

Global Energy Management System Implementation: Case Study EPRE

Argentina

EPRE

Management to set the example and be held accountable. (5,7 % annually)



Energy team

Government Business Case for Energy Management

The EPRE is a public body in charge of controlling and supervising electrical energy matters. Among its functions, we can mention: to protect users' rights; to improve the quality of life and to enforce the regulatory framework, overseeing the compliance of concessions' contracts and preventing anticompetitive or discriminatory conduct.

The EPRE is directed and managed by a board composed of a president and two members. It also has an advisory body, made up of local government representatives, intermediate entities, universities and other interested parties. It is sustained by inspection fees charged to distributors and users. Its headquarters consist of a building built in 1909 that has not been substantially modified ever since and is part of the patrimonial and cultural heritage of electricity in the

province. Its tasks are primarily administrative and has 66 agents.

The entity obtained ISO 50001 certification in April 2015, after 18 months of implementation, and has requested recertification for 2018. During that period we received 4 external audits that confirmed the evolution of our system. The EPRE was the first public body in Argentina to certify the ISO 50001 standard from the Argentine Institute for Standardization and Certification (IRAM). In fact, its IRAM-IQNet certificate is No. 2.

In order to understand the motivations behind the certification, we must mention that as of 2007, with the National Decree No. 140, the rational and efficient use of energy was declared of national interest and priority and the guidelines for the National Program for Rational and Efficient Use of Energy were officially approved. Soon afterwards, the province of Mendoza, by Decree No. 043/07, adheres to the nation's initiative, stating that the province intends to set the example by implementing measures to optimize energy performance of its facilities. As the expert entity in energy, its board considered strategic that the EPRE assumed the leading role in energy efficiency against the waste habits acquired by society after years of subsidized rates. On another note, the resulting decrease in personal consumption, and its consequent financial savings, is a way of reporting back to electricity users who pay a rate to support the EPRE. Once this challenge was raised, an Energy Management System (EnMS) was implemented, so as to control and reduce energy consumption (gas and electricity). The EnMS was designed according to the requirements of ISO 50.001, by virtue of its replicability. The entity also decided to certify it by a third party through the IRAM. The ISO approach not only allows the optimization of resources but it also channels the efforts towards clear objectives, offering a strategic approach. Therefore, the EnMS implementation methodology focuses on improving

energy performance through the management and contribution of all its members, as they are responsible for the success or failure of the systems.

It must be stated that the EPRE has implemented the system assuming the costs of implementation and external audits, and has not had external financing to do so, with the exception of some energy recording meters granted by means of a gratuitous loan.

The implementation of EnMS in the EPRE is a collective achievement as it is the result of the participation of the entire organization. Its benefits affect the entity, its employees and Mendoza’s electricity users—Elian Japaz, President

Case Study Snapshot	
Industry	Government
Product/Service	Electricity Regulation –User Protection
Location	Location Mendoza - Argentina
Energy Management System	ISO 50001
Energy Performance Improvement Period	3 (2014-2015-2016) Certification in 2015
Energy Performance Improvement (%) over improvement period	17,20%
Total energy cost savings over improvement period	\$USD 3.500
Cost to implement EnMS	\$USD 12.000
Payback period (years) on EnMS implementation	3,55 years
Total Energy Savings over improvement period	146,76 GJ
Total CO ₂ -e emission reduction over improvement period	18 Metric tons

Benefits Achieved

The benefits obtained from the implementation of the system are many. The aspects that show improvement are detailed below

Financial: due to a reduction in energy consumption of approximately 5,7% per year, our operating costs fell, which strengthens our position against current rate adjustments. Since the implementation of EnMS, in 2014, energy savings are observed. However, after the certification in 2015, there was a considerable increase in energy savings.-

Environmental: based on the rational use of energy, electricity and gas, we have stopped issuing 18,6TnCO₂e since its implementation. Water has been considered in the analysis of the EnMS, since Mendoza is located in a desert area with an annual rainfall of less than 200 mm.

