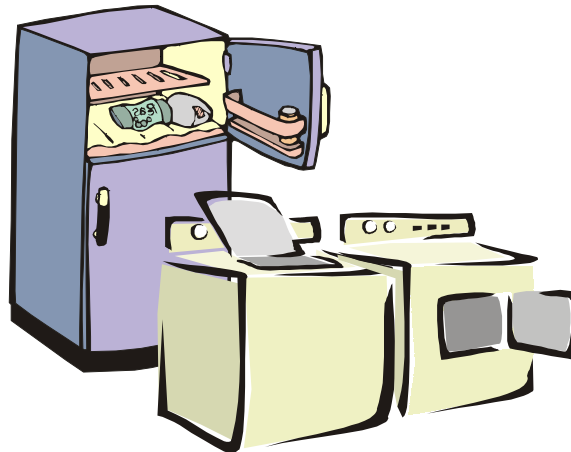


# White Goods

## COMMODITY PROFILE

North Carolina Department of  
Environment and Natural Resources  
DIVISION OF POLLUTION PREVENTION AND  
ENVIRONMENTAL ASSISTANCE

MARKETS ASSESSMENT 1998



### OVERVIEW

White goods, also frequently referred to as major appliances, are a category of durable goods composed mostly of ferrous metals. In addition to ferrous metals, white goods can also contain varying amounts of other metals, glass, plastic, and an assortment of other materials. For the purposes of this report, however, tonnages will be reported as an overall white goods number.

White goods are defined in North Carolina GS 130A-290 (a) (44) as: "refrigerators, ranges, water heaters, freezers, unit air conditioners, washing machines, dishwashers, and clothes dryers, and similar domestic and commercial large appliances." Discarded white goods have some market value as scrap metal and have been recovered for years by North Carolina scrap yard dealers and metal recoverers.<sup>1</sup> However, according to a Steel Recycling Institute source "increased use of plastics in appliances and automobiles, primarily in major body and structural components, may im-

pact future acceptance by scrap processors and revenue derived from the scrap value."<sup>2</sup>

On January 1, 1994, the advanced disposal fee on white goods went into effect (\$10 for white goods that contain CFCs and \$5 for white goods that do not), the result of the passage of Senate Bill 60 during the 1993 Legislative Session. The white goods fee was extended for three years through legislative action in June 1998, but at a lower rate (\$3 per appliance versus the previous two-tiered fee). The white goods legislation required counties to implement a comprehensive management program for a wastestream that has traditionally been given low priority. As a result of the program all counties now have a written white goods management plan, and many closely monitor and report tonnages, costs, and income.<sup>3</sup>

Since the advanced disposal fee on white goods went into effect, illegal dumping of appliances and other white goods

**Figure 1. Major Appliances Generated in the U. S. Municipal Waste Stream (thousands of tons)**

<b>Year</b>	1960	1970	1980	1990	1992	1994	1995	1996
<b>Tonnage</b>	1,630	2,170	2,950	3,310	3,280	3,280	3,420	3,520

**Figure 2. North Carolina White Goods Generation Estimates (tons per year)**

	<b>1997</b>	<b>2002</b>
<b>North Carolina Population</b>	7,436,690	7,891,238
<b>North Carolina Per capita white goods generation rate</b>	27 lbs.	27 lbs.
<b>Unadjusted North Carolina white goods generation</b>	100,395	106,532
<b>White goods growth rate</b>	N/A	15 percent
<b>Adjusted North Carolina white goods generation</b>	100,395	122,512

has been greatly reduced; however, some illegal dumps remain. The strong impact on dumping has been due to removal of landfill disposal fees and a more convenient infrastructure for collection of white goods. The program has provided the funds needed to “jump start” county white goods management activities. Counties access the White Goods Management Account by obtaining grants that make it unnecessary for them to accumulate funds during a period of years in order to purchase needed equipment and make capital improvements. Funds in the White Goods Management Program have made it possible for counties to purchase specialized equipment for CFC recovery and to construct collection and loading areas.<sup>4</sup>

North Carolina counties reported collecting 46,358 tons of white goods during fiscal year 1996-97. The estimated tonnage of white goods managed has been reported by North Carolina counties since fiscal year 1991-92 when only 25,749 tons were collected.<sup>5</sup>

**SUPPLY**  
**Generation**

A recent national study estimated the amount of white goods (referred to as “major appliances” in the study) generated in 1996 at 3.52 million tons, an increase of 1.89 million tons from the amount reported in 1960, as presented in Figure 1.<sup>6</sup>

This represents an increase of 115 percent during the 36-year period covered in the study or 3.2 percent per year. It was reported that generation of white goods increased by 33 percent and 35 percent during the 1960s and 1970s, respectively, but increased by only 12 percent during the 1980s. Generation numbers actually decreased slightly from 1990 to 1992 and 1994, but rebounded to increase by four percent and three percent, respectively, in 1995 and

1996. Based on this 36-year history, it is reasonable to assume that white goods generation will increase by three percent per year or 15 percent between 1997 and 2002.

