Regulatory Impact Analysis

Control of Hazardous Air Pollutants from Mobile Sources

Chapter 4
Industry Characterization

Assessment and Standards Division
Office of Transportation and Air Quality
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Chapter 4: Industry Characterization

An understanding of the nature of the affected industries is useful in assessing the potential impact of the proposed emission control program. Information regarding the structure of the market, including such things as the degree of concentration, entry barriers, and product differentiation, can help explain the pricing and other policies that exist in that market. This chapter describes the light-duty vehicle (LDV) and light-duty truck (LDT) manufacturers, the petroleum refining industry, and the portable fuel container manufacturers.

4.1 Light-Duty Vehicle and Light-Duty Truck Market Structure

The LDV/LDT market is fairly concentrated, with only five of the 19 total generally-recognized manufacturers accounting for almost 82 percent of all sales. LDV/LDT sales numbered more than 16.9 million vehicles in 2004. The top five companies are the so-called "Big Three" (General Motors (GM), Ford, and Daimler-Chrysler) plus Toyota and Honda. The remaining 18 percent of sales are split between the other 14 manufacturers, with none of them achieving more than 2 percent of total sales. The bottom 10 manufacturers in fact account for only about 4.5 percent of total sales. Four of these firms, Ferrari, Maserati, Lamborghini, and Lotus, are considered small-volume manufacturers, since their sales are less than 15,000 vehicles per year.[A] Table 4.1.-1 provides sales figures by manufacturer.

None of the major manufacturers are small businesses. (As discussed later in Chapter 14, the Small Business Administration (SBA) criterion for a small business in the vehicle manufacturing industry is 1,000 employees or less.) This is mainly because of the large outlay of capital and other resources necessary to enter the market. Becoming even a relatively minor player in the industry requires a great deal of manufacturing capacity to achieve the necessary production volumes, as well as an extensive distribution and marketing network. There is also a significant amount of brand loyalty on the part of consumers, because of tradition or perceived differences in the product. These all combine to make market entry difficult, and the industry is basically dominated by the established major manufacturers.

As discussed later in Section 4.1.3, there are also a few smaller, lesser-known LDV/LDT small volume manufacturers, importers and alternative fuel vehicle converters. These have limited product lines, and account for less than one-tenth of one percent of all U.S. sales. They primarily fill niche markets of one kind or another. More than half of these firms are small businesses.

4.1.1 Domestic vs. Foreign Manufacturers

[A] EPA defines small volume manufacturers to be those with total U.S. sales of less than 15,000 vehicles per year. This status allows vehicle models to be certified under a slightly simpler certification process. For certification purposes, small volume manufacturers also include independent commercial importers (ICIs) and alternative fuel vehicle converters since they sell less than 15,000 vehicles per year.

Previously, it has been relatively easy to characterize manufacturers as "domestic" or

Table 4.1-1

LDV AND LDT MANUFACTURERS, SALES VOLUMES AND MARKET SHARES

MANUFACTURER NAME	LDV/LDT SALES	MARKET %	CUM %	LDV SALES	MARKET %	CUM %	LDT SALES	MARKET %	CUM %
GENERAL MOTORS	4,655,459	27.5%	27.5%	1,875,551	24.4%	24.4%	2,779,908	30.1%	30.1%
FORD MOTOR CO.	3,319,767	19.6%	47.2%	1,034,992	13.5%	37.8%	2,284,775	24.8%	54.9%
DAIMLER CHRYSLER	2,427,634	14.4%	61.5%	807,733	10.5%	48.3%	1,619,901	17.6%	72.5%
TOYOTA MOTOR CO.	2,060,049	12.2%	73.7%	1,054,208	13.7%	62.1%	1,005,841	10.9%	83.4%
AMERICAN HONDA	1,394,398	8.2%	81.9%	843,289	11.0%	73.0%	551,109	6.0%	89.4%
NISSAN MOTOR CO.	985,988	5.8%	87.8%	536,756	7.0%	80.0%	449,232	4.9%	94.2%
HYUNDAI GROUP.	688,670	4.1%	91.8%	456,002	5.9%	85.9%	232,668	2.5%	96.8%
VW of AMERICA	336,421	2.0%	93.8%	308,506	4.0%	89.9%	27,915	0.3%	97.1%
BMW GROUP	296,524	1.8%	95.6%	226,695	2.9%	92.9%	69,829	0.8%	97.8%
MAZDA	263,882	1.6%	97.1%	187,678	2.4%	95.3%	76,204	0.8%	98.6%
SUBARU	187,402	1.1%	98.2%	187,402	2.4%	97.8%	0	0.0%	98.6%
MITSUBISHI	161,609	1.0%	99.2%	108,937	1.4%	99.2%	52,672	0.6%	99.2%
SUZUKI	73,946	0.4%	99.6%	47,109	0.6%	99.8%	26,837	0.3%	99.5%
PORSCHE	31,473	0.2%	99.8%	13,356	0.2%	100.0%	18,117	0.2%	99.7%
ISUZU	27,188	0.2%	100.0%	0	0.0%	100.0%	27,188	0.3%	100.0%
FERRARI	1,176	0.0%	100.0%	1,176	0.0%	100.0%	0	0.0%	100.0%
MASERATI	1,055	0.0%	100.0%	1,055	0.0%	100.0%	0	0.0%	100.0%
LAMBORGHINI	653	0.0%	100.0%	653	0.0%	100.0%	0	0.0%	100.0%
LOTUS	84	0.0%	100.0%	84	0.0%	100.0%	0	0.0%	100.0%
TOTAL	16,913,378			7,691,182			9,222,196		

