Gasoline Marketing in the United States Today

API PUBLICATION 1593
THIRD EDITION, MAY 1992

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Manufacturing, Distribution and Marketing Department

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I. INTRODUCTION

Motor fuel, and especially gasoline, is essential to the American economy. Gasoline prices are among the most scrutinized prices in motorists' budgets. Yet knowledge of gasoline marketing and prices is limited. This booklet provides an overview of gasoline markets, including prices and their components, taxes, employment, and numbers of retail outlets. It also describes the participants, facilities, and institutions that comprise the gasoline business. Finally, it is a basic data book for gasoline marketing.

II. MOTOR FUEL CONSUMPTION

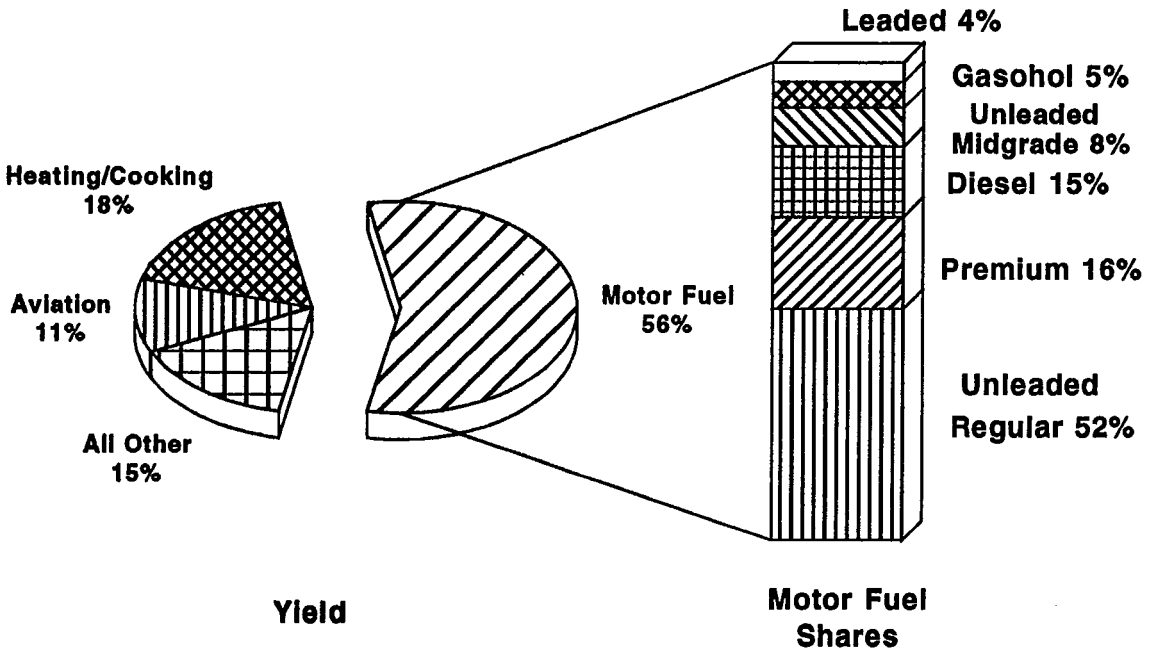
Approximately one-fourth of world oil consumption occurs in the U.S., and over two-thirds of U.S. oil use is for transportation. More than one-half of U.S. oil consumption is motor fuel. Indeed, U.S. *gasoline* consumption exceeds the *oil* consumption of any other industrialized nation.

Motor gasolines represent about 80 percent of total U.S. motor fuel consumption, as indicated in Figure II-1. Most of the remaining motor fuel comprises diesel fuel, the preferred choice for large motor vehicles due to the greater fuel economy of diesel engines. Today the dominant motor gasoline is unleaded regular, which displaced leaded regular as the leading fuel in the 1980s.

The leading states in motor fuel use are California and Texas. Just six states--California, Florida, Georgia, Illinois, New York, and Texas--accounted for half of the growth in motor fuel consumption over the past decade. Figures II-2 and II-3 show that Florida experienced the greatest growth, moving from sixth to third place in state motor fuel consumption. Ohio, however, fell from fourth to sixth in motor fuel consumption, despite an increase of about 39 million gallons between 1980 and 1990 (Tables 2-1 and 2-2).

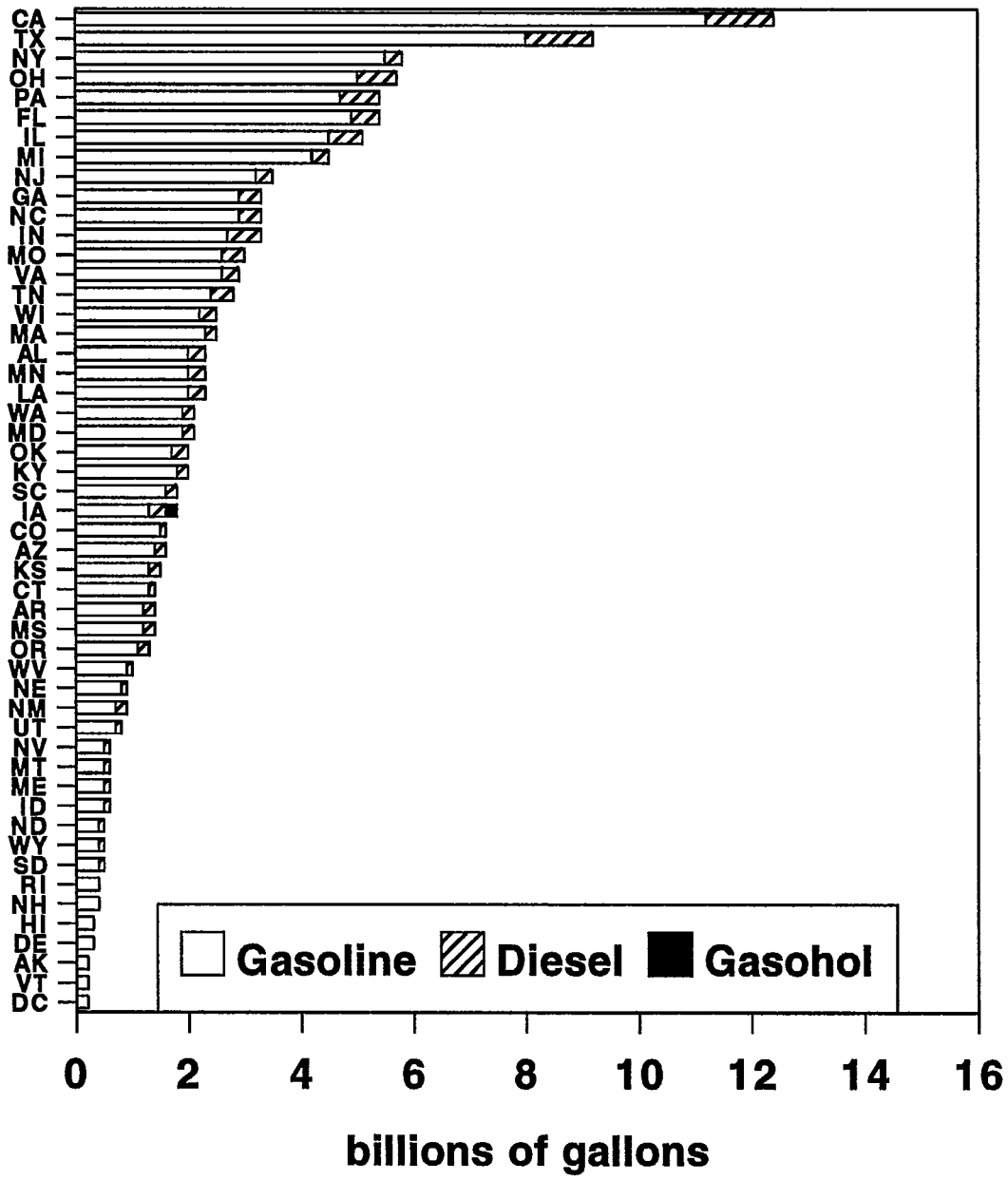
Ohio and Illinois consume large amounts of gasohol, a gasoline-ethanol blend. Gasohol accounts for about 20 percent of motor fuel consumption in Ohio and Illinois, compared to about 5 percent nationwide (Table 2-2). Overall, consumption of gasohol increased fifteenfold during 1980-90.

Figure II-1: Yield From a Barrel of Oil and Relative Shares of Motor Fuel Consumption, 1990



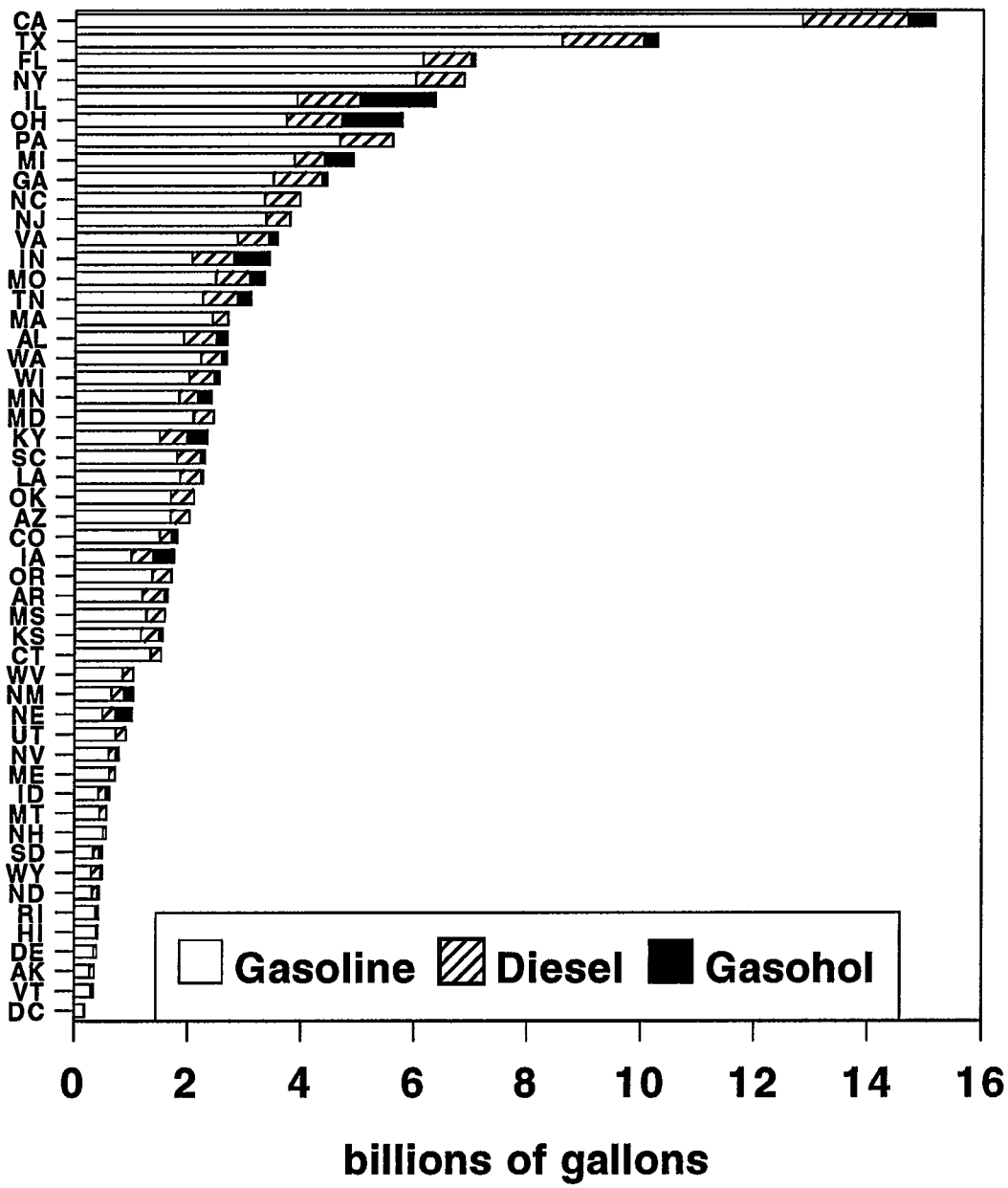
Source: DOE/EIA and Federal Highway Administration

Figure II-2
Motor Fuel Use by State, 1980



Source: Federal Highway Administration

Figure II-3
Motor Fuel Use by State, 1990



Source: Federal Highway Administration

TABLE 2-1: MOTOR FUEL CONSUMPTION BY STATE, 1980
(thousands of gallons)

State	Gasoline[a]	Special Fuels[b]	Gasohol[c]	Total[d]
Alabama	1,927,862	322,457	0	2,291,673
Alaska	176,508	46,132	0	217,986
Arizona	1,335,734	218,807	2,798	1,574,133
Arkansas	1,158,380	213,762	8,250	1,381,608
California	11,005,095	1,153,621	0	12,366,420
Colorado	1,495,944	141,087	3	1,620,720
Connecticut	1,313,106	104,213	15,849	1,414,690
Delaware	287,189	35,156	1,512	327,360
D.C.	168,308	17,293	124	169,045
Florida	4,782,182	498,560	14,359	5,445,006
Georgia	2,852,361	449,287	11,063	3,386,756
Hawaii	320,053	19,169	1,095	334,988
Idaho	485,977	55,085	0	535,022
Illinois	4,734,077	604,245	15,088	5,128,791
Indiana	2,619,601	577,215	0	3,247,318
Iowa	1,541,419	268,905	155,947	1,687,675
Kansas	1,290,742	232,972	37,786	1,556,303
Kentucky	1,731,216	247,928	4,763	2,023,850
Louisiana	2,053,329	288,967	0	2,324,312
Maine	513,146	57,474	2,634	579,803
Maryland	1,912,745	165,740	18,549	2,124,779
Massachusetts	2,239,015	185,113	16,209	2,471,139
Michigan	4,224,371	304,285	29,924	4,539,735
Minnesota	2,010,927	252,877	11,776	2,304,715
Mississippi	1,168,545	212,544	0	1,418,224
Missouri	2,563,018	359,091	0	2,988,253
Montana	457,299	98,615	158	570,076
Nebraska	835,791	145,923	30,067	1,008,003
Nevada	493,628	78,064	0	575,486
New Hampshire	408,329	27,956	3,642	427,045
New Jersey	3,157,473	340,076	6,567	3,578,999
New Mexico	738,984	167,771	0	904,586
New York	5,537,492	332,853	0	5,797,567
North Carolina	2,879,089	382,817	10,688	3,308,621
North Dakota	399,800	79,070	13,491	489,256
Ohio	4,924,878	707,286	16,726	5,722,020
Oklahoma	1,729,969	305,944	28,910	2,040,935
Oregon	1,332,274	243,414	0	1,369,326
Pennsylvania	4,691,130	705,190	0	5,422,835
Rhode Island	374,377	27,187	1,763	408,127
South Carolina	1,545,179	228,847	11,608	1,816,842
South Dakota	423,548	73,557	10,507	498,947
Tennessee	2,392,632	383,751	0	2,815,891
Texas	7,890,182	1,199,933	0	9,247,206
Utah	678,501	111,133	0	791,656
Vermont	236,677	29,771	0	241,926
Virginia	2,566,496	318,037	0	2,896,420
Washington	1,861,717	235,020	14,063	2,120,351
West Virginia	843,208	123,976	692	979,943
Wisconsin	2,155,685	304,702	0	2,511,462
Wyoming	372,469	93,962	611	464,738
TOTAL U.S.	104,837,657	13,776,840	497,222	119,468,570

[a]Excludes losses allowed for evaporation, handling, etc. Includes gasohol figures shown in this table.
[b]Represents gross gallons of special fuels (primarily diesel fuel with small amounts of liquified petroleum gas) reported by the state motor fuel tax agencies.
[c]Represents gross gallons of gasohol (ethanol blends) reported by the states. In states where gasohol is taxed at the same rate as gasoline, some gasohol gallonage may be commingled with gasoline data.
[d]Total excludes exports and military use, but includes 854,073 thousand gallons of gasoline losses allowed for evaporation and handling.
Source: Federal Highway Administration, "Highway Statistics, 1985," Tables MF-221, MF-224T, MF-225, MF-226, and MF-233GLA.

TABLE 2-2: MOTOR FUEL CONSUMPTION BY STATE, 1990
(thousands of gallons)

State	Gasoline[a]	Special Fuels[b]	Gasohol[c]	Total[d]
Alabama	2,114,554	571,091	197,856	2,687,978
Alaska	270,832	83,524	0	354,816
Arizona	1,694,334	331,071	0	2,025,405
Arkansas	1,248,553	385,802	62,004	1,646,990
California	13,166,741	1,852,610	479,716	15,152,394
Colorado	1,531,789	206,215	97,263	1,753,477
Connecticut	1,339,193	186,197	0	1,531,217
Delaware	346,730	53,266	0	400,047
D.C.	173,390	22,818	0	196,046
Florida	6,137,213	843,849	77,558	7,043,054
Georgia	3,573,671	867,436	88,672	4,439,053
Hawaii	382,770	25,795	0	412,308
Idaho	492,689	128,235	70,199	625,901
Illinois	5,200,780	1,095,000	1,341,148	6,348,313
Indiana	2,668,046	726,926	638,337	3,421,936
Iowa	1,362,766	375,714	374,897	1,752,245
Kansas	1,233,131	314,068	73,971	1,559,689
Kentucky	1,847,847	489,652	355,987	2,337,499
Louisiana	1,889,888	374,598	38,760	2,265,007
Maine	608,301	111,379	0	722,258
Maryland	2,036,369	354,729	0	2,445,934
Massachusetts	2,406,598	262,051	0	2,692,978
Michigan	4,293,491	534,548	510,447	4,901,888
Minnesota	2,056,804	334,510	244,336	2,412,090
Mississippi	1,252,411	328,349	0	1,593,411
Missouri	2,749,492	594,302	267,408	3,345,821
Montana	447,364	125,346	1,423	572,710
Nebraska	794,588	220,284	300,632	1,015,605
Nevada	645,271	132,136	49,167	783,955
New Hampshire	505,919	51,759	0	561,188
New Jersey	3,364,597	422,486	0	3,787,083
New Mexico	803,095	222,638	156,935	1,033,847
New York	5,971,939	859,646	0	6,856,604
North Carolina	3,333,266	627,675	0	3,964,316
North Dakota	350,707	93,125	35,821	443,832
Ohio	4,747,902	964,868	1,072,040	5,760,729
Oklahoma	1,695,341	412,127	0	2,107,468
Oregon	1,365,524	338,950	0	1,704,474
Pennsylvania	4,614,575	931,630	0	5,593,428
Rhode Island	377,590	40,827	0	420,421
South Carolina	1,859,473	422,625	62,549	2,287,383
South Dakota	389,115	100,902	60,000	493,973
Tennessee	2,494,386	607,875	246,713	3,102,261
Texas	8,842,370	1,426,255	247,384	10,268,653
Utah	721,491	180,927	485	909,706
Vermont	287,733	41,851	0	332,490
Virginia	3,018,984	544,963	161,202	3,564,325
Washington	2,305,401	363,028	86,847	2,674,159
West Virginia	843,858	192,826	0	1,038,415
Wisconsin	2,097,141	443,696	82,961	2,540,837
Wyoming	306,112	176,724	9,513	482,836
TOTAL U.S.	114,262,125	21,398,904	7,492,231	136,368,453

[a]Excludes losses allowed for evaporation, handling, etc. Includes gasohol figures shown in this table.
[b]Represents gross gallons of special fuels (primarily diesel fuel with small amounts of liquified petroleum gas) reported by the state motor fuel tax agencies.
[c]Represents gross gallons of gasohol (ethanol blends) reported by the states. In states where gasohol is taxed at the same rate as gasoline, some gasohol gallonage may be commingled with gasoline data.
[d]Total excludes exports and military use, but includes 707,424 thousand gallons of gasoline losses allowed for evaporation and handling.
Source: Federal Highway Administration, "Highway Statistics, 1990," Tables MF-21A, MF-25, MF-33GLA, and MF-21.

III. GASOLINE CONSUMPTION

Gasoline consumption rose steadily during 1962-72 and then erratically during 1973-78. The peak consumption attained in 1978 was almost equalled 11 years later, but still has not been surpassed (Figure III-1).

Gasoline consumption is seasonal, tending to peak in summer and reach bottom in winter. (Figure III-2). Demand also tends to be greater in periods of rising incomes.

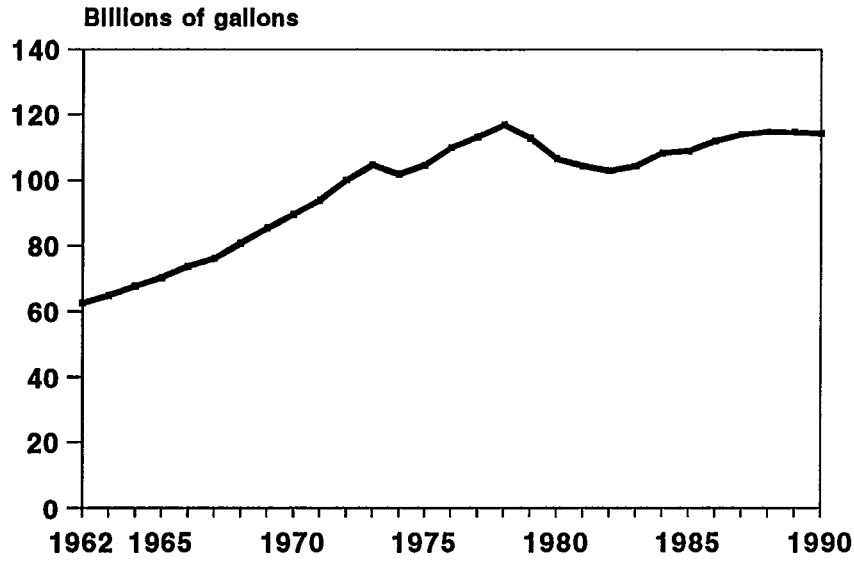
Unleaded regular gasoline has become the dominant fuel of choice over the last decade, accounting for about 65 percent of all motor gasoline consumption by 1990. Midgrade and premium unleaded fuels have supplanted leaded fuels. Since leaded regular commonly had an octane rating of 89 (the same as midgrade unleaded), the average octane of motor gasolines has been roughly constant. During 1985-90, unleaded midgrade became a significant fuel of choice in many states east of the Mississippi River.

Relative use of gasoline grades varies by area, with leaded regular still significant in the Rocky Mountain states and premium sales highest on the East Coast. Variability in use of unleaded regular is much smaller (Figure III-3). State-by-state consumption of unleaded gasolines for selected years is displayed in Figures III-4 through III-6.

Figure III-7 shows the decline of leaded gasolines from their position of dominance in 1975. In 1980 leaded regular still was the dominant grade of gasoline. Today the U.S. is a world leader in consumption of unleaded fuels.

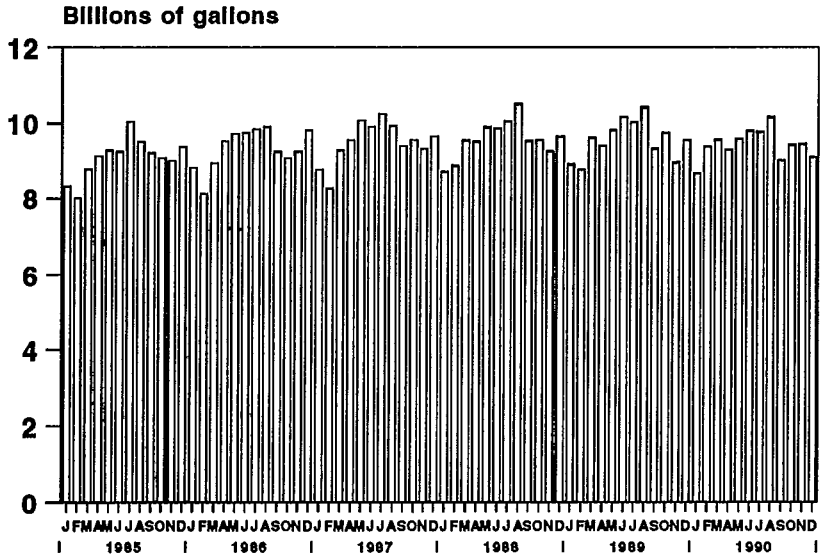
Self service dispensing became popular in the 1970s as most states repealed prohibitions of self service (Figure III-8). Today self service accounts for about 85 percent of sales (Figure III-9).

