

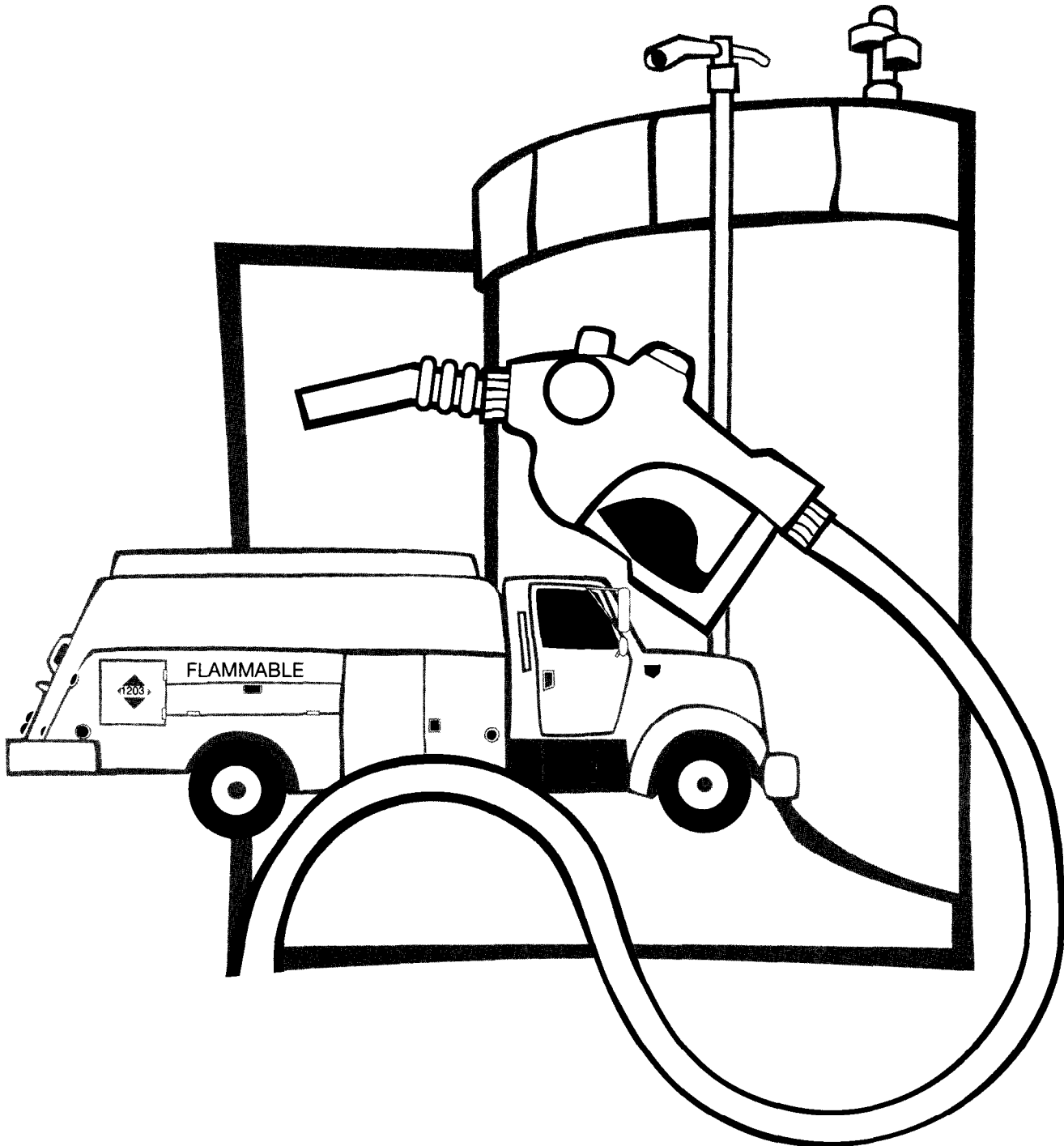


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Petroleum Cooperatives, 1995



Abstract

This report examines the vital role that agricultural cooperatives perform in providing petroleum products to farmers and rural America. All aspects of cooperative involvement are documented, from acquisition of crude oil and natural gas and crude oil refining, to the wholesale and retail distribution of refined petroleum products. Fifteen regional and interregional cooperatives responded to a survey that asked detailed information on their petroleum operations. Cooperatives continue to be an important supplier of petroleum products for farm production, having a 41 percent share of marketing activity in 1993.

Keywords: cooperatives, petroleum products, refineries, wholesale and retail distribution.

Petroleum Cooperatives, 1993

E. Eldon Eversull and John R. Dunn
Cooperative Services
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Preface

Regional and interregional cooperative petroleum operations-refineries and wholesale and retail marketing and distribution-are documented in this report. Challenges and opportunities for cooperatives in the petroleum industry are also identified.

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Highlights

Agricultural cooperatives play a vital role in providing petroleum products to U.S. farmers and rural markets. In 1993, more than 2,500 regional and local cooperatives sold \$5.2 billion worth of petroleum products. Fifteen regional and interregional cooperatives, representing most of those handling petroleum products, provided information on their operations for this report.

Cooperatives provided 41 percent of petroleum products used by U.S. farmers for farm production, up slightly from 1988-46 percent of all gasolines, 37 percent of diesel fuel, and 49 percent of propane.

Regional cooperative suppliers of petroleum products to farms and rural areas identified four challenges, ranked as follows:

- growing legislative and regulatory burden,
- decreasing number of farms and farm customers,
- increasing distribution costs, and
- deterioration of rural roads and bridges.

The cooperatives also identified four opportunity areas, ranked as follows:

- rural **nonfarm** markets,
- retail pump sales to highway traffic,
- card- or key-activated outlets, and
- convenience stores with fuel stations.

Crude oil produced from cooperative-owned wells dropped to 1.5 million barrels in 1993, less than half of **1988's** production. Natural gas produced from cooperative-owned wells also dropped to almost 4 billion cubic feet.

Cooperatives owned and operated four refineries, with a combined capacity of about 200,000 barrels per calendar day. Eighty one percent of the crude oil supply for these refineries came from domestic sources.

Total liquid fuel production at cooperative refineries of 64 million barrels in 1993 fell 6 percent from 1988. Production of unleaded gasoline and premium diesel fuel showed large increases from 1988. Cooperative refineries produced 25 million barrels of distillate fuels in 1993. More than 88 percent of all gasolines produced by cooperative refineries and more than 94 percent of both distillate fuels and propane were delivered to cooperatives.

