy.

Because of these three factors—the failure to switch from petroleum-based to nonpetroleum-based fuels, the growth in vehicular travel, and changes in the mix of vehicles on the road—transportation is responsible for a large and growing share of domestic oil *consumption*. In 1973 the sector accounted for 51 percent of domestic oil consumption; by 1988 this figure had risen to 63 percent (see Figure 2), an amount 23 percent greater than U.S. oil *production* in that year. This shortfall is projected to increase to 41 percent in 2000 and to 68 percent in 2010 (*5*).

Transportation's Contribution to Environmental Problems

The transportation sector also contributes to several environmental problems. Of particular import is global warming resulting from increasing concentrations of greenhouse gases in the atmosphere. During the last 100 years, the average global temperature has risen 0.7°C. Increasing temperatures could lead to a rising sea level and climatic changes (for example, severe droughts, flooding, and shifts of growing areas to acreage with thinner soils). Carbon dioxide, the most abundant of the greenhouse gases, is produced by combustion of fossil fuels, including gasoline, diesel oil, and jet fuel. As the number of vehicle miles traveled increases, the transportation sector's contribution to this problem will increase.

Also of concern is the transportation sector's contribution to acid rain and ozone depletion. Vehicle exhaust gases con-

tribute to acidification of the atmosphere, causing increased corrosion of structures and other physical property and damage to ecosystems. Chlorofluorocarbons released by aerosol propellants and refrigerants, including Freon from automotive air conditioners, are a major cause of holes detected in the earth's protective ozone layer.

Traffic Congestion

Urban traffic in the United States is growing by 6 percent per year and is projected to double in many areas by 2000. Increasing traffic congestion translates into increased fuel consumption and tail pipe emissions. Most local officials and transportation planning professionals agree that expanding our roadway system is not always feasible. The space may not be available, or the political and economic costs of land acquisition and highway construction may be too high. Therefore, innovative means must be found to increase the people-moving capacity of existing roadways. Energy conservation is an important side benefit of many of these projects.

TACKLING TRANSPORTATION'S DEPENDENCE ON OIL

Improving Vehicle Technology

Overall automotive fuel economy will continue to improve as older vehicles are retired and newer, more fuel-efficient vehicles take their place. However, even the widespread use of more fuel-efficient vehicles will leave the United States heavily dependent on oil for transportation for the foreseeable future. The most promising technological opportunities for further reductions in oil consumption lie in developing alternative fuels for existing engines or developing new engines that can run on alternative fuels. Although measures like these are being pursued, they are still many years away from tangibly affecting this petroleum-based transportation system.

Improving Transportation System Efficiency

Improving the efficiency of the transportation system is the only feasible near-term option for conserving petroleum in the transportation sector. In the past two decades, the concept of transportation system management (TSM) has evolved to combat traffic congestion and improve air quality. Most TSM measures conserve energy by maximizing transportation system efficiency, and many have found their way into the transportation control plans required by the U.S. Environmental Protection Agency for improving air quality in major urban areas.

Through its state energy offices, the U.S. Department of Energy has promoted TSM and assisted in implementing transportation control plans by funding transportation projects that help meet energy conservation goals. Since 1975, departmental activity has become more visible as a result of legislation establishing a grant program to support energy conservation projects, including ridesharing. By continuing to provide funds for ridesharing and various other TSM measures, state energy offices are the U.S. Department of Energy's principal means of supporting transportation energy conservation.

Energy Conservation Programs of the U.S. Department of Energy

All U.S. Department of Energy funding for state transportation programs is managed by the Office of State and Local Assistance Programs (OSLAP) under the Assistant Secretary for Conservation and Renewable Energy. OSLAP manages the following four energy assistance programs; a fifth—the Low-Income Home Energy Assistance Program (LIHEAP)—is administered by the U.S. Department of Health and Human Services. LIHEAP is structured as a state block grant program to help low-income households pay home energy costs.

