

# INDUSTRY TAKING ACTION – CASE STUDY OF A WATER USE EFFICIENCY PROGRAM IN COCA-COLA PLANTS

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**Abstract.** “Counting every drop, making every drop count.” The Coca-Cola Company and its largest bottler, Coca-Cola Enterprises, have recently embarked on an effort to measure water usage, identify opportunities to reduce water consumption and the wastewater production and improve operating efficiency at its four Atlanta-based production facilities. Coca-Cola has engaged the water experts from the JohnsonDiversey and Nalco Alliance, who used an innovative program called aquacheck to conduct this assignment.

In this paper, aquacheck is presented as a methodology targeted to optimize water use efficiency in beverage processing facilities. Examples from studies at two Coca-Cola Enterprises facilities and two facilities owned by The Coca-Cola Company in Metro Atlanta, Georgia, are used to illustrate both the type of baseline data collected and some of the gains that can be achieved. Through this synthesis, it is hoped that other industries will be empowered to take action and that new opportunities will be identified for cost-effective eco-efficiency within the beverage industry.

## INTRODUCTION

A healthy environment, locally and globally, is vital to Coca-Cola’s business. Coca-Cola views protection of the environment as a journey, not a destination. Coca-Cola began that journey over 100 years ago, and it continues today. Each employee of the Coca-Cola system has responsibility for stewardship of natural resources and to conduct business in ways that protect and preserve the environment. Coca-Cola employees, business partners, suppliers and consumers must all work together to continuously find innovative ways to foster the efficient use of natural resources, prevention of waste and the sound management of water. Doing so not only benefits the environment, it simply makes good business sense.

Water is the major ingredient in all of the products made by Coca-Cola, and therefore represents one of the biggest risks to the business. Sustainable water management practices and improved water use efficiency are vital. However, water efficiency measures must be

viewed holistically within a business strategy. A successful program must set well-informed goals based on measured performance, industry benchmarking, and Total Cost of Operations (TCO) impact analysis.

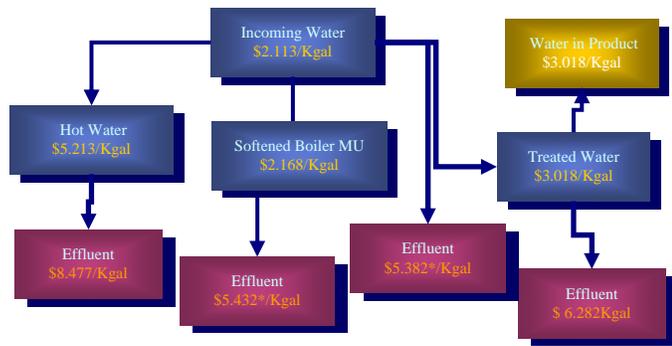
Concentrating on the link between the reduction in TCO and Environmental Performance Improvement (EPI) will identify new gains which can impact the financial and environmental sustainability of the beverage processing operation. This requires a change in thinking which will usually lead to new performance metrics and innovations. Support functions, like utilities that involve water and energy management, will now bring their own new value as part of a plant resource optimization strategy. In addition cost avoidance by consistent standards compliance for wastewater discharges and atmospheric emissions must become benchmarked as environmental costs are now seen as a real cost of doing business.

By reducing water consumption, (with no negative impact on production quantity, quality or yield, or affecting the quality of water involved in beverage preparation), optimized resource utilization can be a realistic and cost-effective strategy.

Responding to immediate needs often means that big picture savings potential is overlooked. For this reason, a methodology that both assesses solutions to immediate problems and also offers a big picture baseline performance map of water use efficiency is required. This provides information for management to make decisions in a *proactive mode versus a reactive mode*.

## METHOD AND RESULTS

*Water uses to be assessed: a comprehensive system (aquacheck).* In order to contribute to better operational management of water resources, the aquacheck program is implemented. Aquacheck approaches water use efficiency on three basic levels: (1) SCAN it, (2) PROBE it, and (3) SOLVE it.



**Figure 1: Water cost profile for a CCE plant.**

### Aqua-Scan - stage one assessment

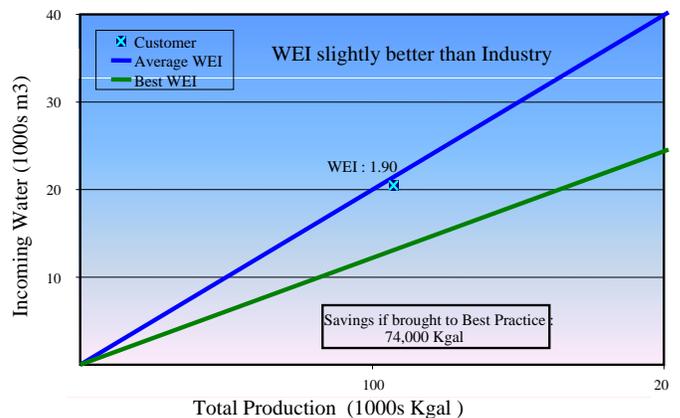
An assessment of what’s happened so far, which summarises available historic data and costs, providing a holistic overview and trend analysis; measurement of an operating index (WEI-Water use Efficiency Index); and benchmarks where the facility is operating versus industry norms.

The typical deliverables from this first step in the methodology include:

- Trend analysis of historical data
- Identification of value streams (water cost breakdown)
- Benchmark evaluation of plant water use and wastewater production against industry norms, and identification of any areas for improvement.
- Characterization of fresh water and effluent water plus quantities used versus production and effluent composition generated; these are suitable for environmental reporting.

