

# Recycling: Sub-Sector Trends

October 2011



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CANACCORD|Genuity



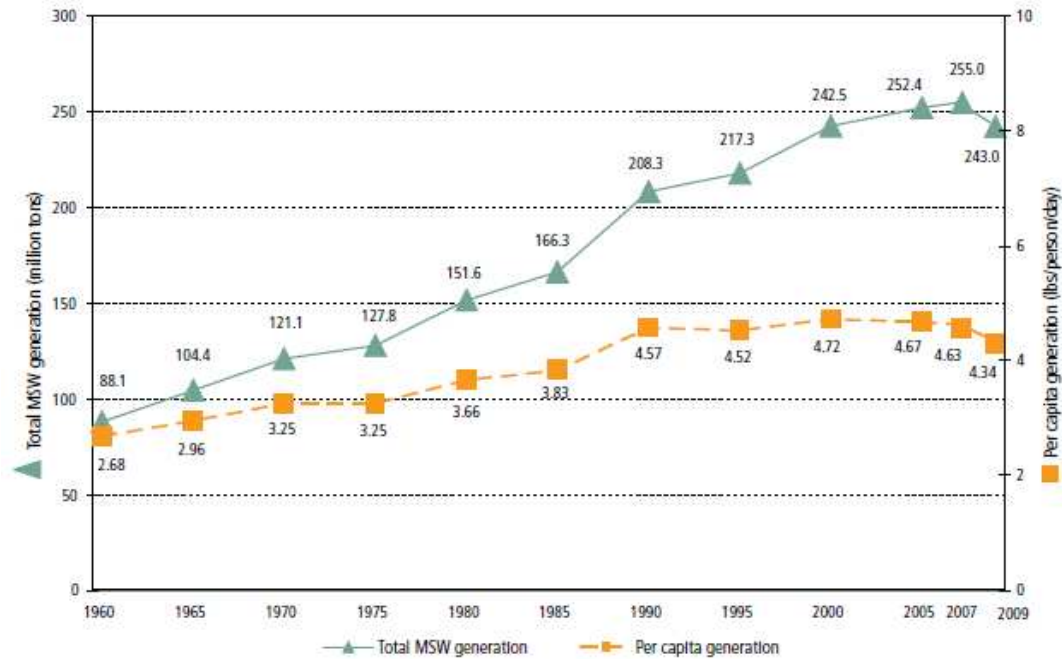
# Municipal Solid Waste and Recycling

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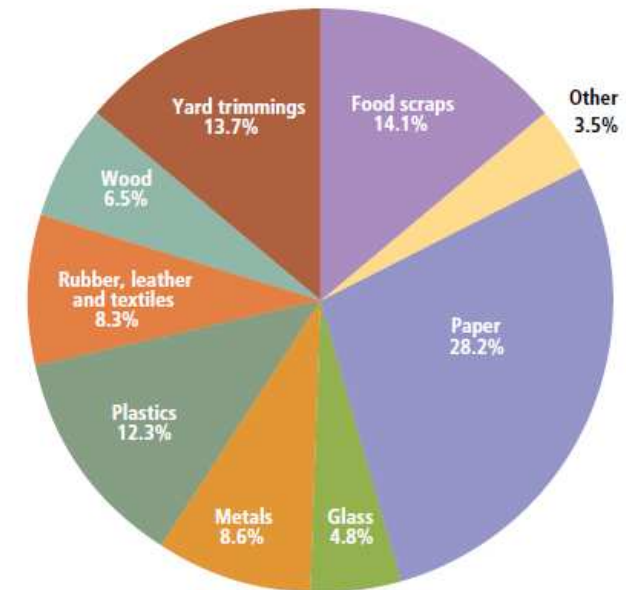
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# Municipal Solid Waste (“MSW”) – Introduction

MSW Generation Rates, 1960 to 2009



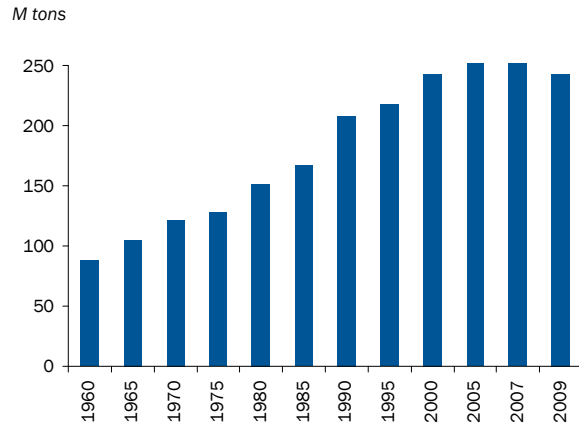
Total MSW Generation (by material), 2009  
243 Million Tons (before recycling)



