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Methodological Brief:
The 2008 Beverage Market Data Analysis (BMDA) using 2006 data

INTRODUCTION

The Container Recycling Institute's 2008 Beverage Market Data Analysis (BMDA) is an analysis of beverage sales and recycling data for the year 2006, for beverage types and for packaging materials. Sales data are presented for all carbonated and non-carbonated beverages (excluding dairy, champagne, and wine coolers); for all traditional materials (metal, plastic, and glass), and for what we call non-traditional packaging: aseptic containers, gable-top paper cartons, and foil pouches. Recycling and environmental benefits data are presented for traditional materials only. BMDAs for all 50 states and the United States are available free of charge from the Container Recycling Institute to interested parties, by contacting Betty McLaughlin <recycle@container-recycling.org>. If you disseminate this information in any manner, we request that you credit CRI . The below pages provide a guide to what is contained in the tabs (worksheets) within each Excel file (workbook), then describe the sources and methodology used in generating the Beverage Market Data Analysis.

GUIDE TO READING AND PRINTING TABLES IN EACH OF THE TABS:

Tab "1.GalTtl" provides sales data in packaged gallons, gallons per capita, units, and units per capita for all the **beverage types**, as follows: carbonated beverages (soft drinks, beer, and sparkling water); non-carbonated non-alcoholic beverages (domestic non-sparkling water, sports drinks, fruit beverages, ready-to-drink tea, and energy drinks); and non-carbonated alcoholic beverages (wine and spirits). The BMDA excludes milk, wine coolers, champagne and sparkling wine, and frozen fruit concentrates. Average unit size in fluid ounces is also provided. Print area is pre-set, but you may want to use your "print preview" command and adjust accordingly prior to printing.

Tab "2a.UnitTtl" provides sales data in billions of units for all the above beverages, in the following packaging types: traditional containers (aluminum cans, steel cans, PET plastic bottles, HDPE plastic bottles, and glass bottles) and non-traditional containers (gable-top cartons, aseptic boxes, and foil pouches). Print area is pre-set, but you may want to use your "print preview" command and adjust accordingly prior to printing.

Tab "3a. PkgMktShr" provides packaging market share for each beverage type listed above, by percent. Totals for each row add up to 100%. Print area is pre-set, but you may want to use your "print preview" command and adjust accordingly prior to printing.

Tab "3b.BevMktShr" provides beverage market share for each packaging type listed above, by percent. Totals for each column add up to 100%. Print area is pre-set, but you may want to use your "print preview" command and adjust accordingly prior to printing.

Tab "3c.Pkg&BevMktShr" provides beverage and package market share for the entire beverage market, by percent. The sum of all the cells is 100%, in the cell in the last column of the last row.

Print area is pre-set, but you may want to use your "print preview" command and adjust accordingly prior to printing.

Tab 4. "Trad'lMatsSum" is a summary of the sales data (in billions of units) for traditional materials only. Summary per capita sales numbers, and summary market share numbers (in percent) are also provided on the far right column, and on the last row. Print area is pre-set, but you may want to use your "print preview" command and adjust accordingly prior to printing.

Tab "5.Recycling & Wasting" is organized as follows:

- **Block 1**: **SALES**: The first block of tables (running from top to bottom) on the far left provides sales data for traditional beverage containers (all beverage types) in millions of units, below that in units per capita, below that in tons, and finally in millions of lbs.

- **Block 2: EXISTING RECYCLING**: The second block of tables shows the amount of beverage containers recycled for traditional beverage containers (all beverage types), expressed in millions of units, units per capita, tons, and millions of lbs. The bottom two tables show the amount of energy savings and greenhouse gas avoidance from these recycling levels, respectively. **Note** that the recycling rates used in deriving these figures are shown. For each of the 50 states, the recycling rates used are linked to a tab called "**Modifiable rates**." The user has the option of changing the recycling rates in that tab, and all the recycling and wasting values will update automatically. If you want to re-instate the values that were originally in the cells when you received the BMDA, simply re-type what's shown in the "screen shot" into the modifiable cells. Instructions are shown within the state files.

- **Block 3: EXISTING WASTING**: The third block of tables shows the amount of beverage containers wasted (not recycled) for traditional beverage containers (all beverage types), expressed in millions of units, units per capita, tons, and millions of lbs. Wasting is sales minus existing recycling. The bottom two tables show the amount of energy required to replace these wasted containers with new containers made entirely from virgin materials, and the greenhouse gas emissions that result from that replacement production.