Source: Automotive News, "Market Data Book, 2005"

"foreign." However, this is currently much more difficult. For example, the Daimler-Chrysler merger combined the former Chrysler divisions Chrysler, Dodge and Jeep with the imported Mercedes line; but it also includes Maybach, a high-end German luxury car. Ford now includes not only the traditional Ford, Mercury and Lincoln lines, but also the imported marques Jaguar, Volvo, Land Rover and Aston-Martin. GM sales include the Swedish import Saab.

Conversely, Toyota and Honda, as well as the six other Far Eastern manufacturers, all maintain a substantial American manufacturing presence, and the majority of their vehicles sold here, almost 80 percent on average, are manufactured in North America. Sales figures from North American manufacturing facilities for individual firms range from 95 to 98 percent for Toyota and Honda, to 52 to 72 percent for some of the smaller manufacturers. Volkswagen, which now also includes Bentley, is the only European manufacturer with a North American manufacturing operation. About 55 percent of its sales are manufactured here. BMW, which now includes the formerly British Rolls-Royce and Mini lines, is 100 percent imported, as is Porsche.

On the other hand, substantial portions of the Ford and GM "domestic" lines are also imported. Actually, the term "North American-built," meaning “made in the United States, Canada or Mexico,” seems to have replaced the term "domestic" in the sales reports. About 28 percent of all domestic LDVs sold in the U.S. are considered "imports," i.e., not North-American built, as opposed to only about 13 percent of all LDTs.

4.1.2 Light-Duty Vehicles vs. Light-Duty Trucks

In earlier years, light-duty vehicles tended to outsell light-duty trucks by a fairly wide margin. In 1981, for example, LDTs comprised less than 20 percent of total sales, and this had only grown to about 38 percent by 1993. However, in recent years the gap has been closing rapidly. LDTs have made considerable gains in the last decade; by the 2000 model year LDVs outsold LDTs by a margin of only about 52 to 48 percent. By 2001 the split was roughly 50/50, with LDT sales actually moving slightly ahead by about 100,000 units.[1] As shown in Table 4.1-1, for the 2004 model year, LDTs outsold LDVs by a 55 to 45 percent margin. The rise of the Sport-Utility Vehicle (SUV) accounts for much of this change, but stronger sales of the more traditional LDTs account for a substantial amount of the increase as well.

In general, LDTs and LDVs are produced by the same manufacturers, both foreign and domestic. The Big Three plus Toyota and Honda account for almost 90 percent of LDT sales. The Big Three actually account for almost 75 percent of all LDT sales, but only about 45 percent of all LDV sales. All of the Far Eastern manufacturers, except for Isuzu and Subaru, also make LDTs as well as LDVs. Isuzu sells only LDTs, in the U.S. while Subaru sells only LDVs. Three European manufacturers, Volkswagen, BMW, and Porsche, sell both LDTs and LDVs, while the remaining four European manufacturers sell only LDVs. These four are all small-volume, high-end sports car manufacturers (Ferrari, Maserati, Lamborghini and Lotus). Figures 4.1-1 and 4.1-2 show market shares for LDV and LDT manufacturers.

