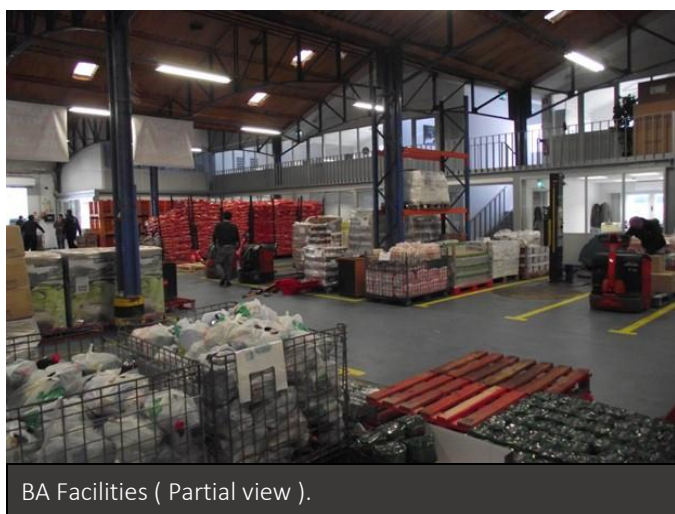


Global Energy Management System Implementation: Case Study

Portugal

Banco Alimentar (BA)

By Manuel Norton, Feb.2017



BA Facilities (Partial view).

Business Case for Energy Management

“Banco Alimentar Contra a Fome” (BA) is a Charity Organization which Mission is **“Fight food waste and help feed people in need ”**. BA is a member of Portuguese Federation of Food Banks.

BA was founded in 1992, is based in Lisbon and actually distributes about 9.500 ton of food per year to more than 70.000 people in the area of Lisbon.

The total amount of food distributed comes from different sources but always as donations.

Also the BA operation costs are full supported by annual donations from more than 7.000 donators. No Government support is considered. BA has a payroll of 20 people and the collaboration of about 200 volunteers. This meaning a daily presence of about 80 persons.

Taking in consideration that “Fighting waste” is part of BA’s Mission decision to apply for ISO 50001 was taken

in order to better manage and reduce waste of energy, as an extension of this concept.

BA is certified both ISO 9001 (2009) and ISO 50001 (2015) by APCER.

“The Energy Certification is full in line with our Mission to fight against waste.”

— Isabel Jonet, BA President

Case Study Snapshot

Industry	Charity
Product/Service	Food / Storage & Distribution
Location	LISBON PORTUGAL
Energy Management System	ISO 50001
Energy Performance Improvement Period	2 years
Energy Performance Improvement (%) over improvement period	1,0 %
Total energy cost savings over improvement period	6940 \$USD
Cost to implement EnMS	0 \$USD
Payback period on EnMS implementation (years)	0 Year
Total Energy Savings over improvement period	30,85 GJ
Total CO ₂ -e emission reduction over improvement period	3,7 Metric tones

Business Benefits Achieved

During the EnMS implementation phase (2014) Electricity consumption has been reduced on a total of 3%, just because of behavior changings and best practices. Not a single USD has been spent, which is a fact of major importance to a “Charity” like BA.

During the building refurbishment (2015) ISO 50001 requirements have been considered and introduced, when defining renovation solutions as well as when defining the procurement criteria for the contractor, materials, and equipment.

In 2016, one year after EnMS Certification, energy efficiency measures (LED Lighting System) has been implemented, sponsored by EDP Foundation, due to their perception of BA’s EnMS credibility and sustainability. Yearly electricity reduction from 5% to 8% is expected in 2017.

Energy Intensity (toe/1000 ton of food distributed) has been reduced from 4,67 (2014) to 4,62 (2016) and Global Energy Cost from 4,82 USD/ton (2014) to 4,44 USD/ton (2016) resulting in a saving of 6.940 USD during 2015 and 2016. It means an 8% reduction in Energy Costs and 0,9% in Operating Costs.

PV panels have been installed in order to support a rational and sustainable use of energy.

