

# ISO 50001 Energy Management System Case Study

Argentina

## A-Evangelista S.A. (AESA)

*AESA Planta Canning Facilities*



AESA Planta Canning, Buenos Aires, Argentina.

### Organization Profile & Business Case

AESA is a leading company with 70 years of experience in the energy industry, dedicated to Engineering, Construction and Services, which integrates engineering activities, manufacturing, construction, operation and maintenance of plants and oil fields; directed mainly to the Oil, Gas and Petrochemical sectors. It develops all its operations under its Integrated Management System (IMS) according to the ISO 9001, ISO 14001 and OHSAS 18001 Standards.

Engineering activities, equipment manufacturing, and process modules are carried out at Planta Canning, located in the south of Buenos Aires City.

#### Drivers

Aligned with the company's policy and the commitment with the environmental care and its continuous improvement, during 2011 the path towards energy efficiency began to be explored. At the end of that year, it was defined to move forward with an Energy Efficiency Audit carried out by specialists in the field, which yielded novel results that enhanced the interest in the subject and with wide possibilities of implementation of all the improvement actions.

Some of the identified improvements and awareness actions in conscious and rational & efficient use of the resources were implemented at different stages.

#### Case Study Snapshot

<b>Industry</b>	Iron Steel and Fabricated Metals
<b>Product/Service</b>	Oil & Gas Engineering and Equipment Construction.
<b>Location</b>	Buenos Aires, Argentina
<b>Energy management system</b>	ISO 50001
<b>Energy performance improvement period</b>	2 years
<b>Energy Performance Improvement (%) over improvement period</b>	6,56 %
<b>Total energy cost savings over improvement period</b>	\$USD 44.182,00
<b>Cost to implement EnMS</b>	\$USD 39.114,00
<b>Total Energy Savings over improvement period</b>	1574,00 GJ
<b>Total CO<sub>2</sub>-e emission reduction over improvement period</b>	212,5 MT eq. CO <sub>2</sub>

## Business Benefits

Tangible and intangible benefits were identified within the privileges reached by the implementation of ISO 50001 standard.

First, the standard was incorporated into the existing Integrated Management System and as result it was obtained a 6,56% reduction in the electricity consumption, representing 437.222,26 kWh and a \$USD 44.182 savings, constituting a reduction of CO2 emissions equivalent to 212,5 MT eq. CO2.

It contributed to the execution of an evaluation of renewable energy installation projects in our facilities, with potential for future implementation.

Second, the contribution to the paradigm shift of the excessive use of resources, promoting culture and good habits of rational use of energy in our stakeholders: in our employees who acquire knowledge and good practices and then replicated in their homes, and in the strengthening of the value chain.

It represented a significant contribution to the company, in line with its operational excellence objective and its commitment to sustainability, contributing systemically to the generation of human and social capital.

## Plan

AESA has implemented an IMS since 2005, which meant a great advantage for the implementation of ISO 50001, from the consolidation of the system to the commitment of employees, the familiarization with the system and its daily use.

In 2015, the "Subsecretaría de Ahorro y Eficiencia Energética", under the "Ministerio de Energía y Minería de la Nación", launched the "Programa de Soporte ISO 50001" for companies. This opportunity marked a course towards the implementation of ISO 50001. AESA Planta Canning applied, and it was selected as one of the companies which were participating in the program.

This program consisted in a financing of an external Consultant to support the first energy review, identification of gaps with the current IMS and a first internal audit. In addition to this, it contemplated the training of six employees who would later form part of the Energy Management Team (80 hours per participant, online mode, with final evaluation).

This project allowed the company to materialize the objectives pursued for:

- Optimize the plant energy performance.
- Strengthen the rational use of energy.
- Provide continuity and integration of all actions already carried out and maintain the results over time.
- Evaluate, plan and define critical processes to be intervened.

Having addressed the issue of energy efficiency in previous years, it also meant a contribution to the efficient operational culture in which the company had already been working.

The General Management and different managerial levels contributed giving their support in the decision of the implementation of the ISO 50001 standard, as well as making the necessary decisions for the associated resources.

## Energy review and planning

At Planta Canning facilities, a conjunction of developed activities are presented: administrative and engineering activities (offices), as well as production activities (manufacturing, warehouses). It was essential to have accurate and discriminated information regarding energy consumption.

