ISO 50001 Energy Management System
Case Study: Coca-Cola European Partners Portugal

2020 Portugal

Coca-Cola European Partners Portugal

The First ISO 50001 certified Portuguese company in the Food and Beverage Industry

CCEP Portugal Plant Management Team

Case Study Snapshot	
Industry	Food & Beverage
Product/Service	Non Alcoholic Beverages
Location	Setúbal, Portugal
Energy management system	ISO 50001
Energy performance improvement period, in years	2014 - 2019 (6 years)
Energy Performance Improvement (%) over improvement period	30.7%
Total energy cost savings over improvement period	$USD 2,873M
Cost to implement EnMS	$USD 135,000
Total Energy Savings over improvement period	172,500 GJ
Total CO_2-e emission reduction over improvement period	13,909 ton CO_2

Organization Profile & Business Case

Coca-Cola European Partners Portugal, formerly known as Refrige, was founded in 1977, and currently has an annual production volume over 200 million liters. Our factory in Setúbal (near Lisbon) is a role model in CCEP plants, certified by the ISO 14001, ISO 9001, ISO 22000, ISO 50001 and OHSAS 18001.

We're part of CCEP, the world's largest independent Coca-Cola bottler based on revenue, achieving more than €12Billion in 2019, with 54 plants in 13 European countries and serves a market of 300M Clients.

CCEP wants to lead the industry with a clear sustainable action plan called "This is Forward" that covers economic, social and mainly environmental issues with clear goals to achieve until 2025.

CCEP is present in the Dow Jones Sustainability Indices and CDP in Energy and in Water by the 4th year in a row. Other ratings like FTSE4Good and Prime in the ISS-oekom Corporate Responsibility were also achieved.

Most recently, in 2019, within the CCEP system the results on "Water and Energy Efficiency use management" were also acknowledged resulting on an award in the Sustainability category in 2019. Appliance video: https://youtu.be/CfsqkHpR_4Q.

We are pioneers in ISO 50001 in Portugal and it has been a fantastic support to achieve all the energy saving that we have done till now and surely will continue to improve."

— Carlos Branco, Environmental Manager

Business Benefits

Continuous improvement of energy performance is a corporate requirement. Portuguese legislation, from the mid-1980s, also required it, for energy-intensive installations (> 1000 petroleum equivalent ton / year), requiring energy audits, every 6 years, and the implementation measures to improve energy performance by 6% in the same period. In 2003, with the implementation of the environmental management system, according to the ISO 14001 standard, energy consumption was considered a significant environmental aspect and therefore energy performance started to be the target of improvement plans. However, despite the implementation of these requirements and close to 100 electricity and water meters installed, what was seen was a tenuous and inconsistent improvement in energy performance. It was in that context, that in the first quarter of 2013, the decision was made to implement an energy management system, according to ISO 50001. Its certification came in December of the same year.

The decision to implement an energy management system, according to the ISO 50001 was motivated by the need to consistently comply with legal and corporate requirements, reduce production costs (costs of energy represented around $2M/year) and add value in terms of reputation as very few companies had yet obtained ISO 50001 certification.

The benefits accumulated in the period 2014-2019 (6 years) resulting from the implementation of the ISO 50001 energy management system based on the performance obtained in 2013, were: 30.7% improvement in energy efficiency; 172,500 GJ energy savings; $2,873M cost saving; 13,909 ton CO_2 emissions reduction. Close to 70% of this cost saving was a result of the Energy Management System.

This implementation was made in 6 months, with an estimated staff time of 700h.worker, and with an added investment of $135,000 mainly in consulting, auditing, energy review, training, meters and certification.

Continuous improvement in water use efficiency is another corporate requirement. This is also considered a significant issue in the environmental management system (ISO 14001) as drinking water is a scarce resource in Portugal, a country that is in a region of water stress. In this context, the decision was also taken to implement a water management system using the methodologies established in ISO 50001 and ISO 50006.

The benefits accumulated in the same period were as follows: 42.2% improvement in water use efficiency in auxiliary and cleaning processes, 354,000 m3 water reduction; $ 990,000 cost reduction (water & wastewater treatment).

