



## Stewardship in Action

Bottled water industry  
invests in sustainability  
improvements and  
efficiency measurement

By Eileen Lo

**E**nvironmental stewardship has gained significant attention across industries as society recognizes the importance of sustainable resource consumption and effective management of environmental externalities (i.e., the costs or benefits that affect people or the environment outside of the market for a good or service). Increased awareness of responsible business practices, along with the need for risk management and continuous improvement, has led to more widespread adoption of data tracking to assess operational efficiency and support the improved sustainability performance. Businesses are now placing greater emphasis on water stewardship, energy efficiency, and emissions reduction in response to stakeholders' expectations of measuring and reporting environmental impacts, risks, and strategies. Those efforts collectively influence the long-term health of global ecosystems and the resilience of businesses, ultimately affecting the availability of resources and the well-being of future generations.

Members of the beverage industry especially understand the importance of sustainability measurement and management of environmental resources. Without reliable and decision-useful data, businesses face challenges in evaluating the environmental impacts of their operations and demonstrating progress toward management objectives. By collecting and tracking standardized metrics, beverage companies continue to develop an understanding of the efficiencies of their operations and trends over time, helping them



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take effective actions to integrate environmental conservation and stewardship projects into their own business processes while supporting increased consumer demand for sustainable products throughout the industry.

As an organization committed to promoting environmental responsibility and sustainability within the industry, the International Bottled Water Association (IBWA) completed its fourth benchmarking study in 2024. Following the inaugural study in 2013 and subsequent studies in 2014 and 2018, the latest study advances our understanding of emissions intensity within the bottled water industry, while continuing the evaluation of progress related to water use and energy efficiency.

### **Efficiency Ratios**

Benchmarking analyses throughout the beverage industry commonly evaluate resource intensity as the basis of efficiency. That is, how many units of resources are used to produce one unit of finished beverage product. Intensity ratios provide a starting point for evaluating how process changes, conservation efforts, and other aspects of facility operations have influenced efficiency over time. Using that information, a facility can further identify drivers for efficiency and potential opportunities for process optimization.

The 2024 IBWA benchmarking study selected the water use ratio, energy use ratio, and emissions ratio as the key performance indicators utilized in the assessment. Those metrics also align



with the methodology used by other beverage industry studies (see sidebar "Examples of Industry Benchmarking Studies" on p.6). The ratios are focused on on-site beverage production operations for a given time period, with the intention being to identify and evaluate efficiencies within a facility's control. Utilizing a recognized methodology adds value to the study, ensuring comparability and consistency of data metrics that can be reviewed and compared to other industry benchmarks for further performance evaluation.

### Study Results

The 2024 benchmarking study report presented data and trends from 101 bottled water facilities of three IBWA member companies that contributed data for all or select reporting years (2017, 2020, and 2022). Each IBWA participant was asked to provide facility-specific information over the study period, including facility type [small pack, home and office delivery

(HOD), or mixed pack]; total water use; total energy use; total production volume; Scope 1 and 2 emissions (location-based and market-based, where available); and supplemental process-related information (e.g., type of water treatment, use of refillable bottles, and on-site bottle blow molding operations). By reporting supplemental data, participants were able to provide additional information regarding potential drivers for perceived efficiency ratio trends. Efficiency ratios are normalized (i.e., the total aggregate water use is divided by the total aggregate production volume from all reporting facilities) to reflect the average amount of resources used to produce 1 liter of bottled water.

Key takeaways from the 2024 IBWA benchmarking study include:

**1. The 2022 water use ratio of water bottlers was 1.41 liter (L/L), including the 1 liter that is consumed.** The industry water use ratio remained relatively consistent

compared to 2017, while the average water use and production volume per facility increased by 18%, indicating steady water efficiency at facilities even though product demand increased over the study period (Figure 1).