Figure 1 shows one of the typical deliverables that should be expected from this type of work. It indicates the absolute cost of water by use type, also referred to as identification of the value streams within the facility. (Derived from a detailed review of at least one year’s worth of water, energy and chemical bills along with details on related wastewater treatment surcharges.)

Figure 2 shows a benchmarking exercise for a beverage plant and depicts the gap between current plant water management performance for fresh water use, and the average for the beverage industry as a whole. Opportunities for improvement exist through the deployment of the Best Available Technology as used by the most efficient water user in the Beverage Industry.



**Figure 2: Industry benchmark model for beverage processing versus water utilisation.**

### Aqua-Probe - stage two assessment

A “Where are we now?” assessment, including a systematic audit of all water uses, users, and costs on site. (Basically using non-obtrusive ultrasonic flow meters, detailed measurement data is developed to establish the water use and cost of every water use within a beverage manufacturing facility.)

The deliverables from Stage Two include an audit report, containing a summary of:

- The systematic audit of the plant, assessing all uses and users of water.
- A review of all available operating data for the systems being considered, including flow rates, temperatures, water chemistries, and other critical parameters.
- In-depth discussions with plant personnel regarding water quantity and quality requirements and potential recommendations for each process where water is used.
- Creation of a footprint (mass balance) of plant water use.
- A ranking of all water uses on site by volume and cost where possible.
- An assessment of components (BOD, TSS, etc.) and their sources within the effluent stream(s).
- A baseline data-summary, water use map, for use in the strategic management process, as a guide for future decisions required within Stage Three.
- Recommendations for improvements by applying Responsible Resource Solutions.

sometimes needed to build the water recycling system.

### Aqua-Solv - stage three implementation

A ‘Where can we go?’ and ‘How do we get there?’ implementation plan defined together by the facility and the service provider based on prioritized Responsible Solutions from both Stage One and Stage Two. This will include technical, practical and cost information to assess the improved environmental performance for each prioritized solution, identification of metrics to sustain improvements and set new realistic targets for making water efficiency gains. These will include:

- Quantitative targets for water use reduction (from the recommendations) are prioritised, and the feasibility and impact of the specific technology, practice, and costs surrounding each opportunity are fully documented.
- Strategic high-level projects are evaluated, together with the implications of Best Available Technology and best practice for operational costs.
- Final implementation of the best solution(s) to meet short term and long-term needs is accomplished.

*This is intended to be the beginning (not the end) of a program that delivers continuous improvement in water use efficiency. It provides the metrics to manage by including baseline measurement, targeted recommendations for improvement (with impact analysis), implementation of improvements and a re-audit schedule to sustain the proactive actions.*

### SUMMARY AND CONCLUSION

Positive action can move theory into practice, and deploy the best solution. The three-stage methodology proposed here is already in practice (being delivered by an Alliance between JohnsonDiversey and Nalco). The outline discussed gives examples from CCE a proven methodology for the identification and feasibility of improved water management practices, where the focus is clearly on the link between environmental performance improvement, and cost-efficiency to deliver production sustainability.

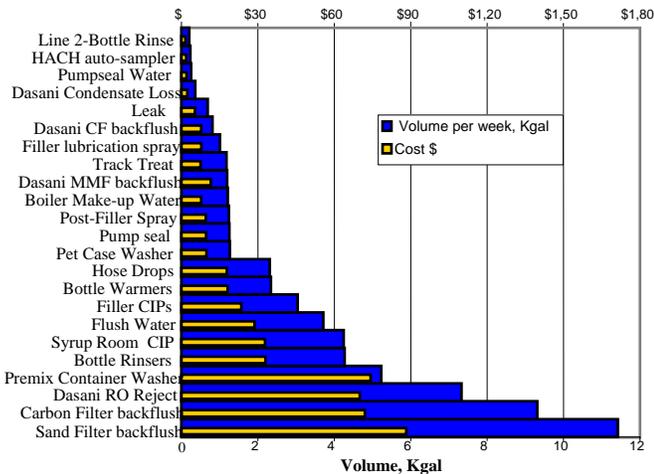


Figure 3: Relative water use and cost for each user.

Figure 3 shows the output of a water use footprint (mass balance), that can be used to highlight areas of plant water use representing the greatest cost drain that demand further investigation.

The water savings are usually identified in the three principle categories of:

- Conservation – bringing water use within good housekeeping guidelines inline with industry norms. These tend to be addressed first in any water management strategy and range from stopping leaks, maximizing cycles of concentration in cooling towers and boilers, optimizing individual process operations, to a review of what water type is actually used vs. required in the many applications on site. All viewed against the backdrop of production and growth targets.
- Reuse – using the water outflow from one application makeup to another. Examples may be: use of RO rejects water as sand filter backwash, condensate at high temperature as pre-heat water, or the use of final CIP (Clean in Place) rinses as pre-rinse in the same operation. Some capital costs (pipe work, etc.) are usually involved in this area, which of course increases the cost of making the change. In the aquacheck program, these costs are fully justified in terms of reduced fresh water and effluent costs and associated energy costs where applicable by applying the value stream calculations from stage one.
- Recycle - changing the physical properties of water so it can be recycled from one application into another. Examples may include the recycling of water softener regeneration as cooling water or boiler makeup, and a variety of other applications. *Water Recycle* tends to be more capital intensive, as re-engineering is