

ISO 50001 Energy Management System Case Study

2020

Argentina

Mastellone Hnos.

The first dairy company to certify ISO 50001 in Argentina, extends its EnMS to facilities far from the main headquarters accumulating 54.100 GJ of energy saved



Mastellone Hnos. staff members in the Pascual Mastellone Complex (Main Headquarters)

Organization Profile & Business Case

Mastellone Hnos. S.A. is a dairy company based in Argentina main responsible for the supply of more than 170 products, not only for the local market but also in several neighboring and extra-regional countries. Ninety years from its foundation by the Mastellone family, the company has more than 3500 direct collaborators, of which 2800 already work according to ISO 50001 standards.

Although the company was born in General Rodríguez, (Where the main complex has grown uninterruptedly) it currently comprises 8 industrial complexes distributed in the Argentine territory. These include: Pascual Mastellone Complex and Armonía plant in General Rodríguez (Metropolitan Area of Buenos Aires); Victorio Mastellone Complex in Trenque Lauquen, Leubucó cheese producing plant in Saliqueló and two milk

Case Study Snapshot

Industry	Food
Product/Service	Dairy Products
Location	Argentina
Energy management system	ISO 50001
Energy performance improvement period, in years	3
Energy Performance Improvement (%) over improvement period	1%
Total energy cost savings over improvement period	550.000 \$USD
Cost to implement EnMS	55.000 \$USD
Total Energy Savings over improvement period	54.100 (GJ)
Total CO ₂ -e emission reduction over improvement period	4.677 (Metric tons)

analyzing and classifying plants located in the city of Mercedes and Junín (all of them in the interior of Buenos Aires); also the Villa Mercedes plant in the province of San Luis and Canals cheese producing plant in Cordoba province.

Since its beginnings, Mastellone Hnos., under the brand “La Serenisima”, has had the vision of elaborating its products with an efficiency similar to or higher than those in developed countries. Under this premise, the Leadership has established in the company's policy the implementation of Management Systems which promotes the continuous improvement and the training of staff in concepts of efficiency, quality, food safety, occupational health and safety, environment care and energy efficiency.

Based on these concepts, in 2018 the company declared its policy of sustainability defining 5 pillars: Assurance of dairy raw material, rational use of water, healthy lifestyle, human development and energy efficiency. This made the latter a strategic objective, transversal to the whole organization.

At the time, the Armonía plant had a certified EnMS and Pascual Mastellone Complex was about to have its first external audit, both under the ISO 50001 standard. By April 2019, Mastellone Hnos. had completed and maintained certification of the afore mentioned and successfully included Victorio Mastellone Complex and the Leubucó plant under the scope of the EnMS. As of January 2020, the Leadership reinforces its commitment, providing the necessary resources to incorporate every productive site under this standard. These efforts made Mastellone Hnos. the first dairy company in Argentina to certify ISO 50001 and a reference to other companies through its active participation in the “Redes de Aprendizaje en Eficiencia Energética”, a network driven by the National Subsecretariat of Energy Savings and Efficiency to share the experiences on this matter.

“Making energetic efficiency part of the organization's culture was the main factor in the implementation process and the extension of the scopes of ISO 50001 quote from organization about its achievement and success through ISO 50001.”

—Luis Ignacio Demicheli, management systems manager.

Business Benefits

Since the beginning of the process, we have achieved a reduction in energy consumption estimated in **15.027.777 kWh** which directly translates into avoiding the emission of **4.677.000 kg of CO₂**.

Some benefits are clear. As afore mentioned, each of Mastellone Hnos.' sites develop its activities in the Argentine territory. It must be stressed that 90% of energy produced derives from non-renewable sources and energy prices tend to rapidly grow due to high inflation rates. Also, the government began a process of

reduction of subsidies to the cost of energy. In this context, any improvement contributes to a reduction in both carbon emissions and energy costs.