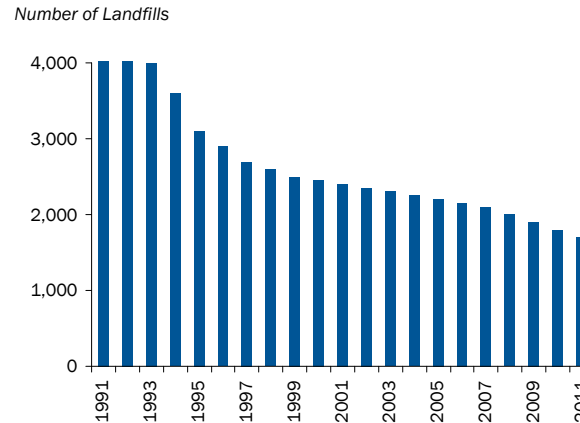
- In 2009, Americans generated ~243 million tons of trash with individual waste generation of 4.34 pounds per person per day
- Residential waste approximately 60% of total MSW and waste from commercial and institutional locations (schools, hospitals, and businesses) approximately 40%.
  - Waste not classified as MSW include construction and demolition debris, automobiles and trucks, land clearing debris, agricultural waste and oil and gas waste (among other items)

# Declining Landfill Capacity

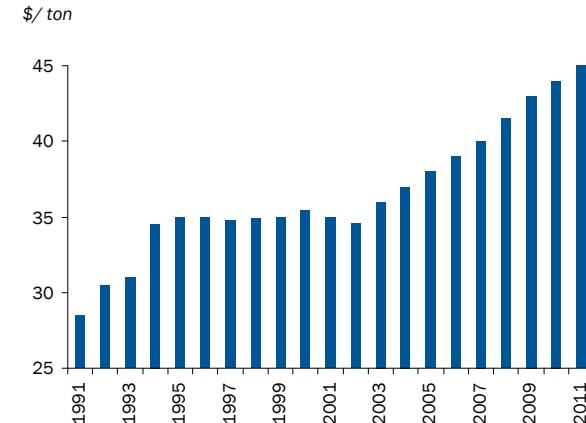
## U.S. MSW Generation Rates



## Active US Landfills Accepting MSW



## Average U.S. Tipping Fees

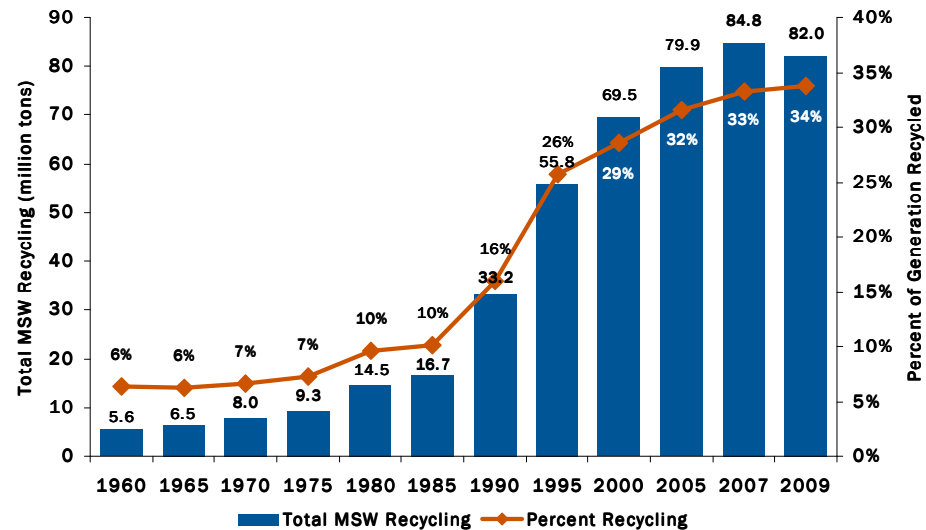


- The growth of landfills is dependent on the permitting procedures and standards of the sanitation department of local governments.
- Decline in the number of active landfills can be attributed to:
  - Landfills reaching their maximum life and total capacity
  - Regulatory standards of Resource Conservation and Recovery Act (RCRA) of 1976 caused many landfills to shut down as a result of non-compliance.
  - Given new regulations and the limited land availability, landfill capacity growth has been limited.
- Major incumbents (e.g. Waste Management, Republic Services/Allied Waste) control 57% of all landfill volumes.