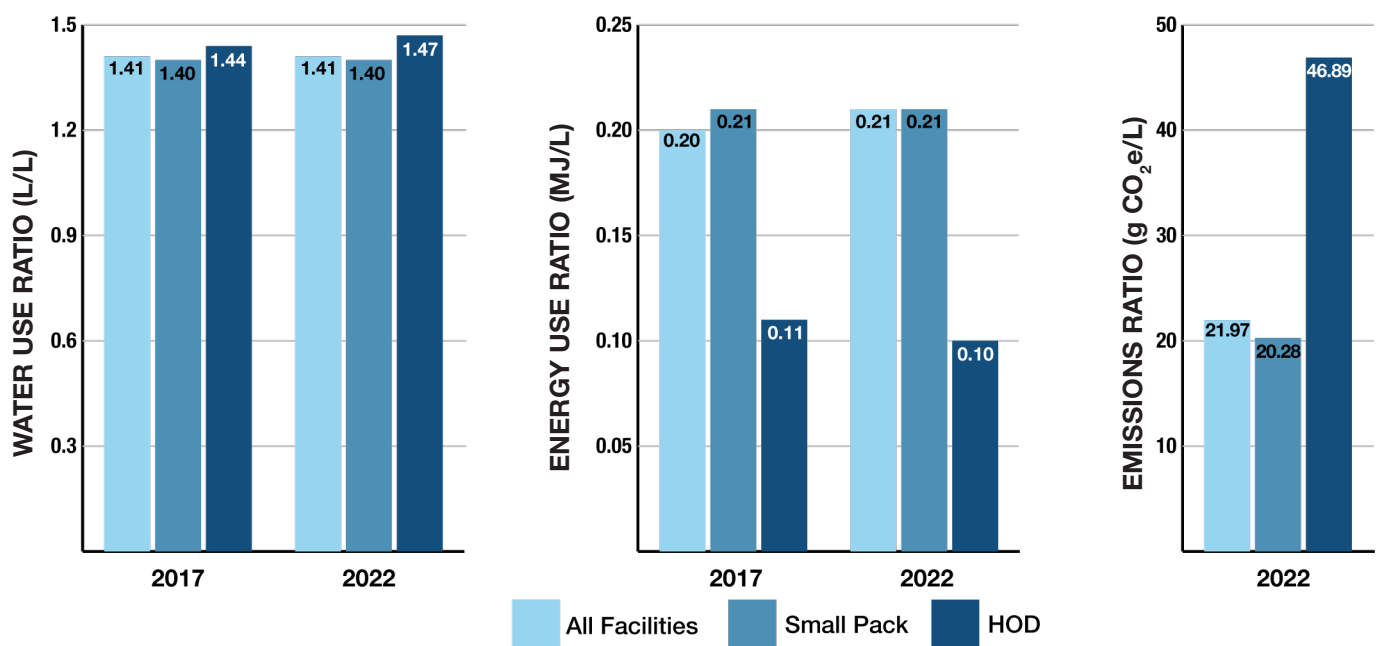
**2. The 2022 energy use ratio of water bottlers was 0.21 megajoules per liter (MJ/L).**

The ratio represents a 1% increase from 2017, which corresponded with an increase in production volume and the addition of new participating facilities that contributed data to the study.

**3. The 2022 emissions ratio of water bottlers was 21.97 grams of CO<sub>2</sub>e per liter (g CO<sub>2</sub>e/L).**

This is the first IBWA bottled water industry benchmarking study where greenhouse gas (GHG) emissions data was requested from all participants. All facilities were able to report complete Scope 1 and Scope 2 emissions data for 2022.

**FIGURE 1: WATER USE, ENERGY USE, AND EMISSIONS RATIOS OF THE BOTTLED WATER INDUSTRY, 2017 AND 2022**



**On average, other beverage production facilities—such as carbonated soft drinks and beer—have higher performance ratios than bottled water facilities because of their unique resource-intensive processes, such as flavor mixing, blending, carbonation, fermentation, cooking, distilling, etc.**

**4. In general, bottled water facilities have the lowest water use, energy use, and emissions ratios compared to other beverage sectors.** In comparison, other beverage production facilities—such as carbonated soft drink bottling and beer production facilities—have higher performance ratios on average, which are driven by more resource-intensive processes unique to these other beverages, such as flavor mixing, blending, carbonation, fermentation, cooking, distilling, etc.

