



Water and Energy Use Benchmarking Study:

Executive Summary

Prepared for
International Bottled Water Association

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Antea Group





The International Bottled Water Association (IBWA) is committed to driving environmental stewardship and social responsibility in the bottled water industry. To support this commitment, in 2013, IBWA released the results of the first water use benchmarking study, which established an average water use ratio for the North American (United States and Canadian) bottled water industry (1.39 L/L), and evaluated trends and observations associated with bottled water production. In its second year of benchmarking, IBWA has elected to expand upon this study by continuing the water benchmark and adding an energy use component to better understand resource use efficiencies in the industry. This study dives deeper into trends and observations reported in 2013, while preparing for future evaluations of the industry's broader water footprint and calculation of carbon emissions.

To establish a robust, consistent data set, each IBWA member was asked to provide five years (2009 through 2013) of facility-specific information, including facility type, total water use, total energy use, total production, and supplementary process information (e.g., type of water treatment, use of refillable bottles). The two key performance metrics for this study are the **water use ratio** and **energy use ratio**, which present the average amount of respective water (liters - L) and energy (mega joules - MJ) used within the facility to produce one liter of bottled water. The 2014 report reflects an **amended data set** – the 2009, 2010, and 2011 values previously reported in the 2013 study have been revised in this report and should be the referenced historic performance values moving forward.

The study was managed by Antea[®]Group, a third-party consultant, who conducted the data collection process, verification, analysis, and reporting.

In total, **76 North American bottled water facilities, representing seven IBWA member companies and one industry peer, contributed to the benchmarking study.** The study represents 21.6¹ million liters of bottled water production – **over half (56 percent) of total 2013 United**

Benchmarking Study Key Definitions

Total Water Use: all water used by the facility, including product water, and water used for facility processes (e.g., treatment, cleaning, maintenance).

Total Energy Use: all energy consumed on site from all sources (e.g., electricity, fuel, steam) used for facility processes

Total Production: the volume of finished product developed at the facility.

Water Use Ratio (WUR): the liters of water (including product water) used to make one liter of bottled water.

Energy Use Ratio (EUR): the mega joules of total energy (electricity + fuel + heat) used to make one liter of bottled water.



Quantifying Mega Joules: It takes approximately **3.6 mega joules** of energy to power a 100 watt light bulb for 10 hours

¹ This study presents water-related results in liters (L) and energy-related results in mega joules (MJ), to align with other beverage industry studies (1 liter = 0.2641 US gallon; 1 mega joule = 0.2778 kilowatt hours).

States bottled water consumption², and a 20 percent increase in participation from the inaugural study. This outstanding level of participation demonstrates continued interest and dedication of North American bottlers to better understand the industry's water and energy use performance.

Industry Performance

In total, **76 North American bottled water facilities** contributed to the study. Performance data is presented in two ways - a **fixed data set** (column graphs) representing the facilities that provided five full years of water use data, and a **dynamic data set** (line graphs) representing all facilities that provided any data over the five years of the study. As seen in Figure 1, total water use and total bottled water production increased from 2009 to 2013, while water use ratio remained relatively flat with a decrease of two percent over the same period. Figure 2 presents energy use performance for the industry. Total energy use and total bottled water production³ increased from 2009 to 2013, while energy use ratio decreased 14 percent over the same period. **These trends in water and energy use demonstrate that investment in efficiency measures and process improvements are yielding positive results in water, energy, and cost savings, while the industry experiences sustainable growth.**