As the sites are in different locations and have different infrastructures, the impacts of implementation vary. Moving away from the metropolitan area of Buenos Aires, energy costs may rise significantly. For example, in Trenque Lauquen, site of the Victorio Mastellone Complex, the cost of electricity doubles that of General Rodriguez, site of Armonía and the Pascual Mastellone Complex. Moreover, in the case of the Leubucó plant, situated in a remote location unreachable by natural gas connections, the company is forced to use fuel oil as the source of energy to produce steam. This means that the EnMS' impact is greater in the reduction of carbon emissions in this case.

“It may seem unambitious to propose reducing energy consumption by 1% or 2%, but when it translates to millions of kWh, it is really encouraging.”

—Gabriel Markow, Maintenance Manager.

From our experience, implementing in multiple sites helped to promote communication between different complexes, not only as what regards energy efficiency. Also, having similar equipment across different sites allows teams to contrast each other's measurements, revalidating them.

We can also find indirect benefits. Some projects resulted in a reduction of water consumption. In the Leubucó Plant cold water from silos was recovered, allowing the plant to consume less electricity for this purpose. Also, lowering running hours translates to less maintenance associated costs and the reduction of accident risks.

Implementation Costs

Three years of experience working with the certification in ISO 50001 allowed each implementation to be more timely and cost-efficient, requiring less staff time and no significant monetary investment. The challenge posed by the certification of the Victorio Mastellone Complex and the Leubucó Plant was the distance from the main headquarters, being more than 400km away.

Nevertheless, having preexistent procedures and documented information simplified this arduous task.

Plan

Stage by stage, learning and improving: Implementing across multiple sites.

The first stage of our ISO 50001 implementation began in 2016 when Leadership decided to introduce this new standard in the Armonía Plant (102.232 GJ/year). At the time the plant had similar processes as the Pascual Mastellone complex but in smaller dimensions and less equipment. The strategy behind this was clear: make our first steps into the standard in a more controlled environment. To carry out this task, the first EnMT was constituted, composed of staff from the areas of Management Systems, Maintenance, Engineering, and Production. This first case (Presented to this ministerial in 2018) was successful, obtaining the certification in March 2017, improving our energy performance by 3,2%.

Following this, motivated by the results achieved, Leadership set its sights on replicating this experience in the Pascual Mastellone complex (with consumption of **1.257.326 GJ/year**, 12 times that of the Armonía Plant). Due to the complexity of this new challenge, the whole complex was divided into 5 different areas, each one with its own EnMT correspondent to the main production lines. Although each area had its own team, the company considered necessary to establish another workgroup with representatives of each team, to inform the progress of the implementation, share useful information and determine general procedures with the help of the Management Systems area. Some members of this central team had already experienced the implementation process in Armonía, making the process smoother. The result of this effort was the certification in December 2018.

Our third stage was the extension of the EnMS to two other complexes, this time far away from the Main Headquarters: Victorio Mastellone Complex and the Leubucó Plant. This seemed like the next logical project because, although 400km away, they are the closest facilities, allowing the company to increase the energy managed by **448.015 GJ/year**. As with the Armonía

implementation, this was a trial on how to implement an EnMS from a distance, before extending to the rest of the facilities. At the same time, this advancement served as a declaration of energy management as a policy for the company as a whole and not just a local initiative in the General Rodriguez plants. For this purpose, two more EnMT were assigned, also dependent on the Central EnMT.

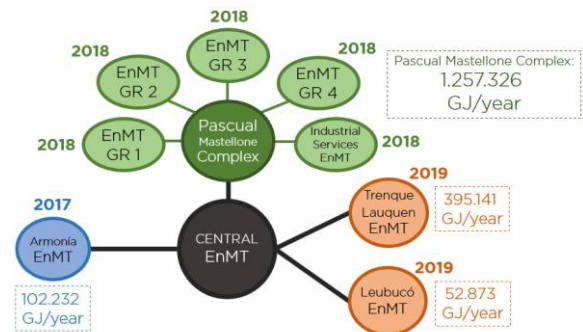


Figure 1. Diagram showing EnMTs created to carry out each certification process.