Strategic: setting the example allows us to be favorably positioned against electricity users, electricity companies, other government agencies and society as a whole. Considering that electricity generation is one of the main responsible for greenhouse gas emissions, public awareness of its rational use is highly positive.

Internal: through efficient energy management, the EPRE has led its staff towards a specific common objective.

The savings achieved, by modifying people’s daily behaviors, and the consequent motivation of our staff provided by this achievement, is perhaps the greatest benefit obtained from the implementation of EnMS according to ISO 50001.

EnMS Development and Implementation

After evaluating the implementation of ISO 9001 or 50001, the agency decided to begin with the second one, due to the strength of its energy competencies and the ability to reach a measurable objective such as energy savings. The agency’s motivation when implementing EnMS, led its board in 2017, to kick-start the implementation of 9001. Therefore, unlike most agencies, the EnMS preceded the QMS.



Energy meters

In this respect, we can say that the EnMS has considerably evolved since its certification in 2015 and today, the administration department works together with the energy team. For example, as regards purchases and hiring, "ad hoc" instructions were proposed at the beginning to deal with the impact on energy consumption. However, at present, the General Procurement System has been modified, incorporating energy evaluation. This is very significant, and it was not a minor task. Because the EPRE is a public body, its disbursements are regulated by strict rules that are difficult to modify. Therefore, the aforementioned inclusion is an example of how consolidated its EnMS is and how incorporated energy management is to the EPRE culture.

From the beginning, the board has been committed to energy management and has expressed its interest by following an energy policy and investing in activities to motivate and involve its staff in this matter. For instance, we can mention the initial awareness of this issue provided by the CREARA consultancy from Chile and the resources allocated to develop a space on the intranet for the EnMS, where the current system documents were placed and a suggestion box was implemented. This tool is essential to secure continuous improvement through the participation of all the staff, providing solutions, suggesting improvements, making observations, even expressing non-conformities and, of course, being recognized for their contribution.

The directors also appointed its representative, who put together an energy management team and proposed

internal auditors. The team is made up of an EnMS manager, an energy manager and a maintenance operator. Both the team and the auditors are permanent employees of the EPRE due to the fact that all our staff is very well trained in energy matters. Due to the size of the organization, their dedication is part-time, combining energy management with other tasks. When the implementation was decided, everyone was trained in 50001 through IRAM. Until the implementation of EnMS, the organization did not have its own maintenance staff. In fact, those tasks were carried out sporadically, if needed, and always through outsourcing contracts. However, the implementation required a part-time operator.

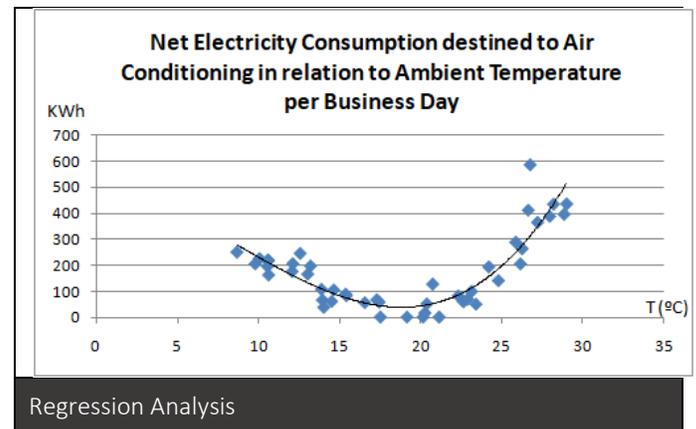
The team led the implementation of EnMS and coordinates energy management with the different members of the organization and their cleaning or surveillance contractors. Their tasks include: spend analysis, the annual energy planning review, achievement assessments, monitoring of objectives' progress, updating of system documents and the outline of proposals for improvement. These proposals may arise from any member of the organization since all of them have been made aware of the impact of their activity on the entity's energy performance and have also been motivated to participate. By means of the Intranet, the EPRE communicates the objectives and achievements of EnMS with all employees.