The period between 2014 and 2016 was considered for the realization of the baseline, and the different sources of energy and distribution were taken by source: electric energy, natural gas and gas oil. All the data corresponding for total consumption, productive man hours, and degree days necessary for cooling and heating were used, at a confidence level of 95%, applying a linear regression model.

According to the data of the period under analysis, energy consumption was distributed as follows:

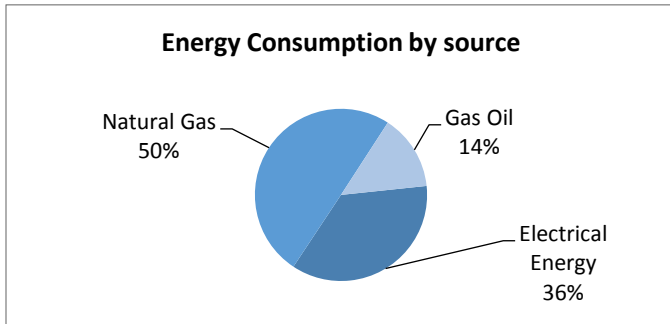


Figure 1. Energy Distribution consumption by source

Meanwhile, from the economic point of view, the consumptions adopt the following distribution:

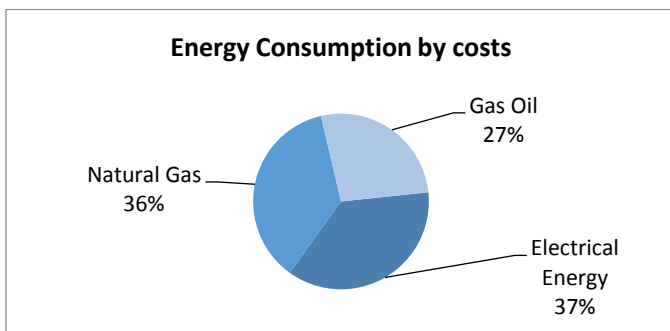


Figure 2. Energy Distribution consumption by costs

From the analysis of the energy consumption, it could be verified that natural gas varies significantly with the seasonal periods, being that the consumption of electrical energy maintains a more constant line and independent from the seasonal temperature.

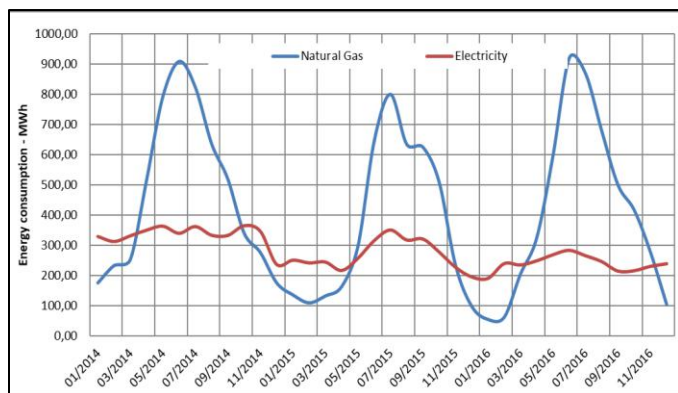


Figure 3. Timeline Evolution for Energy consumption by source - period 2014 - 2016

Under these concepts, AESA defined a focus on the optimization of "Electrical Energy" source based on:

- Achieve efficiency in the energy source that can represent the greatest social impact and saving.
- The implementation of improvements that affect both sectors (offices and production areas).
- Development of actions that may have continuity throughout the year.
- Enhance the obtaining of an improvement / constant saving.
- Minimize significant environmental impacts of the activities it develops.

### Do, Check, Act

#### Energy Management Team

The initial work team received training and formed a new Energy Management Team, integrated by maintenance, general services, production, IMS, environment and engineering personnel.

Likewise, it was made an open invitation to participate to anyone who was interested in the subject by communications made through the company's network.