Figure 4.1-1.

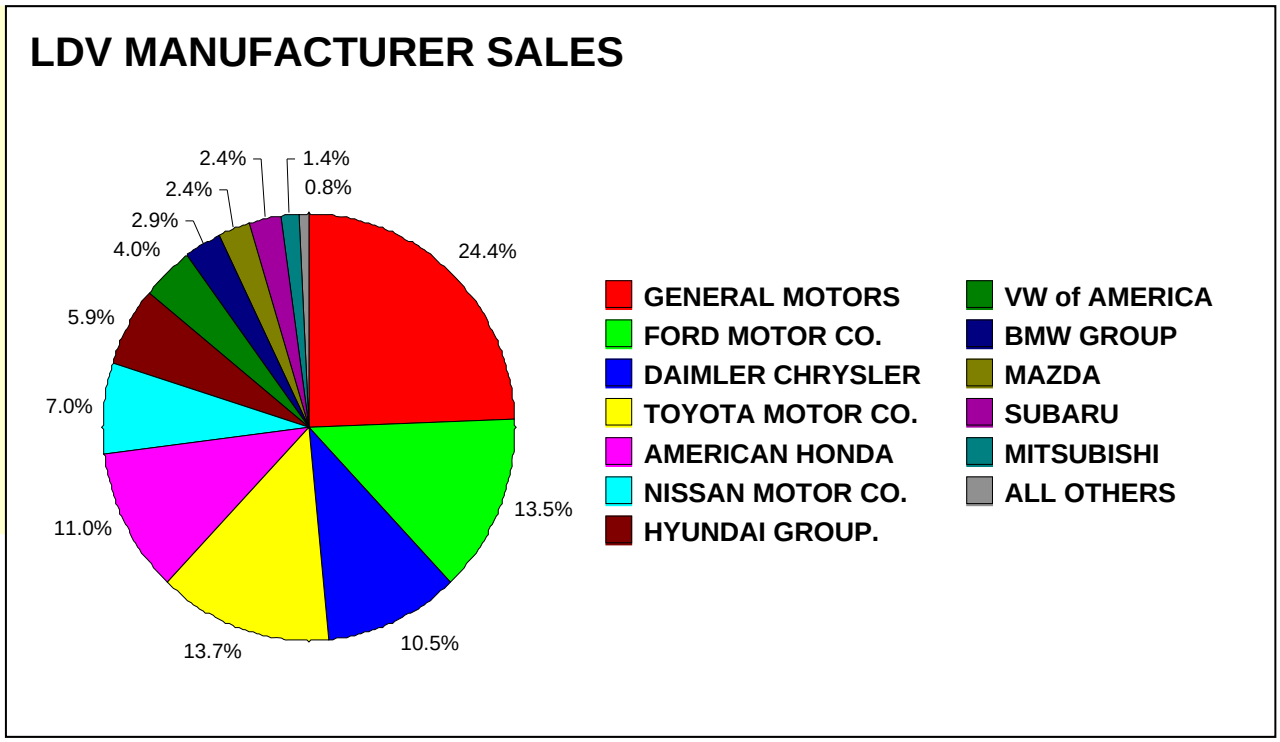
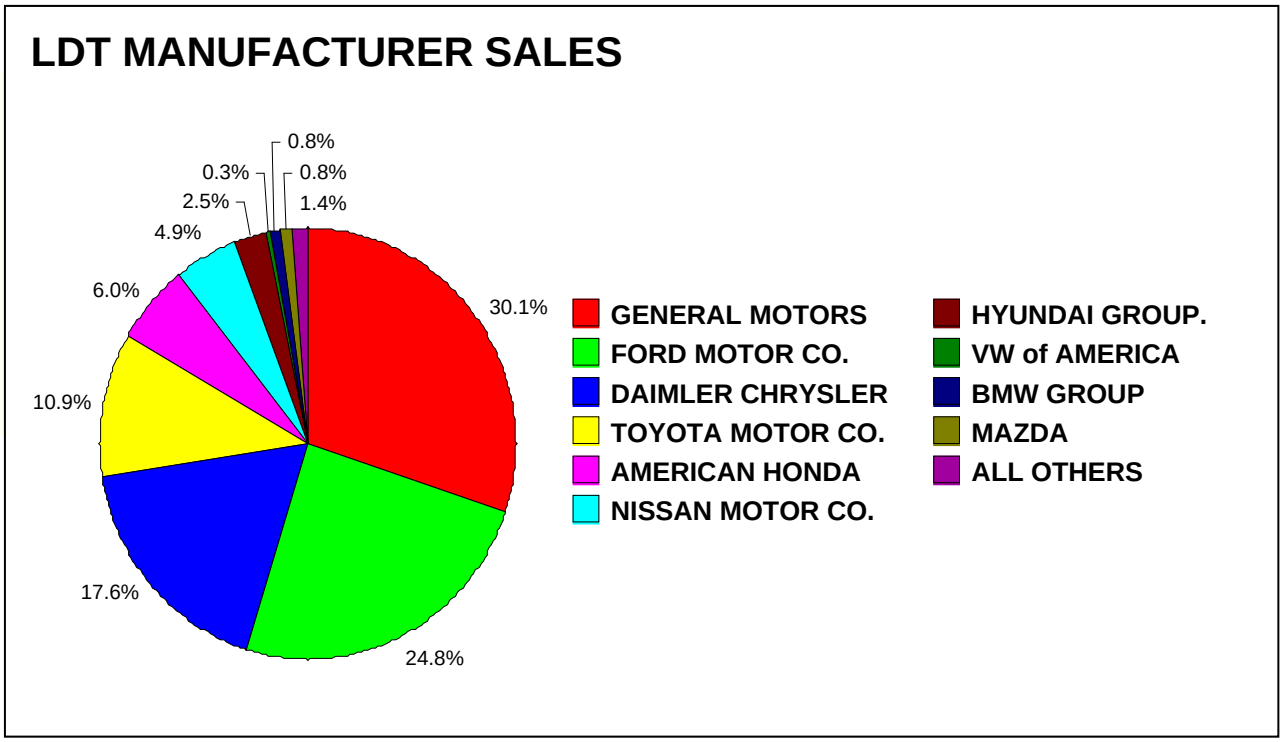