1. State Energy Conservation Program (SECP): Congressionally established in 1975, SECP is a cooperative effort of federal and state governments to promote energy efficiency and to reduce growth in energy demand. The U.S. Department of Energy provides grants to states to implement state energy conservation plans. The grants have a 20 percent state matching requirement. Five energy conservation measures are mandatory under SECP: (*a*) lighting efficiency standards for public buildings, (*b*) thermal efficiency standards for public buildings, (*c*) programs to promote ridesharing and mass transportation, (*d*) energy efficiency standards for state procurement activities, and (*e*) programs to permit right-turn-on-red. Once these mandatory programs are funded, the states may fund discretionary programs to conserve energy.
2. Energy Extension Service (EES): The EES is a partnership between federal and state governments to provide small-scale energy users with practical information and technical assistance on energy conservation. The U.S. Department of Energy provides EES grants to the states; in turn, states support a variety of activities, including small business workshops, energy efficiency demonstration programs, weatherization loans, and energy information centers. Although eligible, transportation is not a major component of this service.
3. Weatherization Assistance Program: There are no transportation elements in this program.
4. Institutional Conservation Program: There are no transportation elements in this program.

Since 1982, most of OSLAP and much of LIHEAP funding has come from oil overcharge funds. Deposited in escrow accounts, these funds derive from court judgments against crude oil producers for overcharging purchasers of petroleum products or for not complying with the allocation regulations established before 1981. The escrow accounts contain billions of dollars from a complex network of settlements and are governed by different judgments, regulations, and statutes. To date, more than $3.7 billion has been disbursed to states to be spent on energy programs. (This excludes $1.25 billion in Texaco funds. According to the September 29, 1988, court decision, $534 million of these funds will be distributed to states.) An additional $1.4 billion is in an escrow account held

by the U.S. Department of Energy. This account earns about $244 million in interest annually. In addition, approximately $1.3 billion will be available in the 1990s when pending court cases are settled. Thus, significant funds are available to support energy conservation programs, including transportation projects. The states will decide how to spend their oil overcharge funds; the U.S. Department of Energy requires only that the state plans comply with its governing regulations.

There are three major oil overcharge settlements:

- Exxon: The $2.1 billion settlement can be used only for the four programs mentioned above, plus LIHEAP. Exxon funds cannot be used for capital or research and development projects. Most of these funds have been earmarked for specific projects.
- Stripper Well: The $727 million settlement can be used not only for the same five programs as the Exxon settlement, but also for other energy-related activities. This judgment is more open than Exxon's judgment, permitting the funding of existing or new energy-related programs designed to benefit state energy consumers. Although most of this money has been earmarked, much of it has not been spent. States can still reallocate these, as well as Exxon, funds to innovative transportation programs.
- Texaco: Of the $1.25 billion settlement, $534 million will go to states over a 5-year period beginning in calendar year 1989. This judgment is more like the Stripper Well judgment in that funds can be spent under any precedent of any earlier oil overcharge fund settlement. None of this money has been earmarked to date.

In addition to these three settlements, the Petroleum Overcharge Distribution and Restitution Act and the Warner Amendment directed the U.S. Department of Energy to disburse additional funds to the states. The act allows the U.S. Department of Energy to disburse excess funds (up to $200 million annually) from all oil overcharge settlements for five specific energy programs. Between 1987 and 1989, $250 million was distributed under this act. The Warner Amendment is a one-time disbursement of accrued interest from oil overcharge accounts. Under the 1982 amendment, the Department of Energy disbursed $200 million to be spent on the five energy programs specified in the Exxon settlement.

Table 1 summarizes OSLAP data on Exxon and Stripper Well funds distributed to states, territories, and possessions as of March 31, 1989. It also indicates how much had been spent as of that date and how much was still available. (The accuracy and completeness of the OSLAP data base depend on how quickly and completely states report their receipt and use of funds. Thus, data tend to be less current than the accountings of individual states, which should be contacted for a more up-to-date report on fund availability.) Because there have been several court judgments and because of the complexities of the project approval process, it is not clear how much oil overcharge money is being used to support transportation energy conservation projects. However, Table 1 suggests that only 12 percent of the funds is being used for such projects.

Figures 3 and 4 provide, respectively, specific examples of transportation projects eligible for funding and lists of the actual types of transportation projects funded with Exxon and Stripper Well funds as of March 31, 1989.

Clearly, funds are available to support transportation energy conservation. As always, however, effective planning requires identification of measures appropriate to each state or locality and enlistment of the support of constituent agencies. The process can take time and fortitude. Agencies that can be consulted for guidance and support when developing transportation energy conservation measures include state energy, transportation, and environmental management departments, as well as metropolitan planning organizations. These agencies have considerable knowledge and expertise and can be valuable allies in planning and implementing transportation energy conservation projects.