**5. The 2022 efficiency ratios of water bottlers demonstrate a higher level of water, energy, and emissions performance compared to the global averages for bottled water facilities.**

When comparing the performance of all global facilities producing bottled water (i.e., the majority of products produced at a facility was bottled water), bottled water facilities reported lower water use, energy use, and emissions ratios. However, when comparing facilities that had a beverage mix of 100% water (i.e., only producing bottled water products compared to mixed production facilities), facilities reported a lower water intensity compared

to the global dataset, with higher ratios reported for energy use and emissions compared to all other global bottled water facilities. That is likely due to better energy and emissions efficiency performance reported in the global dataset by facilities located in Europe or other regions that had lower energy intensities attributed to jurisdictional sustainability and emissions-limiting related regulations or expectations.

**6. Facility-specific processes contributed to differences in efficiency ratios by facility type.** The 2022 water use ratio of Small Pack facilities was 1.40 L/L, compared to the HOD average of 1.47 L/L. HOD facilities typically bottle finished products in refillable containers, resulting in additional water use for sanitization processes that do not exist at facilities that use single-fill packaging (i.e., most Small Pack facilities). In 2022, the energy use ratio of Small Pack facilities was 0.21 MJ/L, and the ratio of HOD facilities was 0.10 MJ/L. Some Small Pack facilities had bottle blow molding operations on-site, resulting in additional energy use compared to facilities that used off-site blow molding operations to supply bottles. (Note: No HOD facilities in

## DEFINITIONS

**A water use ratio is defined as the amount of water utilized to produce 1 liter of finished beverage product.** Calculating a water use ratio requires a facility to quantify how much water is used for all on-site processes, including on-site water treatment, ingredient water, cleaning/sanitization, operation of employee washrooms or canteen services, and landscaping. It does not include off-site water uses or stewardship efforts (e.g., off-site water reclamation, product transportation, or customer refrigeration).

**An energy use ratio is defined as the amount of energy consumed on-site from all sources (e.g., purchased electricity, fuel, heat, and renewable and non-renewable energy generated on-site) to produce 1 liter of finished beverage product.** Fuel types include oil, natural gas, propane, coal, biogas, biomass, and other specific fuel types used by facilities.

**An emissions ratio is defined as the amount of carbon dioxide equivalent (CO<sub>2</sub>e) emissions generated from on-site facility processes to produce 1 liter of finished beverage product.** The ratio includes Scope 1 and Scope 2 emissions, with Scope 1 being direct emissions from owned or controlled sources, and Scope 2 being indirect emissions from the consumption of purchased or acquired electricity, heat, steam, or cooling. Scope 3 emissions, which are other indirect emissions from upstream and downstream activities, are not included within the scope of the study, as it focuses on the efficiency of production processes at a facility.



**In the 2024 benchmarking study, IBWA included greenhouse gas emissions data for the first time.**

the 2024 study operated on-site blow molding operations.) Despite a higher energy intensity, Small Pack facilities reported a lower emissions ratio (20.28 g CO<sub>2</sub>e/L) compared to HOD facilities (46.89 g CO<sub>2</sub>e/L) due to a higher percentage of renewable energy in the reported electricity procured from local grids.

**7. Bottlers have continued to make efforts to improve efficiencies.**

When asked to identify water stewardship efforts implemented at facilities, participants identified the following actions:

- Improving performance in the reverse osmosis process
- Verifying water stewardship practices
- Optimizing clean-in-place (CIP)

frequency to maximize efficiency

- Improving water data collection
- Installing water-efficient bottling equipment

Energy efficiency measures and initiatives adopted by participants include, but are not limited to:

**Management Strategies**

- Establishing dedicated personnel or teams to manage energy- and efficiency-related initiatives
- Regularly collecting data and implementing monitoring, benchmarking, and goal-setting activities regarding energy performance
- Conducting scheduled energy surveys or audits
- Increasing energy awareness and providing training to employees