- **Block 4: HYPOTHETICAL RECYCLING W/UBB**: The fourth block of tables shows the amount of material that could be recycled with a container deposit system that covers both carbonated and non-carbonated beverages (an "updated bottle bill" or UBB). For the United States as a whole, a dime deposit is assumed, with an 85% recycling rate across the board. For the 50 states individually, a 75% recycling rate was used (with the exception of some existing deposit states, as noted within the files[1]). The rationale for using this rate is that 9 of the 11 existing deposit states already have a nickel deposit, and achieve recycling rates roughly averaging 75%; if legislation were to be crafted at the federal level, a dime deposit might be easier to institute nationwide than by attempting to do it piecemeal. The recycling rates are modifiable; notes within the first table in Block 4 give instructions for modification; all subsequent tabs will update automatically. Hypothetical quantities recycled are expressed in millions of units, units per capita, tons, and millions of lbs. The bottom two tables show

[1] Current recycling rate estimates were used in Iowa, Maine, Massachusetts, Michigan, and Oregon.

the amount of energy that would be saved, and the greenhouse gas emissions that would be avoided, if these recycling rates were achieved.

- **Block 5: ADDITIONAL RECYCLING = ACTUAL GAINS: HYPOTHETICAL RECYCLING MINUS EXISTING RECYCLING:** The fifth block of tables shows the amount of **additional** material that could be recycled with a container deposit system that covered both carbonated and non-carbonated beverages (an "updated bottle bill" or UBB)**.** Quantities shown (expressed in millions of units, units per capita, tons, and millions of lbs) are the **additional** amounts (***over and above existing recycling quantities)*** that could be recovered with an updated bottle bill. The bottom two tables show the amount of energy that could be saved (over and above existing energy savings at existing recycling rates), and the greenhouse gas emissions that could be avoided (over and above existing emissions avoidance at existing recycling rates), if these recycling rates were achieved.

- **Block 6: DEPOSITS INITIATED (ESTIMATED):** The sixth block contains two tables. The first is the amount of deposit money that would be initiated (paid by grocers, retailers and other resellers to the beverage distributor) if a nickel deposit were placed on all the beverages sold in that state (based on the first table in Block 1). The second table shows deposits initiated if a dime deposit were in place. All beverages and all traditional container types are displayed, so that decisionmakers can evaluate whether to include various types of beverages and packaging materials.

- **Block 7: UNCLAIMED DEPOSITS (ESTIMATED):** The seventh block contains two tables. The first is the amount of deposit money that would be unclaimed (not redeemed by the consumer for refund) if a nickel deposit were placed on all the beverages sold in that state (based on the first table in Block 1), assuming an across-the-board 75% recycling rate (for the 50 states individually). The second table shows unclaimed deposits if a dime deposit were in place, and an 85% recycling rate were achieved. All beverages and all traditional container types are displayed, so that decisionmakers can evaluate whether to include various types of beverages and packaging materials. Several deposit states escheat (turn over) these unclaimed deposits to state agencies, and use the money to help fund recycling or other environmental programs. In other states, unclaimed deposits are retained by distributors and are used to help offset the cost of administering the deposit/return system.

- **Block 8: SUMMARIZED: UNCLAIMED DEPOSITS (ESTIMATED):** The eighth block summarizes the unclaimed deposit figures presented in the Block 7 tables (for a nickel and a dime), omitting the packaging materials and grouping the beverage types in several classes: carbonated, non-carbonated non-alcoholic, non-carbonated alcoholic, all non-carbonated, and total. It also provides potential unclaimed deposits for various redemption rates, from 60% up to 95% in 5-percent increments.

Printing: due to its size, this tab does not have a pre-arranged print area. Please select the tables you wish to print using the "Set print area" command in Excel's File menu, and test it on-screen first with the "Print Preview" command prior to printing. Each table is designed to stand on its own with sources and assumptions explained.

SOURCES USED IN GENERATING THE BMDA:
These sources were used in generating CRI's 2008 Beverage Market Data Analysis (using 2006 data):

SALES:
1) National beverage sales[2] figures (in units and gallons) were derived from: "Beverage Packaging in the U.S., 2007 Edition," Beverage Marketing Corporation, December 2007; with additional purchased data from the Beverage Marketing Corporation. Regional sales numbers and market share for all beverages (except beer) were also derived from data provided by the Beverage Marketing Corporation (BMC). The seven regions CRI used correspond to the regions previously used in annual reporting by *Beverage World* magazine. The regions described by BMC are slightly different from those used by *Beverage World* in prior years, so CRI re-organized the BMC data (using state population data) in order to maintain our time series to correspond to the old *Beverage World* regions.