EnMS Development and Implementation

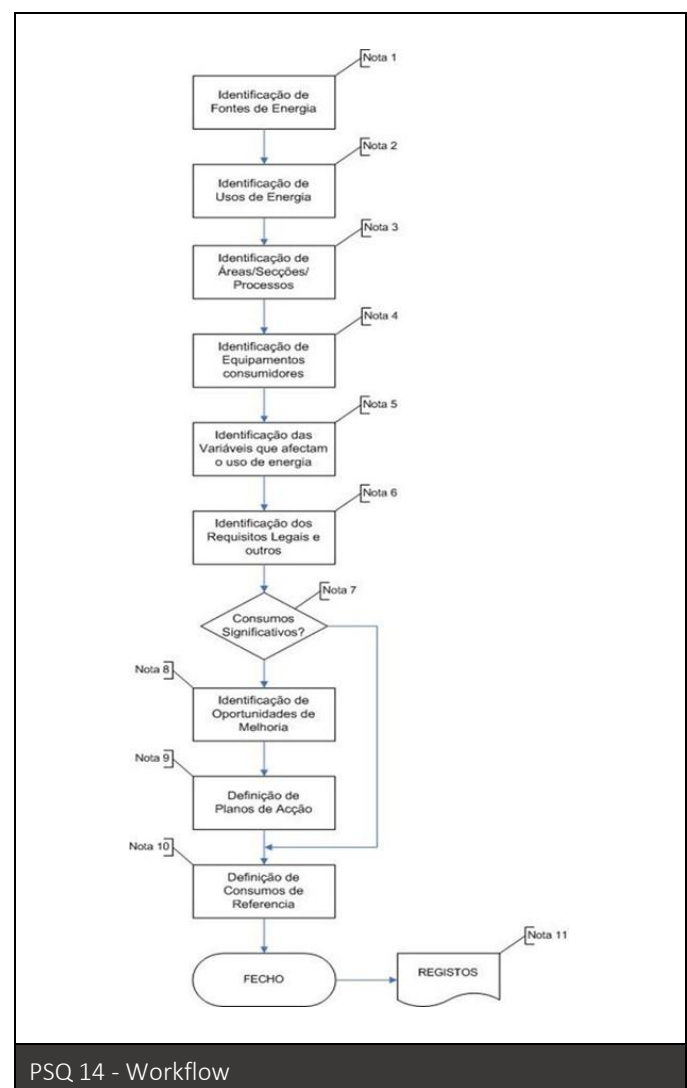
Organizational: EnMS is certified since 2015, after 1½ year implementation period, so it can be considered as a mature system. Due to its integration with the QMS (ISO 9001), that is implemented and certified in BA since 2009, top management involvement, decision making processes, system revision, i.e. the structure of the Management System, follow the PDCA cycle programed according to the ISO 9001.

Energy review: The yearly “Energy Performance Report” is the output of the Process “Energy Management” (activities related to the energy planning), and the support of the decision making concerning Energy

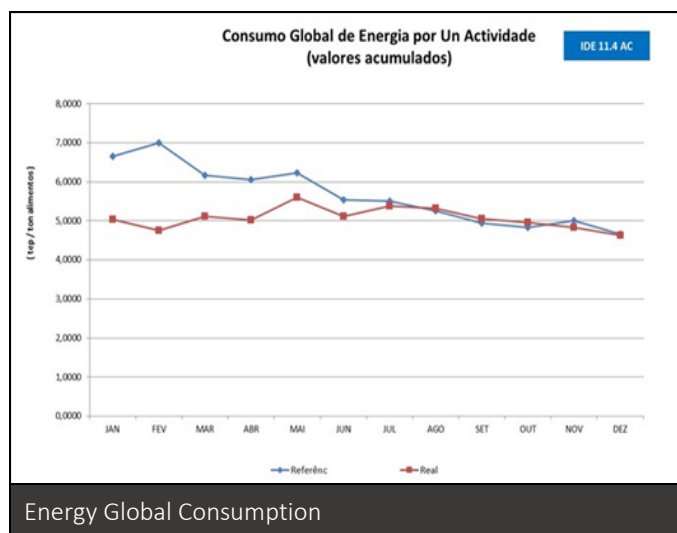
Revisions, Action Plans (PAGE), Energy Evaluation and Monitoring Procedures.

The “Energy Performance Report” deals with following issues:

- ENERGY EVALUATION
- LEGAL COMPLIANCE
- ENERGY INDICATORS (EnPI)
- IMPROVEMENT OPORTUNITIES
- OBJECTIVES AND TARGETS
- CONCLUSIONS AND PROPOSALS (Baseline, EnPI’s, Objectives and Targets, Action Plans)



The process of understanding energy consumption & use, is in accordance with the workflow defined by the Procedure **PSQ 14 – “Energy Evaluation Methodology”**, which objectives are the definition of a methodology, criteria and the necessary responsibilities to grant the correct Energy Review and compare with the Baseline, through the activities defined in the integrated management system. These activities are done in a monthly basis that allows the basic monitoring and internal communication.



Every time values are out of the defined limits, the system generates automatically a NONCONFORMITY that has to be registered and managed according to the **PSQ 09 – “Corrections, Corrective Actions and Preventive Actions”**. Legal and other requirements applicable to BA’s activities are identified, controlled and its compliance evaluated.