INNOVATIVE TRANSPORTATION ENERGY CONSERVATION MEASURES

There are many specific strategies for improving transportation energy efficiency and an array of program models incorporating them. Most are eligible for funding under Exxon, Stripper Well, or several of the smaller oil overcharge settlements. Many successful programs are multipurpose—they both save energy and further other local objectives. These other objectives could include economic development, providing special assistance to low-income persons, reducing vehicle emissions, expanding the people-moving capacity of existing transportation facilities, and so forth. Obviously, for any particular state or locality, programs must be tailored to local needs and resources. In some cases, it may be appropriate to design multipurpose programs; in others, such constituency-building techniques may be irrelevant.

Table 2 gives a number of transportation energy conservation programs recently implemented by state and local agencies. Programs focus on one or more basic strategies—improving vehicle occupancy, improving vehicle technical efficiency, enhancing traffic flow, or switching from petroleum to nonpetroleum fuels. The following discussion elaborates on these strategies.

Vehicle Occupancy Improvement

Occupancy improvement strategies focus on promoting ridesharing—by either providing new transit services, encouraging workers to join carpools or vanpools, or otherwise improving the efficiency or attractiveness of high-occupancy vehicles (HOVs). An innovative context for new transit services is in crowded resort areas where such services can reduce traffic congestion, improve air quality, and generally enhance visitor enjoyment. With sufficient ridership and a tight cost structure, they can be virtually self-supporting from farebox revenues.

Rideshare promotion programs can assist in carpool and vanpool formation by providing personalized matching services with regular follow-up and continued assistance or by using mass merchandising techniques (e.g., publishing carpool matchlists like classified advertisements) to reach passive markets of potential ridesharers. Rideshare promotion programs can also focus on reaching particular submarkets (e.g., low-income workers who live in central cities), providing incentives (e.g., discounts on monthly transit passes or payments

TABLE 1 EXXON AND STRIPPER WELL FUNDS DISBURSED TO STATES AND EARMARKED FOR TRANSPORTATION AND OTHER PROJECTS

State, Territory, or Possession	Exxon Settlement				Stripper Well Settlement				Transportation Funding	
	Disbursed (Thousand $)	Interest (Thousand $)	Earmarked		Disbursed (Thousand $)	Interest (Thousand $)	Earmarked			
			Thousand $	%			Thousand $	%	Thousand $	%
Alabama	32,192	NR[a]	19,706		15,443	958	14,819	90.4	13,328.3	38.6
Alaska	8,272	1,334	8,790	91.5	3,894	528	3,555	80.4	0	0
American Samoa	371	32	300	74.4	NR	14	NR	NA[b]	0	NA
Arizona	21,566	3,399	19,487	78.1	10,323	995	3,578	31.6	2,733.0	11.8
Arkansas	25,950	3,290	20,176	69.0	12,807	826	11,639	85.4	5,582.7c	17.5
California	194,717	28,380	82,056	36.8	92,128	8,709	132,784	132.0	58,045.7	27.0
Colorado	22,716	3,741	23,611	89.2	10,821	873	7,851	67.1	3,300.7	10.5
Connecticut	34,900	5,853	7,367	18.1	17,091	1,472	18,269	98.4	5,484.9[c]	21.4
Delaware	9,945	1,422	6,343	55.8	4,778	456	4,074	77.8	103.5	1.0
District of Columbia	4,604	718	2,418	45.4	2,404	333	2,182	79.7	624.8	13.6
Florida	98,115	19,821	59,209	50.2	46,498	4,993	34,080	66.2	13,770.0	14.8
Georgia	46,625	6,302	31,775	60.0	22,411	2,508	22,151	88.9	3,021.5	5.6
Guam	3,100	594	305	8.3	1,483	147	1,483	91.0	46.7	2.6
Hawaii	14,482	1,223	15,810	101.0[d]	6,915	548	NR	NA	1,514.5[e]	NA
Idaho	8,691	958	8,158	84.5	4,130	354	3,365	75.0	1,260.0[c]	10.9
Illinois	96,106	11,377	65,085	60.6	46,224	3,488	46,471	93.5	200.0[c]	0.2
Indiana	51,631	5,113	18,989	33.5	24,789	586	22,836	90.0	29,369.4	70.2
Iowa	27,424	4,437	22,466	70.5	13,113	1,363	23,880	165.0	7,668.1	16.5
Kansas	23,958	1,500	7,866	30.9	11,282	1,237	2,952	23.6	2,830.1	26.2
Kentucky	27,439	1,249	8,331	29.0	12,900	1,256	13,231	93.5	0[c]	0
Louisiana	51,536	4,192	16,224	29.1	23,938	1,471	18,715	73.7	16,500.0[c]	47.2