#### Determination of Electrical Energy use and consumption

To consolidate strategies and plan management objectives, it was necessary to be able to know the main uses and consumption. From the identification of them, the following profile appears:

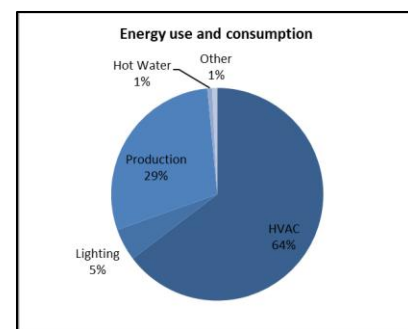


Figure 4. Planta Canning consumption distribution (2014-2016)

**Improvement opportunities in energy performance**

Opportunities for improvement that had a high impact on performance were identified:

- *Implementation of an Energy Measurement System.*

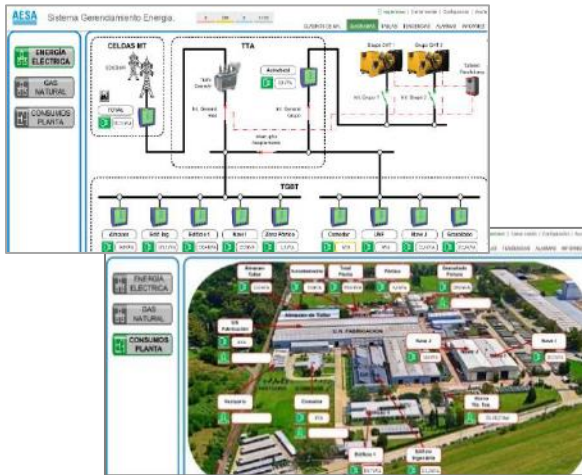


Figure 5. Energy Management AESA's Screen View

In May 2017, the implementation of the “Power Monitoring Expert Software” was carried out, which involved the installation of sectorized electric energy meters and a significant improvement in the quality and quantity of the information provided.

- *Implementation of a training and awareness program in ISO 50001 standard.*

AESA considers training and awareness in the efficient use of resources as a priority and fundamental, and therefore it has already implemented the actions to achieve the involvement and knowledge of the staff.

During 2014 and 2015, the “Programa EPA” was put into practice, which is an annual program launched by IARSE (Instituto Argentino de Responsabilidad Social Empresarial), oriented to promote saving habits of all resources related to energy, paper and water (EPA).



Figure 6. Communication and awareness campaign.

The technological measures implemented, were joined with a training plan that marked behavior patterns and knowledge of the standard.

Training in the specific standard was carried out through the interactive E-learning mode under an on-line platform for those with access to the network, while for the production staff the training was in a classroom.

The communication campaigns were designed under the slogan "Energy Challenge" seeking to reinforce saving concepts and to communicate implementation progress.

Tools for identifying improvement opportunities were developed through a Survey of "My Energy Behavior" and a system of "Inefficient Use of Energy Observation" through which deviations could be recorded.



Figure 7. Improvement Opportunity Tools

- *Implementation of Technological Improvements.*

Improvements to be implemented were designed according to the different uses and facilities, and the opportunities identified in the energy efficiency audit.

Several actions were completed, and others are ongoing.

Energy Efficiency		
Installation	Type of use	Improvements
Production facilities	Lighting	Improve efficiency by changing to LED technology Install sensors for automatic exterior lighting facilities
	Production-Compressors	Avoid discharges cycles
	Production-Road Roller	Avoid no-load operation
	Production- Folder	Avoid no-load operation
Offices	Lighting	Improve efficiency by changing to LED technology
	HVAC-ACS	Set point adjustment of air conditioners. Awareness of keeping doors and windows closed Blocking access to HVAC temperature controllers

Table 1. Planned Technology Improvements

**Cost-benefit analysis**

The costs of implementation of the EnMS include: external audit and certification, employees man hours and development of external training, reaching \$USD 39,114.00.

Likewise, it meant an economic saving for the company of USD 44,182.00 in electricity consumption, resulting in a repayment period of 1.77 years.