Figure III-1: Motor Gasoline Consumption, 1962-1990



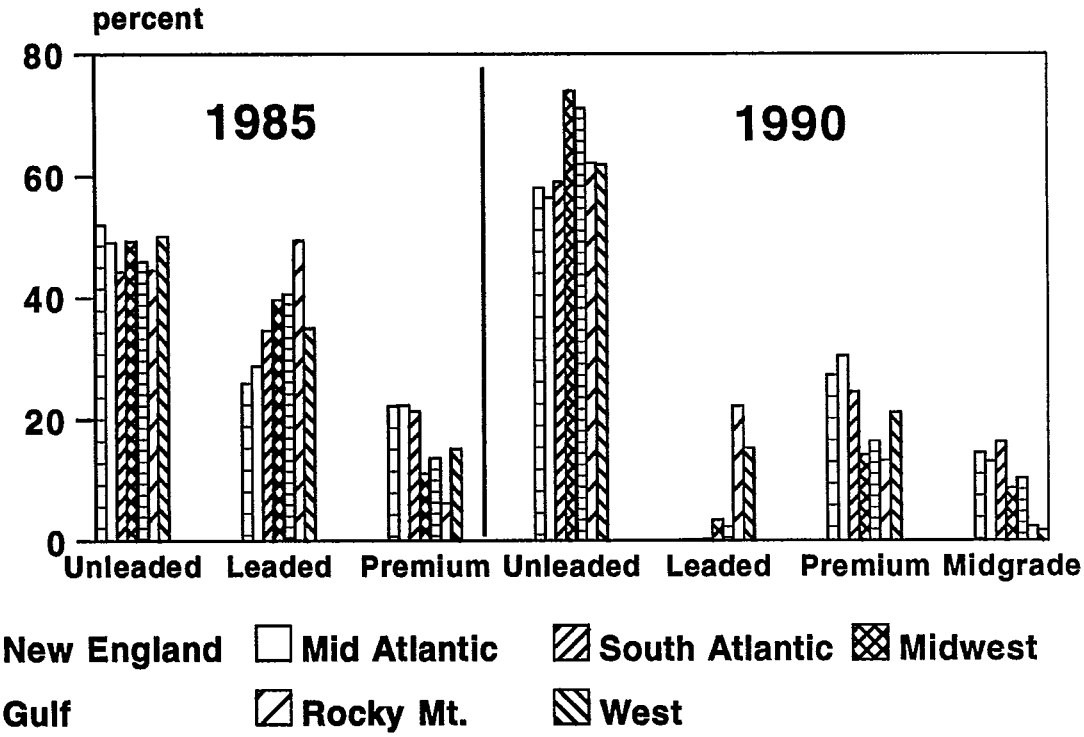
Source: Federal Highway Administration

Figure III-2: Monthly Gasoline Consumption, January 1985-December 1990



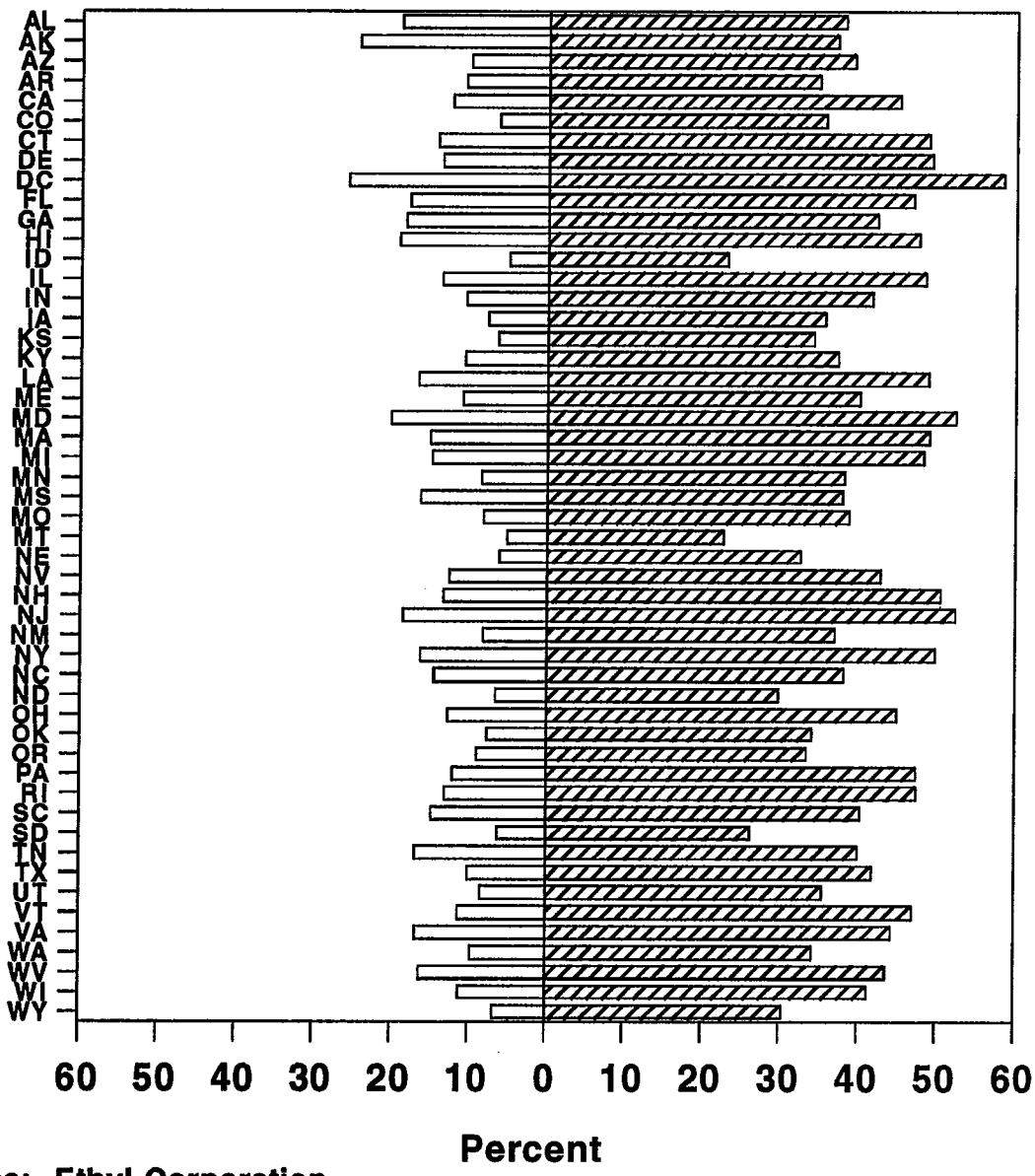
Source: Federal Highway Administration

Figure III-3: Regional Motor Gasoline Grade Shares, 1985 and 1990



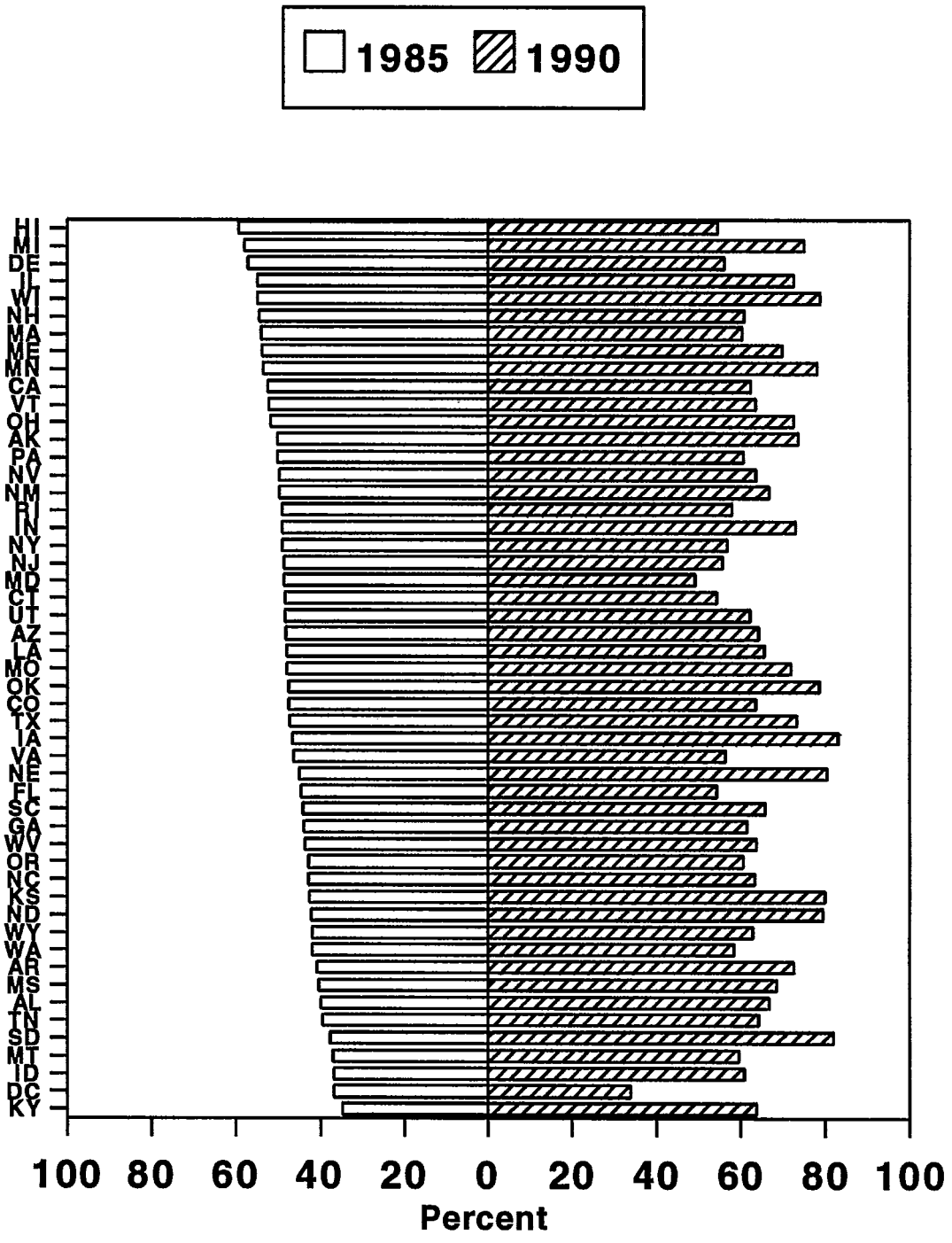
Source: DOE, "Petroleum Marketing Annual 1990."

Figure III-4
Unleaded Gasoline Use by State



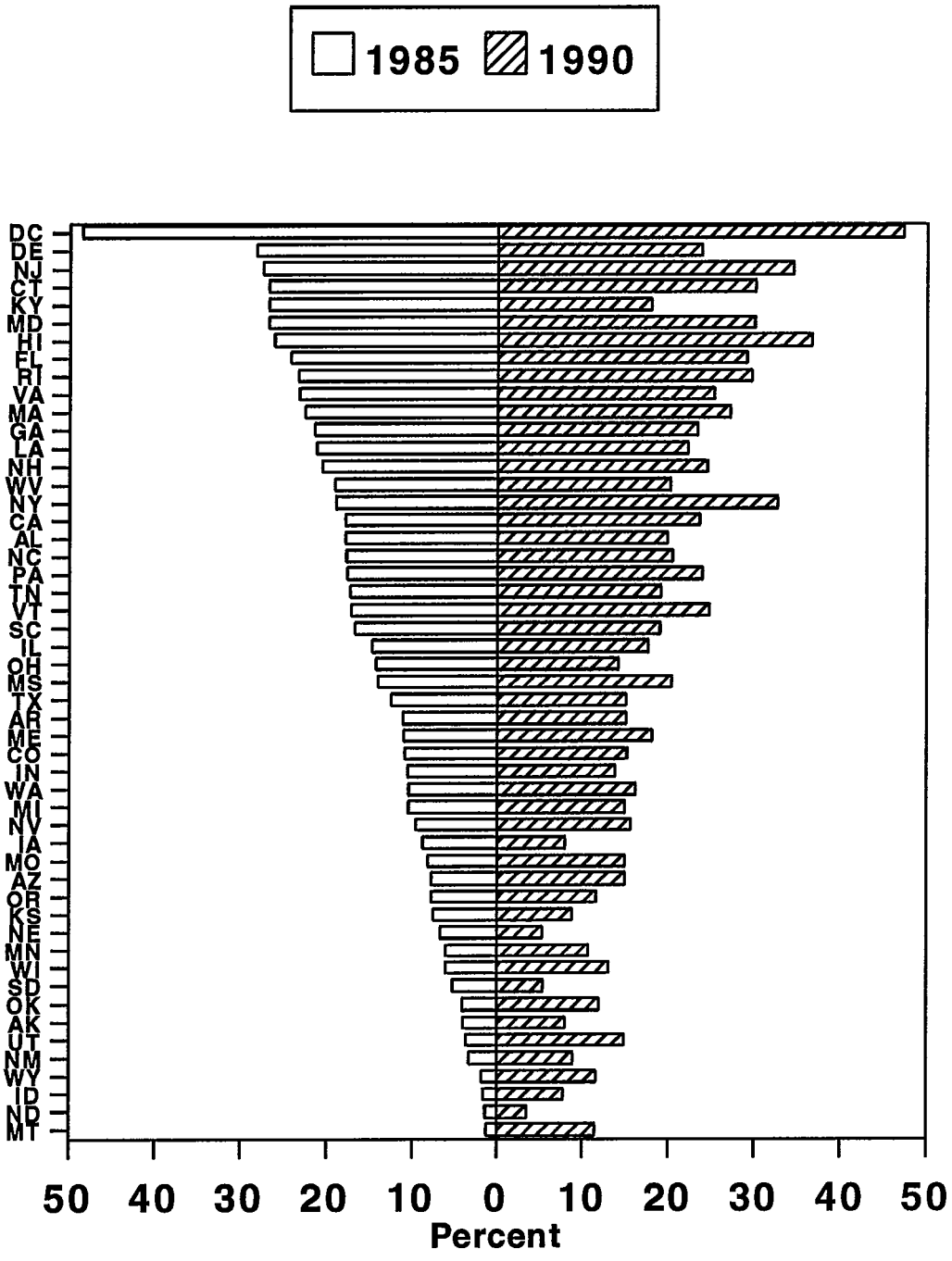
Source: Ethyl Corporation

Figure III-5:
Unleaded Regular Gasoline Use by State



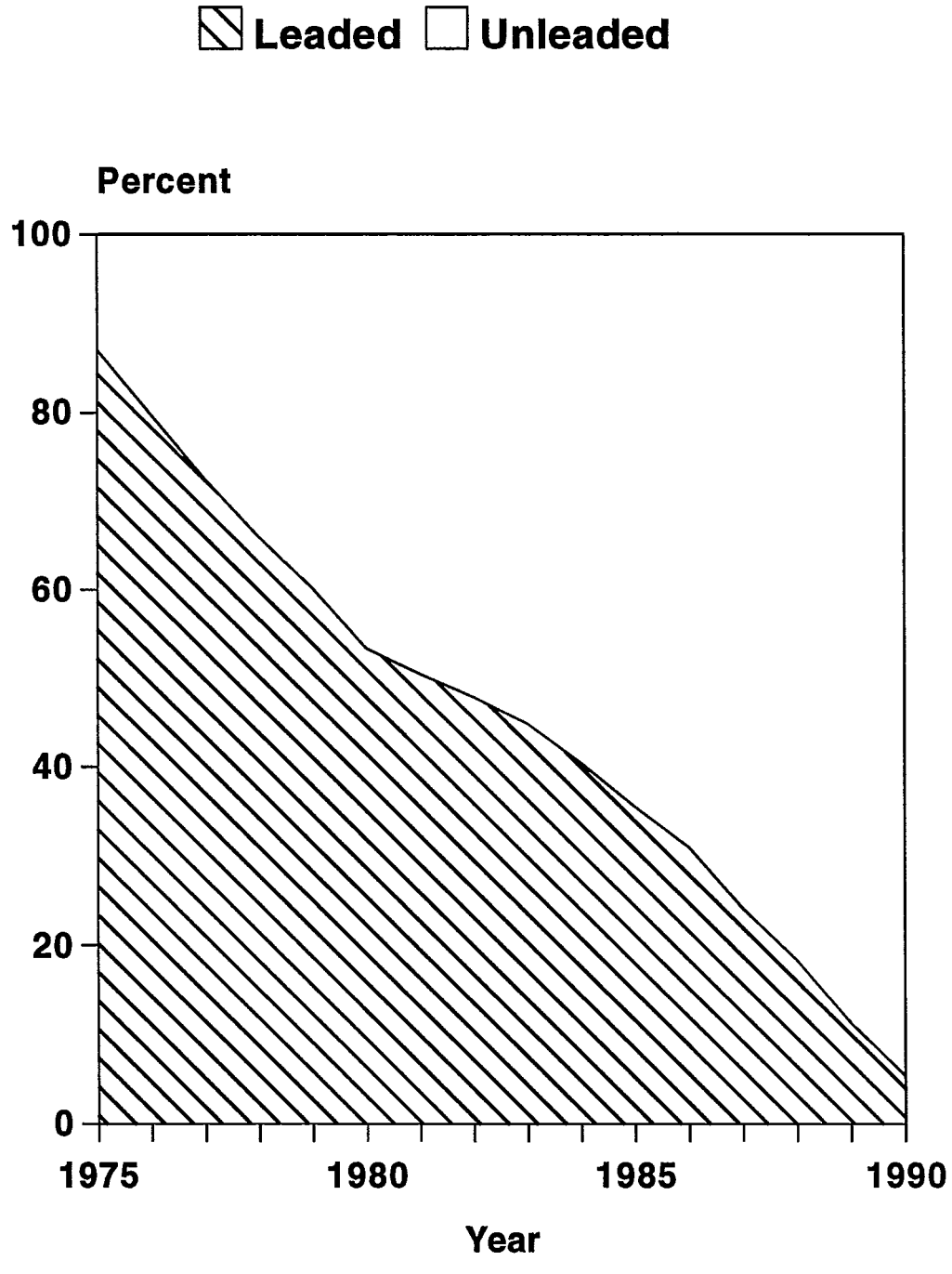
Source: DOE, "Petroleum Marketing Annual."

Figure III-6:
Premium Gasoline Use by State



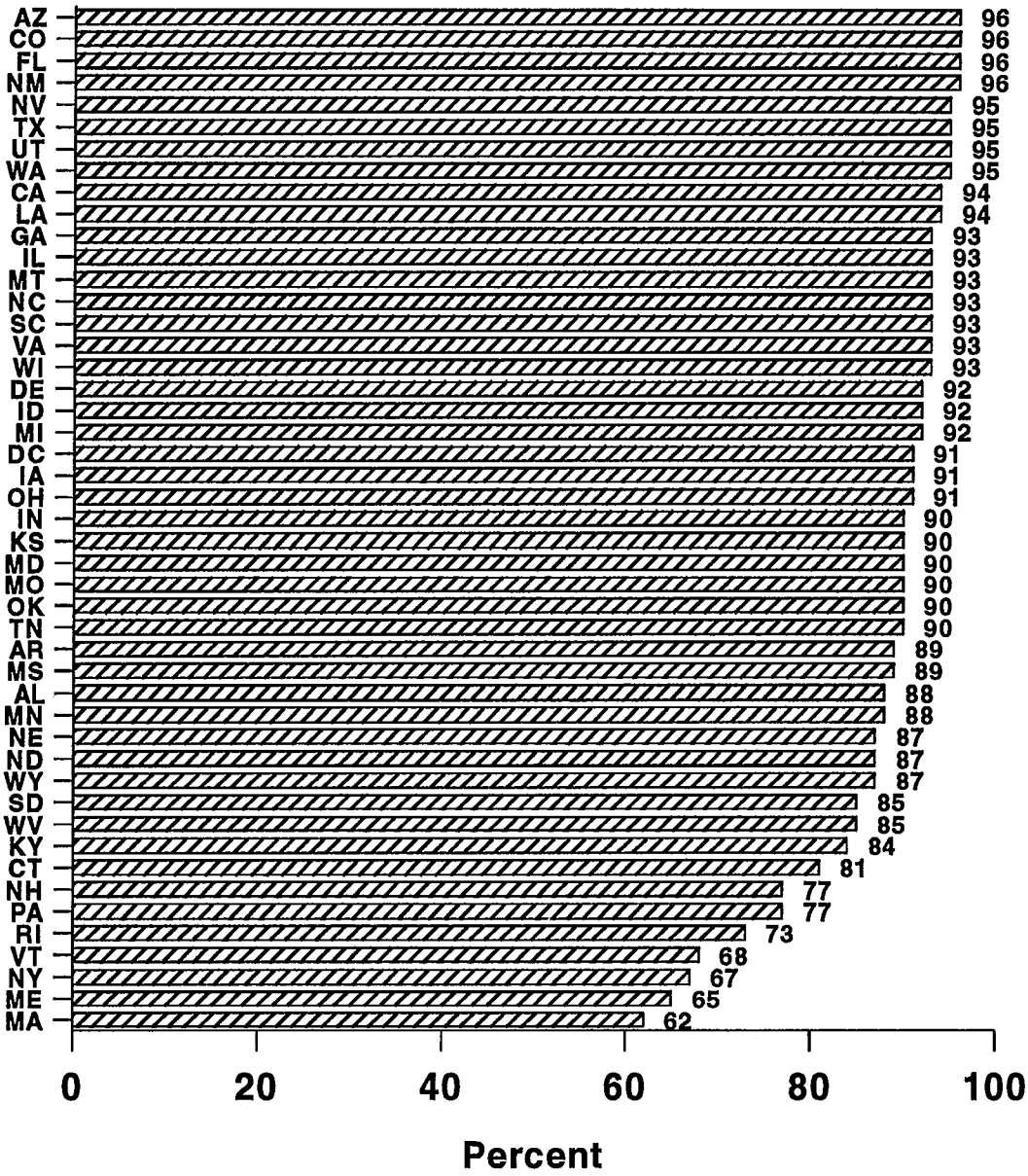
Source: DOE, "Petroleum Marketing Annual."

Figure III-7: Consumption of Leaded and Unleaded Motor Gasoline, 1975-1990



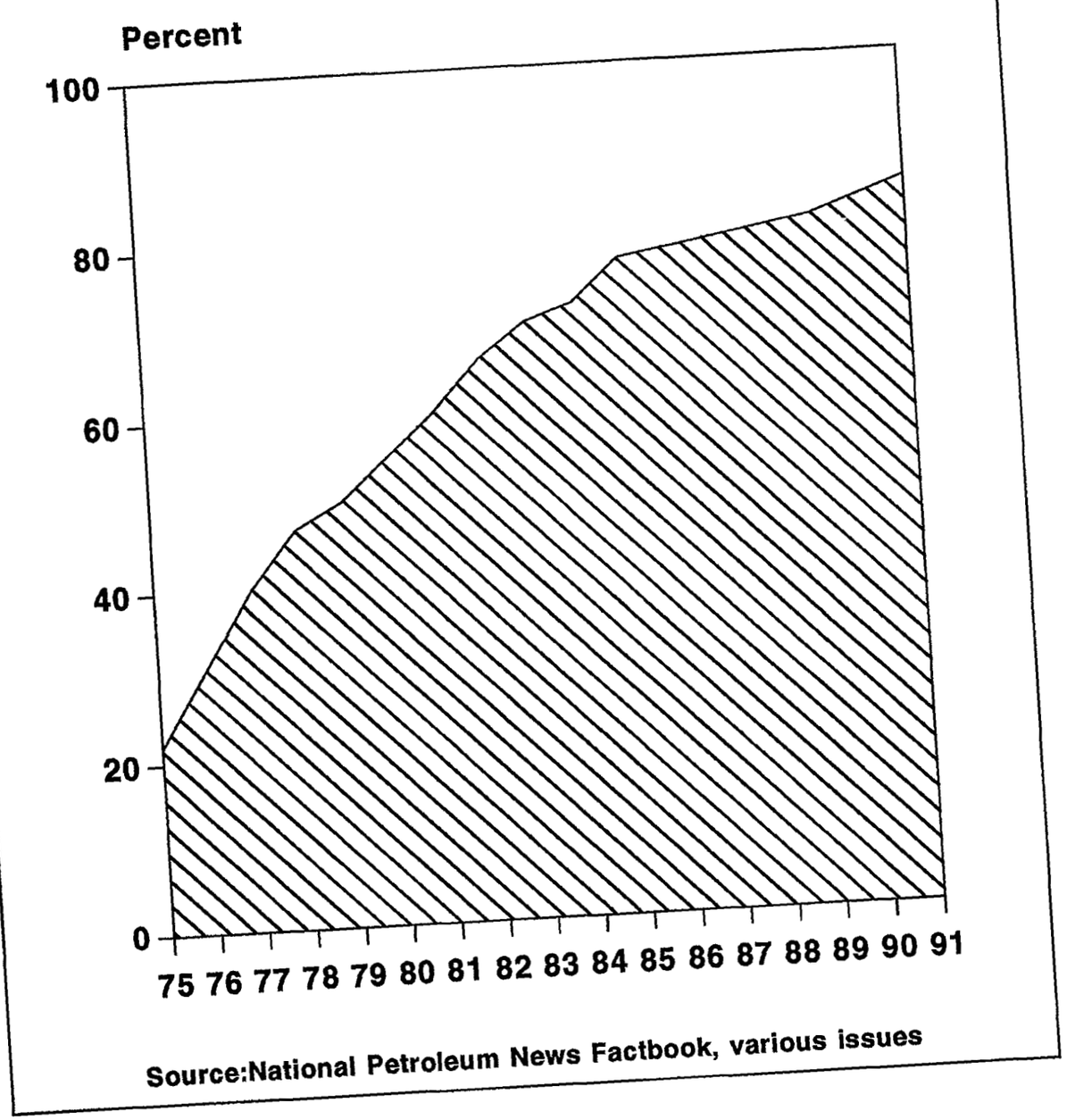
Sources: Ethyl Corporation and Department of Energy

Figure III-8: Self Service Motorist Gasoline Market Share By State,* 1991



*For states within the continental U.S., except Oregon and New Jersey which ban self-serve.
Source: Amoco Corporation, January 1992

Figure III-9: Self Service Motorist Gasoline Market Share, 1977-1991



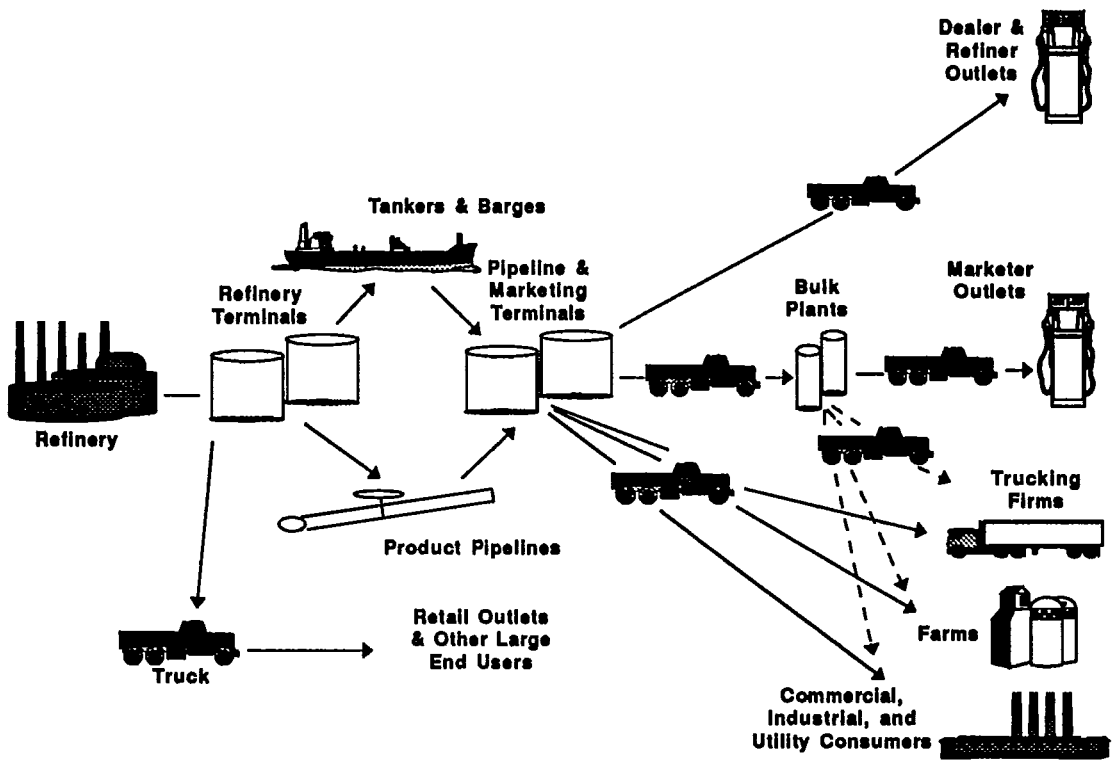
Source:National Petroleum News Factbook, various issues

IV. THE U.S. MOTOR FUEL DISTRIBUTION SYSTEM CONFIGURATION AND GEOGRAPHY

A motorist refilling his tank on an interstate highway probably has travelled a shorter distance than the gasoline he is purchasing. That gasoline likely was manufactured at a refining center hundreds or thousands of miles from the retail outlet, and transported by vessel or pipeline to terminals. Finally, it probably moved by tanker to the outlet's tanks.