Maine	15,094	1,166	13,551	83.3	7,398	404	7,330	94.0	50.0[c]	0.2
Maryland	36,416	5,082	33,772	81.4	18,019	1,926	19,798	99.3	461.2	0.9
Massachusetts	70,341	11,493	63,342	77.4	34,451	3,269	39,000	103.0[d]	0[c]	0
Michigan	70,991	8,987	30,228	37.8	34,290	3,467	43,663	116.0[d]	98.3	0.1
Minnesota	36,066	4,072	25,244	62.9	17,464	2,150	16,769	85.5	6,599.4	15.7
Mississippi	28,378	2,637	30,629	98.8	13,742	1,245	12,283	82.0	5,151.2	12.0
Missouri	41,516	4,271	35,377	77.3	19,871	2,080	14,014	63.8	1,069.7	2.2
Montana	9,585	1,115	7,400	69.2	4,555	428	3,664	73.5	2,187.0	19.8
Nebraska	15,505	3,523	4,877	25.6	7,421	791	600	7.3	540.3	9.9
Nevada	8,767	1,291	4,360	43.3	4,076	317	6,599	150.0[d]	5,345.0[c]	48.8
New Hampshire	9,798	1,882	10,152	86.9	4,690	493	4,174	80.5	868.6	6.1
New Jersey	75,433	NR	22,973	30.5[f]	37,150	2,291	34,775	88.2	0[c]	0
New Mexico	13,693	2,758	10,004	60.8	6,592	655	9,000	124.0d	154.6	0.8
New York	159,875	15,405	153,753	87.7	77,928	7,016	65,070	76.6	19,500.0	8.9
North Carolina	47,030	12,139	20,406	34.5	22,588	3,138	21,917	85.2	2,045.0	4.8
North Dakota	7,721	1,308	5,295	58.6	3,689	313	5,500	137.0[d]	1,756.3	16.3
Northern Mariana Islands	192	24	200	92.6	NR	9	25	NA	0[c]	0
Ohio	79,740	17,809	62,878	64.5	37,816	4,592	37,249	87.8	9,003.1[c]	9.0
Oklahoma	26,234	3,852	15,896	52.8	12,429	814	13,595	103.0[d]	1,410.9	4.8

(continued on next page)

TABLE 1 (*continued*)

State, Territory, or Possession	Exxon Settlement				Stripper Well Settlement				Transportation Funding	
	Disbursed (Thousand $)	Interest (Thousand $)	Earmarked		Disbursed (Thousand $)	Interest (Thousand $)	Earmarked			
			Thousand $	%			Thousand $	%	Thousand $	%
Oregon	20,722	2,552	19,931	85.6	9,976	1,109	10,934	98.6	9,727.8	31.5
Pennsylvania	96,804	10,416	28,560	26.6	46,857	1,421	21,288	44.1	0[c]	0
Puerto Rico	20,054	1,187	2,000	9.4	9,587	910	NR	NA	0[c]	NA
Rhode Island	8,005	1,077	6,761	74.4	3,990	317	4,494	104.0[d]	135.0	1.2
South Carolina	25,188	4,880	2,929	9.7	11,998	1,093	10,166	77.7	336.3[c]	2.6
South Dakota	7,502	1,258	6,177	70.5	3,598	216	2,896	75.9	2,211.0[c]	24.4
Tennessee	34,603	2,923	35,724	95.2	16,283	1,072	4,600	26.5	0[c]	0
Texas	157,187	18,363	49,844	28.4	74,246	8,141	65,481	79.5	5,983.0	5.2
Utah	12,454	1,847	8,809	61.6	5,937	546	5,405	83.4	2,198.4	15.5
Vermont	5,005	619	3,720	66.1	2,409	271	1,602	59.8	150.0[c]	2.8
Virgin Islands	9,951	NR	2,112	21.2[f]	4,655	NR	NR	NA	529.3	NA
Virginia	53,377	NR	29,586	55.4[f]	25,828	4,304	21,268	70.6	5,900.0	11.6
Washington	32,122	2,429	24,226	70.1	15,369	1,500	14,438	85.6	10,755.0	27.8
West Virginia	12,903	2,551	6,819	44.1	6,014	464	6,541	101.0[d]	6,994.1	52.4
Wisconsin	36,967	7,617	17,700	39.7	17,707	1,957	18,420	93.7	2,800.0[c]	7.8
Wyoming	8,874	1,237	6,102	60.4	4,104	312	3,173	71.9	0[c]	0
Total	2,098,433	262,705	1,245,809	53	1,006,099	92,139	933,646	85	269,344	12