In 1993, regional cooperatives handled slightly larger quantities of gasolines and slightly smaller quantities of distillates in their wholesale operations than in 1988. Regional cooperatives handled nearly 2.3 billion gallons of all types of gasoline. Distillate fuel handlings of 2 billion gallons in 1993 were down 6 percent from 1988.

The largest volume of petroleum sold by regional cooperatives was distributed to local cooperative outlets in the Corn Belt, Lake States, Mountain and Pacific, and Northern Plains **regions**—84 percent of gasolines, 68 percent of distillate fuels, and 84 percent of propane.

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E. Eldon Eversull
John R. Dunn
RBCDS—Cooperative Services

Agricultural cooperatives play a vital role in providing petroleum products to U.S. farmers and rural markets. In 1993, cooperatives provided petroleum products valued at \$5.2 billion. Much of it was used for farm production.

Cooperatives were involved at all levels in petroleum product production and distribution, from crude oil well exploration, development, and production, to the wholesale and retail distribution of refined petroleum products.

The operations of 17 regional and interregional cooperatives that handle petroleum were surveyed (table 1). Two of those responding either no longer sold petroleum products or sold only a small amount of lubricating oil and grease.

Cooperatives' Share of Sales

Cooperatives continued to play a significant and increasing role in providing petroleum products used for farm production. In 1993, cooperatives provided 46 percent of all gasolines, 37 percent of diesel fuel, and 49 percent of propane sold to farmers (table 2). These shares were up slightly from 1988 levels, but still below the 1979 peak of 45 percent.

The gallons of fuel provided by cooperatives in table 2 have been adjusted by information from a recent Cooperative Services (CS) study (Chesnick). The 700-plus local cooperative respondents said they received 11 percent of their gasolines and distillate fuels and 17 percent of their propane from noncooperative sources. By including these additional amounts of fuel, cooperative market shares of gasolines and distillate fuels both increased 2 percent while propane was up 4 percent.

Only a portion of the total fuel sold by cooperatives is used for farm production, even in predominately rural areas. Respondents estimated total sales of each petroleum product that was sold for **nonfarm** use, use in farm production, and use on farms other than production (table 3). These estimates form the basis for the share figures provided in table 2.

Except for a small shift in gasoline used for farm production and other fuel oils (which incurred a large shift but

has a small impact due to low sales), little changed in the percentage of fuels used for farm production. Sales of distillate fuels, the major farm power fuels, reflected continued heavy use for farm production.

Challenges and Opportunities

Looking to the next millennium, petroleum cooperatives will face numerous challenges and opportunities as changes continue in their basic markets and ways of doing business. Some are unique to the petroleum industry and cooperatives' niche within it, some are common to all agribusiness concerns serving the American farmer, and others are endemic to the U.S. cooperative system.

For example, the industry was challenged by an Environmental Protection Agency (EPA) requirement that refineries produce low-sulfur diesel fuel for highway use by Oct. 1, 1993. This required investment in expensive additional equipment, such as a diesel hydrotreater. More than 34 percent of cooperative refinery production met this challenge and 51 percent of regional cooperative diesel sales were low sulfur. By the end of 1993, essentially all cooperative diesel sales were low sulfur.

The cooperative system, itself, is challenged by its farmer-members to sell a renewable resource fuel, **ethanol-enhanced** gasoline. About 29 percent of gasoline sold by regional- or local-owned petroleum outlets was probably ethanol or ethanol-enhanced. Ethanol is primarily produced from corn, so cooperatives have turned ethanol-enhanced gasoline sales into an opportunity to add value to their farmer-member corn crop.

Challenges

With 187 refineries and many thousands of retail service stations and bulk delivery outlets, petroleum cooperatives face major challenges. Most of these cooperatives also sell a variety of other farm supplies, so their petroleum sales may be complementary to other farm supply sales and thus expose them to competition from other farm supply **distribu-**

Table I-Regional and interregional petroleum cooperatives' structure, fiscal year, and type of operations, 1993

Cooperative and Headquarters	Fiscal year ends on:	Operations		Refining		Crude oil production	
		Retailing	Wholesaling	Own facilities	Through inter-regional	Own facilities	Through inter-regional
FEDERATED COOPERATIVES:							
CENEX, Inver Grove Heights, MN ^{1,2}	9/30	●	●	●	●	●	●
Countrymark Cooperative, inc., Indianapolis, IN ²	8/31	—	●	●	—	●	—
Delta Purchasing Federation, Greenwood, MS ²	6/30	—	●	—	—	—	—
Farmland Industries, Kansas City, MO ²	8/31	●	●	●	—	—	—
Growmark Inc., Bloomington, IL ^{1,2}	8/31	—	●	—	●	—	●
SF Services, Little Rock, AR ²	6/30	—	●	—	—	—	—
South Dakota Wheat Growers, Aberdeen, SD	12/31	—	●	—	—	—	—
Tennessee Farmers Cooperative, LaVergne, TN ²	7/31	—	●	—	—	—	—
Waterloo Service Company, Waterloo, IA	8/31	—	●	—	—	—	—
CENTRALIZED COOPERATIVES:							
Agway Inc., Syracuse, NY ²	6/30	●	●	—	—	—	—
Maine Potato Growers, Presque Isle, ME ²	6/30	●	●	—	—	—	—
MFA Oil Company, Columbia, MO ¹	8/31	●	●	—	●	—	●
MIXED COOPERATIVES:							
Farmers Petroleum Cooperative, Lansing, MI ²	8/31	●	●	—	—	—	—
Southern States Cooperative, Richmond, VA ²	6/30	●	●	—	—	—	—
INTERREGIONAL COOPERATIVES:							
National Co-op. Refinery Assn., McPherson, KS	6/30	—	●	●	—	●	—
Universal Cooperatives, Inc., Minneapolis, MN	7/31	—	●	—	—	—	—

● Cooperative involved in this activity, and, -cooperative not involved in this activity.

¹ Members of National Cooperative Refinery Association: CENEX, Growmark, and MFA Oil.

² Members of Universal Cooperatives, Inc.: Agway, Alabama Farmers, CENEX, Countrymark Cooperative, Inc., Delta Purchasing Federation, Farmers Petroleum Cooperative, Farmland Industries, Gold Kist, Growmark, Maine Potato Growers, SF Services, Southern States Cooperative, and Tennessee Farmers Cooperative.