All this work in Energy, helped us in our action on climate objective, to halve our direct carbon emissions (base 2010). This commitments are assumed by our entire company, focused in the entire supply chain, covering production, distribution and cold drink operations, resulting also in a reputation improvement.

Our "This is Forward" Action plan goals are only possible with the right tools, like ISO50001 and the right people. Together will make a change in the industry and in our planet.

—Manuel Bastos, Communication and Sustainability Manager

Plan

Drafting the plan, with the commitment of the top management, we defined responsibilities and the realization of a GAP analysis ISO 50001 versus the integrated management system implemented. After this, the plan for implementing the energy management system was outlined, which included the following measures:

- ✓ Elaboration of the Energy Policy
- ✓ Creation an Energy Management Team and function definition
- ✓ Procedure review of Integrated Management System: drafting new procedures, such as "Energy Assessment", "Energy Monitoring &Measurement",

"Energy Purchasing and Supply" and "Operational Control Plans - Significant Energy Use (SEU)"

- ✓ Conduct energy review
- ✓ Select and validate EnPI (use of linear regression methodology, to verify the correlation between energy consumption and the selected variables)
- ✓ Energy management plan and objectives
- ✓ Specific training plan for energy management and energy efficiency
- ✓ Internal and external communication plan
- ✓ Conducting internal and external audits
- ✓ Management review

The energy management team involved 12 workers in the areas of production, maintenance and management systems. This team was divided into two groups and assigned the following tasks:

• Energy review with regard to the identification of energy use, by process.

• Draft of Energy management documentation and Implementation of Energy Management System.

Energy Review (Assessment by levels)

When the implementation of the energy management and energy efficiency system started, one of the first questions that arose was what data we need/have to carry out the energy assessment and how these would be organized. Thus, it was established that energy assessment would be carried out, having four different levels and when applicable, considering the period of one year.

• Level 1: Considered the installation in global terms. Energy efficiency expressed as specific consumption (energy consumed kWh / volume of product manufactured).

• Level 2: Considering the systems/processes that transform one type of energy into another (e.g. air compressors transform electricity into compressed air)

• Level 3: Considering the end-user processes of energy. (e.g. packaging lines, manufacture of PET bottles).

• Level 4: Considering the equipment with an installed power >= 7.5 kW and an average daily operating regime of 16h or more (e.g bottle washers and pasteurizers).

Objectives, Energy targets and planning

The annual energy efficiency goal (Energy ratio) for the facility is established by top management and aligned with the global goal in the CCCEP. To achieve the objective, we use a computing method that takes into account the fixed consumption of the installation (A), the specific energy consumption of each process (EPz) and the outputs of each process (OPz).

$$Energy\ ratio\ goal = A + (EP_1 x OP_1 + \ldots + EP_Z x\ OP_z)$$

If the energy ratio calculated is higher than the goal established by top management we need to put in place measures in order to improve the performance of one or more processes. Because not all the processes have the same weight in the total energy consumption of the plant we need to know how to act. This leads us to focus in significant energy uses.

Significant Energy Use (SEU) - Criteria

Systems / processes or equipments that meet one of the following criteria are classified as significant uses:

• Have an energy consumption equal to or greater than 2% (sum of all forms of energy) of the total installation.

• Have a potential for improvement of at least 20% (in terms of energy performance and/or cost reduction). This potential must be the result of the sum of contributions at the management level (good practices, planning ...) and technology (investment in new equipment and upgrading existing equipment).

Using energy consumption information collected from the internal energy metering system (electrical, natural gas and steam), invoices from suppliers (electricity, natural gas and LGP) and production reports (SAP) it was determined that systems and processes comply with the consumption criterion equal to or greater than 2% (we started with 4%). Based on analysis of benchmarking information, new technologies (e.g.,

suppliers, Best Available Techniques, Integrated Pollution Prevention Control IPPC), among others, we identify which systems / processes / equipment have a significant improvement potential. The review is carried out on an annual basis.

Applying the criteria established in terms of weight in the total energy consumption and potential for improvement, 17 systems/processes/equipment were classified as SEU in 2019, covering close to 90% energy consumption.