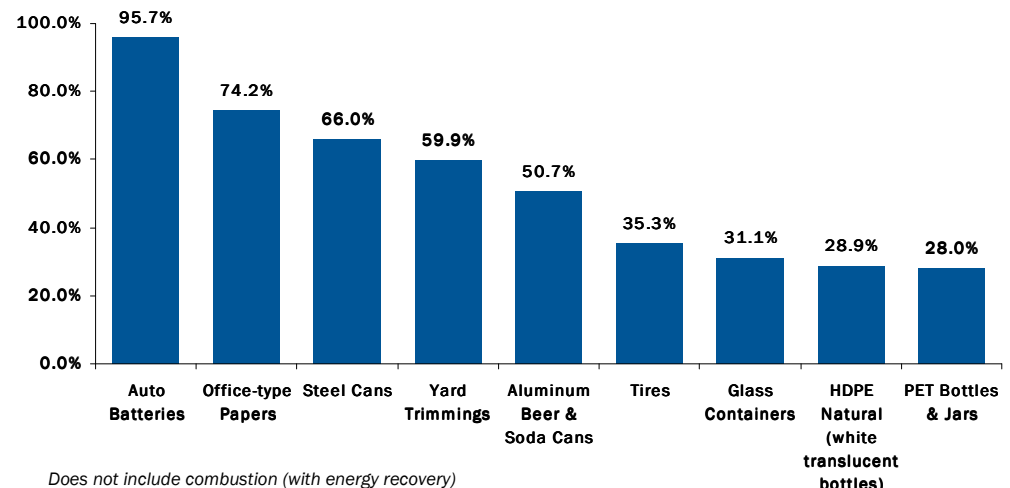
# Growth of Recycling

- Recycling (including composting) recovered 33.8% of MSW generation in 2009
  - Recycled 61 million tons of MSW
  - Composting recovered 21 million tons of waste.
- Approximately 9,000 curbside recycling programs in U.S.
  - Over 70% of U.S. population has access to curbside recycling programs
- Processing performed at material recovery facilities (“MRFs”) and mixed waste processing facilities
  - Most MRFs are low tech – sort by hand
- Recent trends:
  - Single-stream recycling from unsorted waste
  - Increase use of sorting technology such as magnetic pulleys and optical sensors

MSW Recycling Rates, 1960 - 2009



Recycling Rates of Selected Products, 2009



Does not include combustion (with energy recovery)



# Key Recycling Materials

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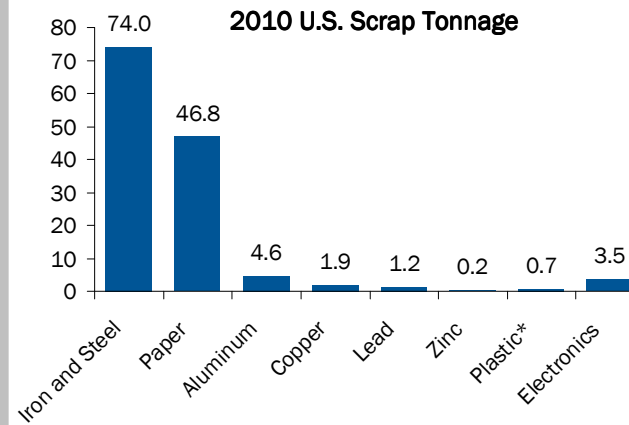
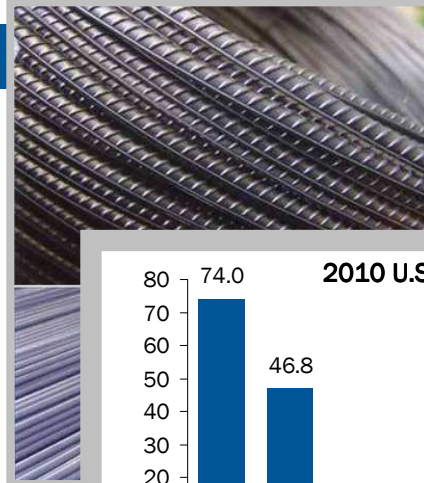
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# Industries Driven by Recycling Have a Vital Economic Impact

Four major categories provide most of the economic activity of the overall recycling industry.

## Ferrous Metals

- 74M tons of steel and iron recycled annually
  - \$60B in sales
- 2009 recycling rate of 103%

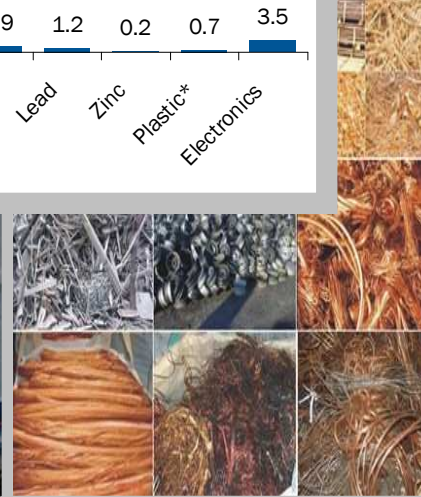


## Paper and Paperboard

- 2010 recycling rate 63.5%, an all-time high
  - 30% in 1990
- 80% of all U.S. papermakers use some recovered paper in their operations

## Plastics

- Explosive growth in demand for plastic bottles
  - Bottled water consumption more than doubled over last decade
- Low overall recycling rate
  - Roughly 20% to 30%
  - Major growth opportunity