Prior to implementation each team underwent a process of analysis to understand how energy was consumed in the plant. For that, the group had to determine which sources of energy were significant and carry out an energy review. A documented procedure was necessary to follow the same methodology uploading data, establishing measurement techniques and using the same formulas to estimate consumptions. If no significant changes take place, energy review is repeated every year and results are communicated to the staff.

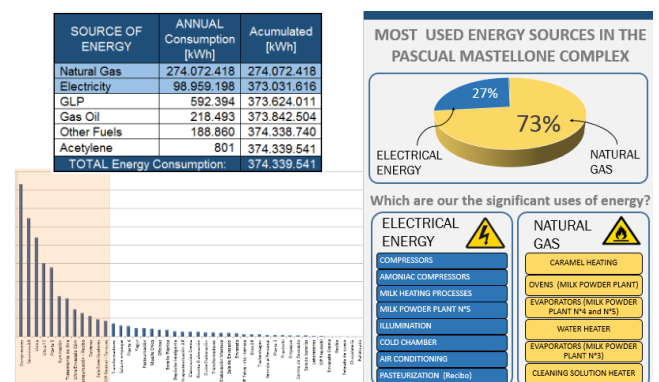


Figure 2. Pascual Mastellone Complex's energy matrix and significant uses of energy as shown to the staff in every production line. Translated for better understanding.

Later, the teams mentioned began the implementation process by holding meetings on a weekly basis with a shared schedule, coordinated by the Management Systems area. Once the implementation process had matured enough the frequency of meetings could space from 15 to 21 days. When it was necessary for staff of different facilities to participate together, Skype software was used.

Generating Culture

Since the first implementation, Mastellone Hnos. decided to establish 2 main objectives. Apart from an energetic goal (reduction of 3% in the electric consumption of the Armonía plant) the company understood that to assure the correct functioning of the EnMS, awareness had to be raised among staff.

Being a company with more than 3600 members, it was important to have as many employees as possible to learn about the challenges that our planet will face, if significant changes in energy consumption habits aren't made, inside the company and in each of our homes.

“We know that by having awareness talks with staff members and institutions we have the chance to make an impact, not only in Mastellone Hnos.’ consumption of energy, but in the communities’ carbon emissions”

—Nicolás Ezequiel Nine, EnMS Implementation Leader.

Do, Check, Act

At first, significant, transversal changes had to be made. Exceeding new legal obligations, Mastellone Hnos. chose to buy 30% of its electrical energy supply from renewable sources. Although this was a big step, work still had to be done to be more efficient.

Energy Management Teams’ Work

Since the beginning, more than four hundred meetings have been held. In each, six main topics were followed to organize the team’s role in the EnMS. We would like to dive into some of them in-depth:

- **#1 Energy Review:** Each team completed several spreadsheets with equipment ID, location, rated power, current measurement (for the electric review)

and nominal consumption, heat exchanged or generated steam condensate measurements (for the fuel consumption review), among others. Apart from this, running hours were completed between maintenance and production staff. Once the review was completed, results were validated contrasting them with the correspondent energy consumption indicator.

- **#2 Staff Suggestions:** Every team was responsible for collecting and analyzing submissions received in their suggestion box. Submissions received were automatically registered in a spreadsheet and prioritized considering two main aspects: potential savings and technical and economic feasibility. Nevertheless, teams took into consideration that concluding projects suggested by staff incentivized collaboration and showed commitment.