Figure 4.1-2.



For regulatory purposes, LDVs and LDTs are divided into categories based on their gross vehicle weight ratings (GVWR). This distinction was based on the premise that heavier vehicles produce more pollutants than do lighter vehicles, making it more difficult to achieve comparable emission reductions. Standards for the heavier vehicles were therefore less stringent. However, modern emission-control technologies are virtually the same and equally effective for both the lighter and the heavier vehicles. Therefore, the Tier 2 emission standards now make no distinction between weight categories. In addition, Tier 2 applies to medium duty passenger vehicles (MDPVs), i.e. passenger vehicles between 8,500 and 10,000 lbs. GVW. These are primarily the very large SUVs, and passenger vans.

Emission standards were also slightly less stringent for the LDTs than for LDVs, partly because of weight considerations, and partly because of perceived differences in usage patterns. Again, the Tier 2 emission standards now make no distinction between LDVs and LDTs, except for some minor differences in the evaporative emissions standards. In large part this is because LDVs and LDTs share the same basic emission-control technologies and are primarily used for the same purpose, for personal transportation. Thus, there does not appear to be a strong rationale for making distinctions between the two.

4.1.3 Small Volume Manufacturers, Importers, and Alternative Fuel Vehicle Converters

There are a number of lesser-known small volume manufacturers who produce high performance and other specialized vehicles, such as Roush Industries or the Panoz Auto Development Company. These number less than a dozen, and about half are small businesses. In addition to the manufacturers, there are a handful of Independent Commercial Importers (ICIs) who are issued certificates to import a limited number of nonconforming vehicles for racing or other purposes, and to modify these vehicles to meet U.S. standards.[B] These ICIs are almost all considered small businesses, and total sales for all of them are fewer than 500 vehicles per year. There are also a small number of converters who convert conventional gasoline- or diesel-fueled vehicles to operate on alternative fuel (e.g., compressed natural gas and liquefied petroleum gas). These are also few in number, and are almost all small businesses. Altogether, combined sales for these small-volume manufacturers, importers, and converters accounted for less than one-tenth of one percent of total sales of LDVs and LDTs for the 2004 model year.