The pictorial overview of the gasoline distribution system in Figure IV-1 underscores the prominent roles of storage and transportation. Each day the millions of barrels of gasoline manufactured and stored at refineries are successively broken down into smaller volume lots of each stage, fanning out to common carriers (e.g., pipelines), terminal operators, marketers, and dealers.

Figure IV-1: Gasoline Distribution System



Annual movements of gasoline among major regions (East Coast, Gulf Coast, Midwest, Rocky Mountains, West Coast) are shown in Figure IV-2. The arrows and associated numbers indicate direction and volumes. For example, 562 million barrels (24 billion gallons) of gasoline were shipped from Gulf Coast refineries to East Coast markets. The Midwest is the most connected region, receiving most supplies from its own refineries and supplementing these with purchases from the East, Gulf Coast, and Rockies. The West is the least connected.

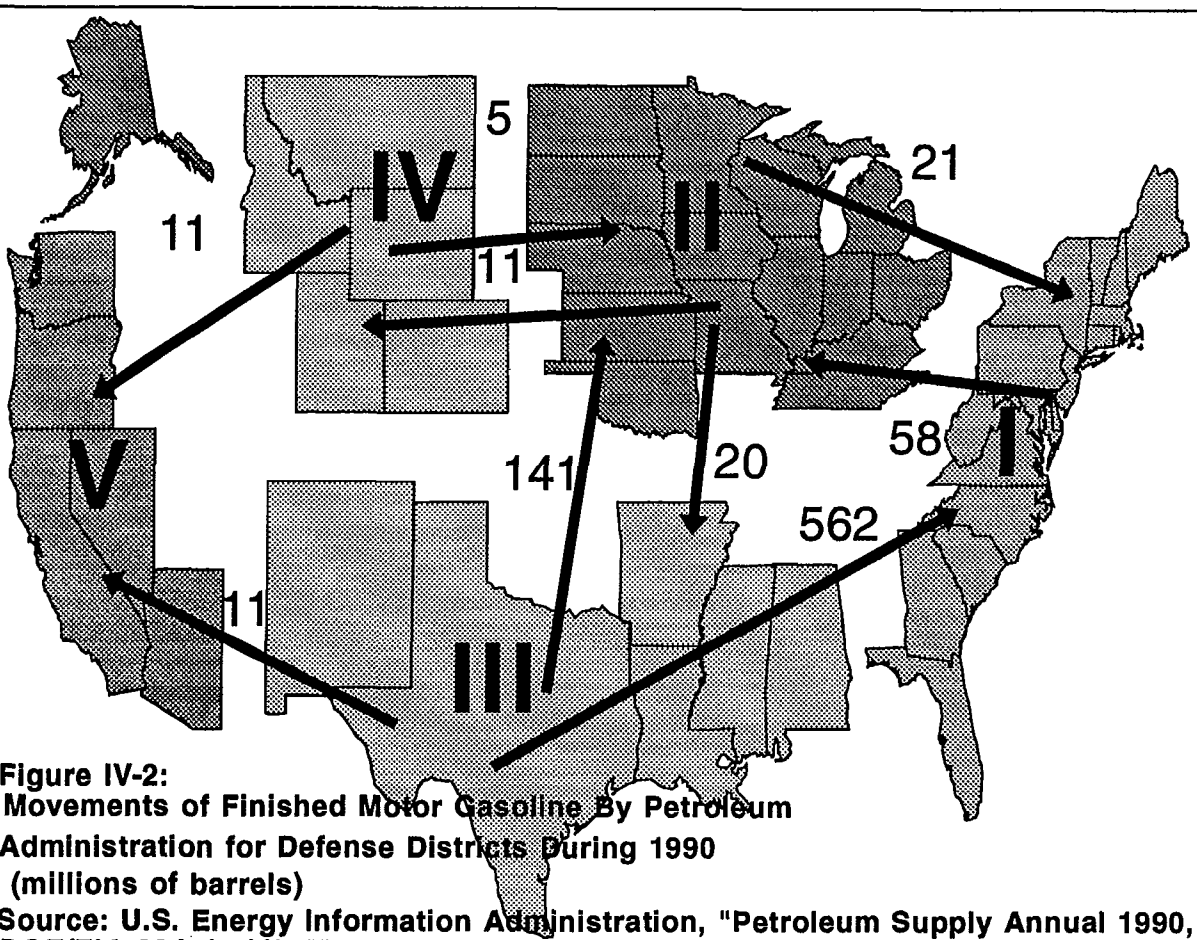
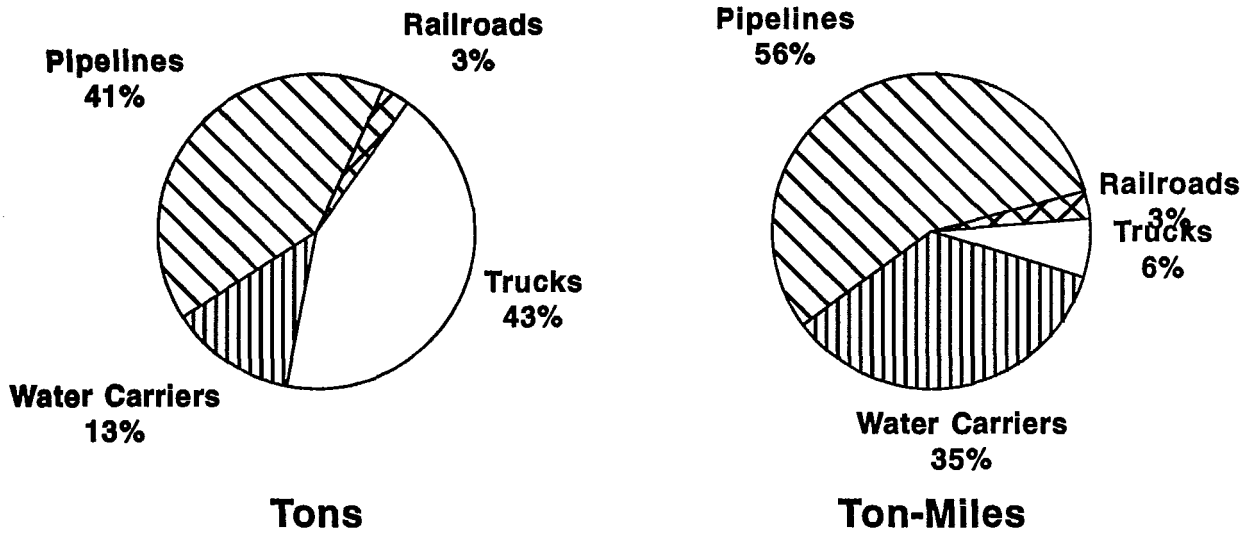


Figure IV-2:
Movements of Finished Motor Gasoline By Petroleum Administration for Defense Districts During 1990 (millions of barrels)
Source: U.S. Energy Information Administration, "Petroleum Supply Annual 1990," DOE/EIA-0340(90)/1, May 30, 1991, pp. 73-76.

Pipelines and trucks are the most important transport modes (Figure IV-3). Pipelines account for over one-half of ton-miles, meaning that they carry more tons more miles than any other mode. (Eight barrels of gasoline weigh about one ton.) Trucks are relatively dominant in terms of tonnage because they are the key mode between terminals and retail outlets. Pipelines are the least cost, least flexible (in respect to origin and destination), and slowest mode. Trucks are the highest cost, most flexible, and fastest mode. Water carriers and railroads usually are intermediate in all three respects.

The final stages of gasoline's journey are the movements from major metropolitan area marketing terminals to rural terminals (historically called bulk plants) and outlets, predominantly gasoline service stations, typically by tank truck. The last stage of distribution is that which most distinguishes gasoline from other fuels' distribution.

Figure IV-3: Relative Shares of Petroleum Products Transported by Mode, 1990



Source: Eno Foundation, "Transportation in America," 1991

Retail gasoline outlets are ubiquitous, in keeping with the wide dispersion of gasoline-powered cars and trucks. In contrast, vehicles requiring diesel and other fuels tend to be concentrated in fleets. Therefore, diesel fuel is predominantly dispensed at noncommercial outlets and travel stops catering to large trucks, whose gallonage sales tend to be several times greater than those of retail gasoline outlets. Even so, roughly one-fifth of motor fuel outlets offer diesel or other fuels.[1] This roughly corresponds to the proportion of motor fuel consumption that is not gasoline.

Improvements in cars' and trucks' performance have contributed to fewer full service stations and more larger volume motor fuel outlets which operate longer hours. Today's cars require less frequent maintenance and refueling stops than those of the 1950s and 1960s when many full service stations were constructed. The larger driveways and greater number of pumps at today's stations permit rapid self service for many motorists simultaneously, thus limiting congestion. The recent increase in 24 hour operation has further enabled consumers' convenience to be served with fewer stations. This transition has resulted in lower prices, due to storage and transportation cost savings, with no loss in convenience.

V. GASOLINE MARKET PARTICIPANTS, FACILITIES, INSTITUTIONS

A variety of participants, facilities, and institutions comprise the gasoline distribution system.

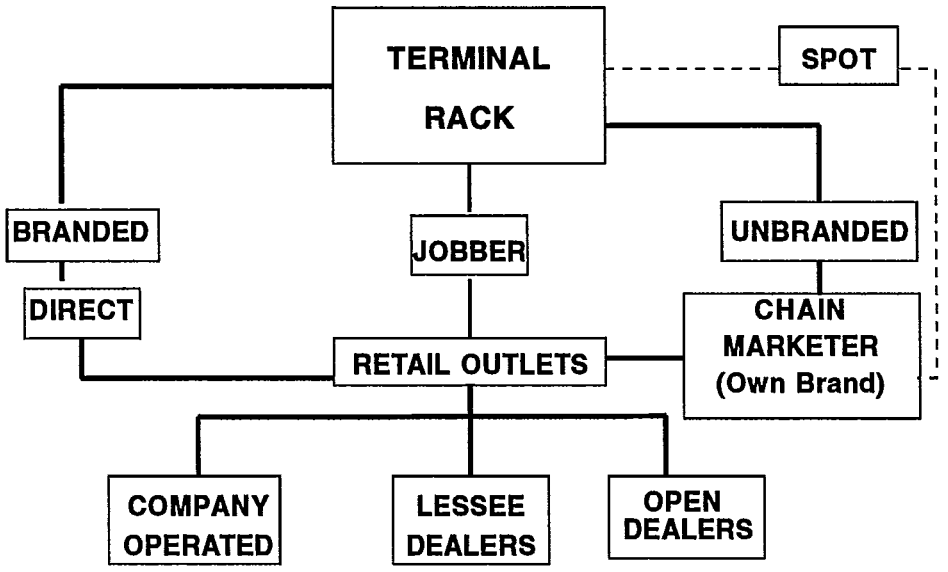
Principal Types of Participants in the Gasoline Distribution System

A myriad of firm types participate in gasoline markets. For example, importers and traders secure gasoline supplies from foreign refiners, transport these supplies by foreign tanker, and store them in port terminals managed by independent operators. Foreign oil producers manufacture gasoline in domestic refineries, shipping the gasoline through independently owned pipelines, barges, and trucks to jointly owned terminals and outlets.

The core of the distribution system comprises those participants who both buy and sell gasoline: traders, refiners, marketers, and dealers.

Traders buy and sell standard quality large volume lots (e.g., 40,000-250,000 gallons) in centrally located areas with informal auction markets. Traders' transactions represent spot market sales, which are sporadic with immediate or prompt delivery presumed (Figure V-1).

Figure V-1: Gasoline Distribution System



Refiners also buy and sell gasoline or gasoline components on spot markets. Usually refiners ship gasoline they have manufactured to marketing terminals for subsequent resale. Major refiners typically practice dual distribution, distributing (1) directly to large end users, their company operated stations, and dealer owned and/or operated stations; and, (2) indirectly to branded distributors (jobbers) and independent marketers. Independent refiners typically have few directly supplied dealers, but tend to rely more on company operated outlets and independent marketers to sell their products. Generally, the smaller the refiner, the greater the reliance on company operated stations.

Branded marketers (distributors, jobbers) typically sell major refiner gasolines through stations they own and through branded dealers they supply, but large end users also represent a significant share of sales. Branded marketers often distribute other products (e.g., heating oil), and usually have long term contracts with two or more major (brand) refiners. Independent marketers are distinguished from their branded counterparts by being larger, more prone to have their own company operated stations, more likely to own refineries or buy gasoline from independent refiners, and more likely to participate in spot markets.

Dealers typically own and/or operate one or a few stations and buy gasoline on a delivered basis. Their purchases are made under long term contract with a single supplier. Independent marketers bear more risk than dealers and manage this risk through multiple supply sources.

Distribution Channels for Major Companies and Marketers

Major oil companies are mainly manufacturers of gasoline who sell principally to marketers and dealers. As shown in Figure V-2, the 23 largest oil companies sell about 23 percent of their gasoline directly to ultimate consumers (15 percent through refiners' stations to motorists and 9 percent to large end users). Most sales are made to dealers (33 percent) and marketers (43 percent). Major oil companies sell 57 percent of their gasoline volumes directly (sum of large end users sales, dealer sales, and sales through refiner operated stations). These companies therefore sell 43 percent of sales to marketers. Dealers and marketers are independent businesses which buy and resell gasoline.

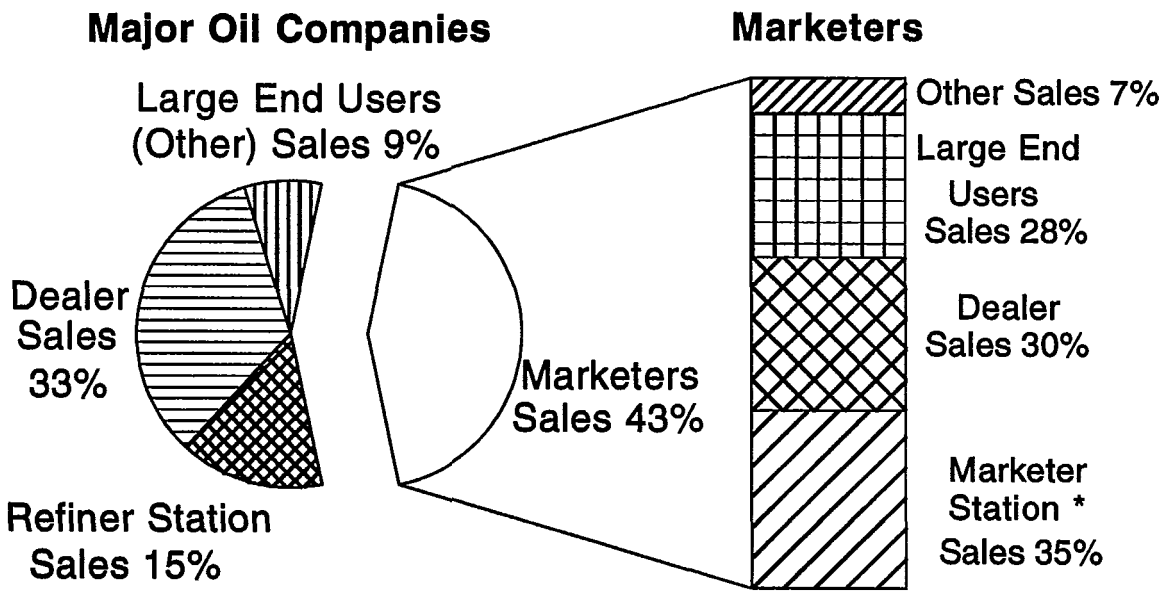
Marketers often are combination wholesalers and retailers. Sales to ultimate consumers comprise about 63 percent of marketer sales (sum of 35 percent through marketers' stations and 28 percent to large end users). Sales to dealers are 30 percent of marketers' total sales.

Major oil companies are similar to marketers in respect to dealer sales (33 percent vs. 30 percent). The biggest difference is in sales to ultimate consumers and reliance on company operated stations, where marketers lead major oil companies by 35 percent to 15 percent.

Major Functions Performed by the Principal Participants

Petroleum refiners manufacture and blend gasoline components into motor gasolines

Figure V-2: Distribution Channels for Major Companies and Marketers (1989)



***Includes cardlock**
Sources: U.S. DOE and Petroleum Marketers Association of America

suitable for today's cars. Only a small fraction of the gasoline sold today comprises straight-run gasoline derived from crude oil distillation. The principal ingredients of gasoline are components obtained from a series of sophisticated refining processes, which are supplemented by various blending agents and additives.

The blending of manufactured gasoline components at refineries seeks satisfaction of fuel performance requirements at least cost. For example, standard unleaded regular gasoline must meet government requirements for octane (a measure of resistance to engine knock) and vapor pressure (a measure of resistance to car stalling and starting problems). Specific brands of gasoline have additional attributes, e.g., capacity to limit or remove engine deposits, and sellers of brands may have stricter quality control requirements.

Consumers rely on industry standards and government requirements for products and information as minimum quality. Consumers further rely on brands for added characteristics and assurance of quality control. Brands enable gasoline manufacturers and blenders to benefit from quality control and improvements. A long series of incremental improvements, made

possible by branded supply, have contributed to the high quality of gasoline.

Pipeline and vessel operators move gasolines from refineries to major marketing terminals. These operations sometimes are joint ventures of refiners or other operators because their scale makes them uneconomic for a single firm. Yet there are independent refiners, pipelines, vessel operators, and terminal operators, many of whom rely mainly on contracts rather than joint ownership/operation.

Storage activities are performed by refineries and pipelines, but most storage occurs at marketing terminals in densely populated areas and bulk plants in sparsely populated ones. Trucking operators, some owned by or affiliated with refiners or marketers, move gasoline from terminals and bulk plants to retail outlets.

Marketers and refiners move gasoline from terminals to outlets and large end users. Marketers, mainly those serving rural areas, also operate bulk plants. Most marketers perform both wholesale and retail functions.

Lessee dealers operate retail outlets owned by their suppliers, selling gasoline, auto parts/services, etc. Open dealers commonly own their stations and perform similar retail functions. Traditional service stations, with full service and repair bays, mainly are dealer operated.

VI. THE U.S. GASOLINE PRICING SYSTEM

Gasoline prices vary "all the time" and "all over the place." They fluctuate in response to changes in seasons, economic conditions, and supply/demand balances in world oil markets. They differ by brand, grade, location, stage of distribution, participants, and terms of sale. Gasoline prices obey the logic of the competitive marketplace: prices equal costs (including competitive profits) in the long run and respond to demand and supply in the short run.[1]

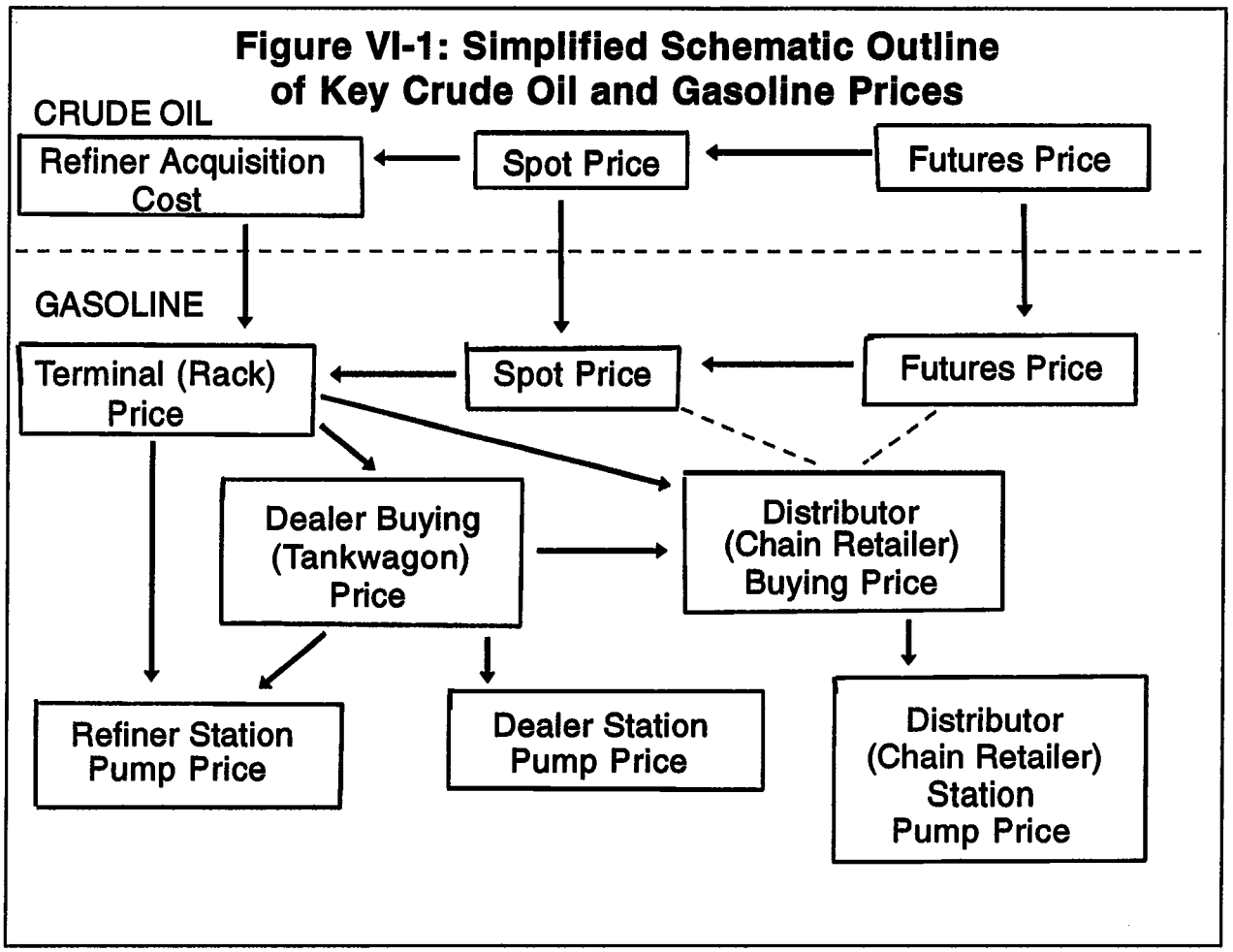
The system of gasoline prices is a human institution, which has evolved through the actions of hundreds of thousands of players over almost a century. It is the planning, organizing, and action mechanism of the U.S. gasoline business. Price changes and differences determine the what, when, where, how, and how much of gasoline manufacture, blending, storage, transportation, and distribution. For example, an increase in demand for gasoline in New Jersey which leads to an increase in that state's gasoline prices would be expected to induce increased manufacture of gasoline in that state and/or shipments of gasoline from other nations or the U.S. Gulf Coast. If the New Jersey price increase were promptly eliminated by modest drawdown of inventories, little change in local manufacture or long distance shipment would occur. If the hypothetical New Jersey price increase were limited to certain grades or retail markets, likely responses could be changes in local distribution patterns.

Prices of gasoline convey information in summary form. A sharp rise in New York spot prices, given no change in Gulf Coast spot prices, tells traders that gasoline has become scarcer in New York. The why of the relative price increase may be unknown, but this lack of understanding does not impede efficient market operation. Traders can immediately profit buying gasoline in the Gulf Coast and selling it in New York. Refiners can redirect shipments, terminal operators can adjust inventories, and marketers in affected areas can alter their purchasing patterns. Motorists need take no action to be assured of having their demands satisfied at competitive prices. Thus, to do its job the gasoline pricing system must have a structure, but one that is flexible and elastic. The retail/wholesale/manufacturing chain of prices must follow a structure based on costs in the long run, but also flex and stretch to accommodate demand and supply circumstances in the short run.

A schematic overview of gasoline prices from the wellhead to the pump is given in Figure VI-1. At the top are crude oil prices, which are the principal factor determining gasoline prices. The refiner's acquisition cost of crude oil includes the price of the oil itself and costs of storage and transportation.