## Nonferrous Metals

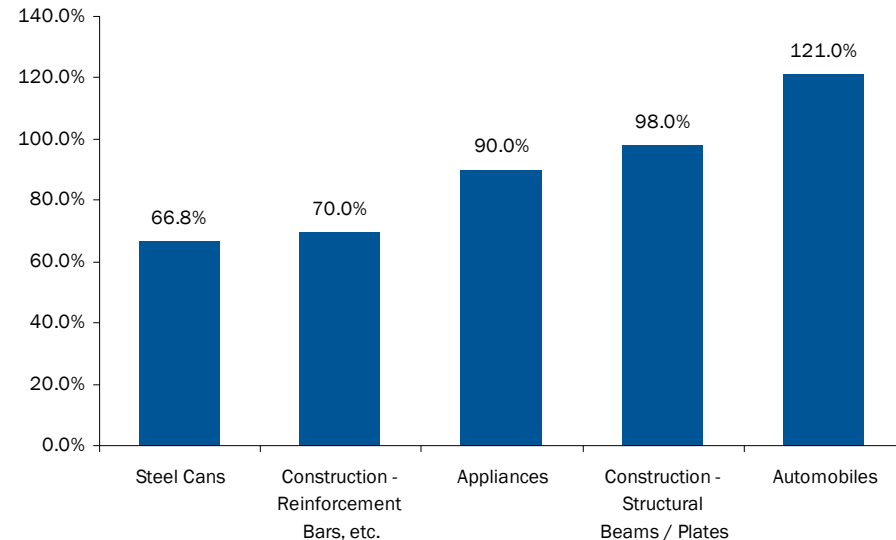
- Includes aluminum, lead, copper, cobalt, zinc, nickel, titanium, chromium and precious metals
- Approximately 8.2M metric tons were recycled in 2009
  - \$28.5B in sales

Note: Plastic bottles only  
Source: ISRI

# Ferrous Metals - The Giants of Recycling

- Ferrous metals (steel and iron) comprise the largest recycling category.
  - Includes steel mills, as well as iron / steel foundries
- 74 million tons of steel and iron recycled annually
  - \$60 billion in revenue
- Recycling rate of 103% in 2009
  - More steel was recovered than used for new steel products
  - 24% increase from 2008
- Driving forces behind the high recovery rate are the significant economic and environmental benefits
  - Typically cheaper to recycle steel than to mine virgin ore and produce new steel
  - Steel recycling industry saves the energy equivalent required to power approximately 20% of U.S. households

## Steel Recycling Rates

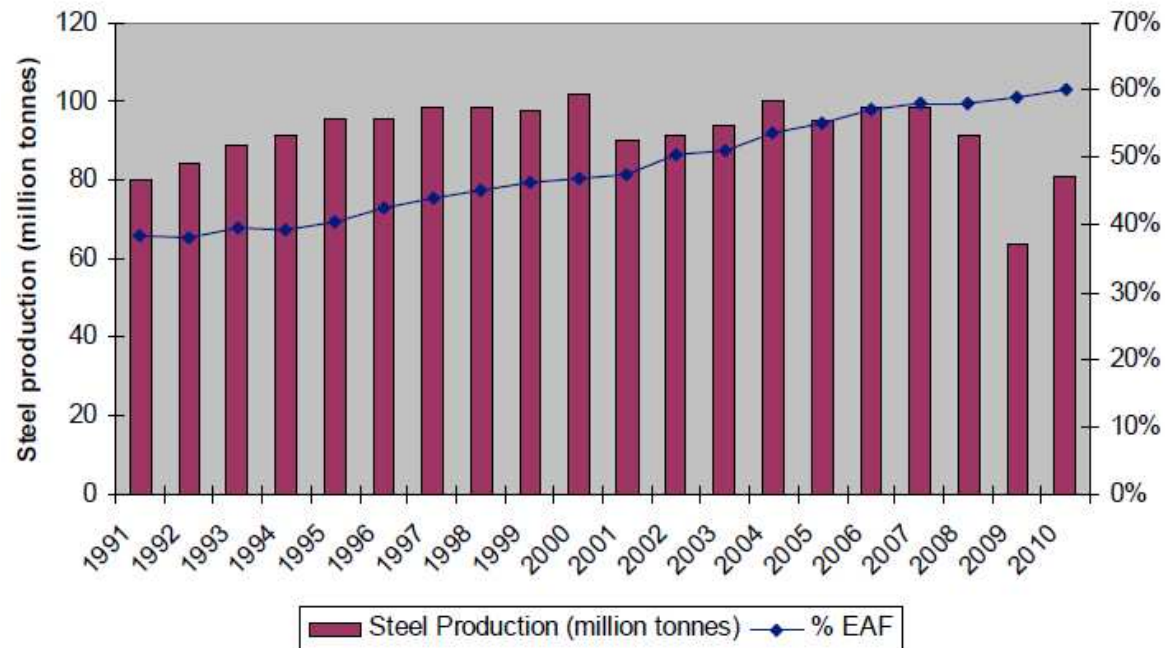


## Interesting Statistics

- Recovery of 1 metric ton of steel from scrap conserves:
  - 2,500 pounds of iron ore
  - 1,400 pounds of coal
  - 120 pounds of limestone
- 2 out of every 3 pounds of new steel are produced from old (recycled) steel