White goods generation in North Carolina is estimated by multiplying the national generation rate of 3.52 million tons in 1996 by North Carolina’s percentage of the United States population (2.78 percent) to arrive at a North Carolina generation rate for 1996 of 97,856 tons. Dividing that number by North Carolina’s 1996 population and multiplying by 2,000 yields a per capita generation rate of 27 pounds per person per year. The per capita generation rate is used to estimate generation in 1997 and 2002, and the 2002 generation is then adjusted using the three percent annual growth rate discussed above. These estimates are presented in Figure 2.

**Recovery**

As stated previously, North Carolina counties reported recycling 46,358 tons of white goods during fiscal year 1996-97. However, a significant amount of white goods recovery occurs in the private sector and is not included in the public sector recovery statistics. Therefore, it is reasonable to assume that the white goods recovery rate in North Carolina approaches or may even exceed the national recovery rate of 81 percent in 1997.<sup>7</sup> For the purposes of this report, recovery rates in North Carolina are assumed to parallel the national recovery rate of 81 percent. Recovery rates for white goods have increased steadily during the decade from 41 percent in 1990 to the current 81 percent rate.<sup>8</sup> This dramatic increase can be attributed to a variety of factors, such as the enactment of landfill bans for white goods by 21 states and the fact that many other states separate white goods for recycling as standard practice.<sup>9</sup> However, it may be unrealistic to expect similar large increases over the next five years as recovery rates approach



**Figure 3. North Carolina White Goods Recovery Estimates (tons per year)**

	<b>1997</b>	<b>2002</b>
<b>Adjusted North Carolina white goods generation</b>	100,395	122,512
<b>Recovery rate</b>	81 percent	91 percent
<b>Estimated white goods recovery in North Carolina</b>	81,320	111,486

**Figure 4. Auto Shredders in North Carolina<sup>13</sup>**

<b>City</b>	<b>Company</b>
Charlotte	Southern Metals Co, Inc.
Greensboro	D.H. Griffin Wrecking Co. (Div of Recycling Industries Inc.)
Kernersville	United Metal Recyclers (Div. of Recycling Industries Inc.)
Statesville	L. Gordon Iron & Metal Co.

their theoretical limits. Therefore, a conservative two-percent increase in white goods recovery per year will be assumed for that period.

North Carolina recovery estimates for 1997 and 2002 are summarized in Figure 3.

## **DEMAND**

In the United States alone, nearly 70 million tons of steel was recycled in steel mills and foundries in 1997. Recycled steel consists of approximately 30 percent home scrap (new recirculating scrap from current operations), 24 percent prompt scrap (produced in steel-product manufacturing plants) and 46 percent obsolete (old) scrap.<sup>10</sup>

According to the American Iron and Steel Institute, steel recovered from municipal solid waste (MSW) is a very small portion (about six percent) of the total recovered scrap used. The only real issue, then, is the continued willingness of the domestic steel and iron industry to utilize steel products recovered from MSW. Since the industry is actively promoting recovery of steel from MSW, markets seem to be secure for the recovered products.<sup>11</sup>

Many scrap industry observers believe that competition for supply of ferrous scrap is heating up with the installation of larger, super-sized automobile shredders. While automobile bodies are the preferred feedstock for shredders, a wide variety of materials including white goods are being fed into these machines in order to produce the stream of dense, ferrous shred desired by scrap consumers.<sup>12</sup> Auto shredding facilities located in North Carolina are presented in Figure 4.