Spot and futures prices are prices in auction markets, where the trading units are lots of 40,000 or more gallons with specified time and place of delivery. These auction market prices are highly volatile. Therefore, participants face large risks. Spot gasoline prices are indicators of the manufactured cost of a gallon of gasoline at major producing or import centers, but they also are leading indicators of general price trends. Thus, spot gasoline prices are pivotal in indicating both cost conditions and demand circumstances.

Terminal rack prices are prices paid by fuel truck operators for lots of 8,000-9,000 gallons picked up at marketing terminal loading racks, where brand-specific gasoline



additives are added. Rack prices for unbranded gasolines closely follow spot prices. Rack prices for branded gasolines are slightly less sensitive to spot prices.

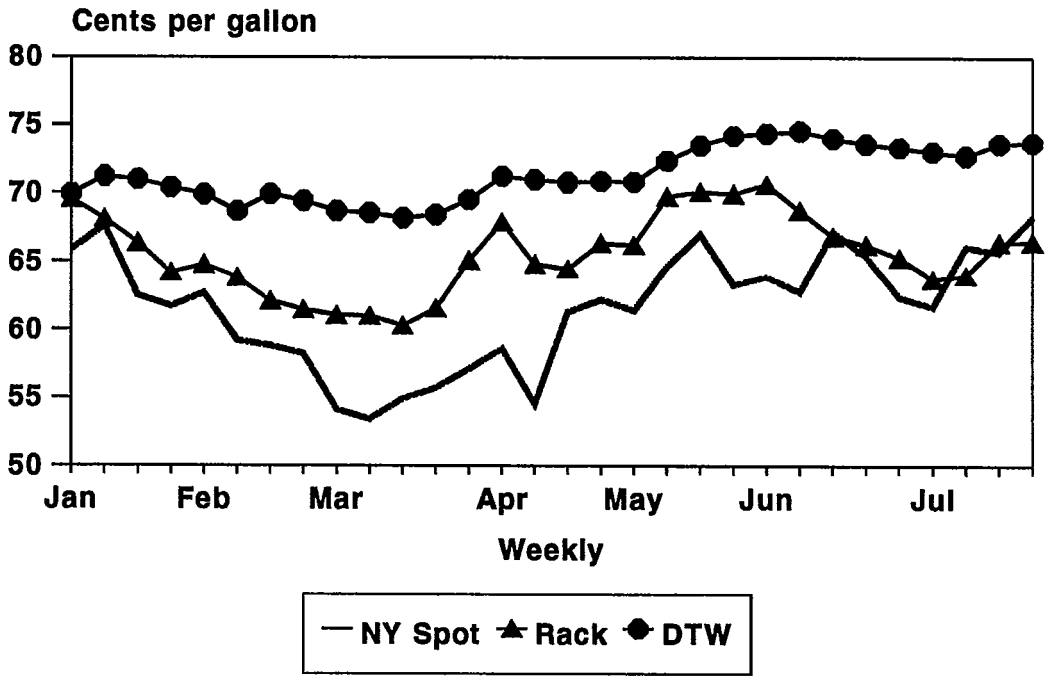
Discounts of various kinds from rack prices for distributors under contract to refiners are common. Moreover, some large independent marketers purchase gasoline in spot and futures markets. Therefore, the average marketer buying price often is less than published rack prices.

The dealer buying price is the price paid for lots of about 8,000-9,000 gallons of gasoline delivered to the dealer's retail outlet. This price also is subject to various discounts, but usually is more than the rack price. The dealer buying price is the least volatile (lowest risk) wholesale gasoline price. See Figure VI-2.

Retail (pump) prices include taxes and also vary according to local demand and cost conditions.

Table 6-1 displays key prices for two grades of gasoline by stage of distribution during 1990. Average New York spot prices were 73.01 cents per gallon for unleaded

Figure VI-2: DTW, Rack, and New York Spot Market Prices for Regular Unleaded Gasoline, January - July 1990



Sources: Weekly nationwide average dealer tank wagon prices, nationwide rack prices, and New York spot market prices as reported weekly by "The Oil Daily."

regular, slightly below average terminal rack prices of 75.57 per gallon. The average price for unleaded regular gasoline delivered to stations was 81.15 cents per gallon, yielding a wholesale margin of 5.58 cents per gallon to cover storage and transportation costs between the marketing terminal and the retail outlet. Since taxes in 1990 were 27 cents per gallon the difference between retail and DTW prices implied for 1990 a retail margin of 8.25 cents per gallon on unleaded regular.

The principal cause of fluctuations in gasoline prices is variability in crude oil costs to refiners. Figure VI-3 traces movements in average wholesale gasoline prices and refiners' costs of crude oil during November 1985 to October 1991.

TABLE 6-1
KEY GASOLINE PRICES BY STAGE OF DISTRIBUTION, 1990
(cents per gallon)

Stage	Unleaded Regular	Unleaded Premium
Spot[a]	**73.01**	**79.43**
Rack[b]	**75.57**	**86.06**
Majors	75.85	87.79
Other Majors	75.27	84.99
Large Independents	75.01	84.67
Small Independents	75.53	84.61
DTW[c]	**81.15**	**93.26**
Retail	**116.40**	**134.90**

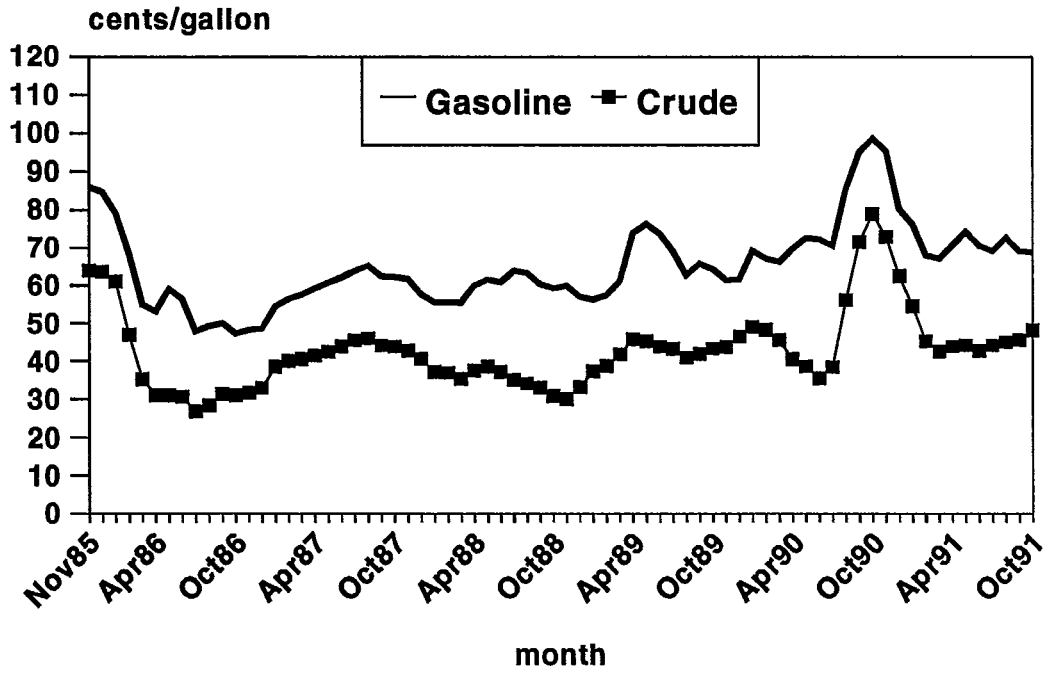
[a]New York spot.

[b]Weighted average nationwide rack. The "Large Majors" group (as defined by *Oil Daily*) includes Amoco, BP America, Chevron, Exxon, Mobil, Shell, Texaco; the "Other Majors" group includes Arco, Ashland, Citgo, Conoco, Marathon, Phillips, Sun, and Unocal; "Large Independents" group includes Atlantic, Champlin, Coastal, Fina, Getty, Gulf/Cf, Hess, Kerr-McGee, Koch, Murphy, Diamond Shamrock, Tosco, and Total; the "Small Independents" group is comprised of Crown-Central, Farmland, Phibro, Louisiana Land, Mapco, Pennzoil, Sinclair, Dreyfus, and United.

[c]Nationwide DTW.

Sources: *Oil Daily*, weekly issues, 1990; and the Bureau of Labor Statistics printouts, "Gasoline Average Prices Per Gallon, U.S. City Average and Selected Areas." The reported prices are derived from representative samples of retail gasoline outlets and include prices paid for full-serve, self-serve and minimum serve sales. These prices include all federal, state and local taxes paid at the time of sale.

Figure VI-3: Refiner Average Wholesale Prices for Gasoline, and Refiner Crude Oil Acquisition Costs, Nov'85-Oct'91



Source: Petroleum Marketing Monthly

VII. MOTOR GASOLINE PRICES AND TAXES

A. The Approximate Major Components of Gasoline Prices

The average retail price of gasoline has four major components: the refiner's cost of crude oil, manufacturing costs, gasoline storage/transport/marketing costs, and excise taxes. (These are long run average costs, including competitive profits, as indicated by prices.) Table 7-1 shows the magnitudes of these components in cents per gallon, on average during 1990. Crude oil costs and taxes are shown to be the dominant components of retail gasoline prices. Figure VII-1 shows that together these two components accounted for approximately two-thirds of the average retail price of gasoline in 1990.

TABLE 7-1
APPROXIMATE MAJOR COMPONENTS OF GASOLINE PRICES, 1990

Average Retail Prices	$1.22
Excise Taxes	.27
Refining/Manufacturing Cost	.19
Storage/Transportation/ Marketing Costs	.22
Crude Oil Costs	.54

Sources: The average retail price for 1990 is from the Bureau of Labor Statistics printouts, "Gasoline Average Prices Per Gallon, U.S. City Average and Selected Areas." Excise taxes include federal taxes of 9 cents per gallon through November and 14 cents per gallon in December, and a weighted average state tax estimate based on state gasoline consumption records of 17.5 cents per gallon. Local taxes are excluded but additional state sales taxes on motor fuel levied by some states are included. Tax data are obtained from "State Tax Guides" and from inquiries to state and local government tax divisions and departments of revenue. State motor fuel consumption data are from the Federal Highway Administration, "Monthly Motor Fuel Reported by States." Refining/manufacturing costs are a combination of various costs not easily allocable and thus are rough approximations. Storage/Transportation/ Marketing costs are from estimates provided by R. Dougher and R. Jones, "Gasoline Distribution and Service Station Margins: An Assessment of EPA Assumptions and Implications for Methanol," American Petroleum Institute *Research Study #055*, September 1990. The crude oil costs represent a monthly average estimate based on the following sources: the crude oil cost for January through October represents the average (domestic and imported) crude oil refiner acquisition cost cited in *The Petroleum Marketing Monthly*, DOE/EIA0380-(91/01), January 1991; and the crude oil cost for November and December are estimates based on daily West Texas Intermediate Crude prices cited in *The New York Times*, Business Section, Table 4-1.

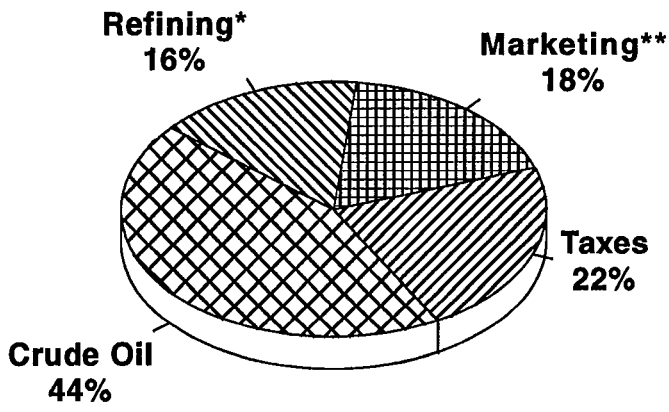
B. Crude Oil Costs and Gasoline Prices

Changes in the retail price of gasoline roughly parallel changes in refiner crude oil acquisition costs. However, over the past decade, the difference between the price paid for gasoline by the consumer at the pump and the price paid by refiners for the crude to make the gasoline has narrowed.

Closure of less efficient refineries and efficiency improvements in the gasoline distribution system have contributed to the decline in the price spread between the refiner's crude costs and the net of tax retail price for gasoline. This spread is illustrated in Figure VII-2. Between 1981 (when gasoline price and allocation controls were lifted) and 1991 the spread declined from 55 cents per gallon (measured in 1991 dollars) to 42 cents per gallon.

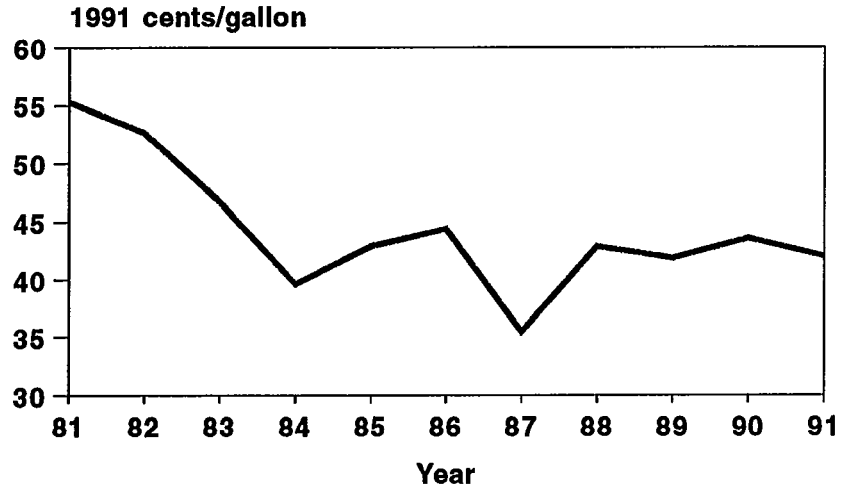
Despite the close correlation between changes in crude oil costs and changes in retail gasoline prices, there is a widespread belief that, in response to changes in the price of crude oil, retail prices of gasoline rise faster than they fall.[1] This hypothesis

Figure VII-1. Approximate Major Cost Components of Gasoline Prices, 1990



*Includes crude oil refining, gasoline manufacturing, and blending costs.
**Includes storage, transportation, and marketing costs.
Sources: Same as Table 7-1.

Figure VII-2: Price Spread Between Refiner Crude Oil Acquisition Costs and Retail Motor Gasoline Prices (Net of Taxes), 1981-1991*



*First 9 months
Sources: BLS, "U.S. City Average Prices" for all types of gasoline and service; API, "State Motor Fuel Tax Rates for Highway Use;" and EIA, "Monthly Energy Review," December 1991.

was tested by D. Norman and D. Shin [API, 1991] using an economic model of price adjustment.[2] The statistical results of the model indicated that gasoline prices decline at the same rate as they increase in response to changes in the price of crude oil or in wholesale prices. This result held even for price intervals as short as one week. Thus, contrary to the perceptions of some observers, changes in gasoline prices are equally responsive to both increases and decreases in crude oil prices. However, the response typically lags, in both directions.

C. Gasoline Taxes

1. Background

The first gasoline excise tax was levied in Oregon in 1919 at the rate of 1 cent per gallon. Within ten years every state and the District of Columbia had adopted a gasoline tax. The proceeds from these taxes soon became an important source of revenue for many states, and were used not only to help build and repair highways, roads, and bridges (their principal use today), but also to finance non-transportation uses, such as schools, unemployment relief, and other general governmental functions.[3]

The federal government did not adopt a gasoline tax until 1932 when, in the midst of the Great Depression, Congress passed a gasoline tax of 1 cent per gallon as a "temporary" measure because "the whole structure of government would perish if the budget was not balanced."[4] Sixty-eight years later, in December 1990 when federal motor gasoline taxes increased for the seventh time--rising from 9.1 to 14.1 cents per gallon--Congress designated half of the increase be used to reduce the federal deficit.

2. Composition of Motor Gasoline Taxes

A wide variety of motor gasoline taxes are levied throughout the nation. In addition to federal and state gasoline taxes, numerous counties and cities impose gasoline taxes as well. A number of states and numerous localities also levy additional taxes on the sale of gasoline, such as sales taxes, gross receipts taxes, rapid transit taxes, home rule taxes, underground storage tank taxes, and even earthquake taxes. Most published estimates of gasoline taxes typically exclude county and city gasoline taxes, as well as additional applicable state and local taxes. For this reason, most estimates significantly underestimate the amount of taxes paid on the sale of a gallon of gasoline.

3. Federal and State Motor Gasoline Taxes

As of April 1992, state motor gasoline taxes ranged from 7.5 cents per gallon in Georgia to 26 cents per gallon in Rhode Island and Connecticut. The national average state tax was 17.5 cents per gallon. Additional applicable state taxes ranged from 3.3 cents per gallon in Hawaii and Michigan to 17.9 cents per gallon in New York. Adding these other applicable state taxes and weighing the state totals by each state's gasoline consumption record raises the national average to 19.5 cents per gallon.

Table 7-2 shows state and federal gasoline taxes and other additional state taxes applied to gasoline sales as of April 1992. The total average for the nation is 33.6 cents per gallon. The average for each state is ranked in descending order and illustrated in Figure VII-3. Connecticut is shown to have the highest gasoline taxes (43.7 cents per

TABLE 7-2: STATE AND FEDERAL GASOLINE TAXES AS OF APRIL 1992
(cents per gallon)

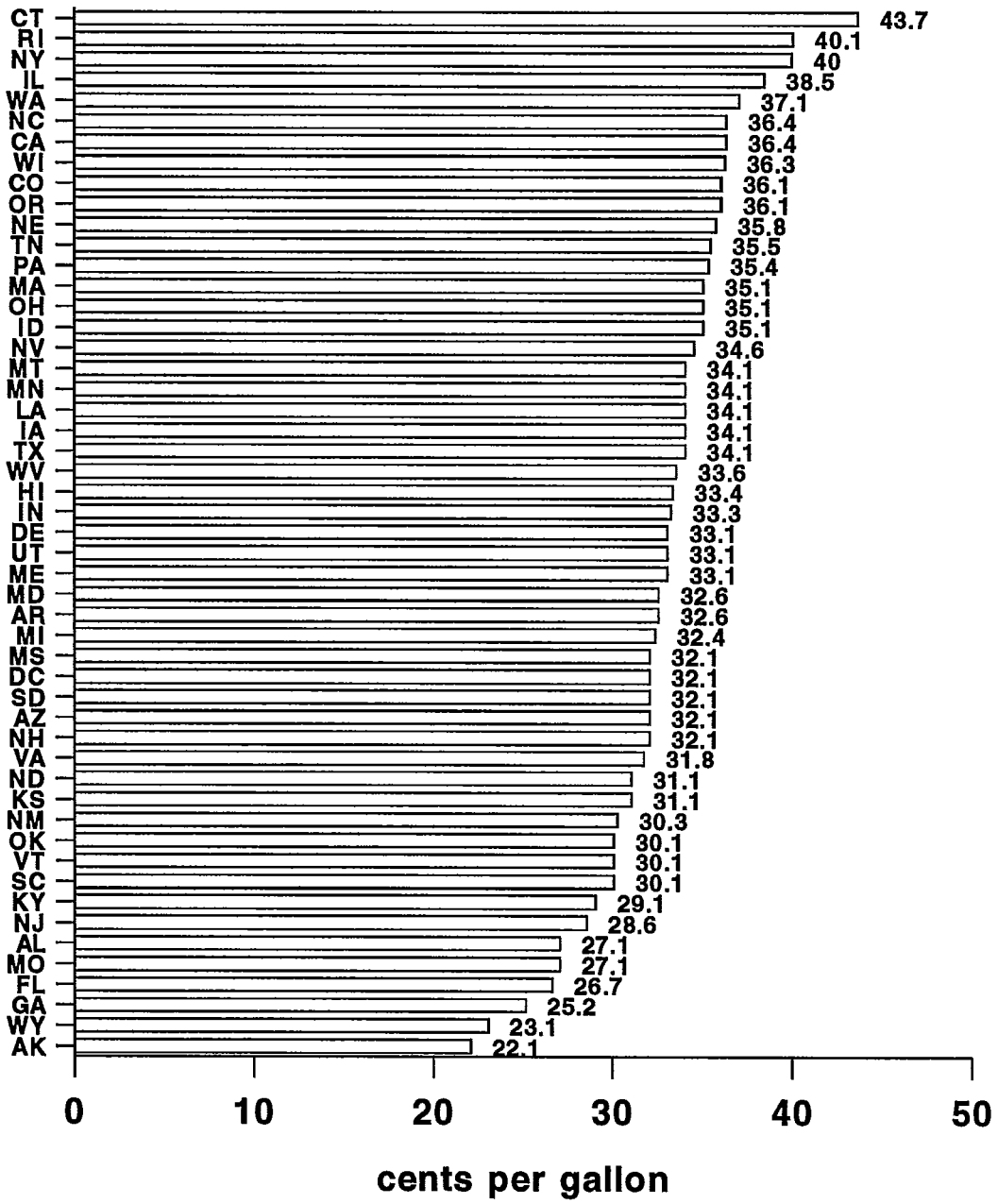
State	State Excise Tax	Other State Taxes[1]	Total State	Total Federal & State Taxes[2]
Alabama	13.0		13.0	27.1
Alaska	8.0		8.0	22.1
Arizona	18.0		18.0	32.1
Arkansas	18.5		18.5	32.6
California	15.0	7.3	22.3	36.4
Colorado	22.0		22.0	36.1
Connecticut	26.0	3.6	29.6	43.7
Delaware	19.0		19.0	33.1
D.C.	18.0		18.0	32.1
Florida	12.6		12.6	26.7
Georgia	7.5	3.6	11.1	25.2
Hawaii	16.0	3.3	19.3	33.4
Idaho	21.0		21.0	35.1
Illinois	19.0	5.4	24.4	38.5
Indiana	15.0	4.2	19.2	33.3
Iowa	20.0		20.0	34.1
Kansas	17.0		17.0	31.1
Kentucky	15.0		15.0	29.1
Louisiana	20.0		20.0	34.1
Maine	19.0		19.0	33.1
Maryland	18.5		18.5	32.6
Massachusetts	21.0		21.0	35.1
Michigan	15.0	3.3	18.3	32.4
Minnesota	20.0		20.0	34.1
Mississippi	18.0		18.0	32.1
Missouri	13.0		13.0	27.1
Montana	20.0		20.0	34.1
Nebraska	21.7		21.7	35.8
Nevada	20.5		20.5	34.6
New Hampshire	18.0		18.0	32.1
New Jersey	10.5	4.0	14.5	28.6
New Mexico	16.2		16.2	30.3
New York	8.0	17.9	25.9	40.0
North Carolina	22.3		22.3	36.4
North Dakota	17.0		17.0	31.1
Ohio	21.0		21.0	35.1
Oklahoma	16.0		16.0	30.1
Oregon	22.0		22.0	36.1
Pennsylvania	12.0	9.3	21.3	35.4
Rhode Island	26.0		26.0	40.1
South Carolina	16.0		16.0	30.1
South Dakota	18.0		18.0	32.1
Tennessee	21.4		21.4	35.5
Texas	20.0		20.0	34.1
Utah	19.0		19.0	33.1
Vermont	15.0	1.0	16.0	30.1
Virginia	17.7		17.7	31.8
Washington	23.0		23.0	37.1
West Virginia	15.5	4.0	19.5	33.6
Wisconsin	22.2		22.2	36.3
Wyoming	9.0		9.0	23.1
AVERAGE TAX	17.5		19.5	33.6

[1] Excludes local county and city taxes. Includes state sales taxes, gross receipts taxes, and underground storage tank taxes. State sales taxes, expressed in cents per gallon, are based on the national average retail price of regular gasoline of 112.2 cents per gallon, excluding federal and state excise taxes.

[2] Includes 14 cents federal excise tax, 0.1 cents leaking underground storage tank (LUST) tax, and weighted average U.S. state taxes based on state gasoline consumption records.

Sources: API State Government Relations Department, "State Gasoline Excise Taxes Ranking-April 8, 1992;" the U.S. Bureau of Labor Statistics, "Gasoline Average Prices Per Gallon, U.S. City Average and Selected Areas;" and the Federal Highway Administration," Monthly Motor Fuel Reported by States."

Figure VII-3: State and Federal Motor Gasoline Taxes as of April 8, 1992



gallon) and Alaska the lowest (22.1 cents per gallon).

Taxes on diesel fuel tend to be similar to taxes on gasoline, while gasohol receives various tax exemptions.

4. Taxes for Selected Major Metropolitan Areas

The impact of additional local taxes in some key metropolitan areas as of July 1, 1991 is shown in Table 7-3. Additional local taxes are shown to have a significant impact, often doubling the amount paid. For example, gasoline taxes in Albany, New York are over 44 cents per gallon, but typically references to gasoline taxes in New York cite only the 8 cent per gallon state motor fuel tax and the 14.1 cent per gallon federal tax.

Similarly, in Chicago, gasoline taxes amount to more than 54 cents per gallon.

