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Economic Impact Analysis of Metal Can MACT Standards

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U.S. Environmental Protection Agency
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This report contains portions of the economic impact analysis report that are related to the industry profile.

SECTION 2

INDUSTRY PROFILE: METAL CAN MANUFACTURING

Cans are one of the most widely used containers in the world. Industry estimates that more than 200 million cans are used each day in the United States (Can Manufacturers Institute [CMI], 1999a). Consumers use metal cans for a variety of purposes, including the storage of food, beverages, and many other products (e.g., paint). During the production process, a variety of surface coatings are applied to these cans. Interior coatings prevent corrosion and protect the contents from being contaminated by the can. Exterior coatings are applied for decoration, to protect printed designs, or to facilitate handling by reducing friction. Traditional coatings used in this industry have a high concentration of solvents, which results in the emission of volatile organic compounds (VOCs) and HAPs. Currently, the U.S. Environmental Protection Agency (EPA) is developing national emissions standards for these HAPs.

This section provides an economic overview of the metal can industry. Section 2.1 describes the production processes with emphasis on surface coatings. Section 2.2 identifies uses, consumers, and substitutes. Section 2.3 summarizes the organization of the U.S. metal can industry, including a description of the manufacturing facilities and the companies that own them. In addition, we identify small businesses potentially affected by the proposed rule. Finally, Section 2.4 presents market data for the industry, including U.S. production, prices, foreign trade data, and trends.

2.1 Production

The can manufacturing process has changed dramatically since its beginnings in the early 19th century. Today's automated processes have replaced the once labor-intensive process and produce an estimated 139 billion cans per year (CMI, 2001a). Metal can manufacturers purchase two primary raw material inputs for the production of cans: steel and aluminum. In 1999, almost three-quarters of all metal cans produced were aluminum (CMI, 2001a). These two raw material inputs are used to produce one-, two-, and three-piece can bodies and can ends. During the production process, the steel or aluminum (in the form of sheets or coil) is shaped, coated, quality checked, and prepared for shipment to a variety of consumers across the United States and the world. The following sections describe individual manufacturing processes in greater detail. Much of the information in these sections was taken from EPA (1998).

2.1.1 Sheet Manufacturing

The process of manufacturing metal sheets for use in metal can manufacturing begins by cutting a large coil of metal into pre-scrolled sheets. An inside protective coating is then placed on the sheets and cured. At this point the sheets can be decorated. An over coat of varnish is placed on the decorated sheet and cured again. A second inside protective coating is placed on the sheets and cured. These pre-scrolled sheets are then cut into small scroll sheets which can be fed into the end or body making process (CMI, 2001b).

2.1.2 Can End Manufacturing

The production of can ends varies by end use. Aluminum beverage can ends are made from precoated coil that is stamped and scored to produce an oval pattern, and an end tab is attached. This end is attached to the can with a solvent- or water-based compound, and the seal is allowed to dry. The production process of ends for food cans and other sheet-coated ends is similar to beverage cans with the exception that food can and other sheet-coated ends are typically coated on metal sheets rather than coils.

2.1.3 One- and Two-Piece Can Body Manufacturing

The one- and two-piece can manufacturing process involves forming a can body, creating an end (for the two-piece can), and applying coatings to the open can and can top. Two fabrication processes are used to produce these cans: the draw-redraw process and the draw-and-iron process. Manufacturers of one-piece can bodies use the draw-and-iron process, while two-piece can manufacturers use both processes.

During the draw-redraw process, aluminum or steel coil is fed into a processor called a cupper that stamps shallow metal cups. The coil may be stamped one or two additional times to create a deeper can. This process typically uses pre-coated coils and if no additional coating steps are required, the cans are tested and stored. However, some manufacturers use an uncoated coil and perform sheet coating similar to the three-piece can body coating operation described in Section 2.1.4.

In contrast, the draw-and-iron process involves the following additional steps after the shallow cup is created. Full-length can bodies are created from shallow cups through an extrusion process (aluminum cans) or "ironing" process (steel cans). The can bodies are then trimmed, cleaned, and dried in preparation for the application and curing of exterior base coats, printing inks, and protective overvarnish coats (aluminum beverage cans) or corrosion-resistant wash coats (steel food cans). Once the coatings are dry, the can necks are flanged (beverage) or beaded (food cans). A leak tester applies air pressure to each can and tests for any holes or cracks and rejects any inadequate cans. In addition, the coating thickness may be tested by a random electrical resistance spot check. After passing these tests, the finished cans are then stacked for storage or shipment. Figure 2-1 provides a detailed example of a two-piece draw-and-iron aluminum beverage can production process.

2.1.4 Three-Piece Can Body Manufacturing

Three-piece cans are typically made of steel sheets. The manufacturing process involves two operations: sheet coating and can fabrication (see Figures 2-2 and 2-3). The sheet coating operation includes the application of a base coat, inks, and overvarnish. After application, the sheet passes through an oven for curing and drying. The can fabrication begins with the processor slitting these coated sheets and feeding them into a "body maker" where the seams are welded or cemented together. The seam along the side of the can is welded or cemented and then coated in a process called "side seam stripe application." This seam may be coated with an interior spray or an exterior spray, or on both sides. The side seam stripe protects exposed metal along the seam. At this stage of the production process, the cans are flanged for proper can end assembly and the diameter of the wall may be reduced (necked-in) according to end-use requirements. In addition, if the can will be used to store beverages, the can's interior is sprayed with a protective coating and then baked or cured. After curing, the end seamer attaches one end to the can in a process called "double seaming" where end seal compounds are applied and used as a gasket material to provide an airtight seal. Afterwards, the leak tester checks for leakage. The finished can is stacked and prepared for shipment.