2) Units sold by material type[3] at the national level were also derived from the "Beverage Packaging in the U.S., 2007 Edition." Please note that for several deposit states, the sales data CRI derived for this BMDA differ significantly from sales data reported to relevant state agencies administering container deposit systems.

3) Data provided by the Beer Institute were used to assess beer packaging market shares in all 50 states individually. Traditionally this has been divided between glass bottles and aluminum cans. The year 2006 marked the first time that the Beer Institute has reported sales of beer in PET plastic bottles, so CRI incorporated that into the regional and state data.

National and regional gallonage data were divided by national, regional, and state population figures to get total and per capita volume sales. We used the U.S. average unit size as the standard for all regions. These figures are identical in all seven regions for all individual beverage categories (by definition), but they differ regionally in the packaging subtotals. For the seven regions, fluid ounces per capita (differs by region) was divided by average unit size (same for all regions) to get total units per capita for each beverage.

Because BMC does not define "plastic bottles" or "cans," CRI estimated market share of PET vs. HDPE for each beverage category, with assistance from NAPCOR. We assumed that polypropylene, polycarbonate, low density polyethylene, and polyvinyl chloride (PP, PC, LDPE, and PVC) were less than 1% of total market share and excluded them. CRI assumed market share of aluminum vs. steel for the relevant can categories.

Without access to regional packaging data, we had to assume that market share by package type within each beverage category was the same at the national level and in each region. The exception

[2] Beverages included: carbonated soft drinks, beer, sparkling and non-sparking water, ready to drink (RTD) tea, sports drinks, chilled and shelf-stable fruit juice and drinks, energy drinks, table wine, and spirits. Beverages excluded: milk, ground coffee, packaged [dry] tea, frozen concentrates, draft beer, fountain drinks, wine coolers, sparkling wine, champagne, and mixed drinks.

[3] Packages included: aluminum cans, steel (bimetal) cans, PET plastic bottles, HDPE plastic bottles, one-way glass bottles, refillable glass bottles; gable-top cartons, foil pouches, aseptic boxes. Packages excluded: cardboard/steel cans, cardboard [wine] boxes, kegs, PP, PC, LDPE, and PVC.

is beer, where data was available for all 50 states. Clearly, packaging choices do vary by state and region.

To compute the tonnage of material sold in all 50 states, CRI multiplied derived sales figures in millions of units (see above description) by unit-to-weight conversion factors, as follows:

Aluminum: 68,420 cans/ton. Source: the Aluminum Association.
Steel: 12,000 cans/ton. Source: CRI estimate.
PET: 26,505 botttles/ton. Sources: CRI estimate derived from NAPCOR resin sales data (in millions of lbs) divided by estimated sales (millions of units) derived from Beverage Marketing Corporation data.
HDPE: 16,000 bottles/ton. Source: CRI estimate.
Glass: 4,000 bottles/ton. Source: CRI estimate.

RECYCLING:

To compute the amount of material recycled and wasted in all 50 states, we first had to derive recycling rates, as follows. We began with reported national recycling rates for the 5 beverage container types as described below, then derived state recycling rates by category (carbonated and non-carbonated, deposit states and non-deposit states) using known population figures and derived sales figures for the 50 states, as well as known and estimated recycling rates in the 11 states with deposit systems. California is the only state to report recycling data by container type. Massachusetts, New York, and Hawaii report overall recycling rates (not broken down by container type). CRI assumed that the same rates applied for PET, aluminum, and glass. For MA and NY, we added 10% to the reported rates to account for estimated collection through curbside recycling programs (not included in deposit return data). We assumed Connecticut and Vermont's rates were similar to rates in MA and NY due to their geographic proximity. State officials in Oregon, Iowa, Michigan and Maine provided CRI with estimates of redemption in those states. We assumed that Delaware's rates were similar to that of MA and NY, and we used the national average for aluminum cans since cans are excluded from Delaware's deposit system. Generally speaking, we assumed that non-carbonated beverages in deposit states where they are not covered by the law were recycled at rates similar to those in non-deposit states.

Aluminum cans: The 2006 nationwide recycling rate reported by the Aluminum Association was 51.6%. This rate includes 7.5 billion imported scrap cans: beverage cans that were not consumed in the United States, and whose collection contributed to the domestic recycling rates of foreign countries such as Mexico and Canada. Using the standard method for computing recycling rates used by the U.S. Environmental Protection Agency, and using export and import data from the U.S. Department of Commerce for new and scrap cans, CRI adjusts Aluminum Association data, thus deriving an overall 45.2% recycling rate. Because only 5% of all aluminum cans contain non-carbonated beverages, there is only a small difference between the two rates.