# Ferrous Metals – Rise of Mini-Mills

EAF as % of Total US Steel Production<sup>1</sup>

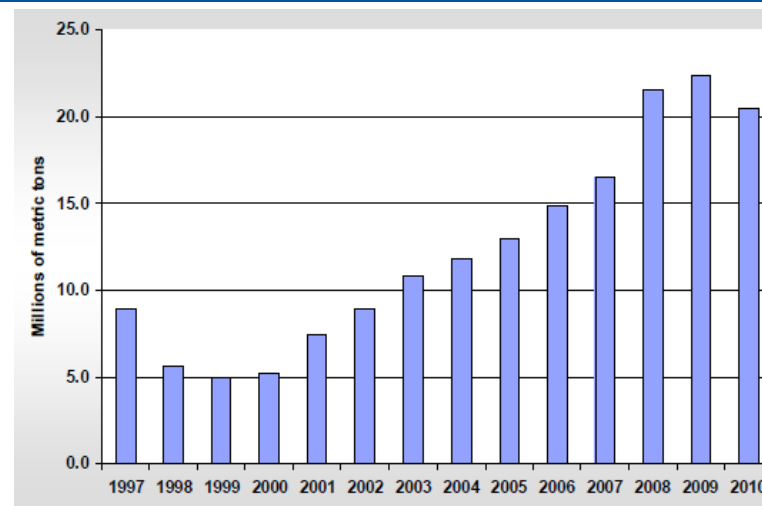


- Significant trend in steel industry over last decade has been the rise of the mini-mill
  - Utilize electric arc furnace (EAF) technology instead of traditional basic oxide furnace (BOF)
  - EAF is 60% of market and BOF 40%
- Steel produced by EAF is generally made from scrap, whereas BOF uses primary feedstock (iron ore and coke)

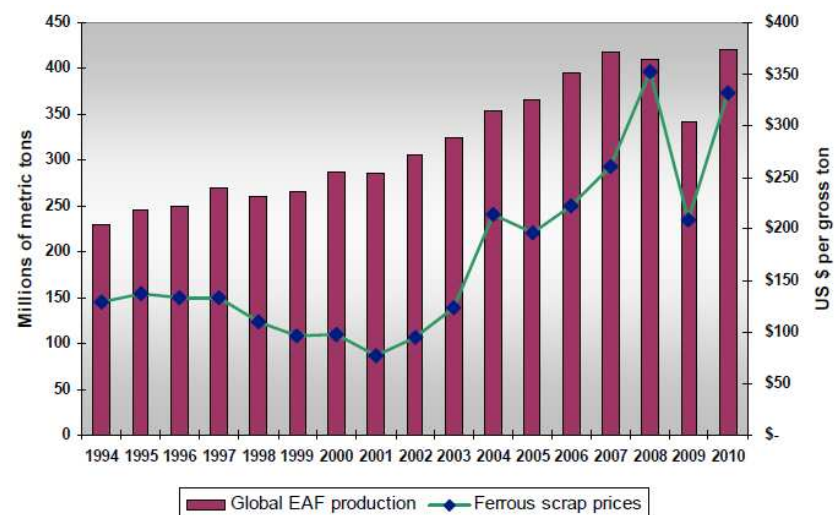
# Ferrous Metals – Scrap Supply Expected to Tighten

- Ferrous scrap exports from the US have more than quadrupled from 1999 to 2010
  - Sharply rising demand from Asia & Middle East
- Steelmaking capacity in non-OECD countries is forecast to grow 18%
  - 1.1B tonnes (2009) to 1.4B tonnes (2012)
- Considerable increase in EAF capacity expected in non-OECD countries over medium term
  - With limited domestic supply of ferrous scrap these countries will need to import feedstock
- While scrap prices will remain volatile, industry dynamics should support scrap pricing
  - Strong overseas demand
  - Limited domestic supplies
  - Growth in domestic steel production

## Ferrous Scrap Exports Have Trended Sharply Higher<sup>1</sup>



## World EAF Steel Production vs. Ferrous Scrap Prices<sup>2</sup>



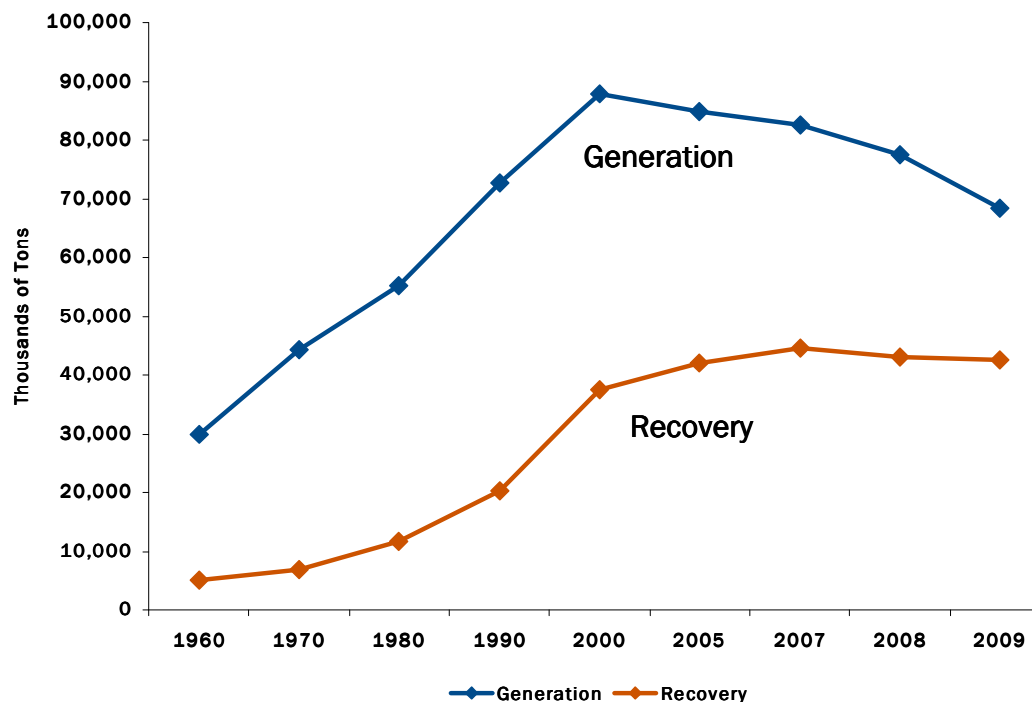
<sup>1</sup> USGC and ITC.