2.1.5 Coatings and Emissions

Coating is an integral part of the production processes of cans and can parts. Without the specialized interior coatings, cans could potentially contaminate their contents and render them dangerous to consumers. Exterior coatings enhance the can's appearance, protect the can from corrosion, and protect printed designs. However, the traditional coatings used in the metal can industry

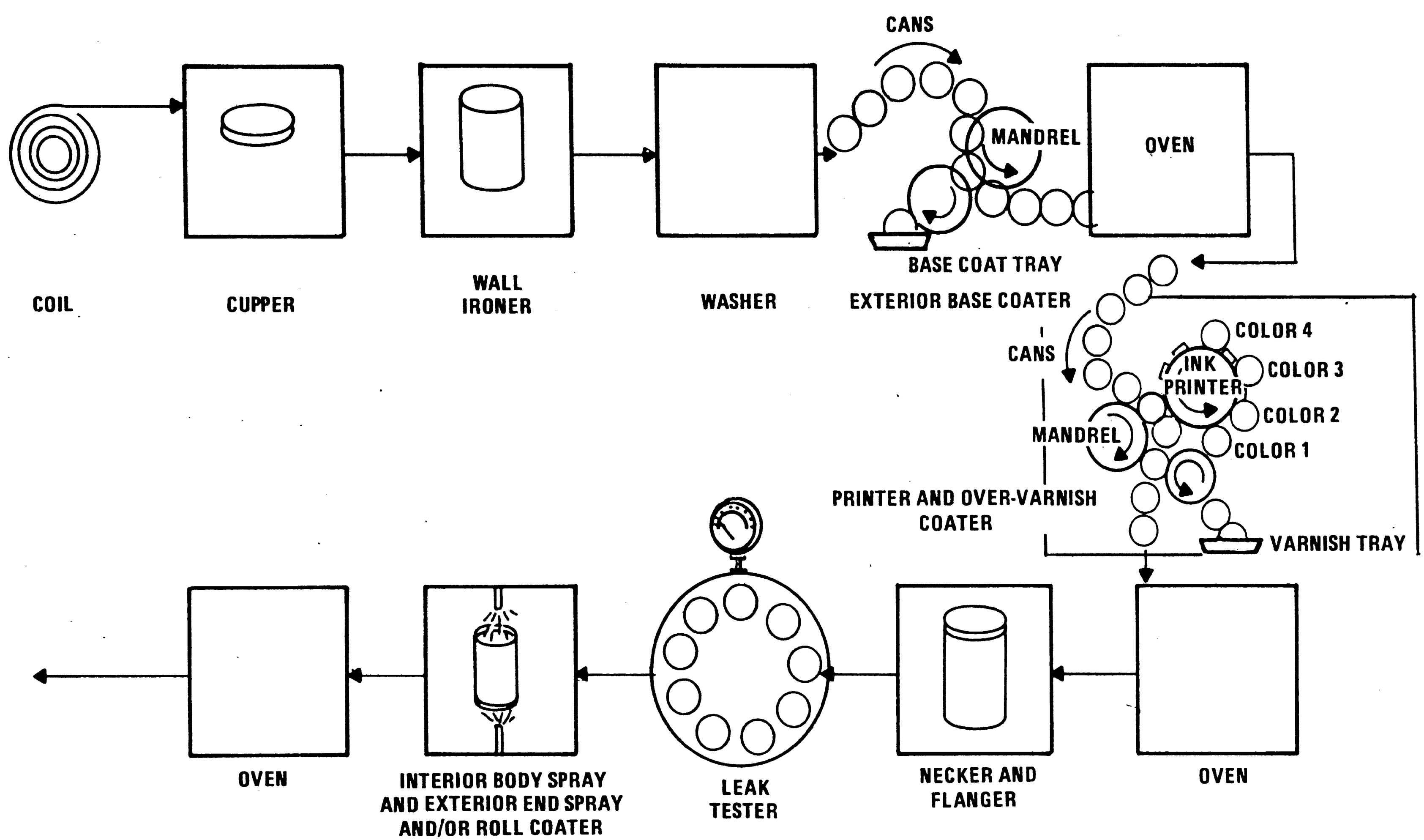

Figure 2-1. Two-Piece Draw-and-Iron Aluminum Beverage Can Manufacturing Process

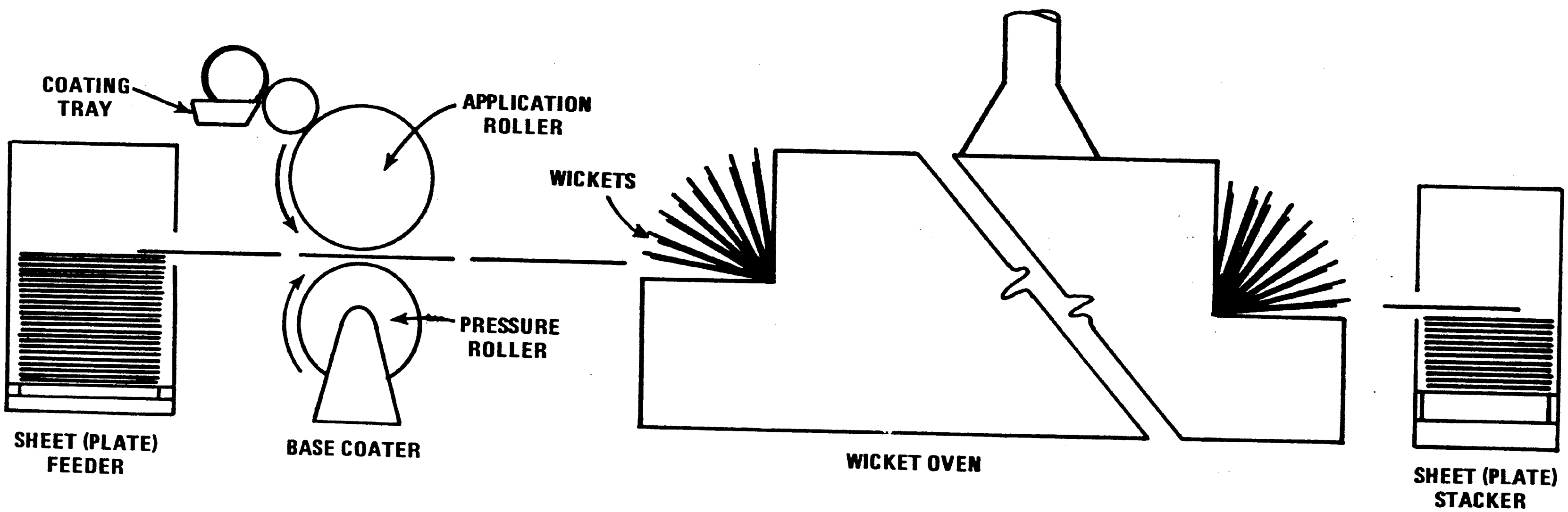

Figure 2-2. Three-Piece Can Sheet Base Coating Operation

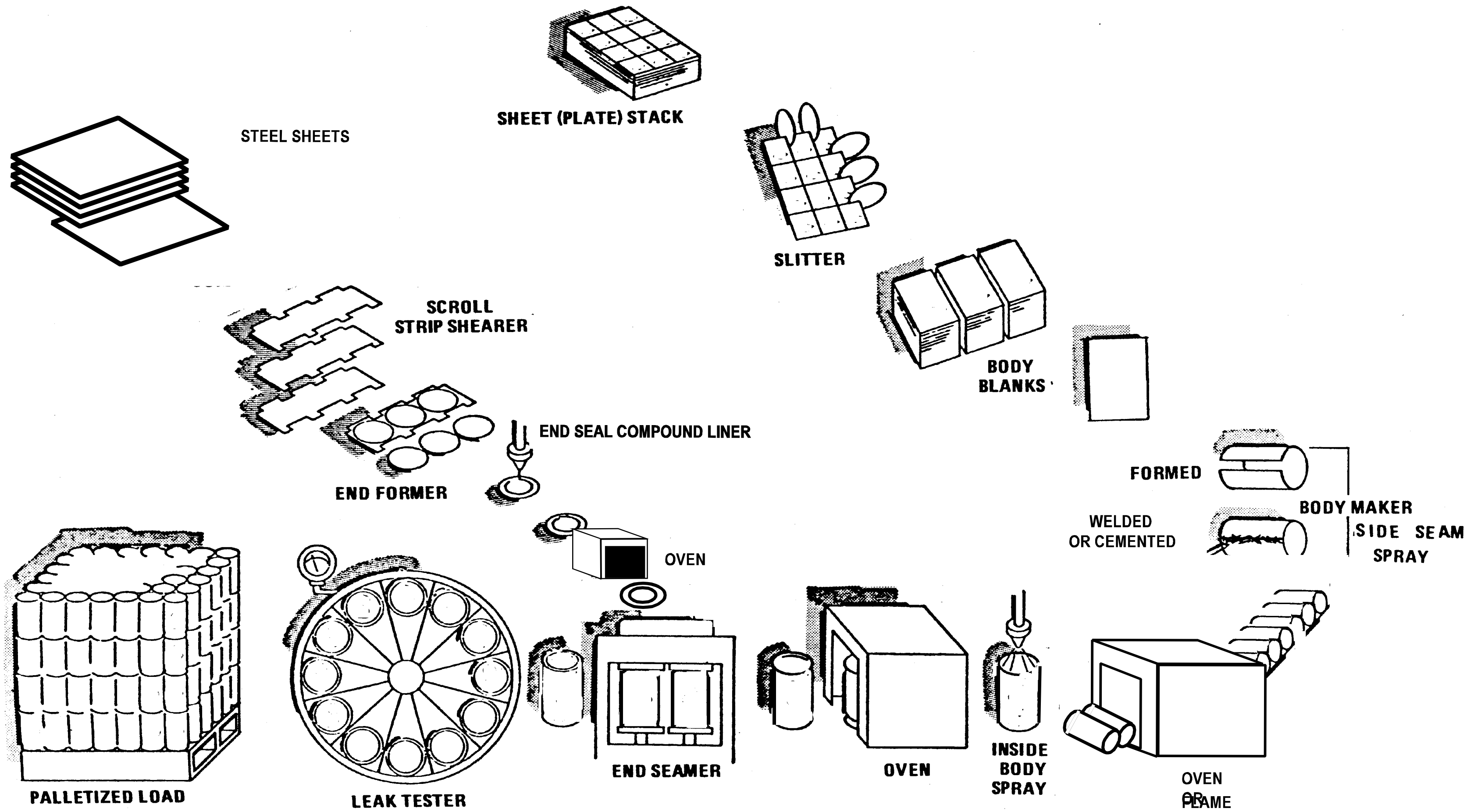

Figure 2-3. Three-Piece Can Fabrication Process

have a high concentration of solvents, which results in the emission of VOCs and HAPs. Several types of coating technologies exist:

- Conventional solvent-borne coatings—Conventional coatings offer good abrasion resistance and ease of application. However, they have high concentrations of VOCs and HAPs.

- High-solid coatings—The most widely used high-solid coating is polyurethane. These coatings are used as exterior bases, some interior sheet coatings, decorative inks, and end seal compounds.

- Waterborne coatings—These coatings are used extensively in beverage can manufacturing.

- Ultraviolet radiation-cured (UV-cured) coatings—UV-cured coatings offer advantages of rapid curing, low process temperatures, and low VOC and HAP content as well as lower energy costs because drying ovens are eliminated. However, UV coatings are expensive and require specialized equipment.

- Powder coatings—These coatings offer excellent resistance to chemicals, abrasion resistance, and barrier qualities. The application process for these coatings is currently not fast enough for can coating line operating speeds, and only limited numbers of colors, finishes, and textures are available for can manufacturers (EPA, 1998).

Coatings are applied to both interior and exterior can bodies and ends. Emissions are generated during coating application, during transportation to the oven (evaporation), and during curing. However, approximately 50 to 80 percent of emissions occur during the drying and curing process (EPA, 1998).

2.1.6 Costs of Production

Raw material and energy costs account for the largest share of the variable costs of metal can production. In 1997, the cost of materials and energy totaled $8.6 million, or 72 percent of the metal can industry's value of shipments. Steel and aluminum purchases totaled $8.1 million, or 94 percent of the cost of materials.