4.2 Petroleum Refining Industry

Early in this rulemaking process, EPA commissioned an analysis of the U.S. gasoline production and distribution system from RTI International in order to support economic analyses of the proposal. The final report of the analysis, entitled "Characterizing Gasoline Markets: A Profile," discusses supply and demand issues associated with the refining industry and with gasoline market

[B] ICIs are not required meet the emission standards in effect when the vehicle is modified, but instead they must meet the emission standards in effect when the vehicle was originally produced (with an annual production cap of a total of 50 light-duty vehicles and trucks).

behavior.[2] The information contained in the report is summarized below, supplemented by additional information found in this RIA and in other sources.

4.2.1 Gasoline Supply

Detailed descriptions of the refinery processes by which gasoline is produced can be found in the final report mentioned above and in Chapter 6 of this RIA. Gasoline is the dominant product for most refineries, constituting almost half of the total product produced by U.S. refineries in 2002.[3] Federal and state regulations have resulted in a variety of gasoline formulations. These include the RFG and CG designations, oxygenated gasoline, octane-based gasoline grades, and volatility distinctions. Additional variation occurs when different oxygenates are used, though that difference will lessen significantly in the coming years as MTBE use diminishes and the renewable oxygenate requirements of the Energy Policy Act of 2005 cause a substantial increase in ethanol use in gasoline. Some gasoline regulations, such as gasoline sulfur and MSAT1, affect all gasoline and impact refineries and gasoline production, but do not contribute to additional gasoline types.

Gasoline supply is also affected by the types of crude oils available, and the refining industry's ability to process the different crude types to maximize gasoline production while meeting all applicable regulations. Sweet, or low sulfur, crude oils are more easily processed, but this factor increases their cost compared to sour, or high sulfur, crude oils. Some refineries are optimized to run based on a certain type of crude oil, and have little flexibility in processing other types. Crude cost is the largest factor in total refining cost and the price of crude can significantly affect the total cost of production.

Gasoline and other petroleum products are transported from the refineries to intermediate points such as terminals, and to the final market by pipeline, truck and barge. Most product is moved via pipeline, as the cost is extremely low. Pipelines have been able to accommodate the many gasoline formulations that have resulted from federal and state gasoline regulations, but are near their limit in handling additional formulations. Modifying schedules and flow rates in order to get gasoline and non-gasoline products on and off the pipeline contributes to increased costs. The final step for gasoline transport to retail outlets is via truck.

4.2.2 Gasoline Demand

Gasoline demand is affected by gasoline use and factors that influence consumption. The vast majority of gasoline is used for private and commercial highway use. About 3 percent is used in non-highway applications such as lawn and garden or marine use. Light-duty transportation accounts for over 90% of gasoline used, and most of this is attributable to private automobile use. Transportation choices, and thus gasoline use, are affected by many factors, including personal income, geography, gasoline prices and the prices of related goods. Though daily travel increases with household income, average annual expenditures for gasoline, as a percent of income, showed little variation by geography or income class. Consumers can respond to gasoline price increases in many ways, such as reducing the number of miles traveled, or by adjusting their "capital stock," that

is, for example, by purchasing a car with better fuel economy.

4.2.3 Industry Organization

The refining industry structure is critical to the implementation and impact of the proposed regulation. Factors such as regional production and shipment patterns and industry concentration can influence market price and product availability. For instance, because of current fuel formulations and distribution patterns, consideration of regional (PADD) gasoline markets, rather than a national gasoline market, may be more appropriate for evaluating certain impacts of the proposed regulatory program.

Market concentration refers to some measure of the market share of competitors in an area. High market concentration may indicate some ability of competitors in an area to influence prices by coordinated action, thus resulting in less competition and higher product prices. A recent Federal Trade Commission analysis has shown that the refining industry is not concentrated or only moderately concentrated. In addition, the possibility of increased gasoline imports, particularly into PADDs I and III, can serve to moderate any attempts to set prices.

Refiners serving the same market may have a wide range of total delivered costs. Cost to the refiner is a function of distance to market, refinery-specific operating costs and gasoline formulation. Gasoline formulation, as discussed, depends on the crude oil, refinery configuration and environmental or other gasoline controls. The market price for gasoline is set by the producers with the highest costs, taking into consideration their full range of products produced.

4.2.4 Gasoline Market Data

An analysis of the impacts of a policy change--in this case, from current gasoline toxics requirements to the proposed fuel benzene standard--requires consideration of the baseline case compared to likely changes expected from the new policy. National and regional (by PADD) consumption and gasoline price, price volatility, international trade, and projected growth (in gasoline consumption) are the primary factors considered in estimating economic impacts of the proposed rule.