Table **z-Cooperatives' share of fuel used for U.S. farm production**

Year/product	Fuel used for U.S. farm production		Cooperatives' share of fuel used for U.S. farm production
	Total fuel provided by all sources	Total fuel provided by cooperatives	
	<i>1,000 gallons</i>		<i>Percent</i>
1993			
All gasolines	1,404,393	645,130	45.9
Diesel fuel	3,298,098	1,231,723	37.3
Total liquids:	4,702,491	1,876,853	39.9
Propane or LP gas	761,204	371,700	48.8
Total all fuels:	5,463,695	2,248,552	41.2
1988			
All gasolines	1,600,000	699,055	43.7
Diesel fuel	2,800,000	1,034,287	36.9
Total liquids:	4,400,000	1,733,341	39.4
Propane or LP gas	600,000	209,864	35.0
Total all fuels:	5,000,000	1,943,205	38.9
1982			
All gasolines	2,385,241	1,124,932	47.2
Diesel fuel	2,931,690	836,698	28.5
Total liquids:	5,316,931	1,961,629	36.9
Propane or LP gas	1,136,167	423,699	37.3
Total all fuels:	6,453,098	2,385,328	37.0
1979			
All gasolines	3,381,130	1,653,765	48.9
Diesel fuel	3,178,766	1,314,703	41.4
Total liquids:	6,559,896	2,968,468	45.3
Propane or LP gas	1,301,867	553,660	42.5
Total all fuels:	7,861,763	3,522,128	44.8

Table 3—Percentage of petroleum products sold by cooperatives for off-farm use, for farm production, and for other farm uses, 1993 and 1988

Petroleum product	Off-Farm Use		Used for Farm Production		Other Farm Uses	
	1993	1988	1993	1988	1993	1988
	<i>Percent</i>					
Gasoline (all types)	44	57	36	31	20	12
Diesel fuel	10	16	80	78	10	6
Home heating oil	36	33	12	13	52	54
Other fuel oils and residual (#4-#6)	40	97	40	3	20	
Kerosene	22	24	28	18	50	58
Propane or LP gas	38	39	30	30	32	31
Lubricating oils	10	13	81	81	9	6
Grease	9	4	83	91	8	5

tors. Specific challenges listed on the survey will be presented in part in the following sections, ranked in order of importance by respondents. First though, a short discussion of the competition of local cooperatives can be assessed from a recent Cooperative Services (CS) study (Chesnick).

More than 700 local cooperatives returned usable surveys on their petroleum operations. Most were associated with the regional cooperatives represented in this study, either by owning or by being owned by the regional cooperative.

For all fuels, lubricating oils, and grease, at least 80 percent was supplied by regional cooperatives to these locals. Major oil companies supplied about 4 percent, and independent jobbers about 6 percent. These locals had an average petroleum sales volume of \$2.1 million and median total sales of \$7.5 million. The local cooperatives had numerous competitors. Each had at least 16 retail competitor service stations in their marketing territories, half representing major oil companies and half independent oil companies.

Legislative and Regulatory Concerns

Respondents said the major challenge facing petroleum cooperatives was the growing legislative and regulatory burden. Most regional cooperatives had at least a legislative and regulatory affairs person while refineries often have an entire department to keep abreast of and in compliance with new laws and regulations. Since the last study, petroleum retailers have instituted measures to control pump vapor pressure and continued efforts to replace leaking underground storage tanks. More recently, the sulfur content of diesel fuel has been lowered and regional oxygen content of gas has come into question.

Public concerns over the quality and safety of the water supply, air, and other components of the environment will continue to affect the production, storage, transportation, and use of petroleum products. The net results affecting the petroleum industry are quite simple: decreased total use of petroleum and petrochemical-based products and more efficient and careful use of existing supplies.

For cooperatives involved in various aspects of the petroleum industry, the impact of these changes will take three general forms: (1) changes in the mix of products produced and raw materials used to produce them; (2) capital investments required to bring the physical plant and operating practices up to regulated specifications; and (3) changes in the agronomic and operating practices of petroleum product buyers.

Decreasing Number of Farms

The trend will probably continue toward an increasingly bimodal distribution of farms—marked by an increase in the number of very large and small farms while the number of medium-size operations declines steeply. Farm numbers have decreased by about 300,000 in the past decade to about 2 million. In some production sectors, most notably in red meats and poultry, independent producers will face especially intense competition from vertically integrated firms striving to dominate the market from farm to consumer. Surviving producers will be more technically sophisticated. They will be more focused on their individual profit and less on activities or groups not having a direct and immediate impact on their profitability.

Cooperatives will be challenged to gain and hold on to the patronage and loyalty of these surviving farmers. New programs and approaches will be required that are tailored to the needs of individual patrons.

A reduction in farms alone means fewer customers and probably more intense competition for their accounts. In addition, production agriculture is also changing, requiring fewer gallons of fuel. Fuel requirements will continue to fall as the products and methods of agriculture production change due in part to new crops developed from genetic engineering and reduced-use agronomic practices.

New commercial crops and different agronomic techniques will alter the location of production, the mix of supplies required, and the demographics of the farming sector.

Increasing Distribution Costs

Declining rural populations and fewer and larger farms have increased distribution costs due to longer distances traveled for the same sales volume. Environmental and safety concerns also have increased distribution costs. Many underground storage tanks have been replaced. The pump-to-vehicle tank delivery system has been upgraded to lower vapor emissions. Cooperatives have had to adopt new technology or adapt to changing marketing strategies. About 25 percent of their terminal distribution facilities have been consolidated or closed. More efficient fuel deliveries allow more shipments with fully loaded trucks.

Rural Transportation Infrastructure

The deteriorating rural transportation system is of great significance to U.S. farm supply and marketing cooperative activities.

The extensive transportation and distribution system of cooperatives depends on a well-maintained rural road, bridge, and transportation infrastructure that provides access to all areas. To minimize costs, larger delivery vehicles are required to transport supplies such as petroleum. Cooperatives must work with other involved public and private parties to ensure that improvement of the rural transportation infrastructure receives the appropriate attention.

Servicing Accounts

With fewer farms and farmers, petroleum cooperatives are increasingly competing for the same customers. Often, this competitor is another cooperative. Another CS study (Chesnick) found that local petroleum cooperatives, on average, have about two other cooperative retail service stations in their marketing territories and three cooperative bulk delivery outlets. Duplicate facilities and services increase cooperatives' cost in the petroleum sector.

Competition, technology, and changing farm demographics pressures will force cooperatives at all levels to restructure in search of greater efficiency, more responsiveness, and improved ability to compete. Serious efforts must be made to eliminate duplication of efforts and investments and to reduce overlap at all levels of the cooperative system.

Opportunities

Within any challenge lie the seeds of opportunity. Cooperatives have met prior challenges in supplying farmers with petroleum products and hold great potential to address more challenges by responding to the special needs of production agriculture.