Recently, prices for steel and aluminum sheet, plate, and coil have fluctuated given the changes in market conditions for these inputs. For 2001, Purchasing Online (2001) reported spot prices for a cold-rolled steel sheet at $320 per ton, coiled-steel plate at $288 per ton, and aluminum common alloy sheet at $1,720 per ton (see Table 2-1). The data show the price of steel has dropped significantly since 1997 as foreign steel imports have surged. For September 1997, spot prices for cold-rolled steel sheet

Table 2-1. Spot Prices for Steel and Aluminum Sheet and Plate: 1997-2001

Year	1997	1998	1999	2000	2001
Cold-rolled steel sheet (Midwest, $/ton)	$480	$410	$390	$380	$320
Coiled steel plate (Midwest, $/ton)	$390	$400	$300	$320	$288
Aluminum (common alloy sheet 3003, $/ton)	$2,200	$1,920	$2,040	$2,240	$1,720

Source: Purchasing Online. September 15, 1998. "Transaction Prices." Purchasing Online.
Purchasing Online. September 16, 1999. "Transaction Prices." Purchasing Online.
Purchasing Online. September 20, 2001. "Transaction Prices." Purchasing Online.

and coiled steel plate were quite a bit higher than more recent levels at $480 and $390 per ton, respectively. In 1995, a shortage of aluminum led to significant raw material price increases, forcing beverage canners, such as Coca-Cola and Pepsico, to increase the use of alternative packaging containers such as plastic bottles (Sfiligoj, 1995). However, aluminum prices decreased significantly in 2001.

Labor is used throughout the production process as well as during transportation of the product. However, labor costs account for only a small share of variable production costs in the metal cans industry. In 1997, payroll represented only 10 percent of the value of shipments.

In 1995, industry estimated that approximately 20 million gallons of coating materials were consumed annually by two-piece beer and beverage can manufacturers (Sfiligoj, 1995). A more recent estimate shows that two-piece beverage manufacturing facilities used 26 million gallons of coating in 1997 (Reeves, 1999). Using data on the volume and value of coatings shipped to the metal coil coating industry, the Agency estimates the average cost of coatings for 1997 at $15.60 per gallon (Bourguigon, 1999). However, it is likely that some specialty coatings sell for substantially more—as high as $50 per gallon.

The U.S. Bureau of the Census (Census Bureau) and U.S. Bureau of Labor Statistics (BLS) publish historical statistics for costs of materials (i.e., materials, fuels, electricity) and labor for the metal can industry using the following classification systems:

- North American Industrial Classification System (NAICS)—beginning with the 1997 Economic Census, the metal cans industry was classified under NAICS code 332431, Metal Can Manufacturing.
- 1987 Standard Industrial Classification (SIC) codes—prior to 1997, the metal cans industry was classified under SIC 3411, Metal Cans.

As shown in Table 2-2, the cost of materials averaged 72 percent of the industry's value of shipments between 1992 and 1997, while payroll represented roughly 10 percent of the value of shipments. Wages for production workers ranged from $15.86 to $17.34 per hour during this period.

2.2 Uses, Consumers, and Substitutes

Historically, steel cans were primarily used to store prepared raw food products. During the 1970s and 1980s, the use of metal cans expanded to the beverage market, and aluminum cans subsequently captured a significant share of the market (Hillstrom, 1994). Today, it is estimated that Americans use approximately 200 million cans each day. Metal cans are used for a wide variety of products, such as soft drinks, food products, and aerosol cans. Table 2-3 lists selected end uses for metal cans.

In 1997, the baseline year selected for this analysis based on data availability, more than 130 billion metal cans were shipped to three primary market segments—beverage, food, and general packaging (CMI, 1999b). Figure 2-4 shows the distribution of shipments of metal cans by market for 1997. As shown, the beverage market accounts for the largest share of metal cans (73.4 percent), followed by food (23.4 percent) and general packaging (3.2 percent).

CMI reports that nearly all beverage cans are made of aluminum. A recent survey conducted by the aluminum beverage can industry identified characteristics of aluminum cans that consumers found attractive compared to other packaging alternatives (CMI, 1999c). These include

Table 2-2. Historical Cost of Production Statistics for the Metal Cans Industry: 1992–1997

Year	Value of Shipments ($\$10^6$)	Cost of Materials ($\$10^6$)	Cost of Materials Share (%)	Payroll ($\$10^6$)	Payroll Share (%)	Average Earnings of Production Workers ($/hr)
1992	$12,112	$8,798	72.6%	$1,262	10.4%	$15.86
1993	$11,498	$8,360	72.7%	$1,212	10.5%	$16.23
1994	$11,610	$8,306	71.5%	$1,256	10.8%	$16.50
1995	$12,326	$9,084	73.7%	$1,183	11.2%	$16.74
1996	$12,273	$8,624	70.3%	$1,194	9.6%	$16.98
1997	$12,007	$8,598	71.6%	$1,183	9.8%	$17.34
Total/Average	$71,825	$51,770	72.1%	$7,485	10.1%	$16.61

Sources: U.S. Department of Commerce, Bureau of the Census. 1999a. *1997 Census of Manufacturing Industry Series: Metal Can Manufacturing*. <http://www.census.gov/prod/ ec97/97m3324c.pdf>.
U.S. Department of Commerce, Bureau of the Census. 1998. *1996 Annual Survey of Manufactures Statistics for Industry Groups and Industries*. <http://www.census.gov/ prod/www/abs/manu-min.html>.
U.S. Department of Commerce, Bureau of the Census. 1997. *1995 Annual Survey of Manufactures Statistics for Industry Groups and Industries*. <http://www.census.gov/prod/www/abs/manu-min.html>.
U.S. Bureau of Labor Statistics. National Employment, Hours, and Earnings—Metal Cans: Series ID eeu31341106. <http:www.bls.gov>. As obtained on August 27, 1999.

- less spillage or breakage,
- ease of storage at home or when traveling,
- maintenance of soft drink carbonation, and
- ease of recycling.

The ability to recycle aluminum cans is one reason why they continue to dominate other packaging alternatives in the carbonated soft drink (CSD) market, one of the largest segments of the market. CMI estimated that in 1998, two out of every three manufactured aluminum beverage cans were recycled as new cans, a process that takes approximately 60 days (CMI, 1999d). In 1997, aluminum cans accounted for 75.7 percent of the soft drink

Table 2-3. Metal Can Uses by Material and Type

Type	Material Used	Products Contained
Three-Piece Can Body	Steel	Food, juices, spices, aspirin, paints, glue, aerosols (includes decorative tins)
Two-Piece Can Body		
Draw-iron	Aluminum	Beer, carbonated beverages, juices
	Steel	Food, other nonfood
Draw/redraw	Steel, aluminum	Food, shoe polish, sterno, fuel, car wax, other nonfood products

Source: U.S. Environmental Protection Agency. 1998. "Preliminary Industry Characterization: Metal Can Manufacturing—Surface Coating." <http://www.epa.gov/ttn/uatw/coat/ mcan/met_can.htm>.