The definition/update of Indicators is done annually during the System Revision and Energy Planning Revision according to the procedure **PSQ 18** which Objective is “Define the methodology and responsibilities for determination and revision of Indicators, as well as Objectives and Targets to be achieved.

The routine control of all the aspects of the operation and the EnMS is based in two main tools, besides the

Energy Evaluation. The Internal Audits and the informal Walk Through Audits (WTA’s).

Finally the management review. Yearly the EnMS is reviewed by the Top Management. The outputs are between others, the new objectives, targets and EnPIs to control as well as the new Action Plans to follow.

When deep changes occur, in the installation, in the processes, in the equipment or in the people (consumption, use and efficiency) a new Energy Audit is done in order to define a new base line. This has happened in 2016 after the changes in the administrative area, and an Energy Audit according to ISO 50002 has been done and a new baseline defined.

Financing: As mentioned before, BA being a “Charity” most of investments were “pro bono”, at several levels. Three main investments related with Energy Management have been done:

- First one was PV and solar heating which involved a direct investment from BA of 698 USD (90% sponsored). Pay back of direct investment was 3 months.
- The second was refurbishment of offices which involved an extra cost of 6.200 USD with a pay back of 8 to 10 years. Extra cost was related with external wall and windows better isolation and use of LEDs instead of fluorescent tubes.
- A third investment was the replacement of all fluorescent lamps (T8) by LED tubes in the store areas. Total investment (pro bono) was 7.990 USD with a pay back of 4.4 years. The savings of one year operation estimated in 1.800 USD must be reinvested by BA in other Energy Action Plans as foreseen in the “Energy Performance Report”.

“Cost reduction is a must to any organization, mainly to a Charity. The EnMS has helped us not only in energy cost reduction but also in attracting sponsors to the investments needed to reduce costs.”

— Manuel Norton, BA’s Board Member

Cost-benefit analysis: As mentioned the works related to the implementation (internal energy team and external consultants) and certification (internal and third part auditors) had no cost, because the internals work as volunteers and the external work was “pro-bono”. However, the estimated implementation costs would already have been paid back with the energy cost savings related to behavior changes, better practices using energy and more efficient equipment.

As said, the achieved Energy Intensity reduction resulted in a saving of 6.940 USD during 2015 and 2016. Savings of 2014 should also be included, but no indicators were available at that time.

Now BA has a more sustainable operation which can be supported by the “Energy Intensity Indicator”. One must never forget that BA is seen as a leader avoiding waste, and Energy is included. This good impact in the image can’t be evaluated.

Several investments are still pending (Action Plans), mainly in the monitoring capacity and in food refrigeration use. Other “pro-bono” investments must be captured to fulfill these needs. So, a responsible and sustainable image is a must to sensitize donators, as said before.

Approach to performance improvement: Energy consumption in BA is in a major part proportional to the amount of food products handled. This is true for Diesel and GPL and on a lesser degree for electricity.

This is why the following two EnPI’s were considered to measure energy performance:

- Global Energy Consumption/Unit of Activity (toe/ton distributed)
- Global Energy Cost / Unit of Activity (USD/ton distributed)

2014 and part of 2015 has been the EnMS implementation period. 2015 and 2016 is considered as the improvement period.

Approach to validate results: As previously stated Monitoring and Registration of energy consumption are activities monthly done by type of energy and, when

possible, by use of energy. Procedures **PSQ 02- Registers Control** and **PSQ 18- Methodology for Definition and Revision of KPIs, Objectives and Targets”** are followed. The parameters monitored and registered in a data sheet are analyzed. Results are validated due to its automatic comparison with reference data (Baseline).

Any time values are out of defined tolerances, a NONCONFORMITY is automatically generated by the system and another register is then created. Thus, the normal EnPI and other operational data are registered and supervised. The NONCONFORMITIES generated help us on the task of tracking significant deviations since they are all registered and listed.

The normal checking is performed by Internal Audits according to **PSQ 03- Internal Audits**. Informal audits (Walk Through Audits) are also used for a more performing operational control.