Cooperatives turned the challenge of providing leaded gasoline to power older farm equipment into an opportunity. Cooperatives have successfully stressed product quality and differentiation through the use of branded products specifically formulated to meet farm production needs. Most regionals, for instance, have provided higher-performance branded diesel fuels and lubricants. These opportunities are listed in order of importance as ranked (weighted by sales volume) by survey respondents.

Rural Nonfarm Markets

Respondents said retail pump sales to highway traffic and rural **nonfarm** markets have the greatest potential for increasing cooperative sales. Faced with falling demand for fuels for farm production, cooperatives need to expand their markets. They already have in place the infrastructure to deliver and sell petroleum products to rural America.

Unless cooperatives expand their potential customer base, more of their capacity will have to be idled in the future. Cooperatives could then spread their fixed costs over larger sales. Expanding their customer base addresses the need to compensate for high-cost, low-volume accounts.

Opportunities for retail pump sales to highway traffic and to rural **nonfarm** markets were ranked third and fourth (unweighted). Card- or key-activated outlets were first and convenience stores with fuel stations ranked second (unweighted).

Although too much can be inferred from the difference in weighted and unweighted rankings, combining this information with a survey of local petroleum cooperatives might be useful. The survey of local cooperatives (Chesnick) found that 71 percent had card- or key-activated outlets and 42 percent had convenience stores. This suggests that the larger regional cooperatives have already adopted these operations. Hence the lower ranking when weighted by volume.

Convenience Stores With Fuel Stations

The third ranked (unweighted rank of 2) opportunity was having convenience stores with fuel stations. Drastic reductions in availability of goods and services due to business closure have hit many rural areas. In some communities, the cooperative may operate the only service station. These communities may also be too small to have a grocery store.

Although they offer a more limited line of food items than a grocery store, convenience stores are a reasonable substitute when the nearest grocery store may be many miles away. Many convenience stores operate 24 hours and offer

more employment opportunities than a self-service station. This is another way cooperatives can expand their petroleum sales to a rural, **nonfarm** market.

Card- or Key-Activated Outlets

Card- or key-activated outlets were ranked as the fourth highest opportunity (weighted), and ranked highest overall (unweighted). Cooperatives were leaders in petroleum outlets that allowed farmers 24-hour access. Several large cooperatives began using this concept about a decade ago. In the last CS survey, about 8 percent of cooperatives' final outlet sales were from this type of automated-billing system. Regional cooperatives estimated about 12 million gallons from these outlets were picked up by farmers in their own bulk tanks.

The petroleum industry has now widely adopted the automated-billing process which features use of a credit or debit card. Seventy one percent of the cooperatives are using this service (Chesnick). The change, however, has been accompanied by higher costs. Pumps used in these systems cost more because of technology involved to process automated billing. Cooperatives also pay a small transaction fee on credit card sales. Some smaller cooperative outlets may not have these updated systems because of these additional costs. Due to wide use by major oil companies, this service was considered the primary opportunity by all survey respondents (unweighted).

U.S. cooperatives have served the petroleum needs of farmers and rural America for many years. By continuing to be innovative, flexible, and dedicated to serving the needs of their patron base, cooperatives will continue to play a major role in the rural petroleum markets for years to come.

Cooperative System

More than 2,500 local, regional, and interregional cooperatives sold petroleum products at the wholesale or retail level in 1993. Two regionals controlled petroleum operations, ranging from crude oil production and refining to retail sales. But most cooperatives were involved only in the wholesale and retail sales of refined petroleum products.

Crude Oil and Natural Gas Production

Crude oil produced in 1993 from wells owned wholly or partially by cooperatives exceeded 1.5 million barrels, down 50 percent from 1988 and continuing the decline experienced during the last decade (table 4).

Both the number of crude oil wells and net proven crude oil reserves declined about 50 percent. National production of crude oil fell to 6.8 million barrels per day, the lowest level since 1958. Cooperative crude oil production and reserves have followed this general pattern. Exploration expenses and the cost of producing domestic crude have risen, making it more attractive to acquire crude oil on the open market and forgo the risk and cost of finding new domestic crude.

Natural gas production and reserves have also declined, largely for the same reasons as the decline in crude oil production. Natural gas produced from **cooperative**-owned wells fell by more than 21 percent between 1988 and 1993 and now totals just under 4 billion cubic feet.

The decreased capability of cooperatives, as a group, to produce crude oil and natural gas should be **a concern** for

Table 4—Crude oil and natural gas production by cooperatives¹

Item	1993	1988	1982	1979
	<i>Number</i>			
Crude oil wells in which an interest is owned	644	1,240	1,961	1,727
Gas wells in which an interest is owned	175	80	342	571
	<i>Barrels</i>			
Net crude oil produced from owned wells	1,543,990	3,154,823	7,926,165	8,683,715
Net crude oil reserves (proven)	8,853,788	15,461,129	96,776,571	52,025,000
	<i>7,000 cubic feet</i>			
Net production of natural gas from owned wells	3,735,974	4,739,860	27,387,163	9,877,000
Net natural gas reserves (proven)	27,650,350	72,066,344	322,221,558	na

¹ Data on a calendar year basis for 1979 and 1982, and on a fiscal year basis for 1988 and 1993.
na = not available.

the United States, given the decline in domestic production. The exit of cooperatives from ownership of production reserves has enabled them to shift their scarce financial resources to other areas with better and less volatile returns.

Cooperative Refinery Operations

In 1993, cooperatives owned and operated 4 of the 187 refineries operating in the United States—at Mt. Vernon, IN; Coffeyville and McPherson, KS; and Laurel, MT.

U.S. crude oil production is declining. Prices have been weak due to increased foreign production that has not been met by increased demand. The real cost to refineries for crude oil (based on 1987 dollars) has continued to fall and in 1993 was at its lowest level since 1973. The real cost per barrel of oil for refineries in 1993 was \$13.41 for domestic oil and \$13 for foreign oil, for a composite price of \$13.21. This was almost \$1 less than prices in 1988.

Reduced crude oil prices allowed refineries in general to increase margins about one-half cent per gallon for motor gasolines and 4 cents for diesel fuels. Although refinery margins were not collected in this study, the increased margins for U.S. refineries between 1988 and 1993 probably indicated that cooperative refineries were not experiencing the high cost of crude oil and low price for refined product that left some with poor refinery margins in 1988.