TABLE 7-3
MOTOR GASOLINE TAXES IN SOME KEY METROPOLITAN AREAS
AS OF JULY 1991
(cents per gallon)

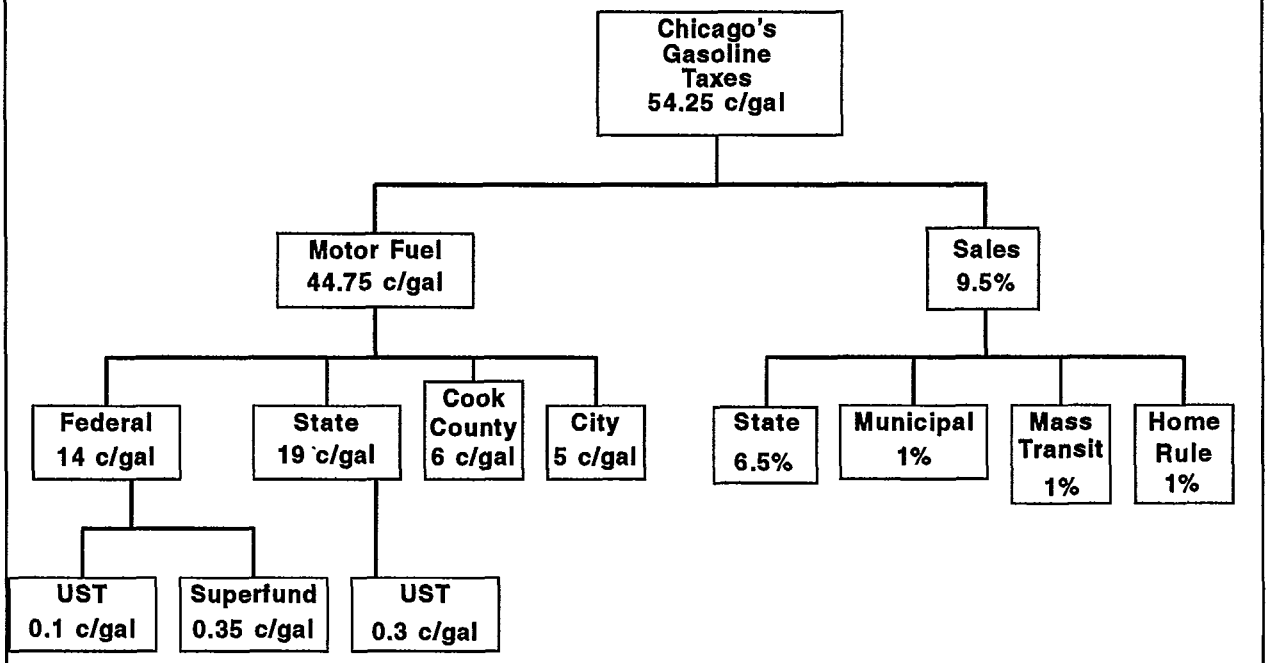
Metropolitan Area	Federal Tax*	State Excise Tax	Other State And Local Taxes**	Total
St. Louis	14.45	11.0	---	25.45
Newark	14.45	10.5	3.44	28.39
Dallas	14.45	15.0	.59	30.04
Philadelphia	14.45	12.0	5.40	31.85
Baltimore	14.45	18.5	---	32.95
Phoenix	14.45	18.0	1.00	33.45
Detroit	14.45	15.0	5.49	34.94
Washington, D.C.	14.45	18.0	2.64	35.09
Boston	14.45	21.0	---	35.45
Miami	14.45	4.0	17.84	36.29
Tampa	14.45	4.0	18.84	37.29
Los Angeles	14.45	15.0	9.05	38.50
Providence	14.45	23.0	3.00	40.45
New Haven	14.45	23.0	3.54	40.99
Albany	14.45	8.0	21.97	44.42
Buffalo	14.45	8.0	23.23	45.68
Long Island	14.45	8.0	23.23	45.68

* Includes federal excise taxes, Superfund tax, and the federal underground storage tank tax.
**Includes sales taxes, gross receipts taxes, local government excise taxes, underground storage tank taxes, and other non-income taxes. (Sales taxes, expressed in cents per gallon, assume a pre-tax dealer price of $1 per gallon.)

Source: The Mobil Corporation, 1991.

Figure VII-4 provides a schematic representation of the kinds of taxes that are applied to the sale of a gallon of gasoline in Chicago. In addition to federal and state motor fuel taxes, Cook county and the city of Chicago also levy motor fuel taxes of 6 cents per gallon and 5 cents per gallon, respectively. Additional applicable sales taxes include state (6.5 percent), municipal (1 percent), mass transit (1 percent) and home rule (1 percent).

Figure VII-4: Chicago's Gasoline Taxes*



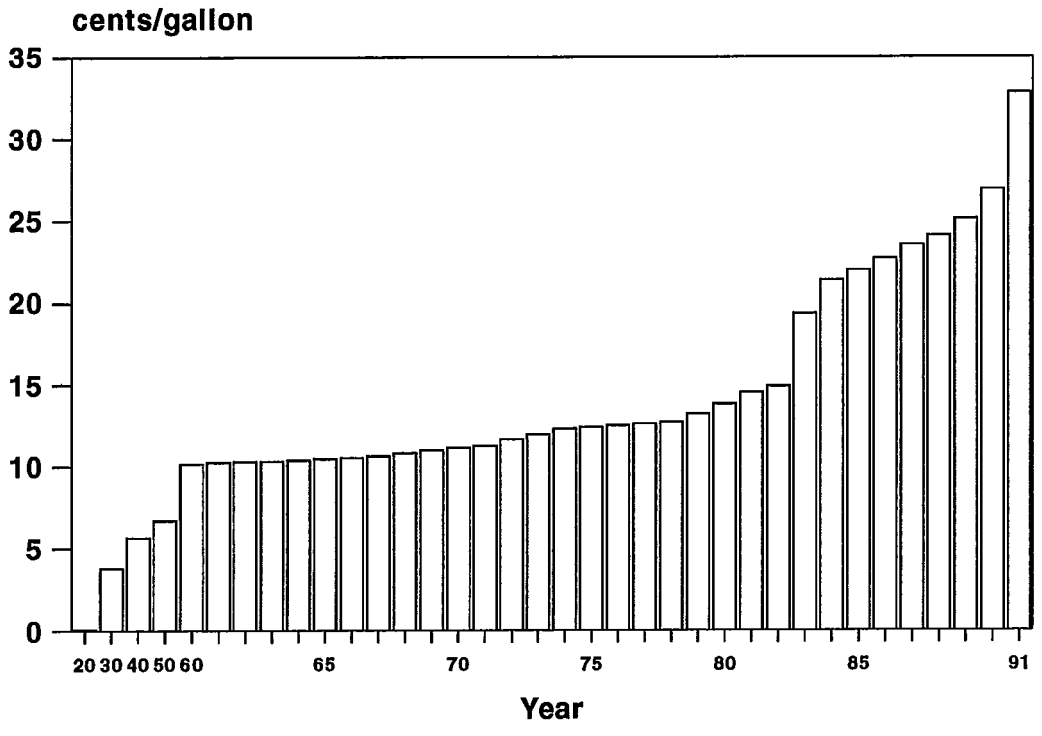
*As of July 1991. Sales taxes are based on assumed pre-tax dealer price of $1/gallon.
Source: API Illinois Petroleum Council.

5. Trends in Gasoline Taxes

Changes in retail motor gasoline taxes over the 71-year period from 1920 through 1991 are graphically shown in Figure VII-5. The taxes shown here include federal taxes and weighted average U.S. state taxes, based on state gasoline consumption records. Local taxes are not included because complete data on local taxes are unavailable. However, some states levy additional state sales taxes and these are included in the totals shown in this figure.

Figure VII-5 shows retail motor gasoline taxes at 10-year intervals from 1920 through 1960 and for each year thereafter. The data shown here reveal that the average fuel tax (federal and state) rose from less than a penny in 1920 to almost 4 cents per gallon in 1930, and 10 cents per gallon in 1960. Over the next decade the average gasoline tax rose by just a penny to 11.1 cents per gallon. By 1980 taxes had increased to 13.8 cents per gallon. Since then, however, motor fuel taxes have more than doubled, reaching 32.8 cents per gallon in 1991. Indeed, in 1991 motor fuel excise taxes increased by 5.9 cents per gallon, reflecting both federal and state tax increases.

Figure VII-5: Retail Motor Gasoline Taxes, 1920-1991



Sources: American Petroleum Institute summaries of state motor fuel tax rates. Taxes include state and federal taxes, but exclude local taxes.

D. Gasoline Prices

1. U.S. Retail (Pump) Prices and Net of Tax Prices for Gasoline, 1920-1991

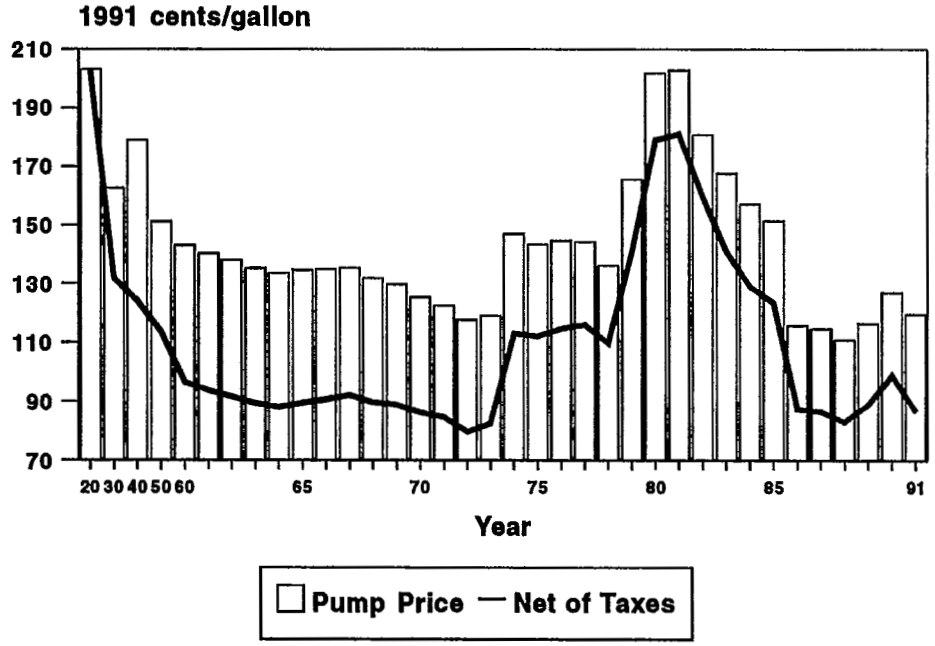
Americans paid a lot more for gasoline earlier in this century than today. Figure VII-6 shows the U.S. retail (pump) price of gasoline at 10-year intervals from 1920 through 1960 and for each year thereafter. All prices have been adjusted for inflation in order to show the relative price over time of a gallon of gasoline compared to the price of all other consumer items.[5]

Figure VII-6 also plots the inflation adjusted net of tax price of gasoline in order to show the real impact of changes in the price of gasoline. It shows the sharp decline in gasoline prices that occurred earlier in the century during the Great Depression and World War II era, and it documents the striking rise in the 1970s and the fall of gasoline prices during the 1980s. After the sharp price increases associated with the 1973-74 oil embargo, prices climbed even higher in 1979 when Iranian crude supplies were disrupted. Prices reached a new high in 1981 and then fell sharply during the winter of 1985-86 owing to large production increases by Saudi Arabia. The impact of the increase in prices after the surprise Iraqi invasion of Kuwait in August 1990 appears minor in comparison.

2. The Price of Gasoline Compared to Other Common Consumer Items

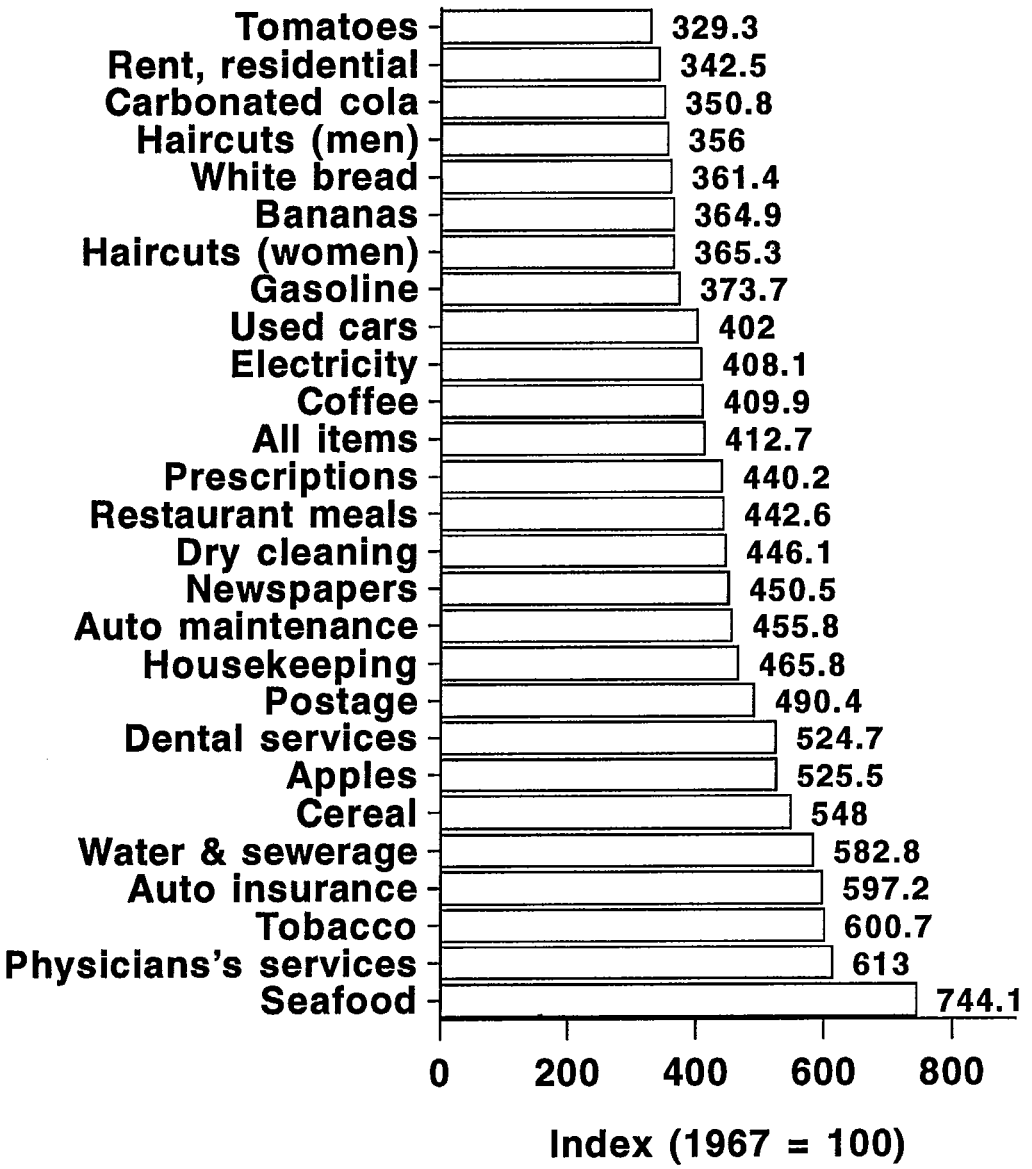
Figure VII-7 provides an historical record of consumer price index values for gasoline

Figure VII-6: U.S. Pump Prices and Net of Tax Gasoline Prices, 1920-1991



Sources: BLS average price for all types of gasoline and service; and API, "State Motor Fuel Tax Rates for Highway Use." Prices adjusted for inflation using 1991 CPI (all items) = 100.

Figure VII-7: Consumer Price Index for All Urban Consumers, Selected Detailed Expenditure Categories, U.S. City Average, November 1991



Source: U.S. Department of Labor, Bureau of Labor Statistics, "CPI Detailed Report," various issues from December 1966 through November 1991.

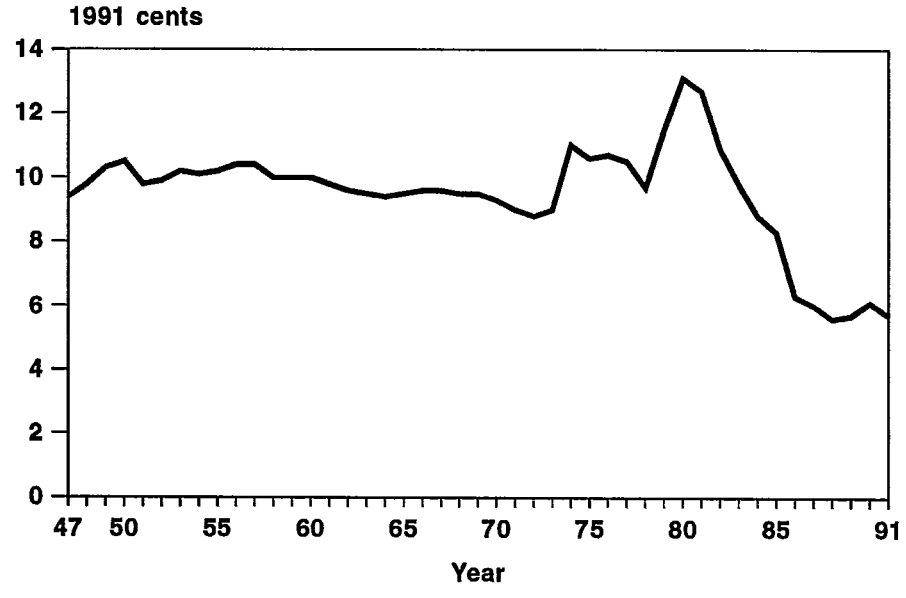
and for a sample of other goods and services that people buy for daily living, such as used cars, cereal, prescription drugs, and newspapers.[6] The reference year of 1967 is used as a base year to measure price changes. For example, in Figure VII-7 the reference year 1967 is shown to equal 100, and the index value for "All items" (as of November 1991) is shown to equal 412.7. This means that the average price (including all taxes) of a fixed market basket of goods and services increased 312.7 percent between 1967 and November 1991. In comparison, the index value for gasoline (373.7) shows that its price increased less than the average for "All items," even though taxes on gasoline rose sharply during the past decade. The higher index values shown for most of the other goods and services demonstrate that the prices for these items have increased more than the price of gasoline.

3. Consumer Cost of Motor Gasoline Per Miles Traveled, 1947-1991

The fuel cost of travel for consumers depends on the price of gasoline and the miles traveled per gallon. Declines in the real retail price of gasoline in recent years, combined with improvements in car fuel efficiencies have led to significant declines in real consumer fuel costs per mile driven during the 1980s.

Figure VII-8 shows that between 1980 and 1991 the cost per mile traveled, (expressed in 1991 dollars), fell in half to about six cents. In contrast, during the previous three decades encompassing 1947 - 77, the

Figure VII-8: Consumer Cost of Motor Gasoline Per Mile Traveled, 1947-1991



Sources: Federal Highway Administration and Bureau of Labor Statistics.
Prices adjusted for inflation using 1991 CPI (all items) = 100.

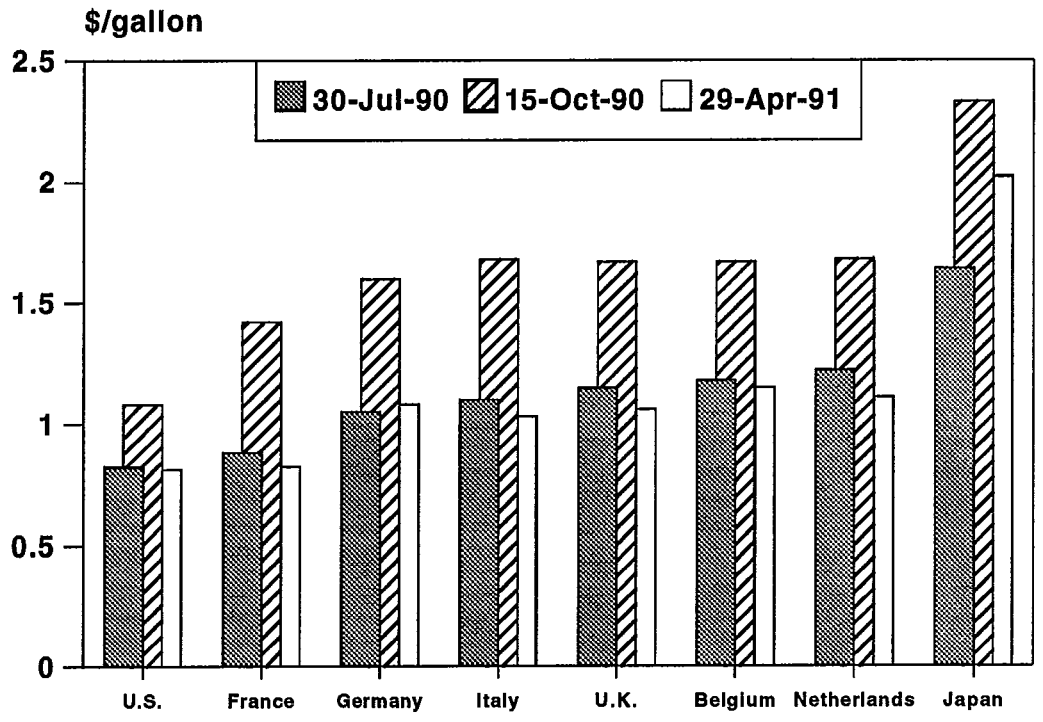
cost remained stable at approximately 10 cents per mile traveled.

4. U.S. and International Retail Gasoline Prices

The average U.S. motorists pays much less for gasoline than motorists in Europe and Japan. Moreover, recent increases in gasoline prices have been less in the U.S. than in other countries. Figure VII-9 provides a comparison of international retail prices for motor gasoline for selected dates since July 30, 1990. The prices represent the average price for the major type of fuel consumed in each country. For example, in the U.S. and Japan unleaded regular is the most common type of gasoline used, whereas in Belgium, France, Germany, Italy, the Netherlands, and the United Kingdom, premium leaded is the most common. The prices shown exclude taxes and duties and are measured in dollars per gallon.

This figure shows that even with taxes and duties excluded, prices in Europe and Japan are higher than in the U.S. and prices increased faster in Europe and Japan after Iraq's invasion of Kuwait, in August 1990, than in the U.S.

Figure VII-9: International Retail Prices for Gasoline (excluding taxes/duties)



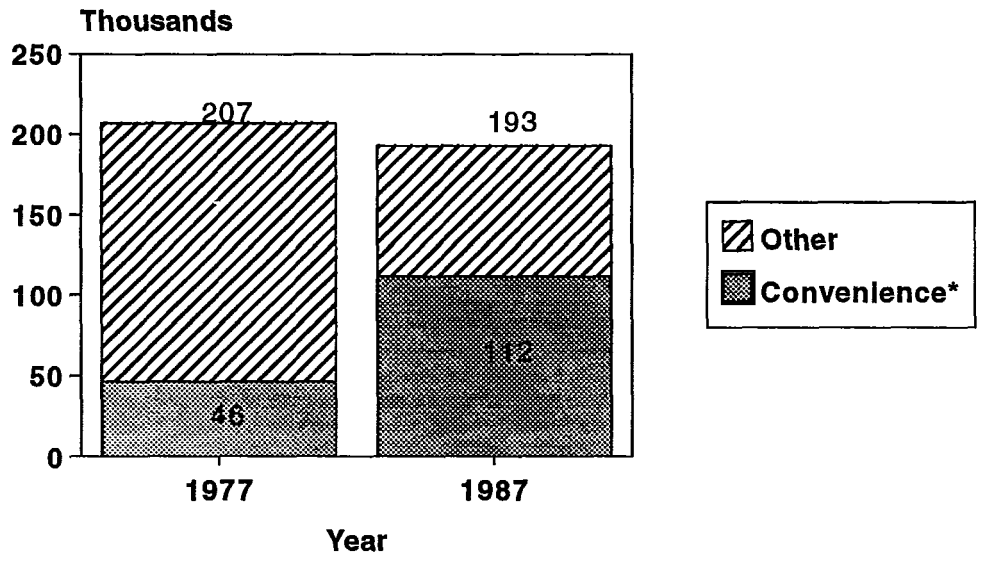
Source: Department of Energy

VIII. THE NUMBER AND CONFIGURATIONS OF RETAIL GASOLINE OUTLETS

A. The Number of Retail Gasoline Outlets, 1977 and 1987

There has been a dramatic change in the composition of outlets selling gasoline during the 1980s. Traditional service stations have been replaced by new convenience stores. This change has contributed to the mistaken perception that the total number of outlets has declined sharply. Only the configuration of outlets has changed sharply. According to U.S. Bureau of the Census data, the number of retail outlets selling gasoline declined at a rate of less than seven-tenths of one percent annually between 1977 and 1987 (the most recent Census). Figure VIII-1 shows that the total number of outlets fell slightly from 207 thousand in 1977 to 193 thousand by 1987. However, during the same time, the number of convenience stores--which are defined very broadly to include all outlets that sell groceries and gasoline--more than doubled from 46 thousand in 1977 to 112 thousand by 1987.

Figure VIII-1: Number of Retail Gasoline Outlets, 1977 and 1987



*Defined as all outlets that sell groceries and gasoline.
Sources: American Petroleum Institute estimates based on U.S. Bureau of Census, "Geographic Area Series," "Nonemployer Series," and "Merchandise Line Series," 1977 and 1987.

The nationwide decline in the number of service stations is due to various factors, including changes in automobiles and land prices.[1] The former reduced the demand for traditional stations' services and the latter raised their fixed costs. An additional factor has been the growth in nationwide regulations to improve environmental quality. These also have raised fixed costs. Such a combination would be expected to reduce the number of stations in the U.S. despite approximately constant consumption of gasoline during 1977-87.[2]

Also during 1977-87, the configurations of gasoline outlets changed as consumers increased their preferences for both self service dispensing of gasoline and speed and convenience in buying many grocery and beverage items. Consequently, the relative importance of convenience stores as retail gasoline outlets rose dramatically during the period.[3]

This fundamental change in how gasoline is marketed has contributed to a general misunderstanding and misuse of the U.S. Census Bureau's service station data. The common perception has been that the number of retail gasoline outlets has declined sharply. This is based in large part on the fact that the most frequently cited Census estimate for 1987 is 114,748 service stations.[4] This figure is the number reported in the U.S. Bureau of the Census *1987 Census of Retail Trade, Geographic Area Series*. It represents only those service stations with employees and a formal payroll which derive more than half of their receipts from the sale of gasoline. It excludes "Mom and Pop" stations with no formal payroll, as well as the large and growing number of outlets that derive less than half their sales from gasoline.