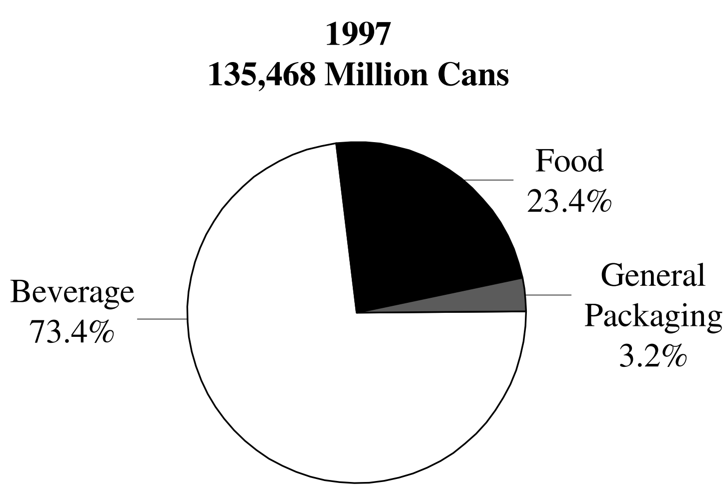

Figure 2-4. Distribution of Metal Can Shipments by End Use: 1997

Source: Can Manufacturers Institute (CMI). "Domestic Can Shipment 1997." <http:www.cancentral.com/foodstats.cfm>. Obtained August 31, 1999c.

packaging mix followed by plastic (19.9 percent), glass (2.3 percent), and other (2.1 percent) (see Figure 2-5). Despite the current dominance of aluminum beverage containers, the use of polyethylene terephthalate (PET) bottles has recently experienced growth due to the widespread availability of the polymer and its low cost (O'Neill, 1998). Aluminum cost increases in the mid-1990s encouraged soft drink canners to substitute bottles made of PET. The glass CSD container share, on the other hand, is small and declining. For example, the Census Bureau (1999a) reports shipments of glass bottles fell 14 percent from 1997 to 1998.

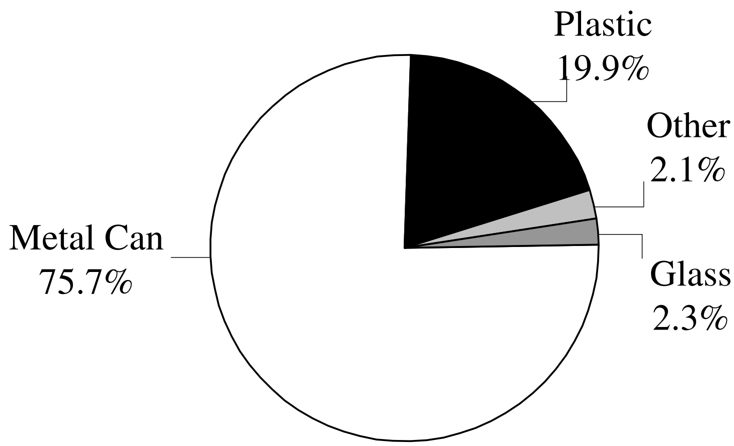

Figure 2-5. Distribution of Soft Drink Packaging Mix by Type: 1997

Source: Can Manufacturers Institute (CMI). "1997 Retail Sales Prove It's Better in Cans." *Canline* 1(2). <http:www.cancentral.com/canline/v1n2/v1n2.htm>. As obtained on August 31, 1999a.

Another important beverage segment is the beer market. Aluminum beer containers accounted for approximately one-third of metal can beverage shipments in 1999 (CMI, 2001a). Small aluminum cans (60 percent) and glass bottles (27 percent) dominate the beer market, with bulk packages such as kegs accounting for the remaining 13 percent (Brody and Marsh, 1997). Recently, plastic containers have entered the single-service beer market.

A variety of alternative packaging methods in the food/general packaging containers market exist. The primary factors in deciding which type of material to use in packaging are temperature control, counterpressure, and shelf-life, but in most cases plastic or glass can be substituted for metal (Brody, 2001).

Plastic containers have enjoyed widespread use since the 1970s, but this use has been concentrated in the beverage market. In 1998, only about 1 billion plastic containers were used in food packaging versus 32 billion metal containers (Brody, 2001). Steel food can manufacturers have primarily been affected by the increasing use of plastic in a limited number of food market segments as they face increased competition from microwave and frozen food products using plastic packaging (Hillstrom, 1994). Plastic also has the advantage of being impact resistant, heat resistant, and transparent. PET is often used as a glass replacement in both food and beverage bottles (Brody and Lord, 2000).

Glass is also used in food packaging. It is usually found in the form of wide mouth containers (i.e., jars). Approximately one half of glass containers are used for baby food. Glass is much more prevalent in the food packaging industry than is plastic (approximately nine times more glass containers are used) (Brody, 2001). Although consumers desire the transparency of glass, it might be less than desirable from the perspective of food preservation because light can accelerate reactions in the food. Although it can be substituted for metal or plastic it is very heavy, breakable, and energy intensive to produce (Brody and Lord, 2000).

Paper and paperboard are the most widely used package materials in the world. However, in order to protect food from moisture, gas, odors, or microorganisms, they must first be coated with plastic. For this reason, they are infrequently used as substitutes for glass, plastic, and metal in the food and beverage industry (Brody and Lord, 2000).

Prices of raw materials can significantly influence beverage producers' choice of container material because containers represent a large share of the product's cost and because several substitute materials exist.[1] For example, aluminum can prices increased nearly 14 percent between 1994 and 1995, leading several manufacturers to consider expansion of plastic packaging methods (Sfiligoj, 1995).

In addition to this anecdotal evidence, there is some quantitative data suggesting substitution between container materials based on relative prices. Aluminum can shipments in the beverage market declined by 5 billion units, or 4.6 percent, from 1994 to 1995, as aluminum can prices rose relative to PET bottles. Since 1995, the price of aluminum cans has fallen relative to PET, and shipments of aluminum cans have risen close to 1994 levels. A simple regression of the ratio of aluminum and PET prices on shipments of aluminum cans provides an elasticity estimate of –0.6.[2] In other words, a 1 percent increase in the price of aluminum cans relative to PET bottles is estimated to reduce the quantity of aluminum cans demanded by 0.6 percent.