Refining Capacity

Cooperative refinery numbers dropped to four after one closed in 1991 (table 5). Although the closed refinery was small and only partly used to capacity in 1988, slight increases at other refineries boosted overall cooperative refinery capacity for the first time in a decade. In 1993, total cooperative refining capacity was 199,950 barrels per calendar day or 208,100 barrels per stream day¹. The remaining refineries represented 1.4 percent of the total 14.4 million-barrel capacity of all U.S. refineries. Average capacity of cooperative refineries per calendar day was just over half the U.S. average of 84,066 barrels.

Products Refined

Cooperative refineries produced 63.6 million barrels of liquid fuels and 1.9 million barrels of liquefied petroleum gas in 1993 (table 6). The total production of 65.5 million barrels was down 5 percent compared with 1988 and down 45 percent from 1979, the peak year. The refineries processed 67 and 6.9 million barrels of crude oil and natural gas liquids, respectively, in 1993.

Cooperative refineries produced 1.4 million barrels of leaded gasolines to meet the demand of some older gasoline-powered farm equipment still in use. Cooperatives produced 35.6 million barrels of unleaded gasolines in 1993, up 72 percent from 1988. While the production of leaded gasoline has diminished in importance, the total production of both leaded and unleaded gasolines was about the same as in 1988.

Table 5—Number and capacity of cooperative refineries

Year	Number	Capacity	
		Per calendar day	Per stream day
		<i>Barrels</i>	
1993 ¹	4	199,950	208,100
1988	5	197,565	205,360
1982	6	319,175	na
1979	8	459,700	na

¹ Source: DOE/EIA-0340(93)/1 "Petroleum Supply Annual 1993, Volume 1," pages 90-93.
na = not available.

Distillate fuel production at cooperative refineries of 25.4 million barrels in 1993 was down from 29.5 million in 1988. Kerosene production sharply declined from 7.5 million barrels in 1979 to only 35,856 barrels in 1993. This decrease probably reflected a shift in production to other distillates.

The product mix at cooperative refineries differs from all others because of the characteristics of farm-fuel demand (table 7). Eighty-six percent of cooperative refinery production was for major power fuels used by farmers (gasolines and distillate fuels). This compares with only 69 percent on a national scale.

When viewed on the basis of power fuels only, the differences in product mix between cooperative and other refineries becomes clearer. Distillate fuels are used more widely than gasolines in production agriculture. Therefore, cooperative refineries devoted 40 percent² of their production to distillate fuels, compared with the industry average of 28 percent.

Sources of Crude Oil

Cooperative refineries purchased most of their crude oil supplies from domestic sources. Only 17 percent came from cooperative owned or controlled sources (table 8). Cooperative refineries became far less dependent on long-term contracts for their crude oil supplies. These contracts represented nearly a third of all crude oil received by cooperatives in 1982, but only 4.3 percent in 1993. Most supplies were acquired under short-term contracts and on the spot market. The cooperatives obtained 72.6 percent of their crude this way in 1993, down slightly from the high of 80 percent in 1988.

¹ Barrels per stream day means running under full capacity at optimal conditions, while barrels per calendar day includes down time and other limiting factors.

² Typically, refinery distillate output is limited to 24 to 30 percent of refined product output. This product mix reported by surveyed refineries may reflect refined product trades or transfers between other refineries to obtain distillates their owners desire.

Table 6—Crude oil processed and products refined or manufactured by cooperatives

Item	<i>Barrels</i>			
Refinery inputs:				
Crude oil run or processed	67,043,754	68,424,389	84,625,330	128,258,000
Natural gas liquid run or processed and other	6,903,452	7,712,564	5082,231	na
Liquid products:				
Unleaded gasoline	35,592,868	20,659,508	24,036,846	16,613,325
Leaded gasoline	1,377,364	16,507,057	23,551,519	52,667,775
Kerosene	35,856	102,657	4,045,516	7,540,800
Premium diesel fuel	3,511,269	2,387,650	2,246,736	na
No. 2 diesel fuel	11,452,543	23,000,449	8,690,186	25,096,725
Home heating oil	10,365,078	4,101,659	18,856,697	15,906,375
No. 4 fuel oil and residual fuel oil (No. 5 and No. 6)	1,305,898	919,546	6,491,662	na
Total liquid products:	63,640,875	67,678,526	85,672,426	117,825,000
Propane or LP gas	1,876,747	1,458,945	2,618,777	2,327,418

¹In 1979, unleaded gasoline and residual fuel oil were combined.
na = not available.

Table 7—Input and output of cooperative and U.S. refineries by major product class, 1993 and 1988

Item	Cooperative refineries		All U.S. refineries ¹	
	1993	1988	1993	1988
<i>1,000 barrels per day</i>				
Refinery inputs:				
Crude oil	180	180	13.610	13,250
Natural gas liquid run and other	1a	21	1,330	1,120
Total:	198	201	14.940	14,370
Products:				
Finished gasolines	101	102	7,240	6,960
Distillate fuels	69	a1	3,120	2,860
Residual oil	3	2	a30	930
<i>Percent</i>				
Output of power fuels as a percent of inputs*	85.7	90.7	69.3	68.3
Products as a percent of output:				
Finished gasolines	58.1	55.0	64.7	64.7
Distillates	39.9	43.7	27.9	26.6
Residual oil	2.0	1.3	7.4	a.7

¹ Source: DOE/EIA-0384(93) "Annual Energy Review 1993," page 155.

² Power fuels include finished gasolines and distillate fuels.

Table 8—Sources of crude oil received by cooperative refineries, 1993 and 1988

Source	1993		1988	
	<i>Barrels</i>	<i>Percent</i>	<i>Barrels</i>	<i>Percent</i>
Beginning inventory ¹	4,634,291	5.9	na	na
Cooperative sources	13,491,909	17.2	8,463,942	12.4
Domestic sources:				
Spot purchases	18,624,775	23.7	19,551,295	28.6
Short-term contracts	30,051,248	38.2	28,417,313	41.5
Long-term contracts	2,221,043	2.8	5,301,072	7.7
Foreign sources:				
Spot purchases	1,294,077	1.7		
Short-term contracts ²	7,093,495	9.0	6,690,767	9.8
Long-term contracts	1,188,375	1.5		
Total used:	73,947,206	94.1	68,424,389	100.0
Ending inventory ¹	4,652,007	5.9	na	na

¹ Beginning and ending inventories are not available for 1988.

² Short- and long-term foreign contracts combined in 1988.
na = not available.

Domestic sources, including cooperative-owned reserves, provided more than 81 percent of the crude oil acquired by cooperative refineries in 1993 (excluding beginning inventories). Reliance on foreign sources declined from more than 25 percent of the total in 1982 to 12 percent in 1993.