**Validate results**

For the definition of the baseline it was used the data corresponding to total kWh consumed, productive man hours, and degree days needed for heating and cooling, at a confidence level of 95%, for the period 2014 to 2016. From the application of the regression, we obtained the equation of the following curve, which represents the energy baseline for electricity.

$$\text{Base Line (EE)} = 236,95 * \text{HDD} + 224,89 * \text{CDD} + 2,67 * \text{MH Productive} + 166270,17$$

Where:

HDD: heating degree days

CDD: cooling degree days

MH: Man-hours

Electric Energy Efficiency – Base Line Application			
Period	Consumption	Total Man Hours	Efficiency
	kWh	MH	kWh / MH
2014	4.009.827,00	2.992.863,00	<b>1,34</b>
2015	3.220.540,00	2.215.420,00	<b>1,45</b>
<b>BASE LINE</b>	<b>2.999.100,56</b>	<b>1.691.285,00</b>	<b>1,77</b>
2016	2.880.754,00	1.691.285,00	<b>1,70</b>

Table 2. Electric Energy Efficiency

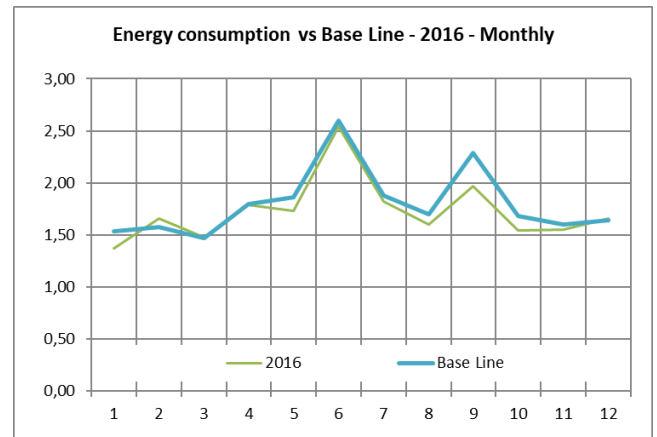


Figure 8. Electric Energy Efficiency 2016 – Base Line

**Target definition**

Two main indicators were initially defined, which were monitored during 2017 and 2018: efficiency in natural gas consumption and efficiency in electricity consumption. It was defined as an objective in electric power, to obtain a saving ≥ 5% in relation to the baseline.

Electric Energy Efficiency			
Period	Real Efficiency	Efficiency according to Base Line	Savings
	kWh/MH	kWh/MH	-
2017	1,56	1,67	<b>6,94 %</b>
2018	1,61	1,72	<b>7,08 %</b>
Accumulated	1,59	1,70	<b>6,56 %</b>

Table 3. Results



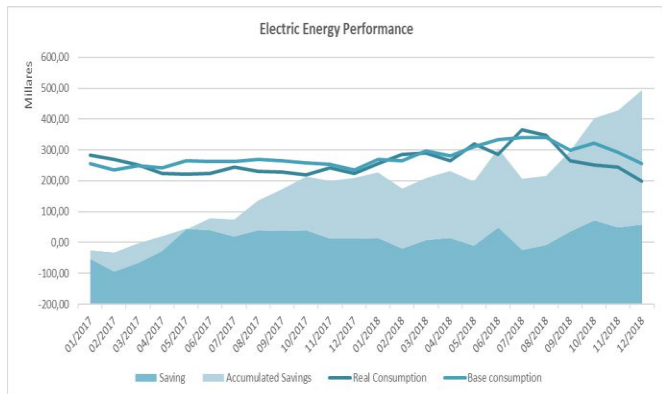


Figure 9. Efficiency Electric Energy Performance

## Results

- The objective of electric energy efficiency was exceeded.
- It was possible to install energy consumption at all levels of the organization as a problem to be considered, implementing open communication channels and responding to the concerns of the interested parties.
- Specific plans were implemented to reduce consumption in the plant equipment, the use of energy for heating and cooling was stabilized, a plan for the replacement with LED lights was planned and implemented.
- ISO 50001 certification was achieved in July 2017 as planned.

## Transparency

AESA communicated ISO 50001 certification through various means of communication, internal and external, as detailed below:

- Internal network of the company for all internal and contracted personnel.
- Corporate network that includes as receivers all the employees of YPF S.A, controller of AESA.
- LinkedIn
- Journals specialized in energy issues with presence on the internet.
- Communication to the “Subsecretaría de Energías Renovables y Eficiencia Energética”.

## Lessons Learned

- The implementation of ISO 50001 allows classifying managements and guaranteeing the continuous improvement in energy performance.
- Small improvement actions can achieve a great impact.
- The contribution of all areas / actors / users is very valuable.
- The expected results can be obtained with a simple and clear EnMS.

*“We are implementing a transformation process and being energy efficient is part of it.”*

Walter Actis, CEO.

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](http://www.cleanenergyministerial.org/energymanagement).