Inasmuch as gasoline prices declined relative to other prices in 1977-87, the criterion of one-half of dollar sales from gasoline caused many retail gasoline outlets to be classified as food or other establishments. Useful comparison of 1977 and 1987 Census data also require accounting for outlets without payrolls.

In 1977, the category of nonemployer or "Mom and Pop" stations had been included in the *Geographic Area Series*. However, by the next Census in 1982 the nonemployer series was not published as planned because according to the Bureau of Census, "a substantial number of non-employer records, obtained from the Internal Revenue Service (IRS), were miscoded by the IRS into miscellaneous categories rather than being classified in the specific kind of business."[5] The error was corrected in the next Census in 1987. However, the nonemployer "Mom and Pop" data were published in a separate *1987 Nonemployer Series*. The *Geographic Area Series* continued to show just the employer series that had more than half of their receipts from gasoline sales.

In addition to the *Geographic Area* and *Nonemployer* series, the U.S. Bureau of the Census publishes a third series--*The Merchandise Line Sales Series (ML)*--which provides detailed information about the number of outlets selling gasoline. This series provides estimates of the total number of establishments (with payroll) selling automotive fuels (ML#720) by kind-of-business (SIC code).[6] So in addition to accounting for the number of service stations (SIC#554) with payrolls that derive more than half their income from gasoline sales (114,748 in 1987), it also accounts for all the other kinds of businesses with payrolls which derive less than half their receipts

from the sale of gasoline. Corresponding estimates of the "without payroll" totals for these other kinds of businesses selling gasoline can then be derived from these figures.[7] When these estimates are added to the Census data, a total estimate is made of outlets selling gasoline in 1987 (192,823) compared to 1977 (206,763). Table 8-1 provides a detailed breakdown of the composition of these totals and the sources for each.

TABLE 8-1
THE NUMBER OF RETAIL GASOLINE OUTLETS
BY DATA SOURCE, 1977 AND 1987
(thousands)

	(1) Geographic	(2) Nonemployer	(3) Merchandise	Grand Total
1977				
With Payroll	146.5	N.A.	21.5	168.0
Without Payroll	30.0	N.A.	8.8	38.8
Total	176.5	N.A.	30.3	206.8
1987				
With Payroll	114.7	N.A.	36.0	150.7
Without Payroll	N.A.	22.4	19.7	42.1
Total	114.7	22.4	55.7	192.8

N.A. = Not applicable
Sources: (1) U.S. Department of Commerce, Bureau of the Census, *1977 Census of Retail Trade, Geographic Area Series*, RC77-A-52, issued October 1979; and *1987 Census of Retail Trade, Geographic Area Series*, RC87-A-52, issued August 1989. (2) U.S. Department of Commerce, Bureau of the Census, *1987 Census of Retail Trade, Nonemployer Statistics Series*, (West RC87-N-4, South RC7-N-3, Midwest RC87-N-2, and Northeast RC87-N-1), issued February 1990. (3) U.S. Department of Commerce, Bureau of the Census, *1977 Census of Retail Trade, Merchandise Line Sales*, RC77-L, issued September 1980; and *1987 Census of Retail Trade, Merchandise Line Sales*, RC87-S-3, issued June 1990.

In sum, the decline in establishments labeled "gasoline service stations" in the U.S. Census Bureau's *Geographic Area Series* does not adequately capture all of the changes in the number of retail gasoline outlets. Furthermore, the tendency to overlook nonemployer outlets ("Mom and Pop" stations) exacerbates the misstatement. Changes in the number of retail gasoline outlets should be measured through the use of all three relevant U.S. Census Bureau series--Geographic, Nonemployer, and Merchandise Line.

B. The Number of Retail Gasoline Outlets by State, 1977 and 1987

Growth in the number of retail gasoline outlets in the Sunbelt states and contraction elsewhere, particularly in the Mid-Atlantic and Midwestern states, characterized changes in the population of outlets over the decade from 1977 to 1987. These changes are shown in Table 8-2 and plotted in rank order in Figure VIII-2. California is shown to have led the nation in the number of retail outlets in 1977, but was surpassed by Texas by 1987. The number of outlets in Florida also grew markedly over this period.

These changes are consistent with the decade-long shift of population from the Northeast to the Sunbelt. Regional changes in the number of retail gasoline outlets are shown in Table 8-3. This table measures the percentage change in outlets between 1977 and 1987 in each state and each PAD District. It shows the Sunbelt states of the Gulf and South Atlantic coasts have experienced the most rapid expansion. At the other extreme several large Midwestern states experienced significant declines of 20 percent or more in the number of outlets selling gasoline.

C. Average Monthly Gallonage for Major Types of Retail Outlets by Region

The national decline in retail outlets noted above has resulted in an increase in the average volume of gasoline pumped per station. Between 1985 and 1990 the U.S. average had increased from 66,000 gallons to 69,000 gallons per month.

Table 8-4 and Figure VIII-3 show the average monthly gallonage for major types of retail outlets by region in 1990 and in 1985. This table and chart shows that growth in monthly volume sales per outlet occurred in the West[8] and the Midwest,[9] while the Northeast[10] and Sunbelt[11] regions experienced a loss of volume sales. Among the regions illustrated in Figure VIII-3, the Sunbelt is shown to have the lowest volume sales per outlet; the West has the highest.

D. The Share of Volume Pumped by Major Type of Retail Outlet by Region

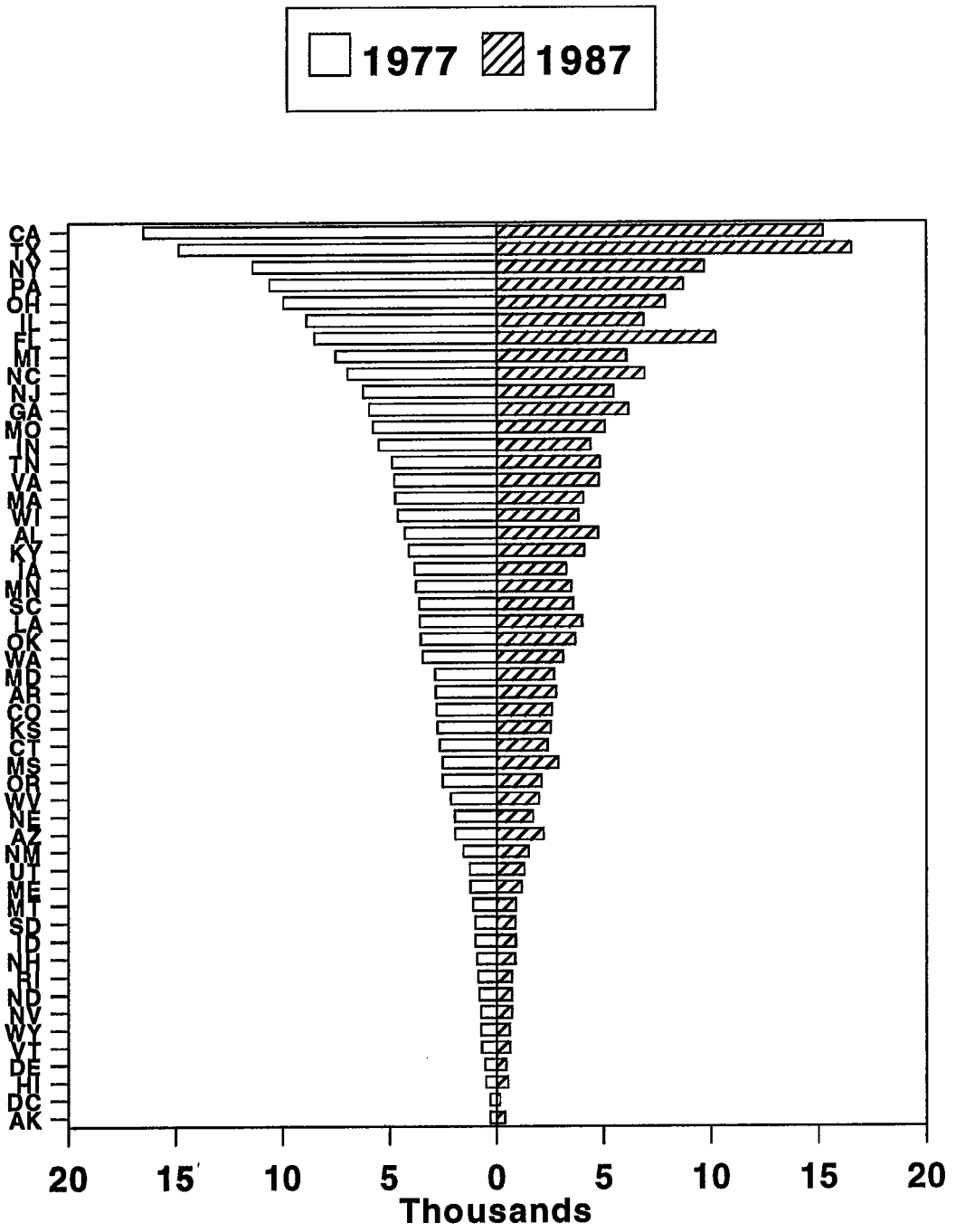
Increases in the volume sold at high volume pumper stations have accounted for most of the average increase in volume sales per outlet. Table 8-5 and Figure VIII-4 show the percentage share of the volume sales pumped by major type of retail outlet by region in 1985 and in 1990. Pumpers are shown to account for the largest and fastest growing share of gasoline sold in the U.S. By 1990 these stations accounted for more than half of all volume sales in the U.S. Only in the Northeast do traditional stations account for more sales.

TABLE 8-2: TOTAL NUMBER OF RETAIL GASOLINE OUTLETS BY STATE, 1977 AND 1987

	1977	1987
Alabama	4,314	4,734
Alaska	284	394
Arizona	1,941	2,212
Arkansas	2,871	2,786
California	16,487	15,200
Colorado	2,818	2,586
Connecticut	2,672	2,396
Delaware	523	447
D.C.	298	161
Florida	8,522	10,220
Georgia	5,969	6,162
Hawaii	496	546
Idaho	977	892
Illinois	8,895	6,846
Indiana	5,517	4,384
Iowa	3,853	3,259
Kansas	2,789	2,549
Kentucky	4,130	4,097
Louisiana	3,616	3,988
Maine	1,244	1,183
Maryland	2,890	2,686
Massachusetts	4,742	4,037
Michigan	7,542	6,052
Minnesota	3,790	3,481
Mississippi	2,534	2,904
Missouri	5,786	5,050
Montana	1,101	898
Nebraska	1,962	1,708
Nevada	725	717
New Hampshire	905	867
New Jersey	6,250	5,468
New Mexico	1,567	1,503
New York	11,389	9,678
North Carolina	6,977	6,902
North Dakota	801	727
Ohio	9,953	7,870
Oklahoma	3,556	3,685
Oregon	2,534	2,114
Pennsylvania	10,604	8,702
Rhode Island	861	733
South Carolina	3,624	3,567
South Dakota	988	875
Tennessee	4,901	4,831
Texas	14,851	16,524
Utah	1,281	1,303
Vermont	683	628
Virginia	4,795	4,770
Washington	3,481	3,096
West Virginia	2,144	1,978
Wisconsin	4,613	3,816
Wyoming	717	611
U.S. Total	206,763	192,823

Sources: API calculations based on U.S. Department of Commerce, Bureau of the Census, 1977 and 1987 Census of Retail Trade, *Geographic Area Series: United States,* RC77-A-52, October 1979, and RC87-A-52, August 1989; *Subject Series: Merchandise Line Sales,* RC77-L, September 1980 and RC87-S-3, June 1990; *Nonemployer Statistics Series: Northeast* (RC87-N-1, February 1990), *Midwest* (RC87-N-2, March 1990), *South* (RC87-N-3, February 1990), and *West* (RC87-N-4, February 1990).

Figure VIII-2: Number of Retail Gasoline Outlets by State, 1977 and 1987



Source: API estimates based on U.S. Bureau of Census, "Geographic Area Series," "Nonemployer Series," and "Merchandise Line Series," 1977 and 1987.

TABLE 8-3
PERCENTAGE CHANGE IN RETAIL GASOLINE OUTLETS BETWEEN 1977 AND 1987

STATE (Region)	OUTLETS
PAD 1 (East Coast)	-6.0
sub1A (New England)	-11.4
Connecticut	-10.3
Maine	-4.9
Massachusetts	-14.9
New Hampshire	-4.2
Rhode Island	-14.9
Vermont	-8.1
sub1B (Mid-Atlantic)	-15.1
Delaware	-14.5
D.C	-46.0
Maryland	-7.1
New Jersey	-12.5
New York	-15.0
Pennsylvania	-17.9
sub 1C (South Atlantic)	4.9
Florida	19.9
Georgia	3.2
North Carolina	-1.1
South Carolina	-1.6
Virginia	-.5
West Virginia	-7.7
PAD 2 (Midwest)	-14.3
Illinois	-23.0
Indiana	-20.5
Iowa	-15.4
Kansas	-8.6
Kentucky	-.8
Michigan	-19.8
Minnesota	-8.2
Missouri	-12.7
Nebraska	-12.9
North Dakota	-9.2
Ohio	-20.9
Oklahoma	3.6
South Dakota	-11.4
Tennessee	-1.4
Wisconsin	-17.3
PAD 3 (Gulf)	9.0
Alabama	9.7
Arkansas	-3.0
Louisiana	10.3
Mississippi	14.6
New Mexico	-4.1
Texas	11.3
PAD 4 (Rocky Mountain)	-8.8
Colorado	-8.2
Idaho	-8.9
Montana	-18.4
Utah	1.7
Wyoming	-14.8
PAD 5 West Coast)	-6.4
Alaska	38.7
Arizona	14.0
California	-7.8
Hawaii	10.1
Nevada	-1.1
Oregon	-16.6
Washington	-11.1
TOTAL U.S.	-6.7

Source: Computed from sources listed in Table 8-2.

TABLE 8-4
AVERAGE MONTHLY GALLONAGE FOR MAJOR TYPES OF RETAIL OUTLETS BY REGION

1990

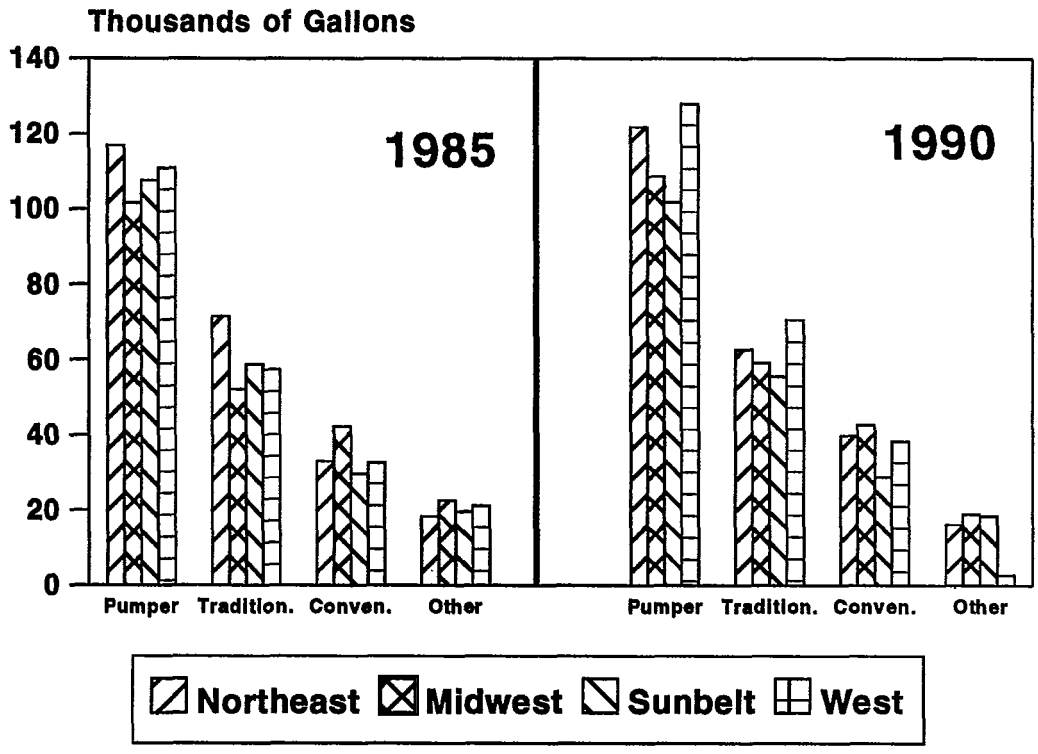
Region	Pumpers	Traditional	Convenience Food Stores	Others	Total
Northeast	121,861	62,611	39,847	15,974	69,360
Midwest	108,706	59,220	42,642	18,802	74,782
Sunbelt	101,853	55,613	28,735	18,343	58,798
West	127,931	70,428	38,252	22,593	82,356
TOTAL U.S.	112,230	62,479	32,220	18,524	69,036

1985

Region	Pumpers	Traditional	Convenience Food Stores	Others	Total
Northeast	116,951	71,433	32,958	18,257	72,035
Midwest	101,705	52,132	42,183	22,455	65,918
Sunbelt	107,728	58,688	29,487	19,599	59,927
West	110,836	57,335	32,549	21,011	67,187
TOTAL U.S.	109,152	61,295	31,356	20,199	66,012

Source: MPSI Inc., Tulsa, Oklahoma, cited in *National Petroleum News Factbook*, 1991, p. 124 and 1986, p. 118.

Figure VIII-3: Average Monthly Gallonage for Major Types of Retail Outlets by Region, 1985 and 1990



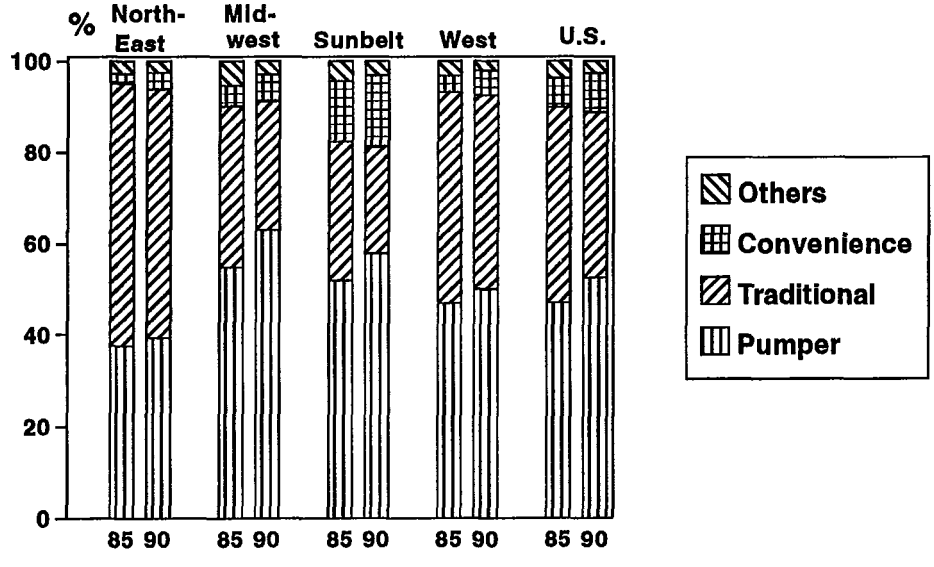
Source: MPSI Inc., Tulsa, Oklahoma, cited in National Petroleum News "Factbook," 1991 and 1986.

TABLE 8-5
THE PERCENTAGE CHANGE IN THE VOLUME OF GASOLINE PUMPED BY MAJOR TYPE OF RETAIL OUTLET BY REGION, 1985-1990

Region	Pumpers	Traditional	Convenience Food Stores	Others
Northeast	1.7	-2.9	1.4	-0.2
Midwest	8.3	-7.3	1.5	-2.5
Sunbelt	5.9	-7.2	2.5	-1.2
West	3.1	-3.8	1.9	-1.2
Total U.S.	5.4	-6.5	2.2	-1.1

Source: Same as Table 8-4.

Figure VIII-4: The Percentage Share of the Volume of Gasoline Pumped By Major Type of Retail Outlet by Region, 1985 and 1990



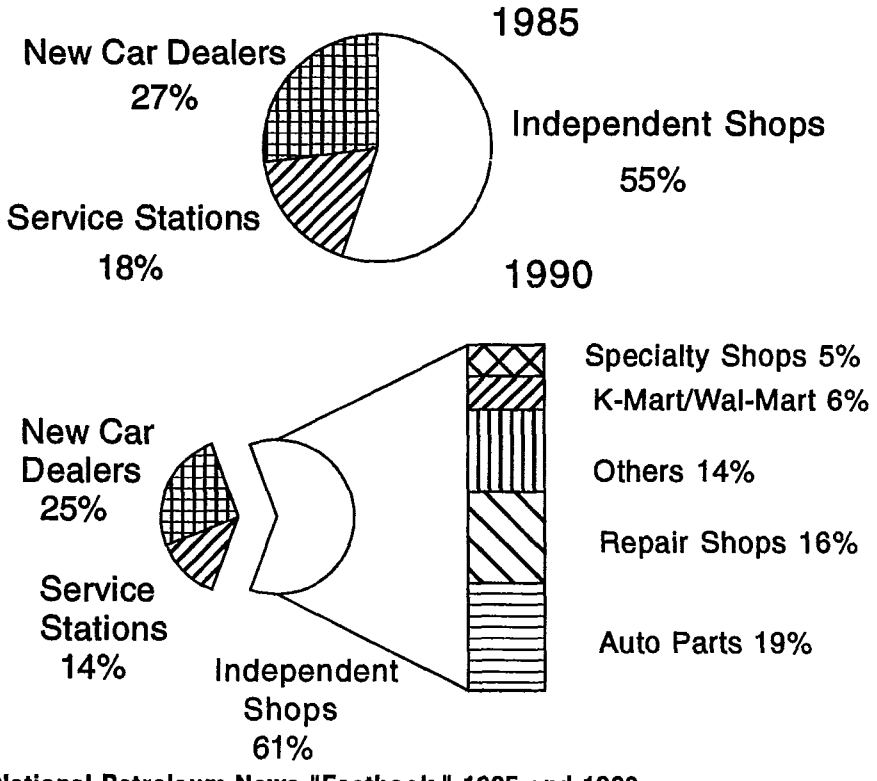
Source: Same as Table 8-4.

E. Automobile Products and Services Sold at Retail Gasoline Outlets

Years ago cars required frequent mechanical checks and service, often provided at traditional service stations. Today's cars need servicing less often, but when necessary such servicing commonly entails specialized parts and repair work. Consequently, automobile parts and services increasingly are provided by other outlets, e.g., new car dealers, quick lubes, muffler shops, and even mass merchandisers. For example, most replacement tire sales are made by independent tire dealers and the leading sellers of motor oil are merchandisers, who sell to the dominant "do-it-yourself" market.

A detailed illustration of the diversity in auto parts and services is provided in Figure VIII-5. Independent shops account for over 60 percent of commercially provided tuneups, and service stations rank fourth, after new car dealers, repair shops, and auto parts retailers.

Figure VIII-5: Where Consumers Get Tuneups



Sources: National Petroleum News "Factbook," 1985 and 1990

IX. EMPLOYMENT AND PRODUCTIVITY IN THE RETAIL GASOLINE DISTRIBUTION INDUSTRY

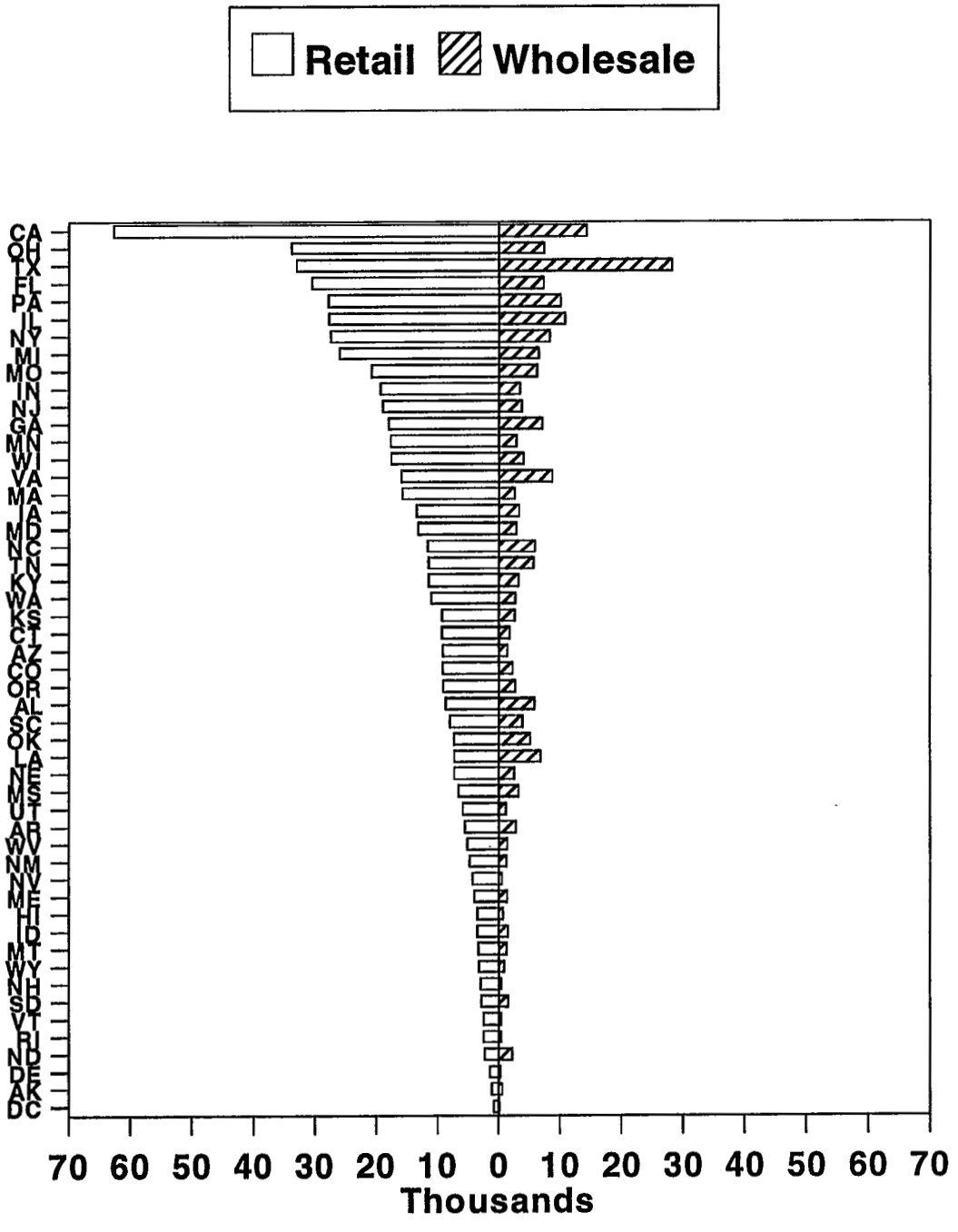
Approximately one-half of the employees in the U.S. petroleum industry work in the wholesaling or retailing of petroleum products. Of this one-half, the vast majority are engaged in the marketing of motor fuels.