Cooperatives increasingly used spot markets and short-term contracts for more flexible response to changes in crude oil prices and sources. This desire for greater flexibility in sourcing follows the same trend in the U.S. refining industry. Since 1982, cooperatives have made greater use of futures contracts at the New York Mercantile Exchange. Through extensive hedging transactions, cooperatives are better able to control their price risks in purchasing crude oil and better protect their crude oil and product inventory values.

Refinery Storage Facilities

Cooperative refinery storage capacity of almost 3 million barrels of crude oil was down from 3.5 million barrels in 1988 (table 9), partly because a refinery was closed. Storage capacity, if fully used, would carry a refinery for 15 days. Storage capacity of refined liquid fuels totaled 8.3 million barrels, or about 13 percent of production. Propane storage capacity was about 1.8 million barrels or about equal to a full year's production.

Table 9—Bulk Storage Capacities at cooperative refineries and nonrefinery sites

Type of storage	1993	1988
	<i>Barrels</i>	
Crude oil	2,992,000	3,545,397
Refined liquid fuels:		
Motor gasoline	4,253,807	4,473,879
Distillate fuel and kerosene	3,842,014	3,488,683
Residual fuel oil	176,878	156,028
Total:	8,272,699	8,118,590
Propane or LP gas	1,827,250	1,919,332
Lubricating oils, asphalt, blending stock and others	1,308,500	1,785,337

Product Transportation

More than 90 percent of the crude oil received by cooperative refineries was transported by pipelines (table 10). Only 8 percent was received by truck and 1 percent by barge or vessel. In 1993, cooperative owned or leased transportation was used to move 43 percent of their crude oil supplies, up slightly from 1988.

Cooperative refiners have increased their control of pipelines to more than 5,000 total miles in the past decade—up nearly 37 percent (table 11). More than 1,800 miles of gathering and trunk lines were wholly owned or leased in 1993, down slightly from 1988. Through various joint ownership or leasing arrangements, cooperative refiners added 600 miles of pipeline.

Cooperatives also owned or leased about 120 truck transports with a capacity of 2,000 gallons or more, and about 400 railcars. Combined capacity of the trucks and railcars used in transporting crude oil, refined products, and asphalt exceeded 240,000 barrels.

Pipelines continued to be the primary (74 percent) transportation mode used by cooperative refineries for liquid fuels leaving their facilities (table 12). Truck volume increased about 4 percent between 1988 and 1993 and now accounts for nearly a quarter of the shipments. About 8 percent of the liquid fuels shipped from the refinery were in cooperative owned or leased pipelines. Use of cooperative trucks increased from 2 percent to 10 percent, helping to double the share of refinery shipments through cooperatives to 17 percent.

Greater use of rail and trucks and less of pipelines marked a shift by refineries shipping propane or liquefied petroleum (LP) gas (table 13). Truck shipments increased to 39 percent, about the same as pipeline shipments. Use of cooperative owned or leased vehicles for shipping propane changed little from the last study. It was only 4 percent in 1993 and entirely in trucks.

Table 10—Transportation modes for crude oil receipts by cooperative refineries

Transportation mode	Crude oil receipts by refineries		Crude oil received through the use of cooperative owned or leased transportation modes	
	1993	1988	1993	1988
	<i>Percent</i>			
Pipeline	90.7	97.0	36.5	38.8
Truck	8.0	2.0	6.0	1.8
Barge or vessel	1.3	1.0		
Total all modes:	100.0	100.0	42.5	40.6

Table 11—Pipeline mileage owned or leased by cooperative refineries

Type of pipeline	1993	1988	1982	1979
	<i>Miles</i>			
Wholly owned or leased:				
Gathering	1,311	1,703	1,414	1,476
Trunk	505	272	347	176
Jointly owned or leased:				
Gathering and trunk	3,634	3,035	1,907	na

na = not available.

Table 12—Transportation modes for the shipment of liquid fuels from cooperative refineries

Transportation mode	Refinery shipments of liquid fuels		Refinery shipments through the use of cooperative owned or leased transportation mode	
	1993	1988	1993	1988
	<i>Percent</i>			
Pipeline	74.2	76.9	7.7	6.2
Rail	.3	2.8		
Truck	22.5	18.9	9.6	1.8
Barge or vessel	3.0	1.4		
Total all modes:	100.0	100.0	17.3	8.0

Table 13—Transportation modes for the shipment of propane or LP gas from cooperative refineries

Transportation mode	Refinery shipments of propane or LP gas		Refinery shipments through the use of cooperative owned or leased transportation mode	
	1993	1988	1993	1988
	<i>Percent</i>			
Pipeline	40.2	68.0		
Rail	21.0	6.8		
Truck	38.8	25.2	4.2	3.4
Total all modes:	100.0	100.0	4.2	3.4

Refined Product Destination

Refined products from cooperative refineries were usually delivered primarily to the cooperatives that owned the refinery (table 14). Eighty-eight percent of all gasolines, 94 percent of distillate fuels, and 95 percent of propane or LP gas was delivered to cooperatives.

As a composite petroleum system, the cooperative refiner-to-wholesaler link remained strong. Most products remained in the cooperative system. Noncooperative buyers, however, purchased all of the refineries' residual fuel oil and solid products.

Wholesale Marketing and Distribution

Cooperatives have the most extensive agricultural supply distribution system in the United States. Many believe this network is the most significant strength of the cooperative supply system. Through this farmer-owned wholesale distribution system and its direct linkage to cooperative retail outlets, farmers are able to buy most major supplies—feed, seed, fertilizer, and crop protectants—in the quantities and quantities they desire and at a fair price. Most petroleum products used for agricultural production are supplied by regional cooperatives and their outlets.

Products Received by Regionals

Supplies of petroleum products for wholesale distribution by regionals to their locals remained about the same from 1988 to 1993. This contrasts with the growth in cooperative wholesale petroleum sales from 1982 to 1988 (table 15).

While the quantity of all gasolines remained virtually unchanged from 1988, ethanol-blended gasoline doubled to 154 million gallons. Although still a small part of the total, its

Table 14—Refinery sales or transfers by product and type of product recipient, 1993 and 1988

Product	Product recipient			
	Cooperatives		Other Buyers	
	1993	1988	1993	1988
	<i>Percent</i>			
Motor gasoline	88.4	82.0	11.6	18.0
Distillate fuel and kerosene	94.4	92.4	5.6	7.6
Residual fuel oil			100.0	100.0
Propane or LP gas	94.9	98.8	5.1	1.2
Lubricating oil		58.0		42.0
Solid products (asphalt, coke, and others)		7.3	100.0	92.7

growth shows a continued effort by cooperatives to help promote the use of renewable resource fuels whose feedstock was grown by farmers.