Each SEU has associated an OCP-SEU (Operational Control Plan - Significant Energy Use). Each OCP-SEU has associated at least one energy performance indicator (EnPI) with monthly and annual goals and respective responsible. Whenever the monthly performance exceeds the established objective by more than 2%, the person responsible for the OCP-SEU will have to open a CAP - Corrective Action Plan, identifying the causes and planning actions to restore normality. In the OCP-SEU, the set points for the relevant variables for consumption are also documented (e.g., washing temperature of reusable bottles, operating pressure of air compressors). SEU can also be audited on a regular basis, to check the level of compliance with established procedures and specifications or to identify waste of energy, misuse of energy, anomalies or poor maintenance status (e.g. compressed air leakage, steam leaks or malfunction steam traps).

Systems, processes or equipment SEU also have associated improvement measures or associated energy investment projects. These are scheduled in a multiannual plan (Roadmap).

"ISO 50001 changed the way we operate daily. Nowadays, energy efficiency is integrated in all decision making process and is core in our factory management"

— Carlos Branco, Environmental Manager

Do, Check, Act

The implementation of the Energy Management System was supported essentially on the following measures:

• **People skills** - Ensure the appropriate skills of employees with specific training actions, such as:

A) **Operational Control Plans - Efficient energy use**

B) **Raising awareness "Fábrica com Bom Ambiente"**

Figure 1. "Fábrica com Bom Ambiente" Comunication Wall- Good Environment Factory

• **Energy performance monitoring** – Dashboard development (KPIs / EnPI) to monitor on a daily basis energy performance. Results are automatically calculated and published in easy-to-read graphics (fig.2)

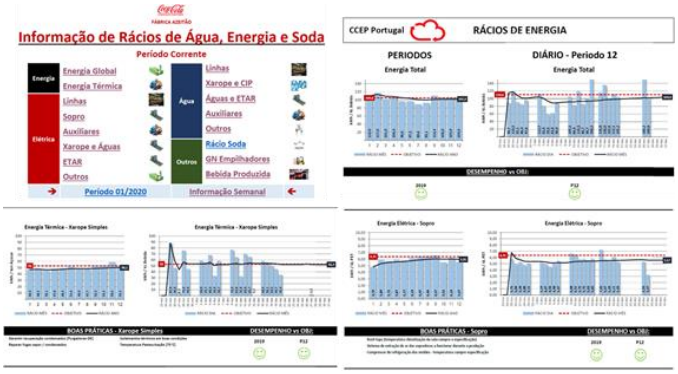

Figure 2. Dashboard KPI/EnPI

• **Internal communication** – communication of the results of energy performance, in a daily basis (mailing, visual management boards, factory management team meetings). Development of awareness material to reduce energy consumption. Display of set points next to the equipment (figure 3)

Figure 3. PET line set points information

• **Energy efficiency good practices audits** - in the first year of certification, monthly audits were carried out in all SEU areas (more than 100 audits). Currently, they are held quarterly, as well as air and steam leak audits, all carried out by internal resources.

• **Energy efficiency audits** - carried out by specialized external companies to identify energy efficiency measures. The reports include proposed improvement measures with the respective costs and savings. As an example, we have audits on thermal insulation, steam production and distribution and energy-intensive equipment.

• **Energy efficiency management** - monitoring energy performance, compliance with objectives and status of improvement projects are carried out in weekly meetings by the energy management team (Sustainability Pilar Meeting). When relevant deviations occur in the overall energy performance or processes, which cannot be solved at the operational level (operational responsible EnPI, SEU), the energy management team takes responsibility for the leadership to develop and implement an action plan. This meeting also evaluates the new ideas proposed to improve energy performance.

• **Recognition** - the participation of workers with ideas to improve energy efficiency is encouraged. The fulfilment of energy efficiency objectives is part of the performance evaluation system, globally and individually.

• **Improvement projects** - improvement projects that require investment (Roadmap) are analysed in monthly meetings, in which the plant's Environmental Manager and the Iberian Directors for Supply Network Manufacturing and the Strategy & Transformational participate. All projects that have a payback period of less than 3 years and have a relevant impact on improving energy efficiency are usually approved in a short period of time (usually 2 weeks). In these meetings, the results achieved with the implemented projects are also followed up against the expected results (cost reduction and energy consumption). The method of calculating savings is established prior to the implementation of the project. Usually, the methodology established in the ISO 50006 standard is followed. Currently, several projects are being studied, such as: A) installation of photovoltaic panels (3 MW power); B) biomass boilers (7 ton/h, 7 bar); C) recovery of thermal energy from air compressors, to gasifier CO_2, among others. Projects that require larger investments are analysed in top management meetings, by the CCEP group.

