

Recycling Generation from Alcohol Consumption

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Abstract

A significant portion of waste on the Beloit College Campus is created by consumption of alcohol. Drinks produce different amounts of waste per standard drink of alcohol, depending on the size and material used for the container. The aim of my project is to determine the most environmentally friendly drink based on the amount of waste per standard drink. I weighed glass bottles, plastic bottles, and aluminum cans and compared the findings to the amount of alcohol in each standard drink of alcoholic beverages. Using the definition of grams of waste per standard drink, beer in a 12 oz glass bottle is the most environmentally unfriendly alcoholic drink because approximately 216 grams (g) of glass are used for each standard drink. The most environmentally friendly alcoholic drink from the perspective of waste generated per standard drink is hard liquor from a plastic bottle, as 2.28 g of plastic are used. The amounts of energy consumed to recycle alcohol containers is presented. Keeping these issues in mind, we will then discuss the role Beloit College students play in reducing and recycling waste.

Introduction

Nearly each activity you participate in generates waste. To support resource demands and the resulting lifestyles that produce solid waste, virgin materials are being extracted from the earth, using significant amounts of time and energy and altering landscapes and ecosystems (Young and Sachs 1994). The past 40 years have shown a 161% increase in the total amount of municipal solid waste (MSW) generated; the amount generated per US citizen has increased 70% (EPA 2007). In 2005, residents, businesses, and institutions generated more than 245 million tons of MSW, which is about 4.5 pounds of waste per U.S. citizen per day, broken down by waste type in Figure 1 (EPA 2007). Thirty-two percent of this is recovered and recycled or composted, 14% is incinerated, and 54% is put into landfills (EPA 2007). "In 1996, recycling of solid waste in the United States prevented the release of 33 million tons of carbon into the air—roughly the amount emitted annually by 25 million cars" (EPA 2007). The consumption of alcohol generates waste. One 12 ounce standard drink of beer is packaged in an aluminum can or glass bottle. Hard liquor is contained in glass or plastic bottles of 750 milliliters (ml) or 1750 ml. The 1750 ml bottle of hard liquor contains 39 standard drinks. Wine is contained in glass bottles of 750 ml, which contains 5 standard drinks. A 40 oz glass bottle containing malt liquor holds 4.5 standard drinks. Unable to be reused, alcohol containers are recycled. For this project, we will be looking at Beloit College as a generator of waste from alcohol consumption. We will begin by calculating the number of standard drinks in alcohol containers commonly consumed on campus, calculating the weight, and then looking at the energy saved by recycling. We can then start discussing what drinks cause the least environmental impact and the role that Beloit College students can play.

Method

To determine the amount of waste generated when each alcohol container was consumed, I collected containers from recycling bins on campus, noted their composition, and measured weight. The selection of containers was based on the most common containers I could find, corresponding with what I know Beloit College students drink.

The containers were as follows:

- 12 oz aluminum beer can
- 12 oz glass beer bottle
- 1183 oz glass malt liquor bottle
- 750 ml glass wine bottle
- 1750 ml glass hard liquor bottle
- 1750 ml plastic hard liquor bottle

Using research done by Richard Heskey 2007, I was able to determine the number of standard drinks in each of the containers I found. See Table 1. With these numbers, I was able to determine the amount of waste created per standard drink of the alcohol type.

Using books and legitimate website resources on recycling practices, I compiled information on the efficiency of recycling compared to the harvesting of virgin materials from the Earth. Results from the Beloit College 2005 CORE Drug and Alcohol Survey provided me with the percentage of Beloit College students who reported consuming alcohol. Rock Disposal, the contractor that disposes of Beloit College's waste, provided me with the amounts of waste generated on campus.

Finally, I looked at what it means to consume alcoholic beverages with attention to being environmentally friendly, taking into consideration the results from the recycling research.

Table 1: One Standard Drink

One Standard Drink =1.2 tablespoons or .6 ounces of pure alcohol (ethanol)	
Type of Alcohol	Standard Drink in ounces
Hard Liquor: 40% alcohol/80-proof	1.5
Table Wine: 12 % alcohol	5
Beer: 5% alcohol	12
Malt Liquor: 5% alcohol	9