**Energy Management Tools**

- Installing indoor and outdoor automatic light controls
- Using energy-efficient light fixtures and natural light in lieu of traditional fixtures
- Distributing energy conservation communication materials/signs
- Adopting automatic/timed temperature controls

**Process and Equipment Improvements**

- Performing leak testing and optimizing settings for compressed air and steam systems
- Utilizing high-efficiency motors
- Optimizing cleaning and fill processes and production schedules

This is the first benchmarking study where GHG emissions data was requested by IBWA. Although information regarding emissions reduction efforts has not been collected from water bottlers, based on information available outside of the benchmarking study, approaches to reducing emissions intensity at beverage production facilities include:

- Pursuing energy efficiency opportunities
- Sourcing renewable or low-carbon energy
- Upgrading refrigeration compressor control applications or using low global warming potential (GWP) refrigerants

**Next Steps**

The bottled water industry has an impressive environmental stewardship story to share, thanks in part to the proactive participation of IBWA member bottlers in this fourth benchmarking study. Members

## The results of IBWA's 2024 study will aid in future performance monitoring and evaluations of sustainability trends and improvement efforts amongst member water bottlers.

reported data regarding facility processes and stewardship efforts, providing valuable insights regarding facility performance and efficiency drivers. Now the question is—how can benchmarking results be used to impact the broader bottled water industry and further drive sustainability action?

### Continue Benchmarking Analyses and Pursue Efficiency Improvement Opportunities.

Efficiency ratios presented in the study serve as industry-specific benchmarks that facilities can compare themselves to. By conducting benchmarking, facilities can develop an understanding of their performance and identify top performers, helping them validate the effectiveness of their environmental management strategies and identify opportunities for improvement in current programs.

### Collaborate on Stewardship Efforts Beyond the IBWA Membership.

Opportunities exist to engage in stewardship efforts in the industry through collaboration. Having collected comprehensive information on sustainability actions, patterning and identifying the overlap of strategic sustainability approaches amongst companies could illuminate opportunities for the development of future best practice guidance documents or additional evaluations of water, energy, and emissions intensities associated with specific efficiency improvement or resource conservation initiatives.

### Encourage Participation in Future Benchmarking Studies.

The completion of the benchmarking study can be used to continue to build interest in the study among water bottlers and encourage additional participation in future studies. Broad participation will enhance the coverage of the study and representation of the industry's performance, contributing to a better understanding of stewardship practices within the beverage industry. IBWA intends to continue to conduct benchmarking studies of sustainability performance within the bottled water industry, which will help capture performance trends and the impact of sustainability efforts over time.

### Industry Leaders Promoting Positive Change

The exemplary participation in IBWA's fourth benchmarking study and impressive list of stewardship initiatives reported at bottled water facilities continue to demonstrate IBWA members' commitment to promoting environmental stewardship. Water and energy use ratios demonstrated consistent trends, despite a continued increase in production volume across the industry. The first reported normalized emissions intensity of IBWA water bottlers outperformed the global industry, showcasing efficiency at member water bottling facilities.

The results of this study will aid in future performance monitoring and

## EXAMPLES OF INDUSTRY BENCHMARKING STUDIES

### Beverage Industry Environmental Roundtable (BIER)

Since its launch in 2006, BIER has conducted biennial benchmarking studies that evaluate global beverage industry trends for water, energy, and greenhouse gas (GHG) emissions metrics, including specific facility-type evaluations for breweries, distilleries, wineries, and bottling facilities. For more information, visit [www.bieroundtable.com](http://www.bieroundtable.com).



### International Bottled Water Association (IBWA)



IBWA's fourth benchmarking study evaluated sustainability trends for water bottling facilities, including specific facility-type evaluations based on primary package type. An executive summary is available on IBWA's website ([www.bottledwater.org](http://www.bottledwater.org)), and IBWA members may also request a copy of the full report (for internal review only) by contacting IBWA Vice President of Science, Education, and Technical Relations Albert Lear: [alear@bottledwater.org](mailto:alear@bottledwater.org).

evaluations of sustainability trends and improvement efforts amongst water bottlers, promoting positive changes toward sustainable bottled water production. **BWR**

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