[a]NR = not reported.

[b]NA = could not be calculated with available data.

[c]Exxon settlement only.

[d]Earmarked funds include expected future interest or expected future disbursements.

[e]Stripper Well settlement only.

[f]Excludes interest.

Sources: J. Duane, F. Weik and E. Guziewicz, unpublished data. For additional detail on state disbursements and allocations see also Ref. 6.

Programs for the general driving public

- Fuel-efficient traffic signals
- Highway traffic management
- Motor fuels recycling
- Highway and bridge maintenance and repair
- Public transportation

Programs for consumers

- Car care clinics
- Fuel efficient driver training
- Ridesharing
- Marketing of state-supported passenger rail and mass transit
- Bicycle promotions

Programs for commercial, industrial, and governmental institutions

- Vehicle fleet maintenance
- Transportation system management assistance
- Remanufacturing and refitting of transit buses
- Computerized school bus routing
- Alternative transportation fuels
- Transit system refitting loans

FIGURE 3 Examples of state restitutionary programs in the transportation sector approved by the Department of Energy [from Department of Energy Stripper Well Exemption Litigation, M.D.L. 378 (May 5, 1986), Exhibit J, U.S. District Court for the District of Kansas].

toward initial van leasing expenses for new vanpools), or removing barriers (e.g., providing reimbursement of taxi fares for emergency midday trips) that can deter workers from participating.

Improving the efficiency or attractiveness of HOVs by either preferential treatment or reductions in operating costs can also increase ridesharing. Exclusive lanes and parking spaces, signal preemption, merge priority at traffic signals, and price discrimination through reduced tolls exemplify the kinds of measures designed to treat HOVs preferentially. Expanding into off-peak charter services, establishing self-insurance pools, and generating additional revenue through the sale of snacks and beverages on subscription routes illustrate the kinds of measures that can control operating costs.

Vehicle Efficiency Improvement

Strategies to improve vehicle fuel efficiency focus on increasing the technical performance of the vehicle or the skill of the vehicle operator. Technical performance of fleet vehicles may be increased by maintenance scheduling and systematic fleet management, especially regular performance monitoring to spot minor problems before they become catastrophic. For

FIGURE 4 Types of transportation projects funded with Stripper Well funds.

household vehicles, "car care clinics" can identify such "fuel-robbers" as improperly inflated tires, out-of-tune engines, and plugged air cleaners. More specialized services focusing on engine diagnostics can identify computer control problems that may not be detected in standard tests but that reduce engine efficiency.

Operator skill can be upgraded through training in fuel-efficient driving practices, either as part of high school driver education curricula or in fleet management programs. Videotapes and computer games offer a particularly effective and innovative means of reaching young drivers. Older drivers can be reached through public service advertisements and through schoolchildren who have learned about energy conservation practices (e.g., proper tire inflation) in the classroom.

System Flow Improvement

Optimized traffic signal timing is probably the most widely applied flow improvement strategy. After several years of applied research and field experience (the first project explicitly designed to conserve fuel was initiated in 1982), a number of signal optimization models (e.g., TRANSYT-7, PASSER, SOAP, AAP, MAXBAND) and planning regimes have been developed. Though staff of the local operating agency must tailor these techniques to local conditions and capabilities (i.e., by designing and implementing an appropriate data collection effort, selecting and calibrating the model, and implementing and evaluating the selected timing plan), they provide both a useful reference and a starting point for the project.