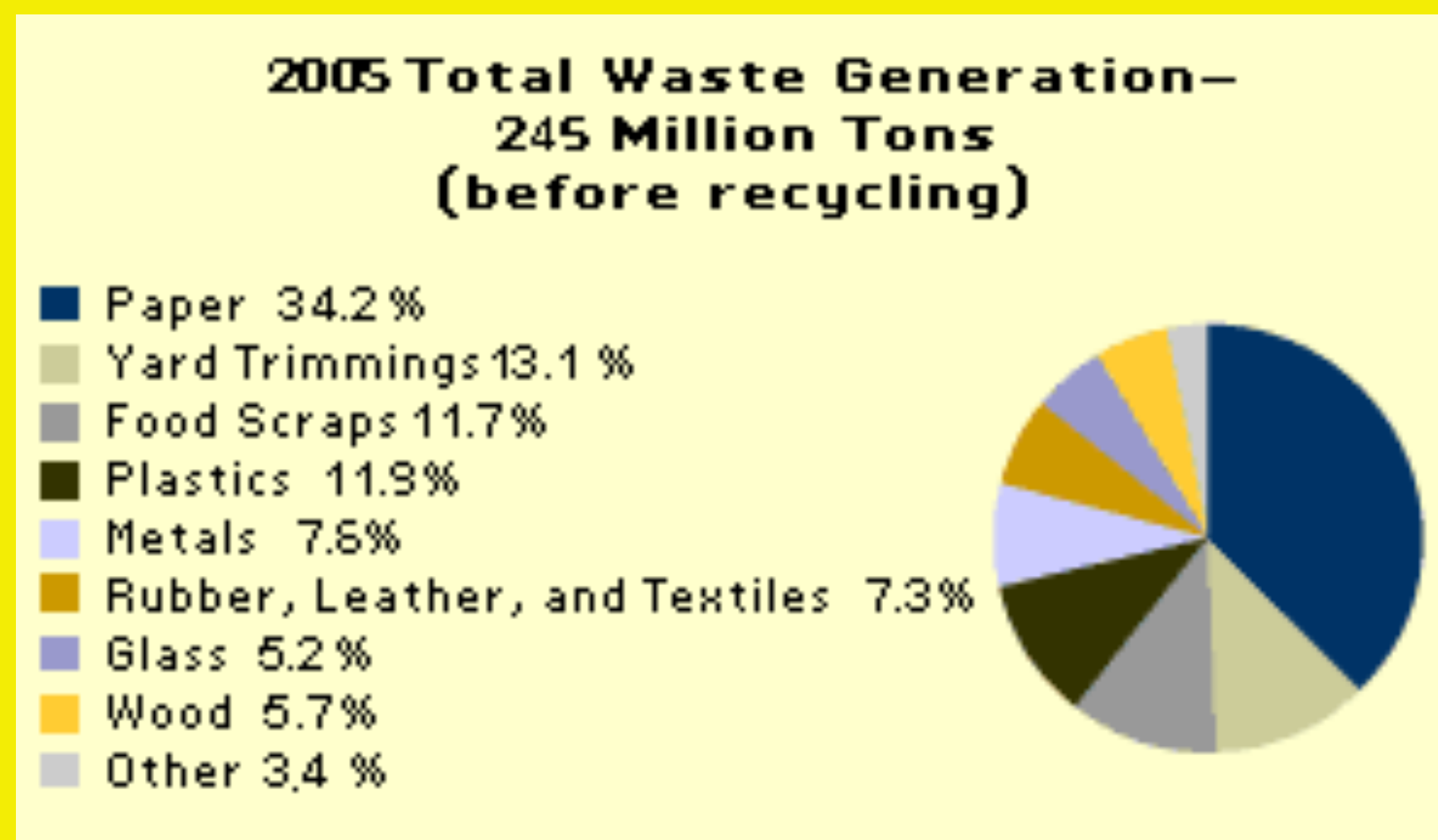
Source: Data compiled by Richard Heskey, 2007.

Table 2: Waste produced per serving size for commonly consumed alcoholic beverages

Type of Alcohol	Composition	Volume of Liquid per Container (ml)	Serving Size (oz)	Serving Size (ml)	Servings per bottle	Mass of Empty Container (g)	Mass of composition per serving size (g/serving size)
Beer	Aluminum	355	12	355	1	17	17.00
Beer	Glass	355	12	355	1	216	216.00
Malt Liquor	Glass	1183	9	266	4.5	527	117.11
Wine	Glass	750	5	148	5	487	97.40
Hard Liquor	Glass	1750	1.5	44	39	1121	28.74
Hard Liquor	Plastic	1750	1.5	44	39	91	2.33

Note: It is difficult to estimate the number of standard drinks in a mixed drink made with hard liquor. Depending on factors such as the type of spirits and the recipe, a mixed drink can contain from one to three or more standard drinks.