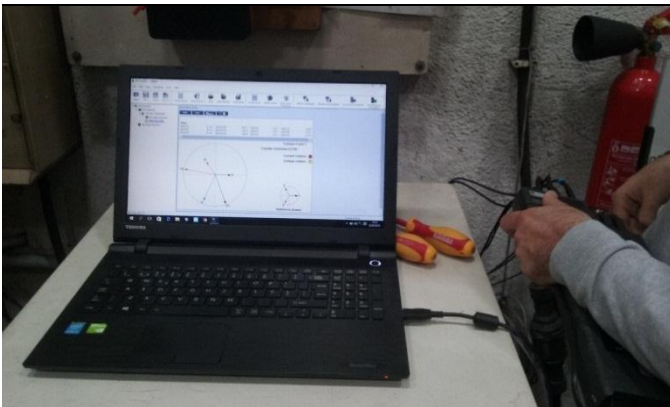
Important changes in processes or lay-outs, like the ones processed in the 2nd half of 2015, led to the decision of doing a new Energy Audit (according to ISO 50002). This has happened during 2016.

Steps taken: The procedure **PSQ 16- Operational Control** defines the methodology and responsibilities for the planning of operation and maintenance of equipment and systems related with significant use of energy.



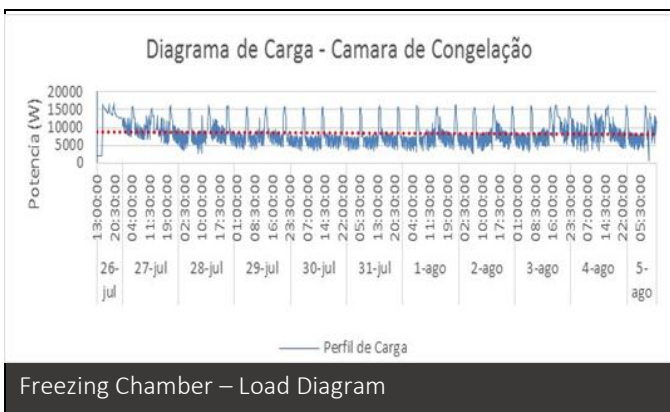
Freezing Chamber and the smaller Cooling Chamber

As said in the previous point, in 2016 an Energy Audit has been done and consumption profile of the significant energy users was evaluated with major detail.



Energy Audit – Data collecting

Freezing Chamber and 2 Cooling Chambers meant 55% to 60% of the total consumption.



Freezing Chamber – Load Diagram

Development: The major part of BA collaborators are volunteers, not employees. The EnMS implementation started with an intense training program about several aspects of energy management and best practices. Everybody, from the President till the most humble volunteer attended these training sessions and discussed the major opportunities and threats of this System.



Training Session

A very simple “Best Practices Manual” has been created. Since there are no Energy specialists in BA, EnMS is kept simple and smart. That is the main key to the success the EnMS has achieved which is everyone’s engagement and the source of inspiration to those who daily come to BA to pick up the distributed food as well as other related organizations.

Tools & resources: EnMS implementation in BA has been done by the internal Energy Team, supported by external Consultants in a “pro-bono” basis as also the Internal Audits and Certification Audits by APCER.



Energy Team

Energy Consumption is monitored and controlled through monthly measurement and registered in a data sheet base that compares real values with reference values (Baseline) and provides alarms when pre-defined limits are over passed. In this case a NONCONFORMITY is opened and the cause analyzed.

Walk Through Audits (WTA) made by ordinary collaborators, in a pre-scheduled basis, help to check the System efficiency, mainly in those uses where energy waste normally occurs, like lighting and air conditioning. These are very simple controls with a very little time consumption, but with enormous results avoiding important energy wastes.

Lessons Learned

Three major lessons were learned:

1. Energy must be cared as an asset or feedstock;
2. To improve energy efficiency, the first thing to look at are behaviors and practices;
3. One can't manage what one can't measure.

The first lesson was learned in the first day implementation started, just because energy has entered the management strategy, from purchasing to use. This is of high importance namely in an organization that lives with few financial resources and aims to fight against waste.

To decrease energy consumption there are two complementary ways. To change behaviors and improve equipment efficiency. Changing behaviors takes time but

better practices are free but bring surprisingly short time results.

The third lesson is a confirmation of a well known lesson in Quality Management Systems. BA's EnMS has now reached a level of information needs where monitoring capacity has to be improved otherwise further decisions can't be taken. Monitoring won't decrease energy consumption, but will help a lot

Keys to Success

- Look at energy in a different manner;
- Make an EnMS smart and simple;
- Engage everyone, not only the Top Management;
- Monitor efficiently;
- Communicate.



Through the Energy Management Working Group (EMWG), government officials worldwide share best practices and leverage their collective knowledge and experience to create high-impact national programs that accelerate the use of energy management systems in industry and commercial buildings. The EMWG was launched in 2010 by the Clean Energy Ministerial (CEM) and International Partnership for Energy Efficiency Cooperation (IPEEC).

For more information, please visit www.cleanenergyministerial.org/energymanagement.