While the total volume of distillate fuels fell about 6 percent from 1988 to 1993, sales of premium diesel fuel grew substantially to 673 million gallons, only slightly behind sales of No. 2 diesel fuel. Growing use of premium diesel fuel has been at the expense of No. 2 sales.

Sales of propane increased 53 percent from 1988 to 1993. Grease sales also increased tremendously, from 3,000 to 12,000 tons.

Sources of Products

Regional cooperatives continued to rely on cooperative refineries to provide the bulk of their petroleum products for wholesale operations (table 16), except for home heating oil, kerosene, propane, lubricating oil, and grease. They were supplied more often by spot purchases or domestic contracts rather than by cooperative refineries. The use of domestic contracts instead of spot purchases decidedly increased for all products in 1993, except propane because of stable petroleum product prices. Cooperative wholesalers used domestic contracts more frequently to lock in a price and assure a supply. None of the cooperatives used foreign contracts to buy petroleum products in 1993.

Disposition of Products

Regional petroleum wholesalers have four primary types of outlets or buyers for their petroleum products: (1) those owned by the regionals, (2) those operated by their local cooperative affiliates, (3) those operated by noncooperative entities, and (4) other outlets.

Cooperative outlets may be bulk delivery centers, customer-fill stations, card- or key-activated pumps, or combinations. Affiliated and unaffiliated locals are treated as a single group in this report. In addition, regional wholesalers sell smaller quantities to a range of other buyers, including other wholesalers and various government or public institutions.

Outlets owned by local cooperatives were the most important customers of regional wholesalers for nearly every petroleum product (table 17). Locals bought 57 percent of the gasolines, 66 percent of the distillate fuels, and 80 percent of the propane sold or transferred by regional wholesalers. Regional-owned final outlets (usually centralized regionals) received 12 percent of all gasolines and 22 percent of all distillate fuels.

Noncooperative outlets purchased only 5 percent of the regionals' gasoline and 3 percent of the distillate fuels sold or transferred. Other buyers, typically resellers, purchased a quarter of the regionals' gasoline supply. Others were less significant buyers of distillate fuel and propane.

Outlets in the Corn Belt, Lake States, Mountain and Pacific, and Northern Plains regions received the largest volume of petroleum sold by regional cooperatives (table 18). These five regions handled 84 percent of the gasoline, 68 per-

Table 15—Quantity of petroleum products received by regional cooperatives for wholesaling operations

Product	1993	1988	1982
		<i>1,000 gallons</i>	
Gasolines:			
Unleaded and leaded gasolines	2,135,330	2,208,962	1,992,543
Ethanol blended gasoline	154,025	70,255	19,802
Ethanol (for blending)	35,826	7,823	na
Total gasolines (ex. ethanol):	2,289,355	2,279,217	2,012,135
Distillate fuels:			
Premium diesel fuel	672,948	87,046	na
No. 2 diesel fuel	761,445	1,105,801	698,757
Home heating oil	573,078	943,629	981,756
Total distillate fuels:	2,007,471	2,136,476	1,680,513
Other fuel oils and residual oil	277,581	22,092	40,342
Kerosene	48,259	73,869	63,506
Propane or LP gas	1,075,600	701,606	763,106
Lubricating oil	28,173	28,671	44,133
		<i>Tons</i>	
Grease	11,979	3,199	6,387

na = not available.

Table 16—Source of petroleum products for regional cooperative wholesale operations, 1993 and 1988

Product	Cooperative refineries		Spot purchases		Domestic contracts		Foreign contracts	
	1993	1988	1993	1988	1993	1988	1993 ¹	1988
	<i>Percent</i>							
All gasolines	71.2	69.0	16.5	23.3	12.3	5.4		2.3
Premium diesel fuel	79.0	70.8	10.5	27.2	10.5	2.0		
Diesel fuel	61.3	71.4	20.4	21.5	18.3	7.0		0.1
Home heating oil	25.3	41.9	14.5	39.2	60.2	11.4		7.5
Other fuel oils (#4-#6)	63.8	86.2	30.7	13.8	5.5			
Kerosene	4.0	7.3	26.8	75.5	69.2	9.2		8.1
Propane or LP gas	8.5	4.1	54.3	24.9	37.2	67.6		3.4
Lubricating oil	36.2	61.5	9.6	25.3	54.2	10.8		2.4
Grease	9.9	62.5	9.7	9.6	80.4	23.1		4.7

¹ No foreign contracts used by regional cooperatives in 1993.

Table 17—Quantity of petroleum products sold or transferred by cooperative wholesalers to each category of final outlet, 1993

Petroleum product	Final Outlet			
	Regional cooperative-owned	Local cooperative-owned	Non-cooperative-owned	Other
<i>1,000 gallons</i>				
Gasolines:				
Unleaded gasoline ¹	249,581	1,198,129	93,679	593,941
Ethanol blended gasoline	22,873	112,799	11,801	6,552
Ethanol (for blending)	479	32,177	1,516	1,654
Total gasolines: (except ethanol)	272,455	1,310,928	105,479	600,494
Distillate fuels:				
Premium diesel fuel	47,437	605,915	10,856	8,740
Diesel fuel	132,644	521,863	25,400	81,538
Home heating oil	270,682	203,559	28,068	70,769
Total distillate fuels:	450,763	1,331,337	64,324	161,046
Other fuel oils and residual (#4-#6)	2,515		4	275,062
Kerosene	27,815	12,141	1,750	6,554
Propane or LP gas	191,393	864,963	1,141	18,104
Lubricating oil	5,705	21,042	584	842
<i>Tons</i>				
Grease	3,265	5,817	6	2,891

¹ Includes leaded gasoline.