Employment in gasoline marketing activities in individual states is roughly consistent with volumes marketed. The largest gasoline consuming states (California, Texas, Florida, Ohio) tend to have the most employees (Figure IX-1). However, states which rely mainly on direct distribution from refiner to dealer (e.g., California) have large retail employment totals. In contrast, states relying on indirect distribution through marketers (e.g., Texas) have proportionately more employees in wholesale activities.

The productivity of labor at gasoline service stations, as measured by output per employee hour, rose 2.2 percent per year during 1984-89, roughly three times the 0.7 percent average annual increase of 28 retail industries surveyed by the U.S. Bureau of Labor. More than one-third of industries surveyed experienced declines in labor productivity.

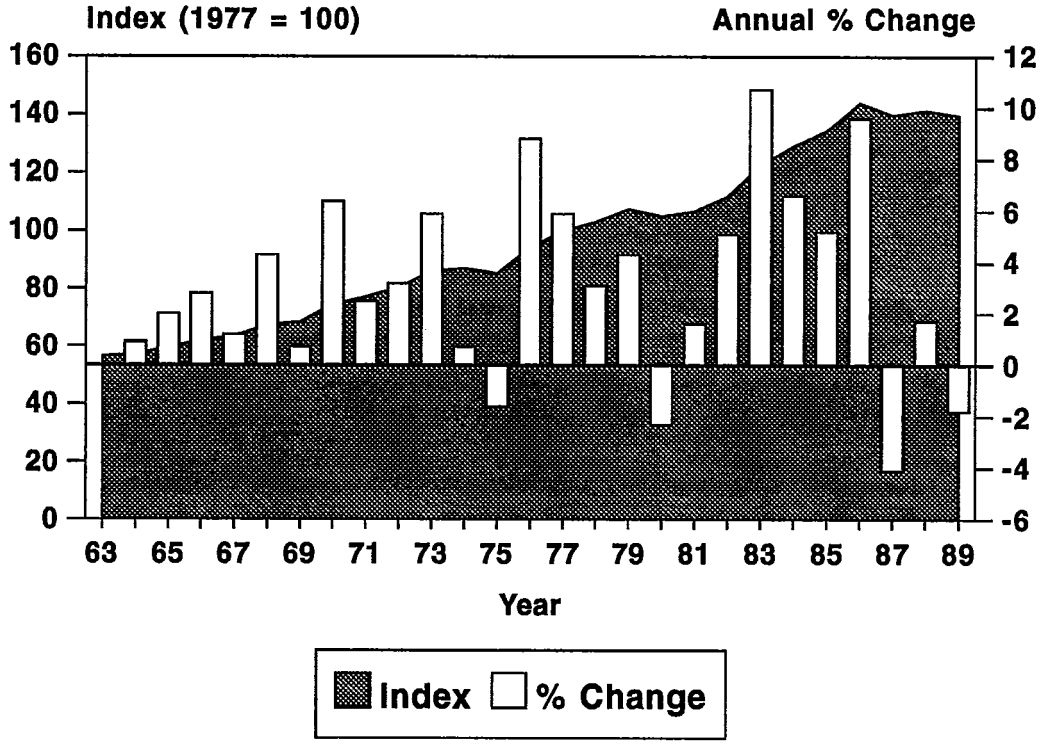
An historical overview of labor productivity at gasoline service stations is provided by Figure IX-2, which shows that productivity has been advancing for nearly three decades. This advance has contributed to the decline in the spread between crude oil and retail gasoline prices (Figure VII-2 above).

Figure IX-1: Employment in Wholesale Distribution of Petroleum Products and Gasoline Service Stations by State, January 1, 1990



Source: National Petroleum News, "Factbook," 1991.

Figure IX-2: Gasoline Service Station Output Per Hour, 1963 - 1989



Source: U.S. Department of Labor

X. ENVIRONMENTAL CHALLENGES AND RESPONSIBILITIES

A. Introduction

Meeting the challenges and responsibilities of environmental rules and regulations will be one of the most important criteria for doing business in the future. All the market participants, facilities, and institutions in the gasoline distribution system will be increasingly affected by environmental requirements, many of which have already been promulgated.

This section provides an overview of the principal federal environmental requirements--both finalized and proposed--that will affect the gasoline marketing sector of the petroleum industry in the coming years.[1] Major new federal regulations with impacts on the operation of retail outlets are reviewed first. These include underground storage tank mandates and Stage II legislation, and regulations affecting used oil recycling and Class V wells. Regulations affecting large marketing facilities are summarized next. These rules largely affect the maintenance and management of aboveground storage tanks at marketing facilities. The scope of the clean fuel requirements of the Clean Air Act of 1990 and the Act's implications for the motor fuel distribution system are reviewed next. A summary of the range of potential costs to the marketing sector to comply with new and potential federal environmental regulations is provided last.

Much of the cost data cited are anecdotal, and are provided in order to illustrate the compliance experience of different marketers. More comprehensive cost data, such as estimates of the nationwide costs of different regulations, are also presented. These estimates are subject to numerous uncertainties. Most of these estimates were undertaken during various stages of the regulatory process and incorporate different assumptions regarding the nature and scope of the final rule, as well as the size of the affected population (e.g. tanks, terminals, outlets, etc.). Therefore, the cost estimates cited should be considered rough measures of the possible impacts of federal environmental legislation on the gasoline marketing sector of the petroleum industry

B. Retail Outlets

1. UST Regulations

In 1984, Subtitle I of the Resources Conservation and Recovery Act (RCRA) gave the Environmental Protection Agency (EPA) authority to create a program regulating underground tanks (UST) storing petroleum. EPA's consequent regulations affect an estimated 700,000[2] retail motor fuel tanks nationwide and govern every aspect of tank management from installation to closure. The program allows for a 10-year phase-in of technical standards beginning in 1989, but originally required all tank owners to have pollution liability coverage by April 1990.[3] EPA subsequently proposed that financial responsibility requirements be deferred until December 1992 for the smallest UST owners.[4]

Financial responsibility requirements can be met through private insurance, self-insurance, state funds, group trust funds, or any other state method approved by EPA.

By the fall of 1991, 43 states had trust funds designed to partially cover the spill cleanup costs.[5] Pollution liability insurance is expensive. For example, a survey conducted by the Petroleum Marketers Association of America (PMAA) found that the average insurance premium for a typical independent petroleum marketer in 1991 and early 1992 was $32,000 or $1,300 per tank.[6] According to PMAA, this premium is 70 percent higher than the average reported in 1988. Nonetheless, the PMAA survey found that only 8.4 percent of the 220 marketers in 42 states who responded to the survey had no coverage at the end of 1991 compared to 24.3 percent at the end of 1990.

The technical standards of the regulations require leak detection devices be installed on all tanks by 1993. The regulations also require upgrades of piping and spill and overfill protection. Existing tanks can be upgraded by

(1) installing new tanks,
(2) adding cathodically protected systems,
(3) installing interior linings, or
(4) installing interior linings and cathodic protection.[7]

EPA estimates leak detection costs range from $3,000 to $8,000 for a station with three 5,000-gallon tanks.[8] Retrofitting cathodic protection on existing tanks will range from $10,000 to $48,000. Three new 10,000 gallon single wall tanks can cost between $76,000 and $100,000.

UST environmental costs per station will vary for a number of reasons, such as the size of the station, and the number and age of the tanks. For example, the Society of Independent Gasoline Marketers of America (SIGMA) reported in their *1990 Statistical Report* that total UST environmental expenses during 1990--capital equipment, testing and remediation, internal compliance costs, and net of insurance--averaged more than $27,000 per owned outlet. As a measure of comparison, the National Association of Convenience Stores (NACS) reported in their *1991 State of the Industry* report that the average monthly rent for existing stores was $2,084 or approximately $25,000 per year. The PMAA reported that the typical independent petroleum marketer spent $145,400 or $6,700 per tank in order to comply with UST regulations in 1991.[9] On a gasoline sales bases, this represents 2.8 cents per gallon. According to a University of California study a station selling 25,000 gallons per month would need 6.6 cents per gallon in order to recover the costs of tank replacement, whereas an outlet selling 300,000 gallons would need only 0.6 cents per gallon.[10]

These costs are significant, but they pale in comparison to the multi-million dollar costs and liability actions that have been brought against owners and operators of USTs for soil and water contamination from leaks. Fuel leaks from USTs can vary from simple soil cases where a small amount of fuel has contaminated a limited part of the site to extensive groundwater cases where dissolved product has polluted groundwater both on-site and has spread beyond the immediate vicinity of the leak. For this reason, the costs associated with soil cleanup and restoration can range from a few thousand dollars up to millions of dollars per incident.[11] For the nation, the costs can climb to tens of billions of dollars. The Waste Management Research and Education Institute of the University of Tennessee, for example, has estimated that the cost of cleaning up UST releases over the next 25

years could range from $32 billion to $67 billion, with expenditures of close to $17 billion required by 1995.[12]

For individual marketers, the uncertainty surrounding the potential for leaks and the possible broad extent of them has made it both expensive and difficult for many of them to obtain insurance. Marketers have also had difficulty obtaining loans from banks in order to comply with UST regulations, because banks have been fearful that they could be liable for leaks, environmental damage and third-party damage claims.[13] For example, according to the PMAA approximately one-third of the bank loans requested during 1991 by the independent petroleum marketers PMAA surveyed were rejected.[14]

The impact of the expense of UST regulations is illustrated in the results of a survey conducted by the PMAA.[15] The 220 marketers from 42 states who responded to the survey reported closing 21 percent of their total outlets between 1989 and early 1992, and they attributed 76 percent of the closures to UST regulations.

2. Stage II

Title I of the Clean Air Act Amendments of 1990 requires states to adopt strategies to reduce air pollution emissions by 1994 or 1995. Stage II vapor recovery equipment[16] for controlling vehicle refueling emissions at gasoline stations is required within two years of the Act's enactment in those metropolitan areas that have been identified as extremely, severely, and seriously out of attainment with national air quality standards. A list of 24 areas that fall into these categorizations is shown in Table 10-1. Another 31 areas shown in this table are classified as moderately out of attainment. These areas have the option to adopt the use of Stage II equipment in order to meet compliance standards. However, in March 1992 the EPA announced that they had decided not to promulgate standards for the use of canisters on vehicles to control gasoline vapors.[17] As a consequence, many more areas will adopt the use of Stage II than may have otherwise.

A large share of motor fuel outlets in the areas targeted is exempt from Stage II requirements. Facilities pumping less than 10,000 gallons per month or less than 50,000 gallons per month in the case of an "independent small business marketer of gasoline" are exempt.[18] Approximately 24 percent of metropolitan area "public" service stations fall into this exempt category according to data presented in EPA's June 1991 "Preliminary Draft Technical Guidance - Stage II Vapor Recovery Systems for Control of Vehicle Refueling Emissions at Gasoline Dispensing Facilities."[19]

These exemptions mean that <u>all</u> dealers affiliated with major oil companies or other large oil refiners[20] who operate stations in metropolitan areas subject to the regulations would be required to install Stage II equipment. The exemptions to the rules also mean that an estimated 69 percent of EPA's Model Plant 2 service stations (stations with an average throughput of 10,000 - 24,999 gallons per month) would be required to install Stage II, but just 55 percent of Model Plan 3 (25,000 - 49,999 gallons per month) would need new equipment.

API calculations of Stage II costs range from $18,500 to $59,000 per facility.[21] This estimated range depends largely on the

Table 10-1: Cities Affected By Clean Air Act Stage II Requirements*

EPA Region	OZONE CLASSIFICATION Moderate	Extreme, Serious, and Severe
I	Knox and Lincoln Cos., ME Lewiston-Auburn, ME Portland, ME	Greater Connecticut Boston-Lawrence-Worcester (E. MA), MA- NH Springfield, MA Portsmouth-Dover-Rochester, NH Providence (all RI), RI
II	Atlantic City, NJ	New York-N. New Jersey-Long Island, NY-NJ-CT
III	Pittsburgh-Beaver Valley, PA Reading, PA Richmond-Petersburg, VA Charleston, WV Huntington-Ashland, WV-KY Parkersburg, WV	Philadelphia-Wilmington-Trenton, PA-NJ-DE-MD Washington, DC-MD-VA Baltimore, MD
IV	Miami-Ft. Lauderdale-W. Palm Beach, FL Louisville, KY-IN Charlotte-Gastonia, NC Greensboro-Winston-Salem-High Point, NC Raleigh-Durham, NC Nashville, TN	Atlanta, GA
V	Detroit-Ann Arbor, MI Grand Rapids, MI Cincinnati-Hamilton, OH-KY Cleveland-Akron-Lorain, OH Dayton-Springfield, OH Toledo, OH Kawaunee Co., WI Manitowoc Co., WI	Chicago-Gary-Lake County, IL-IN-WI Muskegon, MI Milwaukee-Racine, WI Sheboygan, WI
VI	Dallas-Ft. Worth, TX	Baton Rouge, LA Beaumont-Port Arthur, TX El Paso, TX Houston-Galveston-Brazoria, TX
VII	St. Louis, MO-IL	
VIII	Salt Lake City, UT	
IX	Phoenix, AZ Monterey Bay, CA San Francisco-Bay Area,CA Santa Barbara-Santa Maria-Lompoo, CA	Los Angeles,-South Coast Air Basin, CA Sacramento Metro, CA San Diego, CA San Joaquin Valley, CA Southeast Desert Modified AQMA, CA Ventura Co., CA
X		

*Interstate Ozone Transport Regions may also be required to Install Stage II

Source: U.S. Environmental Protection Agency,"EPA Announces Vehicle Vapor Recovery Canister, Will Not Be Required," *Environmental News*, March 13, 1992, p. 3.

number of nozzles per station, and whether or not Stage II is installed at the same time underground storage tanks are upgraded or replaced. Table 10-2 provides a breakdown of the component costs of Stage II for different sized stations. Stations with 6 nozzles pumping an average volume of 20,000 gallons per month would need about $18,500-$19,400 depending on when the Stage II equipment was installed. A station with 18 nozzles pumping 65,000 gallons per month would spend $34,600-$39,200 on vapor recovery equipment. The cost to a station with 30 nozzles pumping 185,000 gallons a month would be about $50,600-$59,000.

3. Automotive Used Oil Recycling

Description and Size of DIY Market

In 1989, 2.4 billion gallons of lubricants were consumed in the U.S.[22] This amount is equivalent to less than one percent of the total amount of oil products consumed. Yet with more than half of all Americans changing the oil in their cars themselves, the amount disposed of in backyards, landfills, sewer systems and storm drains by these do-it-yourselfers (DIY) is estimated to reach 200 million gallons a year--an amount equivalent to a supertanker accident every few weeks.

Developments in Lubrication Services

During the early 1980s, when the salvage value of used oil averaged about 20 cents per gallon, many service stations and automotive repair businesses readily accepted used oil from DIYers.[23] Subsequently, the salvage value fell so that in some regions of the country these businesses had to pay haulers to take the used oil away and many stations stopped collecting. Today recycling efforts with a focus on the DIYers are being promoted by oil companies, service stations, automotive repair businesses, quick lube companies, and communities.

A new industry of quick lube operators offering fast and inexpensive oil changes grew rapidly during the 1980s. Many former DIYers took advantage of this convenient service. Between 1981 and 1988 the number of DIYers is estimated to have declined from 64 percent to 52 percent.[24]

In September 1991 EPA solicited comments on proposed options regarding the listing of used oil.[25] The proposed options include a variety of methods to increase recycling which EPA estimates could cost between $7 million to $61 million annually.[26]

API Program

The API has developed a Used Oil Program designed to encourage state and municipal initiatives to promote used oil collection and education. The Program provides public awareness and technical materials, and recommends standards for collectors, transporters and recyclers.

A component of API's Used Oil Program involves member company participation. As of November 1991, ten major oil companies had formally announced Used Oil Programs with two of the companies implementing their programs in all areas where they maintain a market presence.[27] Several other companies are reported to be testing or initiating plans to begin programs in the near future. According to API as of the November report, "company programs ex-

Table 10-2: Estimates of Stage II Costs By Service Station Size

Cost Categories	Thousands of Gallons/Month (Number of Nozzles) 10-25 (6)	25-50 (12)	50-100 (18)	>100 (30)
Underground Cost (1987$)[a]				
For Stage II Only[b]	$13,162	$18,082	$23,002	$32,846
With Tank Upgrade[c]	$12,387	$15,705	$19,023	$25,659
Above Ground Costs (1987$)[d]	$3,606	$7,212	$10,818	$18,030
Total Cost (1987$)				
For Stage II Only	$16,768	$25,294	$33,820	$50,872
With Tank Upgrade	$15,993	$22,917	$29,841	$43,689
1987 to 1992 Inflation Adj. Factor at 3% Per Year	1.159	1.159	1.159	1.159
Total Cost (1992$)				
For Stage II Only	$19,439	$29,323	$39,207	$58,975
With Tank Upgrade	$18,536	$26,561	$34,586	$50,636

[a]Underground costs include: construction (trenching, excavation, repaving and labor), and equipment (piping, fittings, tank components), as well as associated onetime costs of permit fees, inspection/certification, premium costs, sales tax, design and engineering, contractor selection/project supervision, reinstallation (costs of adjustments to equipment already installed), and other miscellaneous costs.

[b]"For Stage II Only" refers to an installation where only Stage II vapor recovery equipment was placed in service at an existing gasoline retail facility. Excavation, repaving and other procedures were undertaken solely for the installation of Stage II equipment. No tank upgrade, replacement or other renovation was undertaken at the same time. Includes fixed costs of $8,242 for each station.

[c]"With Tank Upgrade" refers to an installation where Stage II vapor recovery equipment was placed in service at the same time underground storage tanks were upgraded or replaced. Only costs directly attributable to Stage II installation are included. Excavation and paving costs, for example, are attributable to the tank upgrade and not Stage II. Includes fixed costs of $9,069 for each station.

[d]Aboveground installation costs include hoses, nozzles, spouts, swivels, faceplates, bellows, retractors, clamps, and vapor caps.

Source: Stage II costs are API estimates based on Tables 10 and 11 of the "API Survey of Actual Stage II Implementation Costs in the St. Louis Metropolitan Area--Final Report," December 2, 1988. All costs were escalated to 1992 $ using 3 percent inflation rate.

tend to 32 states and the District of Columbia and include over 4,300 locations accepting DIYer used oil from the public."[28]

4. Class V Wells

"Class V wells" is the term used to identify the last of five categories of injection wells defined by EPA for regulatory purposes.[29] Class V wells include drywells or septic systems used for service bay drains, air conditioning condensate, roof and driveway storm water runoff, and other uses.[30] EPA estimates there are about 173,000 Class V injection wells throughout the country, but has noted there may be as many as a million.[31]

As a result of the Safe Drinking Water Act (SDWA) of 1974, EPA implemented an Underground Injection Control (UIC) program in 1984 which specified conditions for the permitting, monitoring, financial assurance, reporting, plugging, and abandonment of wells used to inject fluids into the subsurface.[32] The first use of EPA's administrative authority under SDWA occurred in July 1991 when EPA negotiated with ten oil companies to close 1,800 shallow injection wells at service stations located in 49 states.[33] The well-closure plan is expected to take two-and-a-half years and cost between $40 million to $90 million, or $22,000 to $50,000 per well.[34]

C. Marketing Terminals

1. SPCC Regulations

The U.S. Environmental Protection Agency issued draft Phase I revisions to the federal Oil Pollution Prevention regulations (also known as Spill Prevention, Control and Countermeasure (SPCC) regulations) on October 22, 1991.[35] The proposed rules are designed to strengthen and clarify original SPCC regulations promulgated in 1973 under the authority of the Clean Water Act.[36] These revisions will affect the owners and operators of petroleum industry aboveground storage tanks (ASTs). The marketing sector of the oil industry accounts for approximately 20 percent of the total shell capacity of all petroleum industry ASTs.[37]

Phase I Revisions

The first phase of this two-phase process calls for changing the language of the original regulation to "require", rather than "recommend" certain actions. The proposed revisions contain approximately 60 changes in regulatory language ("should" to "shall" changes).[38] The revisions clarify language to require that all SPCC plans be prepared in accordance with good engineering practice. The proposed new rule clarifies that the entire containment system, including walls and floor must be impervious to oil for 72 hours. In addition, Phase I proposals include a one-time notification requirement for all facilities subject to the regulation to provide EPA (within two months of the rules' effective date) with their name and address, number and size of aboveground oil storage tanks, the facility's total aboveground oil storage capacity, the distance of the facility to the nearest navigable waters, and the facility's Dun & Bradstreet number and federal SIC code.

EPA also included two additional new discretionary provisions among their Phase I proposed revisions. First, "that facilities have all buried piping tested for integrity and leaks annually or have buried piping

monitored monthly." Second, that facilities post vehicle weight restrictions to prevent damage to underground piping.

A wide range of cost estimates associated with implementing anticipated revisions to SPCC regulations has been made. Estimates differ primarily due to differences in the scope of the requirements addressed, assumptions regarding current levels of compliance, and the size of the population of tanks and terminals affected. EPA, for example, estimated the total cost of Phase I revisions would be $892 million or approximately $2,000 per facility (based on an EPA estimated facility population of 413,000).[39] In comparison, Gruy Engineering-Consultants (for API) estimated that per facility certification costs would range from $3,000 for a small facility (such as a production facility) to $5,000 for a large facility (such as a refinery).[40] Gruy estimated the potential total cost of Phase I SPCC revisions to the marketing sector of the petroleum industry could range from $3.7 billion to $4 billion, depending upon the scope of the final requirements.

Phase II Revisions and The Oil Pollution Act of 1990

Phase II revisions will be addressed after Phase I and will include "more substantive regulatory recommendations, such as facility-specific contingency planning and above-ground storage tank integrity testing requirements." Phase II will also address applicable requirements of the Oil Pollution Act (OPA) of 1990, such as the requirement that the President conduct a study on whether liners or other secondary means of containment should be used to prevent or help detect leaks from onshore bulk oil storage facilities.

Cost estimates for Phase II revisions will evolve as the new rules are written. However, API has developed preliminary cost estimates for one aspect of the possible revisions to OPA--retrofitting existing ASTs with release prevention barriers (RPB).[41] The estimates are based on an informal survey of API member company expenses associated with RPBs. The estimates do not reflect dike liner costs, only RPB costs for tanks. Estimates for the marketing sector range from $12-$23 per square foot for the largest tanks (over 100,000 barrels capacity) to $130-$185 per square foot for the smallest tanks (26 to 500 barrels capacity). The total estimated cost of retrofitting RPBs in the marketing sector is $2 billion to $5 billion. For the entire oil industry the range is $13 billion to $27 billion.

2. Storm Water Permits

Under the authority of the Clean Water Act (CWA), EPA issued final rules in November 1990 that require permits for storm water discharges associated with industrial activity.[42] Petroleum Bulk Plants and Terminals (Standard Industrial Classification (SIC) code 5171) that have "vehicle maintenance shops, equipment cleaning operations, or airport deicing operations" are subject to the regulation.[43] The costs associated with this permitting requirement are modest, but proposed new monitoring and reporting requirements may involve significant expenditures. Certification costs could increase from $300 to $2,000 per facility due to the requirement that monitoring and/or reporting be certified by independent engineers, rather than "in-house" engineers.[44] Also, tests used to meet proposed effluent limitations could cost thousands of dollars annually; at least one test costs $100,000 or more.[45]

Furthermore, the possibility that the scope of the rule could be broadened to include gasoline service stations could have a significant impact on retail marketing. Under the current rule, service stations are not required to obtain a permit, but they may be required to in the future. Retail gasoline outlets have a deferral until studies mandated by the Clean Water Act determine the storm-water discharge regulatory status of gasoline service stations.[46]

D. Motor Fuel Distribution System

1. Clean Fuels

The Clean Air Act Amendments of 1990 established new requirements for petroleum companies to produce oxygenated and reformulated motor fuels (RFG) for use in metropolitan areas not meeting National Ambient Air Quality Standards. Henceforth, motor fuel sold in 41 carbon monoxide (CO) nonattainment areas must have an oxygen content of at least 2.7 percent.[47] In order to meet this requirement, oxygenated materials, such as alcohols or ethers, must be added to the gasoline, and the retail gasoline stations that sell it will be required to label their pumps with a "Clean Air Act" advisory which states that the gasoline contains oxygenates to reduce carbon monoxide emissions.[48]

Eighteen of the CO nonattainment areas are also out of attainment for ozone standards. A total of 96 ozone nonattainment areas will be required or have the option to require reformulated gasoline be sold. In addition to new levels of oxygen content, new limits on aromatic hydrocarbons and benzene levels are required in order to meet Clean Air Act reformulated fuel requirements. Beginning in January 1995, reformulated gasoline is to be phased in the most severe ozone non-attainment areas. Moreover, in any area where reformulated gasoline is not required, conventional gasoline must meet the Clean Air Act's "anti-dumping" requirements which prohibit emission levels of volatile organic compound (VOCs), nitrogen oxides (NOx), CO, and air toxics from exceeding 1990 baseline levels.