Figure 1



Taken from: EPA 2007

Figure 2



Taken from: EPA 2007

Table 3

<p><i>Glass</i></p> <ul style="list-style-type: none"> •Every glass bottle that is recycled can save enough energy to power a 100-watt light bulb for four hours (Recycling Revolution 2007). •It takes 40% less energy to recycle glass than it does to make it new from raw materials (Recycling Revolution 2007)
<p><i>Aluminum Cans</i></p> <ul style="list-style-type: none"> •50% of each aluminum can purchased from a vendor is made from recycled aluminum (Strong, 1997). •Recycling one aluminum can saves the equivalent of enough energy to run a television set for three hours, the equivalent of a half a gallon of gasoline (Strong, 1997). •It takes 95% less energy to recycle aluminum than it does to make it from raw materials (Recycling Revolution 2007).
<p><i>Plastic</i></p> <ul style="list-style-type: none"> •Plastics take 100-200 years to break down in landfills (Strong 2007). •Americans throw away 2.5 million plastic bottles every hour (Strong, 1997). •It takes 70% less energy to recycle plastics than it does to make it from raw materials (Recycling Revolution 2007).

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Results

Waste Generation

Table 2 shows the weight of alcohol containers that I collected on the Beloit College campus to determine the amount of waste generated by consuming one standard drink of alcohol. Beloit College generated 401 tons of trash, 34 tons of cardboard and paper, 115 tons of yard waste, and 416 cubic yards of co-mingled recyclables from December 2005-December 2006 (Rock Disposal 2007). The consumption of alcohol contributes to the amount of co-mingled recyclable waste generated.

According to results from the 2005 CORE Survey taken by 840 Beloit College students, 75% responded that they had consumed alcohol in the past 30 days (CORE Survey 2005). The same survey reported that the average number of drinks consumed per week was ~6 (CORE Survey 2005).

Recycling

Glass, aluminum, and plastic containers (referred to as co-mingle) are taken to John's

Recycling plant in Milton, Wisconsin.

According to the EPA, 2007, recycling:

- Prevents the emission of greenhouse gases and water pollutants
- Saves energy
- Supplies valuable raw materials to industry
- Creates jobs
- Stimulates the development of greener technologies
- Conserves resources for our children's future
- Reduces the need for new landfills and combustors

See Table 3 to see the amount of energy saved through the recycling of glass, aluminum, and plastics. These numbers indicate that recycling aluminum cans saves the most energy, followed by plastic, then glass when compared to extracting virgin materials from the Earth. Reduction will be discussed in relation to Beloit College.

Discussion

Based on the amount of waste generated by alcohol consumption, we are able to determine how much waste is generated per standard drink. From least to greatest:

- Hard liquor in plastic containers
- Beer in aluminum cans
- Hard liquor in glass containers
- Wine in glass containers
- Malt Liquor in glass containers
- Beer in glass bottles

We also found that it takes 95% less energy to recycle aluminum, 70% less energy to recycle plastics, and 40% less energy to recycle glass than it does to make it from raw materials (Recycling Revolution 2007). This leaves us with hard liquor from a plastic container and beer from an aluminum can being the most efficient use of our resources. The most inefficient use of resources is achieved by consuming beer and malt liquor in glass bottles.

What can we do about our waste problem on campus? In 1989, the EPA released "The Solid Waste Dilemma: An Agenda for Action" which outlines the 3 R's waste management strategy: Reduce, Reuse, and Recycle (EPA 1989), noted in Figure 2. Alcohol consumption on our campus contributes significantly to the accumulation of the annual 416 cubic yards of co-mingled recyclables.

Each person reducing waste by consciously purchasing products with less packaging saves **1000 pounds of carbon dioxide** from entering our atmosphere (Recycling Revolution 2007). Beloit College has had a recycling program on campus since it was started by students during the 1994-1995 school year (Physical Plant 2007). In 1996, physical plant accepted the duties of collecting recycling (Physical Plant 2007). Recycling helps to address larger environmental issues that are important in today's changing world, listed by the EPA, 2007:

- Reduces the need for land-filling and incineration.
- Saves energy and prevents pollution caused by the extraction and processing of virgin materials and the manufacture of products using virgin materials.
- Decreases emissions of greenhouse gases that contribute to global climate change.
- Conserves natural resources such as timber, water, and minerals.
- Helps sustain the environment for future generations.
- Protects and expands U.S. manufacturing jobs and increases U.S. competitiveness in the global marketplace.

Conclusion

•Paying attention to the amount of waste you create by consuming alcohol is a quick and easy way for you to help the environment! The EPA first encourages the **reduction** of waste generation followed by **recycling practices**. When it comes down to your next alcohol purchase, consider purchasing a container with more standard drinks per bottle. Next time you consume alcohol, think about the resources needed to produce your drink and also where the waste will be going. Put your recyclables into the correct recycling bin to make sure that it will be taken to the recycling facility.

•Tell a friend why it is important to reduce and recycle! Healthy environments will lead to a rise in health, standard of living, and thereby increasing the ability of individuals to focus on other aspects of nutritionally satisfying lifestyles. Who knew the picking of your weekend alcoholic drink could be so important!