<sup>2</sup> Worldsteel Association, AMM and Canaccord Genuity Research.

# Paper and Paperboard

- In contrast to metal, paper and forest products are renewable resources
- However, significant environmental benefits to recycling paper beyond just conserving natural resources
  - Reduce landfill usage (a major source of methane gas that leads to global warming)
  - Reduced fossil fuel consumption compared with the production of new paper from virgin pulp
- >36% of the raw material used to make all new paper products in the U.S. comes from recycled paper
- Nearly 80% of all U.S. papermakers use some recovered paper in their operations
  - Makes everything from newspaper to paperboard packaging

**Paper & Paperboard Generation and Recovery, 1960-2009<sup>1</sup>**

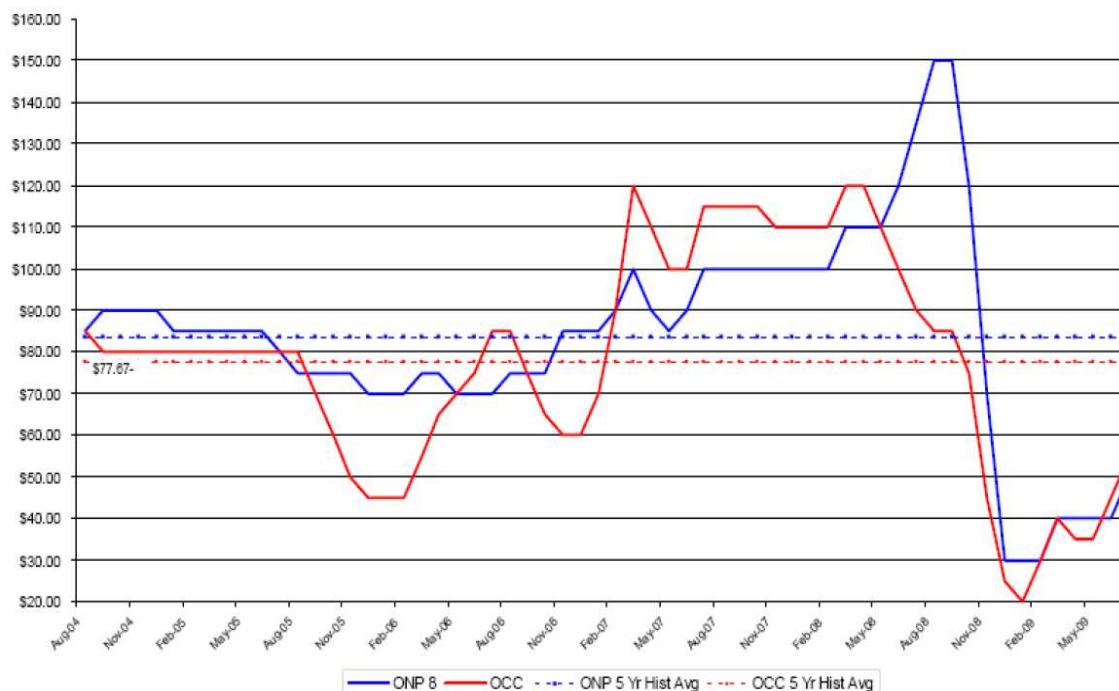


- Approximately 45 million tons of paper products are recycled per year
- In 2010, the paper recycling rate in the U.S. was 63.5%, an all-time high
  - The paper recycling rate was just 30% in 1990
- U.S. papermakers invested \$10 billion in new recycling capacity in the 1990s

# Paper and Paperboard

- Economics of paper recycling dependent upon commodity prices
  - Namely of old newspaper (ONP) and old corrugated cardboard (OCC).
- Between 2006 and 2008, ONP and OCC prices increased from their lows of \$70/ton and \$45/ton to \$150/ton and \$120/ton, respectively.
- With decline in economic activity, prices of ONP and OCC declined, causing recycling operations to become less profitable,
- ONP and OCC pricing trends have begun to show signs of a reversal from their January 2009 lows.
  - Rebound in commodity prices should translate to improved recycling profitability.