In addition to the auto shredders listed in Figure 4, there is an infrastructure in place across the state that processes and delivers ferrous scrap to steel mills throughout the east. The *Directory of Markets for Recyclable Materials* lists 31 such facilities under the metal/appliance category.<sup>14</sup>

## **Major End Users**

According to *Recycling Today*, there are seven large tonnage steel mini-mills in North Carolina and its border states with a combined capacity of 5.28 million tons per year. In addition to the mini-mills currently in operation, Nucor Corp. anticipates increasing capacity at its Mt. Pleasant, South Carolina plant to 2.3 million tons per year.<sup>15</sup> Chaparral Steel plans to open a facility in Dinwiddie, Virginia (one million tons per year capacity) in mid 1999, and Nucor plans to construct a facility in Hertford County, North Carolina (one million tons per year capacity). The capacity and location of each of these nine facilities is presented in Figure 5.

End use markets for North Carolina-generated ferrous scrap are not limited to the facilities and states mentioned. There are also several iron foundries in North Carolina and its border states that use shredded steel as recycled feedstock for their products. In addition, steel mills and foundries in Maryland, Pennsylvania, and Alabama, as well as in other locations along the East Coast, are also consuming significant quantities of North Carolina-generated ferrous scrap. For the purposes of this report, however, generation, recovery, and demand capacity tonnage estimates will be limited to North Carolina and its border states and to the facilities described in Figure 5.

## **SUPPLY / DEMAND RELATIONSHIP**

The capacity to consume ferrous scrap at the large tonnage steel mini-mills in North Carolina and its border states alone is estimated at 5.28 million tons per year in 1997 and 7.28 million tons per year in 2002. With white goods generation estimated at 100,395 and 122,512 tons per year in 1997 and 2002, respectively, and recovery rates estimated at 81,320 and 111,486 tons per year for the same period, it is reasonable to expect that if virtually all white goods generated in North Carolina were recovered,

**Figure 5. Large Tonnage Steel Mini-Mills in North Carolina and its Border States**

Company	Location	Capacity (ton per year)
AmeriSteel	Charlotte, NC	450,000
AmeriSteel	Knoxville, TN	330,000
Georgetown Steel Corp.	Georgetown, SC	1,000,000
Nucor Corp.	Darlington, SC	700,000
Nucor Corp.*	Mt. Pleasant, SC	1,800,000 (soon 2.3 mil)
SMI Steel-South Carolina	Cayce-West Columbia, SC	350,000
Roanoke Electric Steel Corp.	Roanoke, VA	650,000
Chaparral Steel Co.**	Dinwiddie, VA	1,000,000
Nucor Corp.***	Hertford County, NC	1,000,000
<b>Total Projected Capacity</b>		<b>7.78 million tons</b>

\*Nucor Corp. Mt. Pleasant, SC facility planned to expand.

\*\*Chaparral Steel facility scheduled to open in mid 1999.

\*\*\*Nucor Corp. facility planned for Hertford County, N.C.

the total demand for ferrous scrap in the region would be more than sufficient to consume the tonnage generated. This would more than likely remain the case if we assume similar generation and corresponding recovery rates for North Carolina's border states. The relationship between estimated supply (generation) and demand for white goods scrap in North Carolina and its border states is presented in Figure 6. It should be noted that demand estimates are for all ferrous scrap.

**Price History**

Prices paid by processors for white goods scrap in the southeastern United States from 1995 to 1997 are presented in Figure 7.

The wide range of prices paid in the southeastern United States, especially in 1996 and 1997, can be attributed in part to the fact that metals segregated by type and free of contaminants have higher value to scrap metal dealers than

mixed or contaminated metals. In fiscal year 1996-97 North Carolina counties reported a cost of \$2.7 million to collect, process and transport white goods to market and \$0.4 million in revenue from the sale of white goods.<sup>16</sup>

**CONCLUSION**

The total supply of white goods generated in the municipal waste stream in 1997 by North Carolina and its border states (434,760 tons) is estimated to be eight percent of demand (5.28 million tons). Similarly, total supply generated in the year 2002 (530,387 tons) is estimated to be slightly less than seven percent of demand (7.78 million tons). Therefore, it is reasonable to assume that sufficient market capacity exists for the consumption of all white goods generated in North Carolina and its border states today and through the year 2002, assuming that the percentage of steel in white goods is not displaced by other, less recyclable materials. Decreasing amounts of steel in appliances could have a negative impact on the value and scrap deal-

**Figure 6. Estimated Supply and Demand for White Goods Scrap in North Carolina and its Border States (tons per year)**

	1997	2002
<b>Supply*</b>	434,760	530,387
<b>Demand</b>	5.28 million	7.78 million

\*Supply (generation) is determined by using the same formula as in Figure 1 and applying it to population estimates for North Carolina and its border states.