Although the cost of steel cans has remained constant over this period, sharp reductions in raw steel prices in 2000 and 2001 suggest lower costs of steel cans in the future. However, in addition to declines in metal prices, plastic resin costs have fallen since 1995, which makes plastic containers more attractive (O'Neill, 1998). In fact, all of the major materials used in food and beverage packaging (aluminum, steel, plastic, and glass) have been declining in price over the last few years in inflation-adjusted terms.

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[1]Economic theory suggests the elasticity of the derived demand for an input is a function of the cost share of the input in total production cost and the elasticity of substitution between this input and other inputs in production (Hicks, 1966). Because the cost share of containers is relatively large and there are good substitutes available, we may infer an elastic demand for aluminum beverage cans. Containers used in food or general packaging applications (e.g., steel cans) typically have much smaller cost shares than those used for beverages (because the products contained in them often have far higher values than beverages) and would be expected to face less elastic demand curves.

[2]The model estimated was $\ln Q_{A1} = a + b \ln\left(\frac{P_{PET}}{P_{A1}}\right)$, where Q_{A1} is the quantity of aluminum cans; P_{PET} and P_{A1} are inflation-adjusted price indices of PET bottles and aluminum cans, respectively; and a and b are parameters to be estimated.

2.3 Industry Organization

This section provides an overview of the market structure of the metal can manufacturing industry, including the facilities, the companies that own them, and the markets in which they compete.

2.3.1 Market Structure

Market structure is of interest because it determines the behavior of producers and consumers in the industry. If an industry is perfectly competitive, then individual producers are not able to influence the price of the output they sell or the inputs they purchase. This condition is most likely to hold if the industry has a large number of firms, the products sold and the inputs purchased are homogeneous, and entry and exit of firms are unrestricted. Entry and exit of firms are unrestricted for most industries except, for example, in cases where government regulates who is able to produce, where one firm holds a patent on a product, where one firm owns the entire stock of a critical input, or where a single firm is able to supply the entire market.

Four- and eight-firm concentration ratios (CR4 and CR8, respectively) and Herfindahl-Hirschmann indexes (HHIs) can provide some insight into the competitiveness of an industry. The U.S. Department of Commerce reports these ratios and indices by NAICS codes for 1997, the most recent year available. Values for the metal can industry, glass containers industry, and plastic bottle industry are reported in Tables 2-4, 2-5, and 2-6, respectively.

Table 2-4. Measures of Market Concentration for the Metal Cans Industry (NAICS 332431): 1997

Value of Shipments ($\$10^6$)	CR4	CR8	HHI
$11,930	58%	87%	1,180

Notes: CR4 denotes four-firm concentration ratio.
CR8 denotes eight firm concentration ratio.
HHI denotes Herfindahl-Hirschmann index for 50 largest companies.

Source: U.S. Department of Commerce, Bureau of the Census. 2001. *Concentration Ratios in Manufacturing*. <http://www.census.gov/prod/ec97/m31s-cr.pdf>.

Table 2-5. Measures of Market Concentration for the Glass Containers Industry (NAICS 327213): 1997

Value of Shipments ($\$10^6$)	CR4	CR8	HHI
$4,198	91%	98%	2960

Notes: CR4 denotes four-firm concentration ratio.
CR8 denotes eight firm concentration ratio.
HHI denotes Herfindahl-Hirschmann index for 50 largest companies.

Source: U.S. Department of Commerce, Bureau of the Census. 2001. *Concentration Ratios in Manufacturing*. <http://www.census.gov/prod/ec97/m31s-cr.pdf>.

Table 2-6. Measures of Market Concentration for the Plastic Bottle Industry (NAICS 326160): 1997

Value of Shipments ($\$10^6$)	CR4	CR8	HHI
$6,335	33%	52%	425

Notes: CR4 denotes four-firm concentration ratio.
CR8 denotes eight firm concentration ratio.
HHI denotes Herfindahl-Hirschmann index for 50 largest companies.

Source: U.S. Department of Commerce, Bureau of the Census. 2001. *Concentration Ratios in Manufacturing*. <http://www.census.gov/prod/ec97/m31s-cr.pdf>.

The criteria for evaluating the HHIs are based on the 1992 Department of Justice's Horizontal Merger Guidelines. According to these criteria, industries with HHIs below 1,000 are considered unconcentrated (i.e., more competitive), those with HHIs between 1,000 and 1,800 are considered moderately concentrated (i.e., moderately competitive), and those with HHIs above 1,800 are considered highly concentrated (i.e., less competitive). In general, firms in less-concentrated industries are more likely to be price takers, while firms in more-concentrated industries are more likely to be able to influence market prices.

In the metal can industry, the CR4 was 58 percent, while the CR8 was 87 percent. The HHI for this industry was 1,180. Based on the criteria above, the metal can industry can be classified as moderately concentrated.

With only 11 companies, the glass container industry was concentrated with a CR4 of 91 percent and a CR8 of 98 percent. The HHI for this industry implies that it was highly concentrated.

In the plastic bottle industry, the CR4 was 33 percent and the CR8 was 52 percent. With an HHI of 425, the plastic bottle industry can be classified as unconcentrated.

Although the metal can industry appears to fall at the lower end of the moderately concentrated range, the close substitutability of alternative materials such as glass and plastic makes it likely that metal can producers behave as price-takers. Thus, based on the CR4, CR8, HHI, and the available substitutes, an assumption of perfect competition for the metal can industry appears reasonable for modeling purposes.

2.3.2 Facilities

In the baseline for this analysis, 202 potentially affected facilities manufactured metal cans, sheets, or ends in the United States.[3] These facilities can be classified as one of two types of producers: independent can manufacturers and captive can manufactures. Independent can producers coat and fabricate cans based on the customer's specified end use. Several of these plants manufacture cans solely for one customer (EPA, 1998). Captive can producers coat and fabricate cans as part of the

[3]That is, there were 202 facilities classified in the metal can manufacturing industry. However, eight of these facilities are classified as synthetic minor sources and 52 as area sources, neither of which incur any compliance costs under this regulation.

vertical operations of a parent corporation. The great majority of metal cans are produced by independent can producers rather than for captive use (see Section 2.3.2 for more information).