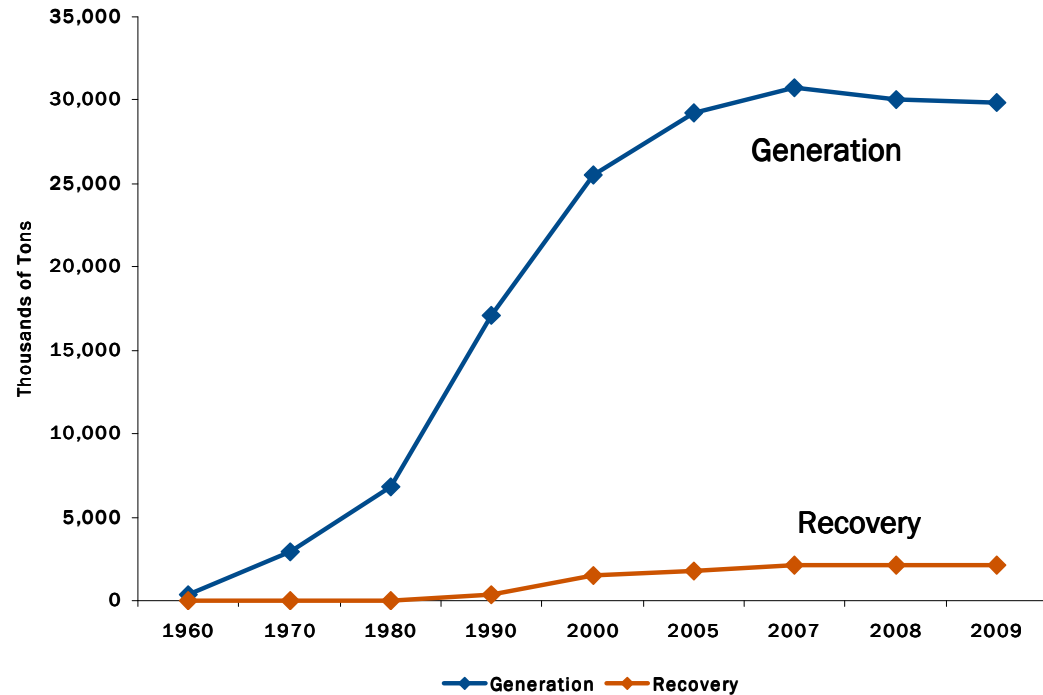
Old Newspaper (ONP) & Old Corrugated Cardboard (OCC) Prices<sup>1</sup>



# The Plastics Problem

- Although significant demand for recycled plastic, there is a “broken” infrastructure between consumers and plastics recyclers
  - Most bottles consumed outside home, where recycling opportunities limited
  - Consumer confusion about what types of plastic can be recycled
- Major trends in the plastics industry - explosive growth in demand for plastic bottles, specifically for water
  - Most consumers have not recycled these bottles
- Significant environmental consequences
  - Making plastic bottles with just 10% post-consumer recycled content in 2004 would have saved the equivalent of:
    - 1.6M barrels of crude oil
    - 72M gallons of gasoline
    - Enough energy to power 270K homes

Plastics Generation and Recovery, 1960-2009<sup>1</sup>

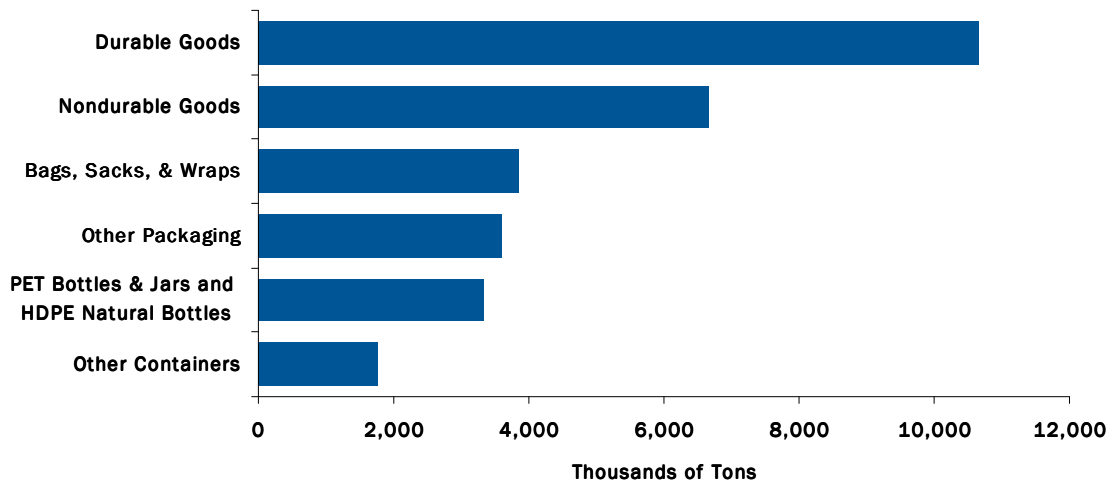


- The plastics sector is one of the largest recycling category
  - Approximately 2 million tons of material recycled each year
- Could be a substantially larger industry if it were not for the billions of pounds of recyclable plastic landfilled every year

<sup>1</sup> EPA MSW 2009 Facts and Figures Study.