Gasoline consumption is estimated to increase by about 1.8 percent annually through 2025. As discussed above, gasoline consumption, primarily influenced by personal light-duty vehicle use, is affected by many factors, including retail gasoline price. Gasoline price is a function of distribution and marketing costs, refining costs, profit, federal and state taxes, and crude oil cost. Crude oil cost accounts for almost half of the retail price of gasoline. Price volatility is primarily due to the magnitude of any supply and demand imbalance, and the speed with which new supply can be provided. These imbalances can be caused by unexpected refinery shutdowns or pipeline disruptions, or even by relatively planned activity, such as seasonal transitions. Isolated markets, or those requiring unique gasoline blends, are likely to be more susceptible to such supply and demand imbalances.

International gasoline trade, that is, imports and exports of gasoline, account for an extremely small part of all gasoline transactions. However, regional activity, at the PADD level, shows significant variation. PADD I received over 90% of all gasoline and gasoline blendstock imports in 2002.[4]

4.3 Portable Fuel Container Industry

EPA also contracted with RTI International for a characterization of the PFC industry in support of our economic analyses of the proposal. The final analysis report, entitled "Characterizing Gas Can Markets: A Profile," discusses production and distribution issues associated with gas cans.[5,6] This report is also summarized below, and is again supplemented by additional information found in this RIA and in other sources. PFCs include gasoline, kerosene, and diesel containers.

4.3.1 Manufacture and Distribution

PFCs are designed to transport, store and dispense fuel, normally for refueling vehicles when they run out of gas, or for home applications such as refueling lawnmowers, trimmers, etc. PFCs include utility jugs that are marketed for use with fuels, which are often used to refuel recreational products such as personal watercraft and all-terrain vehicles. PFCs range in capacity from a gallon or less to over 6 gallons. Standard PFCs have three main components: a spout for pouring fuel, a tank with a fill port to hold the gasoline, and a vent to make pouring the fuel easier. About 98 percent of all containers are made of high-density polyethylene (HDPE) plastic, chosen mainly because of its fuel-resistant properties. Two main manufacturing processes are used: extrusion blow molding, which is used for the bodies, in which a molten tube of plastic is forced into a mold by compressed air; and injection molding, which is used for spouts, caps and other tubes. In injection molding, plastic material is forced through a heated injection chamber and through a nozzle into a cold mold. Because of safety regulations in most states, gas cans are colored red during the manufacturing process. Diesel containers are colored yellow and kerosene containers are colored blue to help consumers avoid misfueling of equipment. Industry and other sources indicate that gas cans and diesel and kerosene containers are distributed by manufacturers through their distribution centers to major retail establishments. Utility jugs are sold in several colors and are more often sold through online retailers.

4.3.2 Container Use

PFCs allow people to refuel a wide variety of equipment without the inconvenience of taking it to a retail gasoline station. This equipment can range from lawn and garden equipment such as tractors, lawnmowers, trimmers and chainsaws to recreational vehicles such as motorcycles, ATVs and golf carts. We estimate that there are about 80 million gas cans in the U.S., which is similar to other such estimates.[7] Although publicly-available data on gas can usage are scarce, a California Air Resources Board (CARB) study performed in 1999 indicated that 94 percent of all gas cans in California were used in households. The remaining 6 percent were used for such commercial applications as farming, logging, construction, lawn care, and automotive applications such as repair

shops and gasoline stations. State surveys in California and Texas indicated that between 46 and 72 percent of all households owned gas cans, and that 14 percent of those surveyed had bought one during the past year. The average number of gas cans ranged from 1.4 per household in Texas to 1.8 per household in California. A typical plastic PFC will have a life expectancy of 3 to 5 years before it needs to be replaced.

The demand for fuel containers reflects the demand for other goods and services. The gas can industry has suggested that the sales of gas cans are linked to the sales of gasoline-powered equipment such as lawn and garden equipment or recreational vehicles. Therefore, factors that influence the sales of these types of equipment will also influence the sales of gas cans. These factors can include such things as price, population growth, or changes in personal income.