TSM strategies may be defined as a host of measures designed to increase the effective capacity of the highway network, particularly during the peak period. Capacity enhancement, in turn, permits existing facilities to accommodate relatively more travel under free-flow conditions, which generally increases vehicle fuel economy. In addition to improved signal timing and priority treatment for HOVs, TSM strategies include improved intersection channelization and striping, peak-period reverse lanes, measures to shift travel demand (both commuters and truck deliveries) from peak to off-peak hours, and various forms of peak-period travel demand reduction.

Because of its potential for dramatic improvements in peak-period congestion, travel demand reduction is gaining increased local attention. Many employment centers, either at the behest of the local community or in response to a widely perceived congestion problem, have formed transportation management organizations (TMOs) to promote ridesharing, flextime, and other options to reduce the share of work trips occurring in single-occupant vehicles during the peak period. Although functions vary in response to local needs and resources, TMOs generally serve as conduits for information on available transit services, areawide carpool and vanpool matching services, and alternative work schedules. Some also collect and main-

TABLE 2 INNOVATIVE TRANSPORTATION ENERGY CONSERVATION PROJECTS RECENTLY IMPLEMENTED BY STATE AND LOCAL AGENCIES (*1*)

Program Name	Type	Sponsoring Agency or Location	Geographic Applicability			Major Innovative Feature	Synergies or Side Benefits
			Urban	Suburban	Rural		
Get In	Ridesharing	Montgomery Co., Md.	X	X		Taxi reimbursement for emergency midday trips	
Share-A-Ride	Ridesharing	Montgomery Co., Md.	X	X		Personalized matching services	
Commuter's Register	Ridesharing	Rideshare Co., Hartford, Conn.	X	X	X	Reaches both active and passive markets	Transit promotion
Innercity Access	Ridesharing	Caravan for Commuters, Boston	X	X		Connects inner-city workers with suburban job sites	Urban economic development
JOBS Bus	Ridesharing	Greater Richmond Transit Co.	X	X		Connects inner-city workers with suburban job sites	Urban economic development
Work Bus	Rural transportation	Berrien Co., Ga.		X	X	Connects rural workers with major job sites	Full cost recovery through concession and charter services
Eureka Springs Transit	Rural transportation	Eureka Springs Transit, Ark.		X	X	Public transportation for recreational area	Tourism promotion
Vanpool Incentive Program (VIP)	Ridesharing	Caravan for Commuters, Boston	X	X	X	Cash incentives to new vanpoolers	Defers highway capacity expansion
Employee Transportation Managers	Ridesharing	Commuter Computer, Calif.	X			On-site, customized rideshare promotion	Turnkey opportunity for private providers
Car Kit	Driver training	Alabama Energy Extension Service	X	X	X	Video and computer games reach young drivers	Training in computer use
Fleet	Fleet management	New York Energy Office	X	X	X	Hands-on, customized fuel management training	Training in computer use
Car Chek	Vehicle maintenance	Virginia Division of Energy	X	X	X	Ongoing engine diagnostic services for the general public	Mechanics' training
CompuCar	Vehicle maintenance	Alabama Energy Extension Service	X	X	X	Ongoing engine diagnostic services for the general public	Mechanics' training; motorist viewing of Car Kit videos
Project Inflate	Vehicle maintenance	Alabama Energy Extension Service	X	X	X	Fun approach to proper tire inflation	School children learn about energy conservation
Fuel Efficient Traffic Signal Management (FETSIM)	Transportation Systems Management	Caltrans and California Energy Commission	X	X		Training and hands-on assistance to local traffic engineers	Improved traffic flow; reduced emissions

(*continued on next page*)

TABLE 2 (*continued*)