# The Plastics Problem

Plastics Products Generated in MSW, 2009<sup>1</sup>



PET Bottle Recycling<sup>2</sup>

Year	Total U.S. Bottles Collected <i>M lbs</i>	Bottles on U.S. Shelves <i>M lbs</i>	Gross Recycling Rate %
1996	697	2,198	31.7%
1997	691	2,551	27.1%
1998	745	3,006	24.8%
1999	771	3,250	23.7%
2000	769	3,445	22.3%
2001	834	3,768	22.1%
2002	797	4,007	19.9%
2003	841	4,292	19.6%
2004	1,003	4,637	21.6%
2005	1,170	5,075	23.1%
2006	1,272	5,424	23.5%
2007	1,396	5,683	24.6%
2008	1,451	5,366	27.0%
2009	1,444	5,149	28.0%

- Containers and packaging category (bags, sacks, and wraps, other packaging, PET bottles, jars and HDPE natural bottles, and other containers) has the most plastic tonnage at 12.5 million tons in 2009
- In durable goods, plastics are found in appliances, furniture, casings of lead-acid batteries, and other products.
- Overall recovery of plastics for recycling is relatively small 7% percent of plastics generation
- Recovery of some plastic containers is significant - PET bottles and jars were recovered at a rate of 28%

<sup>1</sup> EPA MSW 2009 Facts and Figures Study.

<sup>2</sup> National Association for PET Container Resources (NAPCOR)

# Nonferrous Metals

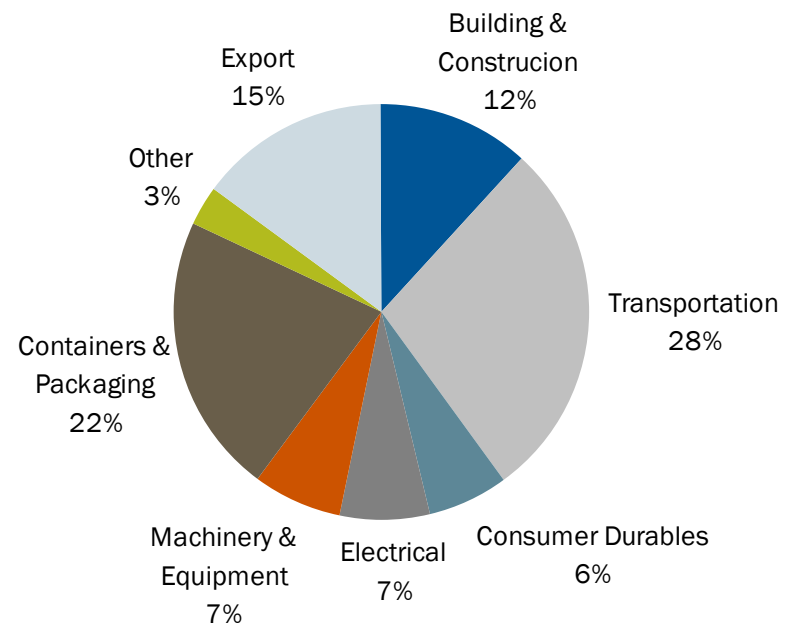
- Non-ferrous metals are any metals other than iron or steel
  - Include aluminum, copper, lead, zinc, nickel, titanium, cobalt, chromium and precious metals such as silver and gold
- Approximately 8.2M metric tons were recycled in 2009
  - 34% recycle rate
  - Generated an estimated \$28.5B in sales
- In 2010, the U.S. scrap industry processed for domestic use or export:
  - 4.6M metric tons of aluminum
  - 2M tons of nickel / stainless steel
  - 1.2M metric tons of lead
  - 160K metric tons of zinc
  - 1.9M metric tons of copper

Three megatrends (globalization, urbanization, and changing demographics) will drive sustained growth for the nonferrous metals market

# Nonferrous Metals – Aluminum

- Within the non-ferrous metals industry, the most versatile metal is aluminum
- 54% of aluminum cans produced and over 90% of aluminum used in the automotive market were recycled in 2008
  - Since 1888, approximately 75% of all aluminum produced is still in use today
- Recycled aluminum provides extraordinary energy savings compared with the production of primary (virgin) aluminum
  - Saves almost 95% of the energy needed to produce aluminum from bauxite ore, its original source
  - Throwing away 21 aluminum cans is the equivalent of throwing away approximately a gallon of gasoline

Aluminum Usage by Application



“Aluminum helps subsidize the cost of recycling other less valuable materials in many materials recovery facilities” – Aluminum Association

# What's Ahead for the Recycling Industry – Even More Growth!

Over the past four decades, the Recycling industry in the U.S. has evolved from a fringe environmental movement to a major economic force. As the industry matures into its fifth decade, the future of Recycling is being shaped by several major trends that will lead to continued growth.

Growth of aluminum content, particularly recycled aluminum, in automobiles



Consolidation of scrap suppliers, partly in response to consolidation within the steel industry



Evolution toward single-stream recycling

Growing demand from China and India, two major economies that depend on the U.S. Recycling industry for raw materials



Hyper-growth of “e-cycling”

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