Once the EnMS has been implemented, it requires permanent incentive to maintain a more systematic approach in energy management. To this end, the board of directors delegated to those in charge of the EnMS, the selection and communication of material by means of good practices and advice, both in the office and at home. Its purpose is to teach people to value the environment and the rational use of energy as a way of protecting it, considering that individual behaviors are the ones that impact on the organization's consumption and the sum of these actions will in turn, have a significant effect on the region, streamlining the infrastructure required for that purpose. As a motivating milestone, we can mention the drawing

contest on energy efficiency among school-aged children and grandchildren of our staff, in which all participants were rewarded.

Definitely, this cultural change was decisive in EPRE's achievements in energy management, since the implementation of its EnMS coincided with the freezing of energy tariffs that had a negative impact on the agency's incentive to save energy. In fact, the freezing of energy tariffs led to a decrease in the entity's income which conditioned the implementation that was presented in stages. During the first stage, we had the advice of CREARA consultancy on how to prepare the initial energy review and energy performance indicators (EnPI) and on EnMS documentation. The initial performance review was conducted globally, based on a charges survey and using the billing data of gas and electricity companies. With the information gathered, the team evaluated energy uses and consumption, identifying the most significant ones, and laid down their energy base line according to the entity's annual calendar of activities in 2013. Consumptions were associated with computer and communication equipment, lighting, air conditioning and, to a lesser extent, with other auxiliary services. As we have said, these uses involve external participants such as cleaning and surveillance contractors, who were duly instructed on good practices. It is safe to say that the savings achieved in 2014 were the result of a change in the individual and cultural behavior of the organization. During the second stage, duly calibrated meters were installed in different circuits, which confirmed the results of the survey. Based on the analysis of the collected data, the energy team outlined the opportunities for improving energy performance, as well as their execution plans, with specific goals and deadlines. Finally, these plans were submitted for review by the board, who, considering the investment possibilities, assigned human and financial resources for their implementation. In summary, the main improvement actions regarding the EnMS have been: the implementation of a consumption monitoring system for the different uses of electricity in several electric circuits, the appointment of a maintenance

operator, the introduction of a scheduled maintenance of air conditioning equipment, the review of temperature control instructions, optimizing consumption based on climatic variables and building occupancy, the conversion to LED lighting and finally, in the event of renovation of obsolete computer equipment, the purchase of PCs, printers and servers that comply with the Energy Star standard and have other advantages that improve their efficiency. These have already been allotted but have not yet been installed. Therefore, their impact on consumption has not been perceived yet.



Because the EPRE is an organization that performs administrative tasks, its EnPI is a simple quotient that defines the energy consumption per working day. So far, they have not been modified because there have been no changes in the entity's activities that have affected their baseline. The model developed to explain energy consumption in relation to temperature and to isolate climate impact is detailed below, determining if a real improvement in energy performance is verified.

In addition to the plans previously discussed, which focused on improving energy performance, the organization has also carried out training and awareness actions to improve global management of energy, which were already mentioned as well. The results' indicators of these efforts are measured based on the investment in hours of training and through surveys on their results.

To assess energy behavior, the energy team analyzes the information provided by the meters in each sector. A regression analysis has also been done in Excel, which links the consumption related to air conditioning with the average daily temperature (from 7 to 17 hours), determined every fifteen minutes by the company CAMMESA for the city of Mendoza, obtaining a coefficient of correlation $R^2 = 0.93$ for gas and $R^2 = 0.82$ for electricity. This correlation allows us to discriminate between the deviations of consumption attributable to temperature and others that may be caused by lack of control in the system. Anomalous events in the use of energy are also analyzed, such as broken air conditioning equipment or building maintenance tasks that may cause atypical consumption and are approached in a particular way.