The size of can manufacturing plants varies depending on the number and types of production processes performed. Some plants coat only the metal sheets, while others may fabricate a particular type of can body or end from the coated sheets. Others both coat and fabricate the metal can.

Metal can manufacturing facilities are generally located near sources of material supply (i.e., steel or aluminum plants) or near the customers based on the costs associated with transporting raw materials and final products. Figure 2-6 shows the distribution of these facilities across the United States. California contains the most metal can, sheet, or end manufacturing facilities (29), followed by Ohio (19), Illinois (15), and Wisconsin (13).

2.3.3 Companies

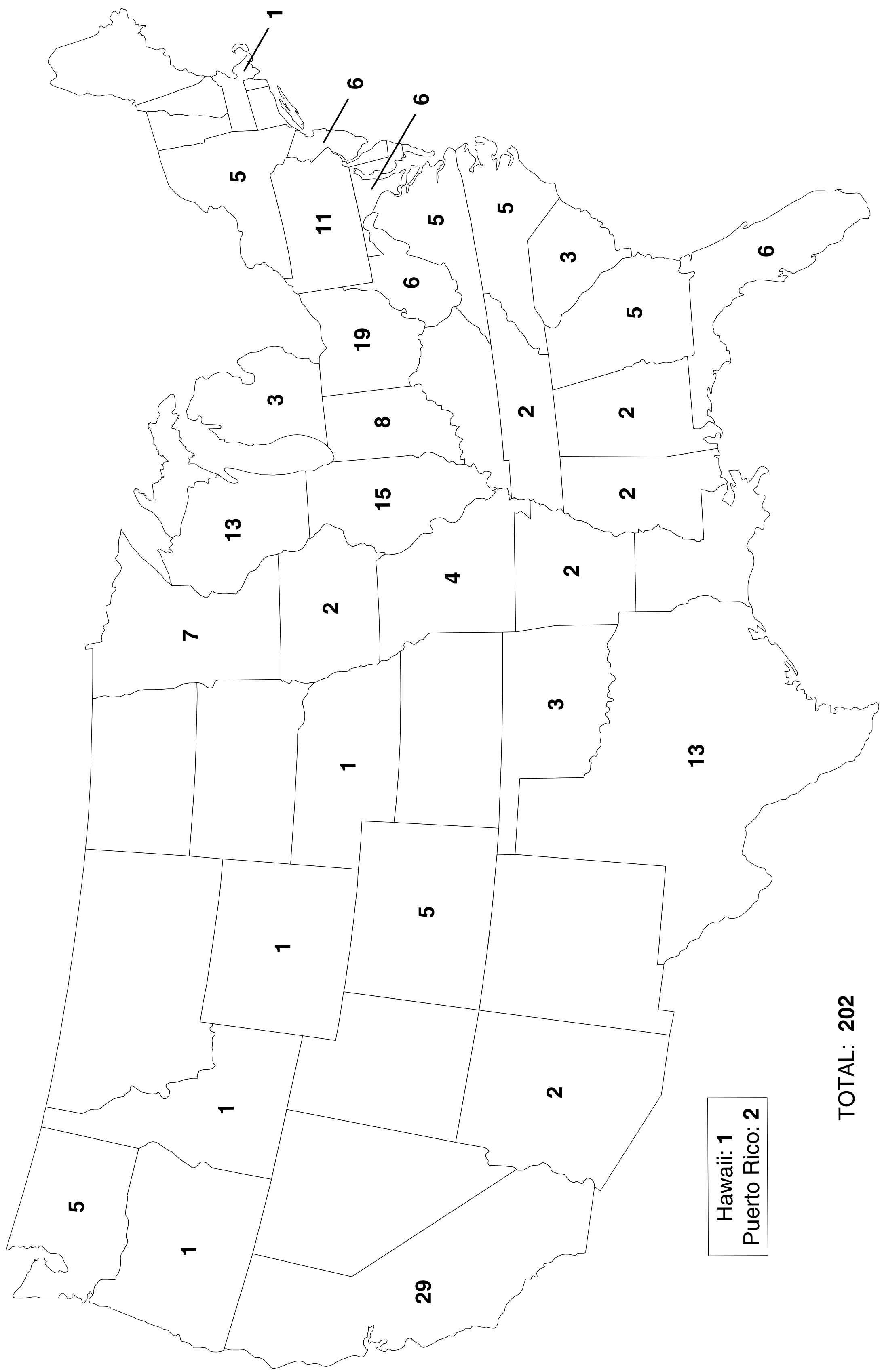
Thirty parent companies own the 202 metal can manufacturing facilities. These companies report an average (median) annual sales of $3.8 billion ($336 million). This figure includes revenue from operations other than metal can manufacturing. The average (median) employment for these companies was 17,400 (2,566) workers. Three of the largest companies, based on annual sales, produce containers as part of the company's vertical operations (i.e., Nestle S.A.—$52.1 billion, Con Agra—$23.8 billion, and H.J. Heinz Company—9.3 billion). However, these companies own a total of only seven facilities, or 3.5 percent of the establishments. *Ward's Business Directory* (Gale Research, 1999) identifies the top metal can manufacturing companies (i.e., those with NAICS 332431 as a primary SIC) as Crown Cork and Seal Company ($8.3 billion), Ball Corporation ($2.8 billion), and American National Can Company ($2.4 billion), all of which are independent metal can manufacturers. These companies own 82 facilities, or 43 percent of the total. Additionally, Silgan Holdings Company is a major independent metal can manufacturer in this market: they own 34 facilities (annual sales are $1.7 billion).

Metal can coating companies can be classified as small or large businesses using Small Business Administration (SBA) general size standard definitions for NAICS codes. For NAICS 332431, the SBA defines a business as small if it employs 1,000 or fewer employees. Using this guideline and available secondary data, the Agency identified 13 small businesses, or 43.3 percent of the metal can companies. For these small businesses, the average (median) annual sales for companies reporting data were $27 ($24) million, and the average (median) employment was 178 (175) employees. Appendix A lists individual metal can companies and includes sales and employment data reported by secondary sources, including Dun & Bradstreet (1999), Hoover's Inc. (1999), and company and industry websites.