Figure 1: Industry Water Use, Production, and Efficiency, 2009 - 2013

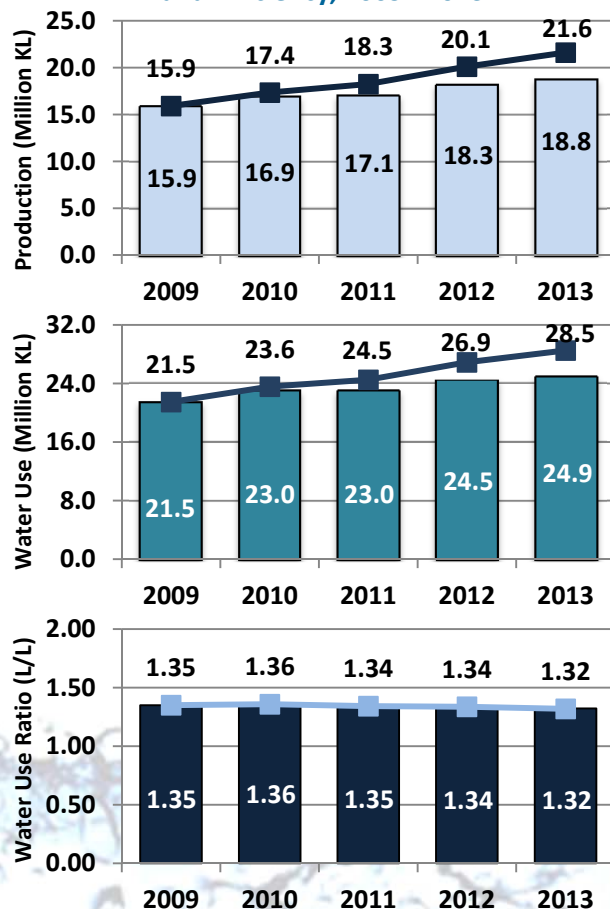
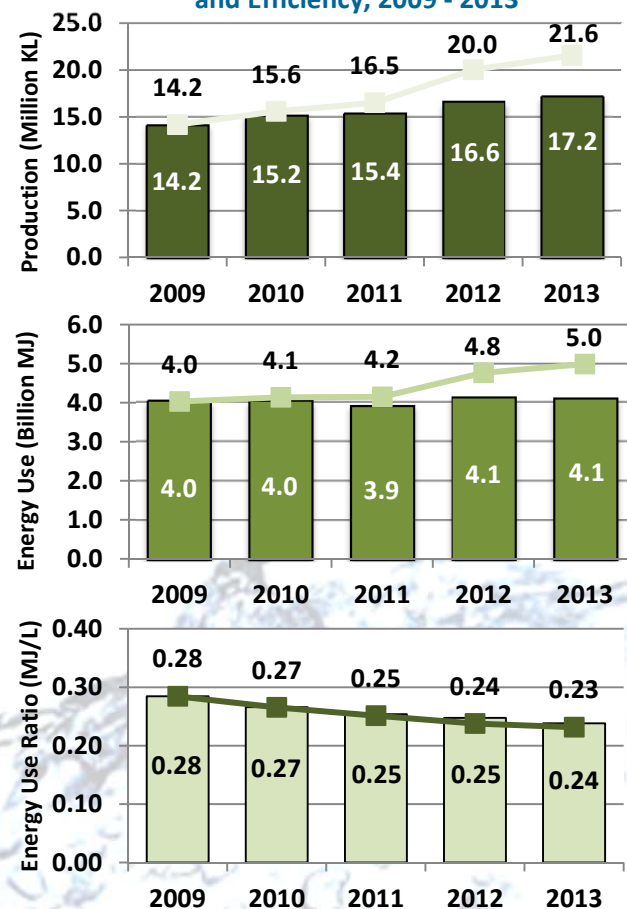


Figure 2: Industry Energy Use, Production, and Efficiency, 2009 - 2013



² "Bottled Water 2013: Sustaining Vitality"; Bottled Water Reporter, July/August 2014.

³ Total production and facility count differs between water and energy use, as some bottled water facilities that provided five full years of water data were unable to provide five full years of energy data.

The 2013 fixed water use ratio for North American bottled water facilities was **1.32 L/L**, and the 2013 fixed energy use ratio for North American bottled water facilities was **0.24 MJ/L**. These ratios demonstrate a **higher level of performance** when compared to the global 2012 averages for bottled water facilities⁴ (1.46 L/L water use ratio, 0.27 MJ/L energy use ratio).

In general, bottled water facilities have the **lowest water use ratio and energy use ratio** when compared to other beverage sectors. In comparison, other global beverage sectors⁵ such as carbonated soft drink bottling and beer production average have larger water and energy use ratios driven by higher intensity processes unique to these other beverages, such as flavor mixing, blending, carbonation, fermentation, cooking, distilling, etc.