Program Name	Type	Sponsoring Agency or Location	Geographic Applicability			Major Innovative Feature	Synergies or Side Benefits
			Urban	Suburban	Rural		
Various projects giving preferential treatment to HOVs	HOV lane model	Oak Ridge National Laboratory, Tenn.	X	X		Bus and carpool travel time reduction	Increased people-moving capacity
	Signal preemption	Santa Clara Co., Calif.	X	X		Increased HOV mode shares	Deferred highway capacity expansion
	Preferential tolls	Caltrans, Calif.	X	X			Reduced emissions
	Project Hero	Seattle Metro, Wash.	X	X			
	Preferential parking and free transit	Portland, Oreg.					
Operation Breezeway	Transportation Systems Management	California Highway Patrol, Caltrans, and California Trucking Association	X			Shift truck delivers to off-peak hours	Peak hour congestion relief; truck accident reduction
Adequate Facilities Ordinance	Transportation Demand Management	Montgomery Co., Md.	X	X		Development continent on adequate transportation; trade-off provisions; bond forfeiture to ensure compliance	Systemwide traffic reduction; transit promotion
Transportation Systems Management Ordinance	Transportation Demand Management	Pleasanton, Calif.	X	X		Annual goals for large employers to reduce single-occupant work trips	Comprehensive data base; transit promotion
Various projects substituting telecommunications for work trips	Transportation Demand Management	Mountain Bell, Colo.	X	X	X	Individually tailored schedules	Improved employee productivity; reduced parking and office space; employment for functionally challenged workers
		State of California	X	X	X	Extensive planning, training, and follow-up support	
Pipeline construction	Modal shifts	Maryland Department of Transportation and Maryland Energy Office	X	X	X	Eliminated truck deliveries of jet fuel to Baltimore-Washington International Airport	Reduced truck traffic; improved reliability
Trawl Efficiency Devices (TEDs)	Nonhighway vehicle fuel efficiency	Georgia Department of Natural Resources			X	Grants for shrimpers to purchase TEDs that reduce drag on nets	Improved competitiveness of local industry; endangered species protection; reduced bycatch and improved marketability of catch

Fishing Vessel Energy Conservation	Nonhighway vehicle fuel efficiency	California Energy Extension Service			X	Information, technical assistance, equipment testing, and low interest loans for efficiency improvements to fishing vessels	Improved competitiveness of local industry
Tractor tune-ups	Nonhighway vehicle fuel efficiency	Utah Energy Office			X	Information and technical assistance on fuel-efficient maintenance of diesel farm equipment	Improved competitiveness of local industry
Dyna-Bite Traction Intensifier	Nonhighway vehicle fuel efficiency	U.S. DOE Energy-Related Inventor's Program			X	Reduced tire friction and ballast requirement for tractors and other farm machines	Improved competitiveness of local industry; enhanced productivity and equipment life
Railmaster™	Nonhighway vehicle fuel efficiency	New York Energy Research and Development Administration			X	R&D on an easily removable underchassis system to convert truck trailers to "rail cars"	Economic development—job creation
Ferry Boat Energy Conservation	Nonhighway vehicle fuel efficiency	Washington State Energy Office	X	X	X	Identified equipment and operating measures to improve fuel efficiency of ferry boats	Operating cost savings to state general fund; crew training
Roadside Rest and Information Centers	Alternative fuels	Maine Department of Transportation		X	X	Solar-powered water and space heat	
Solar-powered highway support facilities	Alternative fuels	Caltrans, Calif.		X	X	Solar-powered irrigation controllers, emergency call boxes, traffic counters, and sign lighting	Cost savings
Various projects testing methanol as a vehicle fuel	Alternative fuels	State of California, U.S. DOE, U.S. DOT (UMTA)	X	X	X	Matched methanol fleets under various climates and service conditions to similarly equipped gasoline control fleets	May stimulate local vehicle industry

tain data bases on work trip travel patterns, actively promote alternative work schedules, and provide in-house carpool and vanpool matching services.

Telecommuting, or substituting voice or data communication for work travel, is an alternative that is receiving increasing interest. Historically, most telecommuting programs have been developed by private-sector employers seeking to expand their work force but not their expenses for office space (and, perhaps, parking). More recently, however, a number of states and localities have begun to investigate telecommuting as a strategy for reducing traffic congestion, improving air quality, and saving energy. Between private- and public-sector activities, a considerable body of knowledge on planning, managing, and evaluating telecommuting programs is being developed.

Off-Road Efficiency Improvement

Although off-road travel accounts for only 28 percent of transportation energy use, it still consumes the equivalent of approximately 720 million barrels of crude oil per year (*7*). This fuel is used by a wide range of mobile equipment operated under an equally wide range of duty cycles. Thus, overall conservation targets tend to be small compared with those in the road sector, and efforts must be further fragmented to deal with diverse subsectors. However, if program development is tailored to regional conditions and resources, efforts to save energy in the operation of marine vessels, rail equipment, farm tractors, and other off-road vehicles can produce extremely interesting and innovative projects, many of which have the potential for significant economic side benefits.