New requirements to reduce the sulfur content of diesel fuel used on highways are scheduled to take effect in October 1993.[49] Off-road diesel and No. 2 distillate fuel not subject to the new requirements must be dyed blue and stored separately from the new diesel fuel.[50]

Restrictions on ozone-forming VOCs and hazardous air pollutants will require major changes in the way refiners separate and recombine the compounds of crude oil to produce gasoline, in the way refiners and marketers store and move product, and in the way motor fuel retailers market the wide variety of new products required. With the addition of reformulated and ozygenated fuels, it has been estimated that the number of motor fuel products offered will increase from the conventional four (unleaded regular, unleaded midgrade, unleaded premium, and diesel/No.2) to perhaps as many as 30 or even 50 due to regional and seasonal differences and the array of oxygenates available.[51]

All of these changes will result in an increasingly complex gasoline marketplace that will require significantly different levels of restructuring to occur throughout different market areas. API estimated the size of the markets potentially affected by clean fuel requirements ranges from 43 to 68 billion gallons a year, an amount equivalent to

between 37 percent and 59 percent of U.S. gasoline sales.[52] Estimates of the size of markets affected by the clean fuel requirements in each PAD District are grouped by category of nonattainment and shown in Table 10-3. This table measures the markets affected in terms of 1989 gasoline volume sales and shows the affected markets as a share of total volume sales.

The results show important regional differences. The CO nonattainment areas (columns 1, 2, and 3) requiring oxygenated fuels encompass more than three-fourths of the gasoline sold along the West Coast (PAD District 5) and Mid-Atlantic states (PAD District 1B), and more than half of New England's supply (PAD District 1A), about one-third of the Rocky Mountain states' use (PAD District 4), but just a small share of gasoline used in the Midwest (PAD District 2) and Gulf states (PAD District 3). Including those areas where the use of reformulated fuels will be mandated (column 4) and areas that may choose to opt-in (column 5) results in the totals shown in column 6. Column 7 shows each PAD District's 1989 gasoline sales and column 8 shows the total possible RFG and CO areas as a share of total sales. It shows that the gasoline market areas of the South Atlantic and Gulf Coast states will be least affected by Clean Air Act requirements, while states along the Northeast corridor and West coast will be most affected.

Estimates of the marketing sector costs associated with clean fuels, such as additional inventory requirements, have not been calculated. The estimates that are available primarily reflect the investment required of refiners. These estimates range from 4 to 5 cents per gallon up to 12.5 cents per gallon.[53] API estimates the annual costs will be between $1.4 billion and $7.9 billion.[54]

E. Summary of Environmental Costs

Table 10-4 provides a summary of the range of potential costs to the marketing sector to comply with new and potential federal environmental regulations. Cost estimates are provided on a per unit basis and on an annualized basis in order to provide some degree of comparability. The present value of the costs associated with UST regulations for all retail motor fuel outlets has been estimated to range from $23 billion ($1,173 million annually), according to EPA, up to $67 billion ($4,209 million annually) according to the University of Tennessee.[55] API has estimated the industrywide cost of installing Stage II in order to comply with the Clean Air Act Amendments of 1990 to range from $193 million annually (over a 20-years period) for extreme, severe, and serious nonattainment areas to $324 million annually if all moderate nonattainment areas adopt this option.[56] The annualized costs of a used oil program and the closure of some Class V wells are modest in comparison.

The environmental costs of new Phase I SPCC regulations that will affect marketing facilities ranges from EPA's estimate of $32 million annually to the Gruy estimate of $133 million to $430 million annually, depending upon the degree of compliance assumed. Preliminary estimates of one aspect of Phase II requirements--Release Prevention Barriers--could cost even more (between $213 and $534 million).

Estimates of the costs associated with the clean fuel requirements of the Clean Air Act

Table 10-3
Estimated Non-attainment Area Gasoline Markets Affected
By Clean Air Act Amendments Of 1990
(1989 Gasoline Sales Measured in Millions of Gallons)

	CO Nonattain. Only (Oxy)	CO Nonattain. & RFG Opt-In	CO Nonattain. & Mandated RFG	RFG Mandated Only	Possible RFG Opt-In	Total	1989 Gasoline Sales	Total Possible RFG & CO Areas as % of Sales
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PAD 1 (East Coast)	240	4,569	11,494	0	11,390	27,693	41,018	67.5
sub1a (New England)	0	1,948	1,056		1,332	4,336	5,850	74.1
sub1b(Mid-Atlantic)	209	1,786	10,438		3,572	16,005	16,701	95.8
sub1c(South Atlantic)	31	835	0		6,486	7,352	18,467	39.8
PAD 2 (Midwest)	1,380	1,710	0	4,357	9,505	16,952	34,587	49.0
PAD 3 (Gulf)	268	306	0	1,901	3,144	5,619	16,319	34.4
PAD 4 (Rocky Mt)	1,269	0	0	0	410	1,679	3,457	48.6
PAD 5 (West Coast)	3,975	4,164	7,604	0	547	16,290	20,015	81.4
U.S. Total	7,132	10,749	19,098	6,258	24,996	68,233	115,397	59.1

CO = carbon monoxide; RFG = reformulated gasoline

Source: Compiled from data presented by Russell O. Jones and Thomas J. Lareau, "Meeting the Oxygenate Requirements of the Clean Air Act Amendments," *API Research Study #058*, June 1991, pp. 34-37.

Table 10-4: A Summary Of New And Potential Federal Environmental Costs To The Marketing Sector Of The Petroleum Industry

Requirement Domain/ Requirement	Effective Date	Per Unit Cost ($ mil)	Estimated Annualized Costs ($mil)	Cost Estimate Source(s)
RETAIL OUTLETS				
UST Regulations	1989-98		$1,173-4,209[a]	EPA and U. of TN
leak detection		$3,000-8,000		
retrofitting cathodic protection		$10,000-48,000		
new tanks		$10,000-76,000		
insurance		$1,300 per tank		PMAA
Stage II	1995	$17,000-59,000 per facility	$193-324	API
Used Oil Recycling*	1992	20 cents/gal	$7-61	EPA
Class V Wells*	1991	$22,000-50,000 per well	$16-36[b]	EPA
MARKETING TERMINALS				
SPCC Regulations				
Phase I	1994			EPA (Gruy for API)
Plan certification only		$2,000-($5,000) per facility		
Total marketing sector			$32-($133-430)[c]	
Phase II & OPA*	1994			
RPB			$213-534[d]	API
Largest tanks		$12-23 sq. ft.		
Smallest tanks		$130-185 sq. ft.		
Storm Water Permits	1990			
New monitoring and reporting requirements*		$300-2,000 per facility	N.A.	API
MOTOR FUEL DISTRIBUTION				
Clean Fuels	1992-2000	4-12.5 cents/gallon	$1,372-7,924[e]	EPA and API

*Specific requirements are expected from a federal agency, but have not yet been proposed.
[a] EPA estimate assumes 3 percent discount rate over 30 years; University of Tennessee estimate is amortized at 3 percent over 25 years.
[b] Represents initial costs of $40-90 million to close 1,800 wells over a two and one half year period.
[c] EPA estimate is based in part on Gruy estimate of marketing sector accounting for 21.7 percent of total oil industry costs. Gruy estimate represents marketing sector costs amortized at an interest rate of 10 percent per year over the median age (29 years) of the tanks.
[d] Amortized at 10 percent per year over the 29 years.
[e] Represent costs primarily to the refinery sector. Marketing sector costs have not been estimated.
N.A. = Not available.
Source: Based on data presented by Jody Perkins, "Costs to the Petroleum Industry of Major New and Future Federal Government Environmental Requirements," *API Discussion Paper #070*, October 1991.

Amendments of 1990 represent the initial investment required of refineries; not the additional costs that may impact marketers. These estimates are provided as a measure of the relative magnitude of the impact of the regulations. With annualized costs of up to $8 billion, the costs amount to approximately $85 per family per year.[57]

The summary estimates presented in Table 10-4 are provided in order to illustrate the potential impact of federal environmental legislation on the gasoline marketing sector. Comparison among the estimates provides a rough approximation of the order of magnitude of costs associated with different environmental regulations, but also shows the degree of uncertainty associated with each as indicated by the range of costs presented. As proposed rules become finalized and experience complying with new ones is gained, a better understanding of the costs will evolve, and the cost estimates may change.

ENDNOTES

Chapter IV

1. *Lundberg Letter*, "Retail Fuel Slates 1990," January 22, 1991, p. 1.

Chapter VI

1. This does not mean that the costs of manufacturing gasoline, a joint product, can be reliably measured. Nor does it mean that sellers establish prices on a "cost plus" basis. However, long run differences in gasoline prices by stage of processing are indicative of differences in costs (see Table 7-1).

Chapter VII

1. For example, in a letter to some oil company CEO's, dated December 7, 1990 Senator Howard K. Metzenbaum (D-Ohio) asked, "Why is it that [your] retail gasoline prices go up instantly when crude oil costs go up, but when oil costs come down, your gasoline prices do not?...The American people can't understand why you have not reduced your prices as promptly as you increased them."

2. Donald A. Norman and David Shin, "Price Adjustment in Gasoline and Heating Oil Markets," *API Research Study #060*, August 1991.

3. American Petroleum Institute, *Tax Manual*, Section III, "Allocation of Revenues," March 1, 1938, p. 2114-2. According to API, by 1937 gasoline taxes were estimated to account for more than half of total state tax collections, and in certain individual states the proportion was estimated to be much greater.

4. The Federal Revenue Act of 1932 originally passed the House of Representatives without the imposition of a tax on gasoline. However, as the bill was being debated on the floor of the Senate, the Treasury Department revised upward its estimates of revenues which would be needed. In light of the new figures, the Senate amended the bill to include a gasoline tax. According to Chairman Doughton of the House Ways and Means Committee (December 28, 1932),...it was passed in the Senate, and we concurred in it because they said the whole structure of the Government would perish if the budget was not balanced, and we too were anxious to balance it, and consequently, in the rush to close the session of Congress and to balance the budget, we imposed the gasoline tax." American Petroleum Institute, *Tax Manual,* March 1, 1938, p. 2104-4.

5. Prices are adjusted for inflation using the Consumer Price Index (all items) with 1991 = 100.

6. The price data used to construct the index are collected by Bureau of Labor Statistics (BLS) representatives in 85 urban areas throughout the U.S., and include reporting from 57,000 housing units and 19,000 retail establishments. See U.S. Department of Commerce, Bureau of Labor Statistics, "CPI Detailed Report, November 1991," Washington, DC, January 1992, p. 97.

Chapter VIII

1. See T. Hogarty, "The Decline of Gasoline Service Stations and Motorists' Access to Car Maintenance Services," *API Discussion Paper #058*, March 1989; and "Issues in Gasoline Marketing," *Contemporary Policy Issues*, Spring 1985, p. 103.

2. According to the Federal Highway Administration, "Monthly Fuel Reported by States," motor gasoline sales increased by just 0.7 percent between 1977 and 1987.

3. Estimates of changes in the total number of convenience stores are derived from detailed information provided by the U.S. Department of Commerce, Bureau of the Census, *1977 Census of Retail Trade, Merchandise Line Sales*, RC77-L, issued September 1980; and *1987 Census of Retail Trade, Merchandise Line Sales*, RC87-S-3, issued June 1990.

4. See, for example, "Counting Procedure Shows How Retail Outlet Population is Greater Than Suspected," *National Petroleum News*, April 1991, pp. 26-30.

5. U.S. Bureau of the Census, *1982 Census of Retail Trade, Geographic Area Series*, RC82-A-52, November 1984, p. A-1.

6. The 1987 ML series provided a separate category for automotive lubricants (ML#730) which had been combined in earlier series with automotive fuels. The series are made comparable by matching SIC codes and adjusting the earlier 1977 series to exclude lubricants.

7. This category of businesses is estimated to account for about 10 percent of all establishments in 1987 and just 4 percent in 1977.

8. The West is defined to include Washington, Oregon, California, Montana, Idaho, Wyoming, Nevada, Utah, and Colorado.

9. The Midwest is defined to include Ohio, Michigan, Indiana, Kentucky, Illinois, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

10. The Northeast is defined to include Maine, Vermont, New Hampshire, Massachusetts, New York, Connecticut, Rhode Island, Delaware, Pennsylvania, New Jersey, Maryland, D.C., Virginia, and West Virginia.

11. The Sunbelt is defined to include North Carolina, South Carolina, Tennessee, Mississippi, Alabama, Georgia, Florida, Arkansas, Louisiana, Oklahoma, Texas, New Mexico, and Arizona.

Chapter X

1. For a comprehensive review of federal environmental regulations affecting the petroleum industry, see Jody Perkins, "Costs to the Petroleum Industry of Major New and Future Federal Government Environmental Requirements, " *API Discussion Paper #070*, October 1991.

2. EPA, "Underground Storage Tanks Containing Petroleum, Financial Responsibility Requirements," Proposed Rule, *52 Federal Register* 12793, April 17, 1987.

3. "Why Pollution Insurance Remains an Obstacle," *National Petroleum News*, February 1990, p. 42.

4. EPA, "Underground Storage Tanks Containing Petroleum; Financial Responsibility Requirements," *56 Federal Register* 40292, August 14, 1991. This notice documents EPA's proposal to extend the financial responsibility deadline to December 31, 1992 for "all marketing firms owning 1-12 USTs at more than one facility or fewer than 100 USTs at a single facility and non-marketers with net worth of less than $20 million."

5. "Deadline for Underground Tanks Extended for Small Marketers," *The Oil Daily*, August 15, 1991.

6. "Underground Tank Regulations Cost Marketers 2.8 Cents Per Gallon," *The Oil Daily*, March 12, 1992, p. 3.

7. "Marketers Plan Their Next Move," *National Petroleum News*, February 1990, p. 37.

8. *Ibid.*, p. 39.

9. "Underground Tank Regulations Cost Marketers 2.8 Cents Per Gallon," *The Oil Daily*, March 12, 1992, p. 3.

10. Estimates are based on replacement costs for three tanks of $120,000 amortized over 10 years at 11 percent interest. The monthly cost is estimated to be $1,653. The replacement costs are based on a survey of its members by the California Independent Oil Marketers Association. See Jerome B. Siebert, University

of California at Berkeley, "Economic Impact on Independent Oil Marketers of Environmental Regulations," cited in "UST Bell Tolls for Smaller Petroleum Marketers," *National Petroleum News*, May 1991, pp. 45-49.

11. "Tank Cleanup: Average Costs," *U.S. Oil Week*, April 3, 1989.

12. Waste Management Research and Education Institute, University of Tennessee (Knoxville), *Underground Storage Tanks: Resource Requirements for Corrective Action*, 1992.

13. Many banks and lending institutions stopped lending to gasoline marketers because recent court decisions (i.e., *U.S. v. Fleet Factors Corp.*) exposed lenders to possible cleanup and other liabilities. "UST Bell Tolls for Smaller Petroleum Marketers," *National Petroleum News*, May 1991, p. 48.

14. "Underground Tank Regulations Cost Marketers 2.8 Cents Per Gallon," *The Oil Daily*, March 12, 1992, p. 3.

15. Petroleum Marketers Association of America, "1992 Underground Storage Tank Status Survey," March 3, 1992, p. 6.

16. Stage II is nozzle equipment designed to capture the vapor emissions that can escape when a vehicle is being refueled. Stage I vapor recovery equipment is designed to capture the vapor emissions that occur when gasoline is delivered to a station; the system returns gasoline vapors from USTs to the delivery trucks.

17. U.S. District Court, Eastern District of Virginia, Richmond Division, "EPA's Notice of Final Agency Action," Civil No. 3:92CV50, March 27, 1992. The API has filed a petition in the Court of Appeals for the D.C. Circuit to ask the court to review and overturn the EPA Administrator's final action.

18. An independent small business marketer of gasoline is defined in section 325 of the Clean Air Act as "a person engaged in the marketing of gasoline who would be required to pay for procurement and installation of vapor recovery equipment under section 324 of this Act or under regulations of the Administrator, unless such person--(1)(A) is a refiner, or (B) controls, is controlled by, or is under common control with, a refiner, (C) is otherwise directly or indirectly affiliated (as determined under the regulations of the Administrator) with a refiner or with a person who controls, is controlled by, or is under a common control with a refiner (unless the sole affiliation referred to herein is by means of a supply contract or an agreement or contract to use a trademark, trade name, service mark, or other identifying symbol or name owned by such refiner or any such person), or (2) receives less than 50 percent of his annual income form refining or marketing of gasoline."

19. Tables 2-8, 2-9, 2-10, and 2-11 of EPA's June 1991 "Technical Guidance--Stage II Vapor Recovery Systems for Control of Vehicle Refueling Emissions at Gasoline Dispensing Facilities" provide information to calculate the share of metropolitan area "public" service stations exempt from Stage II regulations. EPA adopts the *National Petroleum News* April 1991 estimate of 210,120 "public" service stations, but also estimates an additional 210,300 "private" service stations. The latter category includes a large number of small stations owned by the government, auto rentals, utilities, trucking, taxi, and school bus facilities. Ninety percent of "private" stations are estimated to pump less than 5,000 gallons per month and so would also be exempt from complying with Stage II regulations.

20. As defined by the Clean Air Act the term "refiner" shall not include any refiner whose total refinery capacity does not exceed 65,000 barrels per day. This definition excludes approximately 9 percent of total U.S. refinery capacity.

21. Stage II costs are from Tables 10 and 11 of the "API Survey of Actual Stage II Implementation Costs in the St. Louis Metropolitan Area--Final Report," December 2, 1988. All costs were escalated to 1992$ using 3 percent inflation rate.

22. National Petroleum Refiners Association, *1989 Report on U.S. Lubricating Oil Sales*, Washington, D.C., p.1.

23. Mark Emond, "Is the Used Oil Re- cycling Program In Jeopardy?" *National Petroleum News*, February 1991, p. 35.

24. Temple, Barker, and Sloane, Inc., "Generation and Flow of Used Oil in the United States in 1988," Washington, D.C., 1989.

25. U.S. Environmental Protection Agency, "Hazardous Waste Management System: General; Identification and Listing of Hazardous Waste, Used Oil," *56 Federal Register* 48000, September 23, 1991.

26. *Ibid.*

27. API, Marketing Department, "Used Oil Program Summary," November 1991.

28. *Ibid.*, p.2.

29. EPA defines injection wells to include any well or hole dug deeper than it is wide when the principal function is the emplacement of fluids.

30. American Petroleum Institute, *Handling Water Discharges from Automotive Service Facilities Located at Petroleum Marketing Operations*, API Recommended Practice #1633, January 1992, p.1.

31. See 55 *Federal Register* 8534 (March 8, 1990) as cited by J. Gordon Arbuckle, et.al., *Environmental Law Handbook*, eleventh edition, Government Institutes, Inc., Rockville, Maryland, 1991, p. 172.

32. American Petroleum Institute, *Handling Water Discharges From Automotive Service Facilities Located at Petroleum Marketing Operations*, API Recommended Practice #1633, January 1992.

33. "EPA Orders Injection Well Closures at 1,800 Gas Stations in 49 States," *Ground Water Monitor*, Vol. 7, No. 15, July 24, 1991, p. 141.

34. *Ibid.*

35. EPA, "Oil Pollution Prevention; Non-transportation-related Onshore and Offshore Facilities," *40 Federal Register* 54612-54641, October 22, 1991.

36. According to EPA, "The Oil Pollution Prevention regulation, also known as the Spill Prevention, Control, and Countermeasures (SPCC) regulation, was originally promulgated on December 11, 1973 (*38 Federal Register* 34164)under the authority of section 311(j)(l)(c) of the Clean Water Act. The regulations had established spill prevention procedures, methods, and equipment requirements for non-transportation-related facilities with aboveground (non-buried) oil storage capacity greater than 1,320 gallons (or greater than 660 gallons aboveground in a single tanks) or buried underground oil storage capacity greater than 42,000 gallons. Regulated facilities were also limited to those that, because of their location, could reasonably be expected to discharge oil into the navigable waters of the United States or adjoining shorelines." EPA, "Oil Pollution Prevention; Non-transportation-related Onshore and Offshore Facilities," *40 Federal Register*, 54612-54641, October 22, 1991.

37. In 1988 Entropy Limited conducted a survey of major sectors of the petroleum industry for the American Petroleum Institute in order to estimate the size and describe the composition of the U.S. petroleum industry's AST population. See Entropy Limited (Lincoln, MA), "Aboveground Storage Tank Survey," conducted for the API, report #ELRN-623, April 1989. Entropy

Limited's statistical analysis of the surveyed tanks resulted in an estimated 700,000 petroleum industry AST with a total shell capacity of 2.3 billion barrels. This estimate represents AST only at petroleum industry facilities. Entropy Limited did not survey other types of facilities storing oil, such as commercial establishments, industrial manufacturing companies, or farms. According to the Environmental Protection Agency these other types of facilities could account for more than 65 percent of all the oil storage facilities in the U.S. See EPA, "Type of Oil Storage Facilities That Fall Under the Clean Water Act." Cited by the U.S. General Accounting Office, "Inland Oil Spills," GAO/RCED-89-65, February 1989, p. 10.

38. Some major sections of the SPCC regulations that are addressed by EPA in the proposed revisions include:

Section 112.3--Requirement to Prepare and Implement a Spill Prevention, Control, and Countermeasures Plan: A proposed change would require a new facility to prepare and implement a Plan before beginning operations. (EPA assumes all existing facilities subject to SPCC regulations already have their Plans prepared.) The SPCC Plan must be reviewed and certified by a Registered Professional Engineer who must be physically present to examine the facility.

Section 112.4--Amendment of SPCC Plans by Regional Administrator: Requires that an owner/operator shall submit to the Regional Administrator items 1-13 (page 54633) when a single spill event of more than 1,000 gallons of oil or two spills of any size in any consecutive twelve-month period.

Section 112.5--Amendment of SPCC Plans by Owner or Operator: Proposes that the "SPCC Plans be amended before any change is made in facility design, construction, operation, or maintenance affecting the facility's potential for discharge of oil into water of the United States unless an extension has been granted by the Regional Administrator.

39. EPA, "Oil Pollution Prevention: Non-transportation-related Onshore and Offshore Facilities," *40 Federal Register*, 54612-54641, October 22, 1991.

40. These estimates cover the cost of studying the SPCC plan, travel expenses and preparation of the report and certification, but exclude the cost of site and tank inspections. Gruy Engineering Corporation, "Assessment of the Economic Impact of Certain Anticipated SPCC Regulations Pertaining to Aboveground Storage Tanks," September 1990.

41. Russell Jones (API), "Retrofit RPB Cost Data," preliminary estimates, November 1991.

42. EPA, "Final Rule on National Pollutant Discharge Elimination System (NPDS) Permit Application Regulations for Storm Water Discharges," 55 *Federal Register* 47990, November 16, 1990.

43. *Ibid.*

44. API, "API Comments on EPA's Proposed Rule and Notice of Draft General NPDES Permits for Storm Water Discharges Associated with Industrial Activity," October 15, 1991, pp. 6,7, and 18 as cited by Jody Perkins (API), *op.cit.*, p. 18.

45. *Ibid.*

46. McCoy and Associates (Lakewood, Colorado), *New Approach to Regulating Storm Water Discharges Finalized*, issued by the American Petroleum Institute, October 31, 1990, p. 5.

47. The oxygenated gasoline requirements can be waived on an area-by-area basis by EPA under various circumstances: use of oxygenated gasoline would interfere with attainment of an ambient air quality standard other than carbon monoxide; or mobile sources do not contribute significantly to carbon monoxide levels; or there is "inadequate domestic supply" or distribution

capacity for oxygenated gasoline. See Clean Air Act, as amended, §211(m)(3)(A), (B), and (C).

48. EPA "Oxygenated Fuels Labeling Regulations Under Section 211(m) of the Clean Air Act as Amended," Proposed Rule, *56 Federal Register*, 31148 (July 9, 1991).

49. Mark Emond, "Big Changes Coming for Diesel Fuel," *Fuel Oil News*, October 1991, p. 1.

50. "What's Happening With Environmental Regs," *National Petroleum News*, January 1992, p. 37.

51. Nick Snow, "Fungibility Seen As Problem, But Opportunities Will Appear," *The Oil Daily*, March 24, 1992, p. B-8.

52. Russell O. Jones and Thomas J. Lareau, "Meeting the Oxygenate Requirements of the 1990 Clean Air Act Amendments," API Research Study #058, June 1991, pp. 34-37.

53. Alan Kovski, "Reformulation Cost Estimates Reflect Wide Fluctuation," *The Oil Daily*, September 11, 1991, p. 1; "Traditional Antagonists Agree on Makeup of Cleaner, Reformulated Fuel," *Environmental Reporter*, August 23, 1991, p. 1141; and Peter Fusaro, "Reformulation Options Bring Restrictions for Refiners," *The Oil Daily*, July 12, 1991, p. 8; as cited by Jody Perkins, *op.cit.*, p. 7.

54. *Ibid.*

55. See Jody Perkins, *op.cit.*, p. 12. The EPA estimate is based on EPA cost assumptions and estimates of the number of underground storage tanks owned by retail motor fuel outlets. It assumes a 3 percent discount rate over 30 years. The University of Tennessee estimate is amortized at 3 percent over 25 years.

56. See Russell Jones and Michael Rusin (API), "Economic Comparisons of Refueling Vapor Control Policy Options," September 5, 1991, p. 4; and Jody Perkins (API), *op.cit.*, pp. 4-6.

57. This estimate is based on Census data showing approximately 250 million people in the U.S. and 2.7 people per family.

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