Steel (Bi-metal) Cans: In the BMDA, CRI used the Steel Recycling Institute's 63% recycling rate for all beverages, all states. Only 0.025 % of the total beverage market is packaged in steel, and there are virtually no carbonated beverages packaged in steel anymore. Since consumers are recycling the other major beverage container materials at much lower rates than 63%, it is likely that steel cans are recovered mechanically by magnets at waste processing facilities rather than through consumer recycling programs.

PET plastic bottles: The American Chemistry Council (formerly the American Plastics Council) reported a U.S. PET recycling rate of 23.5% in 2006. Up until 2004, the APC reported separate recycling rates for carbonated soft drinks and for "custom" PET bottles, which included non-carbonated beverages such as water and juice, food such as ketchup, and non-food items such as shampoo.

HDPE: The American Chemistry Council (formerly the American Plastics Council) reported a U.S. HDPE combined recycling rate of 26.4% in 2006 (natural and pigmented HDPE). There are 3 deposit states that cover non-carbonated beverages including those packaged in HDPE. California, with 14% of the nation's population, reported a 59% recycling rate for HDPE in 2006. Hawaii reported an overall redemption rate of 68% for HDPE while Maine's overall rate was estimated by state officials at 83%. After adjusting for these rates, CRI estimated an overall HDPE recycling rate in the remaining 47 states at 21%.

Glass bottles: CRI used the national glass recycling rates as reported by the U.S. EPA's Office of Solid Waste and Emergency Response. They reported that the 2006 recovery rate for beer and soft drink bottles (presumed to be carbonated) was 30.7%, and that the rate for wine and liquor bottles (non-carbonated) was 15%. These figures were adjusted using known and estimated recycling rates in the deposit states.

ENVIRONMENTAL IMPACTS OF CONTAINER RECYCLING AND WASTING

Energy: When a container is wasted--or landfilled--it must be "replaced" with a new container made from 100% virgin materials. The amount of energy saved through recycling—or wasted when containers are landfilled--is the difference between the amount of energy required to produce containers from 100% virgin materials and the amount required to produce containers from 100% recycled materials. The per ton energy values (in MBTUs per ton) used in the BMDA were as follows:
Aluminum cans: 207
Steel cans: 20
PET plastic bottles: 53
HDPE plastic bottles: 51
Glass bottles: 9

Source of energy values are from Exhibit 7-8: Energy Consumed/Avoided for MSW Management Options Compared to Landfilling (Million Btu/Ton) in "Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks." 3rd Edition. U.S. Environmental Protection Agency, 2006.

The energy values are then multiplied by the tonnages wasted and recycled for each material. The results at the state and national levels (in trillions of BTUs) are compared to the number of average American homes that could be supplied with that amount of energy (based on 95 Mbtu/household in 2005. The source of average residential energy consumption is Table US1. Total Energy Consumption, Expenditures, and Intensities, 2005. U.S. DoE, Energy Information Administration: http://www.eia.doe.gov/emeu/recs/recs2005/hc2005_tables/c&e/detailed_tables2005c&e.html

Greenhouse gas emission: When a container is wasted--or landfilled--it must be "replaced" with a new container made from 100% virgin materials. The amount of greenhouse gases avoided through recycling is the difference in emissions from producing containers with 100% virgin materials versus

100% recycled materials. The per ton emissions factors (in metric tons of carbon equivalent, or MTCE, per ton) used in the BMDA were as follows:

Aluminum cans: 3.96
Steel cans: 0.49
PET plastic bottles: .54
HDPE plastic bottles: .48
Glass bottles: 0.08

Greenhouse gas emissions factors were derived from Exhibit 2-2: GHG Emissions from the Manufacture of Selected Materials (MTCE per ton of product) in "Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks." 3rd Edition. U.S. Environmental Protection Agency, 2006.

The greenhouse gas emissions factors are then multiplied by the tonnages wasted and recycled for each material. The resulting emissions at the state and national levels (in metric tons of carbon equivalent, or MTCE) are compared to the number of average passenger cars that might be taken off the road (based on 1.5 MTCE per car per year). Source: Emission Facts: Greenhouse Gas Emissions from a Typical Passenger Vehicle, U.S. EPA: http://www.epa.gov/OMS/climate/420f05004.htm#key.

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