Facility-based Results

The study also evaluated water use ratio trends among the three bottled water facility types:

- **Small Pack:** facilities that package bottled water in containers from 8 ounces to 2.5 gallons
- **Home and Office Delivery:** facilities that package bottled water in reusable/refillable containers from 2.5 to 5 gallons
- **Mixed Packaging:** facilities with both Small Pack and Home and Office Delivery packaging

As seen in Table 1, water use ratios for each facility type remained relatively flat over the study period; representing a change in water use ratio of 5 percent or less. As seen in Table 2, energy use ratios demonstrate modest decreases of 15-20 percent. **The differences in ratio magnitude among the three facility types are largely process-driven:** for example, Home and Office Delivery facilities bottle finished product in refillable containers, resulting in additional water use for sanitization processes that do not exist at facilities that use single fill packaging (e.g., most North American Small Pack facilities). Some Small Pack facilities have bottle blow molding operations on site, resulting in additional energy use that is not used at facilities with off-site blow molding (e.g., no Home and Office Delivery facilities in this study operated on site blow molding operations).

Table 1: Water Use Ratio Performance by Facility Type (L/L), 2009-2013

	2009	2010	2011	2012	2013
ALL	1.35	1.36	1.35	1.34	1.32
Small Pack	1.32	1.32	1.30	1.29	1.26
Mixed Packaging	1.39	1.43	1.42	1.43	1.46
Home & Office Delivery	1.59	1.62	1.61	1.58	1.56

Note: Ratios represent the fixed data set for all categories except Home and Office Delivery (less than 3 companies in this category provided five years of data – dynamic data (reported data in any of the five study years) is presented to preserve confidentiality).

Table 2: Energy Use Ratio Performance by Facility Type (MJ/L), 2009-2013

	2009	2010	2011	2012	2013
ALL	0.28	0.27	0.25	0.25	0.24
Small Pack	0.31	0.28	0.27	0.26	0.25
Mixed Packaging	0.24	0.23	0.21	0.19	0.19
Home & Office Delivery	0.11	0.10	0.11	0.12	0.12

Note: Ratios represent the fixed data set for All and Small Pack – and dynamic set for Mixed Packaging and Home and Office Delivery (less than 3 companies in these categories provided five years of data – dynamic data is presented to preserve confidentiality).

⁴ [Beverage Industry Environmental Roundtable, 2013.](#) Note that 2012 data is the most recent information available for comparison.

⁵ *Ibid*

Industry Stewardship Efforts

The North American bottled water industry has actively implemented process improvements to reduce water and energy use while experiencing sustainable business growth. Participants in the study were asked to provide some examples of successful water stewardship efforts, detailed below:

- Improving performance and recovery in the reverse osmosis process;
- Optimization of washer units through automated timers, selection of cleaning chemicals, flow control, air rinsing, etc.;
- Reducing filler overflow through system optimization;
- Routing HVAC unit condensate to on site cooling tower;
- Using chemical controls for zero discharge at on site cooling tower; and
- Maximizing wastewater management through system optimization and/or reuse of wastewater (e.g., spray field irrigation, on site landscaping).

Participants were also asked to indicate the energy management programs and initiatives that are in place at their facilities. The most common initiatives include, but are not limited to:

- Regular inspection, leak testing and repair programs for compressed air systems and steam systems;
- Optimized production schedules to minimize frequency of start up/shut down times;
- Regular cleaning and inspection of HVAC systems for optimum performance;
- Automatic/timed temperature controls;
- Standard use of high-efficiency motors;
- Use of indoor and outdoor automatic light controls (e.g., parking lot lights on timers, light sensors in rooms);
- Use of energy efficient light fixtures;
- Individuals or teams who are responsible for energy management and efficiency initiatives; and
- Comparison of metered energy data with energy invoices to ensure consistency in measurement.

Conclusion

In the second year of benchmarking, IBWA members have continued to demonstrate their commitment to promoting an environmentally responsible and sustainable industry, as evidenced by the exemplary participation in this year's study and impressive list of stewardship initiatives in action at North American bottled water facilities. Water and energy use ratios demonstrated decreasing trends, while production continues to increase across the industry. It is clear that bottlers are driving process efficiencies that result in water, energy, and cost savings, while the industry experiences sustainable growth. The results of this study shall serve as a baseline to measure future progress in water and energy use reduction and conservation efforts across the industry.

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