Gasoline container sales for 2002, the latest year for which we were able to develop data, were about 24.4 million units (including utility jug sales which were estimated to be about 2.4 million units). Diesel and kerosene container annual sales are estimated to be about 620,000 and 1 million units, respectively. Although the PFC manufacturing industry has become fairly concentrated, with one firm accounting for more than half of all U.S. container sales, that firm does not exert significant influence over market prices. This is because there are few barriers to market entry by other companies, and the products are substantially the same, making for very limited brand loyalty. Other firms could enter or re-enter the market should the economic conditions seem right. Imports from Canada, which amount to about 10 percent of annual sales, would also tend to limit arbitrary pricing practices.

4.3.3 Market Structure

As noted above, the PFC market is fairly concentrated, with only five firms accounting for the vast majority of sales. These are Blitz USA, Midwest Can, Scepter Manufacturing, Ltd. (Canadian), No-Spill Research, and Wedco Molded Products, which is owned by the Plastics Group. All of these companies, except for the parent company Plastics Group, meet the primary Small Business Administration (SBA) criterion for small businesses (i.e., less than 500 employees). Data for utility jug manufacturers was scarce, but we believe that there are likely about 5 manufacturers of these containers, including Scribner Plastics. There are other gasoline container manufacturers, but they have a very limited market share. Most of their products are designed for industrial use or to fill a niche market (e.g., racing or safety cans used in an industrial setting), which are not be covered by the standards. These companies include Eagle Manufacturing and Protectoseal Company. Table 4.3-1 provides relevant data about these firms.

4.3.4 Market Entry

There are very few barriers to entering the PFC market. Only about 2 percent of the containers sold in the U. S. in 2002 were of metal construction; the vast majority were plastic. These are produced by a fairly straightforward molding process in much the same manner as hundreds if not thousands of other plastic products. Plastic PFCs are in fact classified in the U.S. Economic

Census as "All other plastics product manufacturing." Since manufacturing such PFCs is similar to manufacturing most other molded plastic products, any firm with that capability could freely enter the market with a relatively low initial investment, if the economic conditions should appear advantageous to do so. Since most consumers tend to view gas cans as more or less all the same, there is not a well-developed brand loyalty to one brand or other, so competition in the industry is based primarily on price. Finally, safety regulations in most states prevent consumers from using old paint thinner cans or other such containers as substitutes for gas cans, thus eliminating any potential reduction in sales from that quarter.

Table 4.3-1. Manufacturers*

Ultimate Parent	Company name	Sales ($million)	Employment	Comments
Blitz USA	Blitz USA	20-50	200	Consumer market
Eagle Manufacturing	Eagle Manufacturing	50-100	100-249	Primarily Metal Safety Cans
Midwest Can	Midwest Can	20-50	45	Consumer market
No-spill Research Inc.	No-spill Research Inc.	2.5-5	5	Limited Distribution
Protectoseal Co.	Protectoseal Co.	20-50	100-249	Primarily Industrial
Scepter Mfg., Ltd.	Scepter Mfg., Ltd.	10-20	200	Canadian-Consumer
Scribner Plastics	Scribner Plastics	5-10	20-49	Specialty Containers
The Plastics Group	Wedco Molded Prod.	20-50	600	Consumer Market

* Businesses Engaged In NAICS Code 326119, All Other Plastic Product Manufacturing, Or NAICS Code 332431, Metal Can Manufacturing

Source: Characterizing Gas Can Markets, a Profile," RTI International, Final Report, EPA Contract 68-D-99-024.

References for Chapter 4

[1] Source: Ward's "World Motor Vehicle Data, 2004."

[2] "Characterizing Gasoline Markets: A Profile," **Final Report**. EPA Contract Number 68-D-99-024, prepared for Robert Johnson, USEPA, Office of Transportation and Air Quality, Ann Arbor, MI by Brooks Depro, et al, RTI International, Research Triangle Park, NC, August 2004.

[3] Table 1-1 in **Final Report**. Data Source: DOE, EIA Petroleum Supply Annual 2002.

[4] Table 4-4. **Final Report**. Source DOE EIA Petroleum Supply Annual 2002.

[5] "Characterizing Gas Can Markets: A Profile." Final Report, EPA Contract Number 68-D-99-024, prepared for Robert Johnson, USEPA, Office of Transportation and Air Quality, Ann Arbor, MI by Brooks Depro, et al, RTI International, Research Triangle Park, NC, August 2004.

[6] "Gas Can Industry Profile Updates", memorandum from RTI to EPA, January 4, 2007.

[7] Memorandum from Terrance R. Karels, Consumer Product Safety Commission, January 3, 2003.