In recent years, several investments were made, such as new air compressors, electronic speed frequency in cold compressors, thermal insulation improvement, economizers in boilers, new tunnel pasteurizer, among many others.

The implemented methodology has enabled the achievement of energy efficiency objectives consistently. For example, the target in 2019 was 104.8 kWh/kl product and the result obtained was 101.9 kWh/kl. In 2018, the target was 108.1 kWh/kl and the result obtained was 103.8 kWh/kl. The objectives are not only set annually, but also set on a monthly basis, depending on the volume and types of products planned/manufactured. Monthly targets are also met as a rule. For example in 2019, the goals were achieved in 83% of the months (10/12) (figure below).

Períod report =>	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	Annual
En. efficiency 2019 - Goal (kWh/kl)	125,8	106,5	110,7	108,1	101,2	99,2	90,7	97,3	102,8	111,3	106,6	110,6	**104,8**
En. efficiency 2019 - Real (kWh/kl)	110,0	117,0	101,9	106,4	96,6	97,2	89,6	93,1	110,4	106,0	105,9	104,0	**101,9**

The energy consumptions (electricity, natural gas and LGP) of the installation, used in the calculations of energy efficiency are based on invoices from suppliers. This information is audited by external entities, a requirement for the publication of sustainability reports for companies listed in the Dow Jones Sustainability

indices. The energy efficiencies of SEU are calculated based on the installed meter system (electricity, steam, natural gas and water). These meters are included in the EMM calibration plan.

When **purchasing services, energy, equipment** and energy-consuming elements (e.g. electric motors, lamps), we now include energy efficiency criteria. Suppliers are informed in advance that energy efficiency is one of the criteria that will be taken into account when purchasing or contracting. In case of equipment purchase, whenever we have more than one option, we carry out the life cycle analysis, with regard to energy consumption, cost and CO_2 emissions.

We prepare **external audits** throughout the year, carrying out the activities planned in the energy management system. Internal audits are carried out using the support of an experienced external auditor. We are proud that in the 6 years of certification (2013-2019) we didn't have any nonconformity in external audits.

•Methodology for energy performance improvement

The Energy performance improvement is calculated comparing reporting period (2014-2019) with baseline period energy consumption (2013). The conversion factors for CO_2 Emissions were used as obliged in Portuguese Law (17313/2008): Natural Gas 64.1kg CO_2/GJ; LGP 63.0kg CO_2/GJ; Electricity 130.56kg CO_2/GJ.

Transparency

Our ISO 50001 certification is widely communicated. In our factory we expose it to all our employees and visitants, in the entrance hall. We communicate ISO 50001 certification in the internal network and to all the CCEP system. Every year it's reported to Carbon Disclosure Project, Dow Jones Sustainability Indices and other indices like FTSE4Good and in the ISS-oekom Corporate Responsibility. It was part of the Green Project Award appliance achieving recognition as a finalist in Energy Efficiency in 2018 in Portugal. Every year we also publish the Portuguese Sustainability Report showing our results in This is Forward plan: https://www.ccepiberia.com/pt/relatorios-anuais/relatorio-sustenabilidade-2018.pdf

Lessons Learned

Recognizing our errors or limitations helped us grow:

Mobilize more resources: Unfortunately Portugal as a very restricted budget, due to the size of the market and the revenues of the Portuguese part of the Iberian BU. Also human resources would be needed to go even further and faster.

Improve team cooperation: A lot of efforts have been done to improve cooperation between departments. In the past years we acknowledged a good team work between the Quality and Environment department and Communication and Sustainability. But this active cooperation has to pass to all departments.

Benefits of ISO 50001 communication: All benefits and cost saving that we achieved need amplification, so that more CCEP factories and BU can see the value of improving energy performance following ISO 500001.

"Our success depends on becoming the world's most sustainable bottler. We'll also do more on carbon and water as we transition to low-carbon, zero-waste and circular business."
—Damian Gammel, CEO Coca-Cola European Partners