2.4 Market Data and Trends

Growth in the metal can industry during the 1990s has slowed as a result of a mature domestic market for aluminum and steel cans. As shown in Table 2-7, domestic shipments were reported at 137 billion cans in 1997 (baseline year), a small increase of 1.2 percent over 1996. During the period 1993 to 1999, total metal can shipments increased at an average annual rate of 1 percent.

There are a variety of metal can products, and prices vary by size and end-use application. The Agency conducted a search for can price data by type of can and found that this information is not published in a statistical annual. However, an industry trade journal did report spot prices for aluminum and steel beverage cans as well as plastic bottles for 1995 (Sfiligoj, 1995). Using these spot prices and the producer price indexes published by the BLS, the Agency computed a historical price time series for these selected cans for the period 1993 through 2000. As shown in Table 2-8, the average prices per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2
4
2
7
3
1
13
1
5
1
2
1
5
1
29
Hawaii: 1
Puerto Rico: 2
TOTAL: 202

1,000 units during this period were as follows: aluminum cans ($62.47), steel cans ($65.28), and plastic bottles ($68.51).

Table 2-7. Domestic Metal Can Shipments by Market: 1993–1999 (million cans)

Year	Beverage	Food	General Packaging	Total
1993	97,605	30,465	4,072	132,142
1994	103,119	31,907	4,228	139,254
1995	98,116	31,313	4,275	133,704
1996	99,136	31,971	4,361	135,468
1997	100,680	31,998	4,375	137,137
1998	102,789	31,782	4,404	138,975
1999	102,253	32,349	4,457	139,059
		Average Annual Growth Rates		
1993–1999	1%	1%	2%	1%

Source: Can Manufacturers Institute (CMI). "Historical CMI Can Shipments." <http://www.cancentral.com/>. As obtained on December 6, 2001a.

Currently, foreign trade does not represent a significant share of metal can shipments. For 1996, the value of imports and exports as a share of the total value of shipments for NAICS 332431 was less than 1.5 percent. However, foreign interest in the benefits of aluminum can packaging is growing and this is expected to benefit U.S. producers of aluminum cans (Hillstrom, 1994). There has been growth in exports since 1992, although exports peaked in 1995 and have generally been declining since then (see Table 2-9). Similarly, imports (primarily from Canada) have risen between 1992 and 2000 but peaked in 1996 and have been on a downward trend. It is unclear why trade spiked in the mid-1990s and has since been falling. Even in the peak years, trade was a very small fraction of total production and consumption of metal cans. Because imports and exports are such a small percentage of total shipments, apparent consumption of metal cans in the U.S. does not differ greatly from total shipments by domestic producers (see Table 2-9).

Table 2-8. Prices for Beverage Containers: 1993–2000 ($/1,000 cans or bottles)

Year	Aluminum Cans	Steel Cans	PET Bottles
1993	$63.99	$64.78	NA
1994	$61.01	$64.78	$65.23
1995	$70.58	$65.66	$70.68
1996	$63.02	$65.81	$68.57
1997	$60.94	$65.76	$68.63
1998	$61.01	$65.76	$67.73
1999	$59.14	$65.30	$67.99
2000	$60.04	$64.37	$70.75
Average:	$62.47	$65.28	$68.51

Sources: Sfiligoj, Eric. June 1995. "At What Price?" *Beverage World*.
U.S. Bureau of Labor Statistics. Producer Price Index—Commodities: Aluminum Cans—Series ID wpu103103. <http:www.bls.gov>. As obtained on December 6, 2001a.
U.S. Bureau of Labor Statistics. Producer Price Index—Commodities: Steel Cans—Series ID wpu103102. <http:www.bls.gov>. As obtained on December 6, 2001b.
U.S. Bureau of Labor Statistics. Producer Price Index Revision—Current Series: Plastic Bottles—Series ID pcu3085#. <http:www.bls.gov>. As obtained on December 6, 2001c.

Table 2-9. Apparent Consumption of Metal Cans (NAICS 332431): 1993–1999 (million cans)

Year	Shipments by Domestic Manufacturers	Imports	Exports	Apparent Consumption
1992	N/A	335	395	N/A
1993	132,142	461	568	132,035
1994	139,254	711	1,390	138,575
1995	133,704	559	2,196	132,067
1996	135,468	1,454	899	136,023
1997	137,137	627	861	136,903
1998	138,975	334	967	138,342
1999	139,059	691	624	139,126
2000	N/A	634	674	N/A
	Average Annual Growth Rates			
	1%	28%	21%	1%

Sources: U.S. International Trade Commission. ITC Trade Data Web. Version 2.4 [computer file]. <http://navigation.helper.realnames.com/framer/1/113/default.asp?realname=US+International+Trade+Commission&url=http%3A%2F%2Fdataweb%2Eusitc%2Egov&frameid=1&providerid=113&uid=17367635>. As obtained on December 7, 2001.

Can Manufacturers Institute (CMI). "Historical CMI Can Shipments." <http://www.cancentral.com/>. As obtained on December 6, 2001a.

In the domestic market, the aluminum container has become widely used because of its relative advantages in price and weight as well as opportunities consumers have to recycle it. The beverage market grew rapidly during the 1980s and 1990s and began to dominate the entire can industry. Aluminum has a 75 percent market share in the beverage segment, experiencing rapid growth along with the beverage industry. As beverage industry growth has leveled off, so have sales of aluminum cans. Although steel represents a declining share of the beverage market, steel cans still dominate the food and consumer product markets. However, they face increased competition from food product packaging using plastic materials. Exports of both food and beverage products are anticipated to increase based on trends established during the 1990s. For example, between 1990 and 1992 soft drink and carbonated water exports increased 63 percent and fruit and vegetable exports increased approximately 32 percent (Hillstrom, 1994). However, it is not clear that these trends will lead to increased exports of metal cans. Because of the low value-to-weight ratio of metal cans, it appears unlikely that foreign trade in cans will develop to a significant degree. On the other hand, an increase in food and beverage exports may lead to an increase in demand for metal cans since they may be used to package the exported items.

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