The results of the analysis described, help the energy team evaluate the behavior of the system and review future objectives and goals. The savings are always contrasted with the baseline, which allows us, through a simple but rigorous analysis, to know if our performance improves. Deviations are determined and evaluated, reconsidering the actions to correct them and keeping in mind the objectives and goals established.

The energy management system audits are carried out part-time by members of the organization who have no responsibility towards the EnMS. To guarantee impartiality and neutrality in their actions, they have been carefully selected and belong to the Technical Supply Management, while the energy management team belongs to the Regulation Technical Management. The behavior of EnMS is reviewed by internal auditors every year at most. The results of the audit represent an input from management's reviews and are a solid contribution to guide future actions. Chronologically, the internal audit precedes the external audit.

“Our energy team is dedicated to studying and analyzing the causes of any observation or non-conformity detected by internal and external audits, but more importantly, we encourage any member of the organization to detect a non-conformity.”

—Jorge Mastrascusa. Director.

Lessons Learned

- We estimated that EnMS required a lot of documentation and that we were not going to be able to prepare it. However, the documents and registers required by the standard are very few, and the rest, which are now part of the EnMS documentation, had already been developed for internal control.
- We incorporate energy care as the core value of the organization, which brought about a remarkable change in their personal habits which, in turn, resulted in a cultural change. For instance, someone informs whenever there is a sensor that does not work properly and the toilet light stays on. The same happens with water, which is a scarce resource in Mendoza.
- We had prejudices about the implementation costs of the EnMS. We thought that in order to make energy savings we would need large diagnostic studies or sophisticated equipment that would require a lot of investment. In a small organization oriented towards control tasks, such as the EPRE, the knowledge of our technicians was enough to detect small savings opportunities and improvements in working methods, which together produced good results.
- Improvements were made according to our investment availability, since the norm does not impose any standard in energy performance, much less investment obligations to achieve it. For example, our heaviest consumption was air conditioning but we did not have the resources to update the equipment. Nevertheless, we were not discouraged and we invested in LED lighting, achieving a substantial saving.

- We developed and implemented our EnMS with internal staff. CREARA advice was very useful at the beginning since they had experience in ISO 50001 and were able to help us draft the documents.

- Considering the scope defined for our EnMS, which is limited to the building and does not include mobility, we were able to organize an energy team with our permanent and part-time staff. We solved air conditioning maintenance with an external contract.

- The results of the implementation of our EnMS were different since the certification. Our implementation began in 2014 and we certified in 2015. Although there was a reduction in consumption since the implementation, the reduction increased since the certification. Therefore, it was absolutely positive to certify the system.

- We implemented the EnMS without having implemented the QMS. Today we feel ready to implement the QMS. We have confirmed that it is possible to implement and certify the EnMS, without having implemented the QMS.

Keys to Success

- Commitment of senior management was essential. The EPRE, as a government agency, replaces its authorities for periods. Being able to have an EnMS and an explicit energy policy guarantees that there will be no step backwards in energy management and its continuous improvement.
- The implementation of EnMS forces us to support our investment decisions to optimize energy performance based on objective criteria, which saves us many discussions.

- In organizations like ours, where mainly administrative tasks are fulfilled, performance improvements have a significant behavioral component. For that reason, it is necessary to carry out awareness actions aimed at each and every one of our members.
- The suggestion box implemented in the intranet is a very powerful and integrating tool.
- An improvement plan developed with everyone's contributions, motivates us to work together to accomplish the objectives set. On the other hand, the objectives are very specific and translate into something easily verifiable like energy. Consequently, the concrete achievements reinforce our motivation.
- It is also important to carry out a thorough energy review at the beginning and use recording energy meters to obtain real consumption data, electrical parameters, load factors, outages, etc. which allow us to make a network analysis and detect areas for improvement.
- The one who best knows the building and its facilities, is the one who can optimize consumption. Therefore, we must take advantage of the experience of our maintenance staff.
- Being pioneers in the implementation and having few references in our sector in Argentina was an internal incentive which, effectively channeled, gave us a competitive advantage.

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.