Table 18—Distribution of cooperative wholesale petroleum deliveries by region, 1993 and 1988

Region ¹	Motor gasoline		Distillate fuels		Propane		Lubricating oil	
	1993	1988	1993	1988	1993	1988	1993	1988
<i>Percent</i>								
Northeast	7.4	10.2	20.0	22.9	9.5	10.2	13.4	21.1
Lake States	18.6	12.1	18.1	12.8	31.3	24.8	23.7	17.1
Corn Belt	28.2	32.0	21.6	28.4	30.6	30.8	18.3	24.0
Northern Plains	16.7	21.6	13.7	16.2	14.7	23.8	15.8	17.7
Appalachian and Southeast	4.6	4.1	5.7	6.0	3.8	3.6	3.6	3.2
Delta States and Southern Plains	4.4	10.5	6.5	6.3	2.4	3.1	7.2	8.7
Mountain and Pacific	20.1	9.5	14.4	7.3	7.7	3.8	18.0	8.3

¹ Northeast: ME, NH, VT, NY, MA, RI, CT, PA, NJ, DE, MD, and DC. Lake States: MI, WI, and MN. Corn Belt: OH, IN, IL, IA, and MO. Northern Plains: ND, SD, NE, and KS. Appalachian: VA, WV, KY, TN, and NC. Southeast: SC, GA, AL, and FL. Delta States: MS, LA, and AR. Southern Plains: OK and TX. Mountain: MT, ID, WY, CO, UT, NV, AZ, and NM. Pacific: WA, OR, CA, HI, and AK.

cent of the distillate fuel, and 84 percent of the propane sold by regional cooperatives in 1993. The market in the Mountain and Pacific regions has grown tremendously since 1988. Motor gasoline sales grew 10 percent and distillate fuels grew 7 percent.

Refined Product Storage and Transportation

Regional cooperatives operated 26 terminals for storage and distribution of motor gasolines and distillates and 5 terminals for propane (table 19). Sometimes these terminals were co-locations for all three products. Motor gasoline storage of 116 million gallons would provide an 18-day supply for cooperative wholesale operations. Distillate storage would provide a 28-day supply. Propane is picked up at a pipeline terminal and delivered directly to retail outlets, so the regionals keep only a one-day sales equivalent in storage.

Highway transports and railcars traveled more than 36 million miles (table 20) delivering liquid fuels and propane. It took 681 highway transports to haul these products, more than 67 percent for liquid fuels. Transports hauled more than 1.3 billion gallons of motor gasolines and distillate fuels and

469 million gallons of propane to final outlets. Regional cooperative owned or leased transports delivered 23 percent of the volume of motor gasolines, 33 percent of the distillate fuels, and 44 percent of the propane to their final outlets.

The average highway transport used for hauling motor gasolines and distillate fuels traveled 45,000 miles while railcars traveled 15,000 miles. Transports used to haul propane traveled 38,000 miles and railcars 19,000.

Retail Operations and Bulk Delivery

More than 2,500 local and regional cooperatives handled petroleum products in the United States in 1993. Their combined net volume of petroleum products topped \$5.2 billion, primarily from sales to end users at bulk delivery centers or customer-fill stations.

In recognition of their primary markets—production agriculture and rural markets—cooperatives have placed special emphasis on developing and marketing branded-premium diesel fuels and special lubricants for agricultural applications. Many rural customers also depend on cooperatives to provide propane to heat their homes.

The relatively small volumes and long delivery distances involved in serving some rural markets have prompted many noncooperative petroleum suppliers to withdraw from rural areas, in favor of the more lucrative urban markets. Cooperatives' continuing commitment to serve their farmer-owners have kept them involved in rural markets where they have become increasingly important suppliers of petroleum products to American agriculture.

Regional cooperative survey respondents felt that 354, or more than 5 percent, of their outlets were in markets where they could be considered the sole supplier. These outlets sold an estimated 242 million gallons of liquid fuels, or more than 5 percent of the total volume.

Survey respondents supplied refined liquid fuels to 3,556 bulk delivery centers, 1,779 card- or key-activated outlets, and 1,938 customer-fill stations (table 21). Some of these outlets are probably located at the same site as the bulk delivery centers. More than 86 percent of them were owned by local cooperatives. Nine percent of the bulk delivery outlets and 12 percent of the card- or key-activated outlets were owned by regional cooperatives, with the remainder owned by noncooperatives. Seventy-one percent of the customer-fill stations were locally owned, 13 percent by regionals, and 16 percent by noncooperatives.

The drastic reduction in customer-fill stations may be a trend towards more card- or key-activated outlets or reflects the choices offered in the prior survey. In the 1988 survey, respondents were not given the choice of card- or key-activated outlets so many of the customer-fill stations in 1988 were actually card- or key-activated outlets.

In 1988 an estimated 8 percent of their liquid fuels volume was sold through card- or key-activated outlets. If use of credit or debit cards at the pump by many of the major oil

Table 19—Number and total capacity of cooperative wholesaler storage terminals, by major product group, 1993 and 1988¹

Products	Number of terminals		Total capacity	
	1993	1988	1993	1988
	<i>Number</i>		<i>7,000 gallons</i>	
Motor gasolines	26	35	116,430	120,481
Distillates	26	36	179,725	144,351
Propane or LP gas	5	na	2,554	na

¹ Does not include storage terminals at refinery sites.
na = not available.

Table 20—Number of transports used and miles traveled in regional cooperative wholesale operations, 1993 and 1988

Item	1993		1988	
	<i>Number</i>		<i>1,000 miles</i>	
Highway transports for: ¹				
Liquid fuels	460	472	20,588	28,224
Propane or LP gas	221	187	8,449	5,527
Railcars used to transport:				
Liquid fuels	400	na	6,100	1,500
Propane or LP gas	81	80	1,527	313

¹ Highway transports with a minimum of 2,000 gallon capacity.
na = not available

Table 21—Final outlets for petroleum products supplied by regional cooperative wholesalers, 1993 and 1988

Product/outlet type	Type of outlet				
	Bulk delivery centers		Card- or key-activated	Customer fill stations	
	1993	1988	1993 ¹	1993	1988
	<i>Number</i>				
Refined liquid fuels:					
Regional-owned	320	304	217	257	299
Local cooperative-owned	3,096	2,794	1,544	1,385	2,578
Noncooperative-owned	140	141	18	296	312
Total:	3,556	3,239	1,779	1,938	3,189
Propane or LP gas:					
Regional-owned	253	154		878	704
Local cooperative-owned	1,532	879		444	127
Noncooperative-owned	81	25		17	
Total:	1,866	1,058		1,339	831

¹ Data for card- or key-activated liquid fuel outlets not available for 1988 and there are none of these type outlets for propane or LP gas.

companies is any indication of their popularity, sales from these outlets will continue to increase. This type of outlet allows 24-hour operations and automated billing, so some cooperatives can maintain petroleum outlets for their rural customers without the expense of an attendant.

Cooperatives also operated 1,866 bulk delivery centers and 1,339 customer-fill stations for propane in 1993. Again, many of these outlets also probably handled other liquid fuels.

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U.S. Department of Agriculture
Rural Business and Cooperative Development Service

Ag Box 3255
Washington, D.C. 20250-3255

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