Embodied Energy of Beverage Containers

This is the Year for the Bottle Bill

Cumberland Sustainable **October 2007**

TN Rates: According to USDA and industry sales figures, Tennesseans consume 3.9 billion beverages a year:

1. 52% soda 30% beer 7% juices 7% water 3% sports drinks

2. Packaging types:
   54% aluminum cans 26% plastic bottles (24% PET, 2% HDPE) 18% glass bottles

3. Tennesseans recycle less than one-fourth (24.5%) of beverage containers:
   35% aluminum 10-11% plastic 10% glass

ALUMINUM CANS

Aluminum Can Sales and Wasting Facts

- The average American bought 351 aluminum cans last year—twice as in 1980.
- Between 1990 and 2000, Americans wasted a total of 7.1 million tons of cans: enough to manufacture 316,000 Boeing 737 airplanes.
- Americans wasted more than twice as many cans in the year 2001 as in 1981, and eight times more than in 1972.
- The quantity of cans wasted in 2001—759,625 tons—was equivalent to the entire annual production capacity of four major aluminum smelters in the Pacific Northwest.
- The quantity of aluminum cans wasted in the year 2001 was greater than the amount used nationally for trucks, buses, bridges, street and highway applications combined.
- Laid end-to-end, the 50.7 billion cans wasted in 2001 would encircle the Earth 153 times.

Aluminum Cans Energy and GHG Facts:

- The energy required to replace the aluminum cans wasted in 2001 was equivalent to 16 million barrels of crude oil: a 21% increase in energy consumption since 1991.
- Replacing one wasted can requires about 0.5 kWh of electricity: enough to light a 100-watt bulb for 5 hours, or to power an average laptop computer for 11 hours.
- For every six-pack of beer or soda not recycled, the energy equivalent of one beverage can full of gasoline is squandered.
- More than two million tons of coal were burned to generate the thermal and electric energy required to replace just half of the cans wasted in the United States last year.
- For each ton of cans wasted, 4.08 tons of greenhouse gasses are generated through replacement production.
- The energy wasted in the year 2001 by not recycling aluminum cans could meet the electricity needs of all homes in Chicago, Dallas, Detroit, San Francisco, and Seattle.
- Over two hundred thousand people have been relocated to make way for hydroelectric reservoirs in nine aluminum-producing countries.
- The difference in energy use between virgin aluminum and recycled aluminum is very large. Producing recycled aluminum requires 95% less energy than producing

aluminum from bauxite, an aluminum ore. In practice, energy savings achieved are closer to 75%.

Aluminum Recycling Facts

- After peaking at 65% in 1992, the aluminum beverage can recycling rate dropped to 49.2% in the year 2001—a rate that had already been exceeded twenty years ago. **TN recycles at the rate of 35%.**
- In 2001, Americans consumed 9 billion more aluminum beverage cans than they did in 1991, yet recycled 6 billion fewer.
- The beverage container recycling rate in the ten U.S. states with bottle bills is above 80%; 3-4 times the rate in non-bottle bill states.
- In Michigan, where the per container deposit is 10¢, the aluminum can recycling rate is 95%, compared to the national rate of only 49.2%.

PLASTIC BEVERAGE CONTAINERS

Mixed Plastics: Producing new plastic from recycled material theoretically could use only two-thirds of the energy required for manufacturing them from raw materials. Yet, at the present time, only a small percentage of plastics are recycled. This is because there are virtually hundreds of different types of plastics, and it is difficult to separate them. Plastics can have very different physical and chemical properties. Mixing of plastics during reprocessing can therefore weaken the recovered plastic, making it less appealing to manufacturers, especially when low-cost virgin resin is available.

Down-Cycling: Even if the plastic is sorted by type, unlike glass, aluminum, and steel which can be recycled over and over again, plastic cannot. In other words, plastic is "down-cycled": e.g., soft drink containers are made into new products, which require a lower grade of plastic The park benches cannot be made into milk jugs again or into new benches. Also, most recycled plastic is used to produce items, such as polyester and plastic lumber, that are not themselves recyclable.

Plastic Energy Consumption

- Producing the bottles for American consumption required the equivalent of more than 17 million barrels of oil, not including the energy for transportation
- According to the plastics manufacturing industry, it takes around 3.4 megajoules of energy to make a typical one-liter plastic bottle, cap, and packaging.
- The manufacture of every ton of PET produces around 3 tons of carbon dioxide (CO2).
- The United States goes through 2.5 million plastic bottles every hour and only a small percentage is recycled. **About 10% is recycled in TN.**
- Enough plastic bottles are thrown away each year in the United States to circle the earth four times.

For More Information: TN Bottle Bill Project: www.tnbottlebill.org.

Louise Gorenflo prepared this fact sheet to encourage civic involvement in community problem-solving. Contributions made to The Learning Community are tax deductible. You may send your contributions to or request information from The Learning Community at 184 Hood Drive, Crossville TN 38555 (484-2633.)