**Figure 7. White Goods Scrap Prices in the Southeastern United States (cents per pound)\***

White Goods	1995	1996	1997
1 <sup>st</sup> Quarter (March)	0.5 to 1.5	0 to 20	2 to 10
2 <sup>nd</sup> Quarter (June)	0.5 to 1.5	2.5 to 20	1 to 10
3 <sup>rd</sup> Quarter (Sept.)	0 to 5	2 to 20	1 to 10
4 <sup>th</sup> Quarter (Dec.)	0 to 5	2 to 10	1 to 10

\*Source: Waste Age's *Recycling Times*, "The Market Page"



ers' acceptance of white goods in the future.

As stated previously, the continued willingness of the domestic steel and iron industry to utilize steel products recovered from MSW is key to the continued success of white goods recovery. Since the industry is actively promoting recovery of steel from MSW, markets seem to be secure.

Also, given the establishment of a more convenient infrastructure for collection of white goods by many North Carolina counties, it can be expected that white goods (made predominantly of steel) will continue to enjoy one of the highest recovery rates of any recyclable commodity in the state. However, given the discrepancy between the cost involved in collection, processing and transportation and the limited revenues from the sale of white goods, it is important to continue the North Carolina White Goods Management Program for the foreseeable future.

## RECOMMENDATIONS

The following recommendations are based on the study of generation, recovery and markets for white goods in North Carolina presented in this section.

- The North Carolina White Goods Management Program should be continued for the foreseeable future. North Carolina white goods legislation requires counties to implement a comprehensive management program for a waste stream that has traditionally been given a low priority. As a result

of the program all counties now have a written white goods management plan, and many closely monitor and report tonnages, costs and income.

- North Carolina counties should continue to try to develop and promote self-sustaining metal recycling programs. Many need to make greater efforts to upgrade their white goods processing areas, enabling segregation by metal type and limiting contamination.
- Counties that do not have adequate funding for capital improvements should obtain grants from the white goods management account. These grants make it unnecessary for counties to accumulate funds over a period of years in order to purchase needed equipment and make capital improvements.
- The state should continue to encourage counties to make use of these funds to develop an infrastructure for a self-sustaining metals recycling program.
- The state should continue to encourage counties to make use of these funds to clean illegal dumps of white goods.
- Counties should take advantage of public awareness and educational materials developed by the Steel Recycling Institute, such as its appliance recycling "Round Up" campaign kit. Call 1-800-YES-I-CAN for more information.

<sup>1</sup> NC DENR, *White Goods Management Annual Report FY 1996-97*, October 1, 1997, p. 2.

<sup>2</sup> Written correspondence from Chuck Nettleship, Mid-Atlantic Region Manager, Steel Recycling Institute, October 29, 1998.

<sup>3</sup> NC DENR, *op. cit.* p. 3.

<sup>4</sup> *Ibid.* p. 1.

<sup>5</sup> *Ibid.* p. 7.

<sup>6</sup> EPA, *Characterization of Municipal Solid Waste in the United States: 1997 Update*, May 1998, p. 56.

<sup>7</sup> Steel Recycling Institute, "Facts About Steel-North America's #1 Recycled Material," May 1998, p. 2.

<sup>8</sup> *Ibid.*

<sup>9</sup> Steel Recycling Institute, "Recycling Steel Appliances," April 1998.

<sup>10</sup> Fenton, Michael, "Recycling Metals, U.S. Geological Survey, Minerals Information 1996," p. 6.

<sup>11</sup> EPA, *Characterization of Municipal Solid Waste in the United States: 1997 Update*, May 1998, p. 143.

<sup>12</sup> Taylor, Brian, "Hungry Mouths to Feed," *Recycling Today*, volume 36, number 8, August 1998.

<sup>13</sup> Taylor, Brian, "Shredder Count at 200 in U.S.," *Recycling Today*, volume 36, number 8, August 1998.

<sup>14</sup> NC DENR / DPPEA, *Directory of Markets for Recyclable Materials*, February 1997, p. 11-9.

<sup>15</sup> "Ferrous Scrap Flow Map," Ferrous Scrap Supplement, *Recycling Today*, January 1998, pp. 18-19.

<sup>16</sup> NC DENR, *White Goods Management in North Carolina FY 1996-97 Supplemental Report on County Reserve Funds – December, 1997*, p. 1.