In the nonhighway sector, energy conservation strategies can be grouped into three broad categories: modal shifts, improvements in the technical efficiency of vehicles, and improvements in vehicle operations. Modal shift strategies are usually from truck to intermodal systems or from truck to rail, water, or pipeline modes. In the past decade, relatively more energy-efficient intermodal systems have captured an increasing share of motor carrier cargo. Today, various types of trailer-on-flatcar, container-on-flatcar, and RoadRailer™ systems are in regular use, and development continues on new systems and improvements to existing systems. Such improvements promise not only enhanced energy efficiency, but also gains in local employment and tax revenue from new manufacturing industries.

Programs to improve the technical and operating efficiency of off-road vehicles can be aimed at a wide range of vehicle types and duty cycles, some of which are usually perceived as transportation (e.g., ferry boats), others of which are not (e.g., farm tractors, fishing vessels, and mining equipment). Depending on local needs and resources, programs can be oriented toward either information and outreach (e.g., by sponsoring tractor tune-up clinics or disseminating information on fuel-efficient designs for vessel propellers) or capital improvements (e.g., by providing low-interest loans). In both cases, programs typically offer the side benefit of improving the competitiveness of local industries.

Alternative Fuels

In the long term, alternative fuels offer the greatest petroleum-displacement potential of any transportation energy conservation strategy. Unfortunately, however, this potential is not without considerable cost—both for technical improvements to enable automobiles and trucks to run on fuels other than gasoline or diesel oil and for a new fuel delivery infrastructure to supply those fuels. In the past decade, a number of demonstration projects have investigated the feasibility of operating school buses, transit buses, and various types of automobiles and light trucks on either methanol or compressed natural gas. Most of these projects have demonstrated acceptable performance, reliability, and safety, but unacceptable cost. Work continues in this area, and the results of demonstration projects should be closely monitored.

In the last decade, advances in photovoltaics have made solar technology competitive with grid-supplied electricity for a wide range of stationary uses. Though generally not perceived as transportation uses, several of these applications should be of interest to state and local transportation agencies. In remote locations, photovoltaics are now being used to power roadside call boxes, traffic counters, and maintenance facilities. Even in urban settings, self-contained photovoltaic lighting systems are often competitive with conventional electric conduit for illuminating new overhead signs.

SUMMARY AND CONCLUSIONS

Since 1986 the states have received more than $3.7 billion in oil overcharge funds, primarily from the Exxon and Stripper Well judgments. In addition to these funds, $0.5 billion from the Texaco judgment will be distributed between 1989 and 1993, and as much as $1.3 billion may become available when pending court cases are settled. Although various restrictions apply to the expenditure of these funds, all settlements share a common intent—to make restitution to petroleum purchasers who were overcharged when domestic oil prices were controlled. Thus, a wide variety of petroleum conservation and assistance programs are eligible for funding under one or another of the oil overcharge settlements.

Because transportation accounts for 63 percent of U.S. petroleum consumption, this sector is a prime candidate for receipt of restitution funds. However, this may not happen unless transportation energy conservation projects are included in the state plans submitted for approval to the Department of Energy. Although much oil overcharge money has not yet been earmarked for specific programs, both the way the settlements are structured and recent funding trends suggest that the transportation sector may not receive its fair share of funding. As of March 31, 1989, transportation projects represented 12 percent of the Exxon and Stripper Well funds that states had earmarked for specific projects.

Under existing court settlements, the states have primary authority for allocating oil overcharge funds. Although each state must submit its plan to the Department of Energy, the department merely reviews the plan to ensure that it complies with whatever restrictions were imposed by the court. Thus, efforts to secure a greater share of oil overcharge funds for transportation programs must occur at the state level. A number of interesting and innovative ideas for transportation energy conservation projects have been presented for consideration by the state planners and policy makers who must develop their state's energy assistance plan. Although the specifics of each plan and each court settlement vary, the projects men-

tioned here and described by Mintz and Zerega (*1*) generally fall within the guidelines of the major oil overcharge settlements and should be eligible for funding under them.

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