- **#3 Energy Efficiency Projects:** Since the creation of the Armonía team in 2017 a software was internally developed, using Visual Basic, which constitutes the teams’ action plan. The different tasks were uploaded with their responsible, dates of implementation and estimated savings. This software was not only necessary to register projects, but also useful as a database to share information. Some of these projects are mentioned in the following chart:

Deviations	Corrective Actions
Inefficient illumination technology	Progressive replacement with LED luminary
Steam pressure higher than necessary	Decrease pressure of steam from boilers.
Air pressure higher than necessary	Decrease air pressure produced from compressors.
Packing machinery running during elaboration stops	Automation of packing machines to start when needed.
Suggestions	Corrective Actions
Use solar energy to heat water from laboratories	Install solar hot water tank
Simplify maneuver to turn on packing machinery	Automation of packing machines so no intervention is needed to turn them off.

Other important topics to analyze in each meeting were: **(#4)** The evaluation of future modifications in production lines, **(#5)** the study of observations from audits (internal or external) and **(#6)** energy performance status.

Energy Baselines (EnB):

Meetings were also used to work on each facility's EnB. Monthly, information was collected from the different variables that contribute to form the EnB together with the energy consumption measured by the supplier. Having recorded all the information, a regression analysis was made using the Microsoft Excel data analysis tool. For each facility, the time frame used for the EnBs was a whole year. Although the construction of each baseline is strongly linked to the processes carried out in each facility, common features can be found between them:

- Maintenance planned stops were used to measure energy consumption irrespective of production. This information allowed baselines to have a fixed component;
- Being an industry with intensive need of heat exchange processes, cooling degree days (CDD) and heating degree days (HDD) were almost compulsory to achieve a valid and useful baseline;
- Depending on the facility's complexity, production level was represented by one, two or up to three different variables. This could be either liters of milk processed, kilograms of powdered milk produced, kilograms of cheese processed, among others.

After the construction of the EnB model, performance targets were set and each month the Management Systems area collected the information needed and compared the EnB with the EnPI. The formula used is indeed simple:

$$\text{Monthly performance} = \left(\frac{\text{EnPI}}{\text{EnB}} - 1 \right) \times 100$$

Once the year was finished, the Period performance was compared to the targets set.

$$\text{Period performance} = \left(\frac{\sum_{i=1}^{12} \text{EnPI}_i}{\sum_{i=1}^{12} \text{EnB}_i} - 1 \right) \times 100$$

Logically, results below zero were expected, meaning that measured performance indicator had been below the expected consumption.

Raising Awareness

As it was mentioned before, making energy efficiency part of Mastellone's culture was planned since the first stage of implementation. To achieve this, the training area designed and prepared material to have group talks with as many staff members as possible.

Four years ago, the objective was to engage 92% of the Armonía staff. In 2017, with the inclusion of the Pascual Mastellone Complex, more than 1000 staff members participated in the activity. Last year, this number rose to 1883.

This activity lasted one hour, where staff from different areas met to answer the following questions:

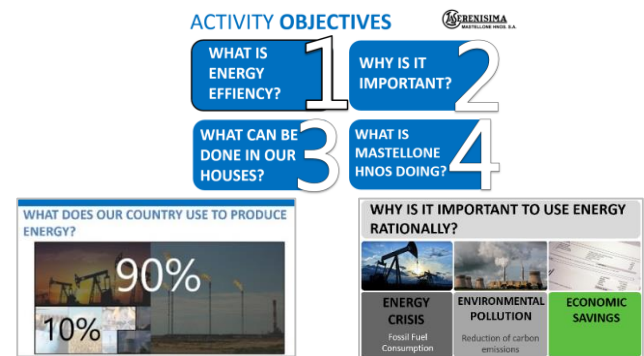


Figure 3. Material presented in awareness talk. Translated for better understanding.

These talks were not limited to staff members. For the last 40 years, members of the community are invited every day to visit the Pascual Mastellone Complex and see how the products they consume are manufactured. For the EnMS this was a huge opportunity to offer schools and universities the chance to participate in exclusive awareness activities. This effort helped our EnMS reach more than 1200 community members that are now aware of the impact they can make in their household's consumption of energy.

Do, Check, Act in numbers:

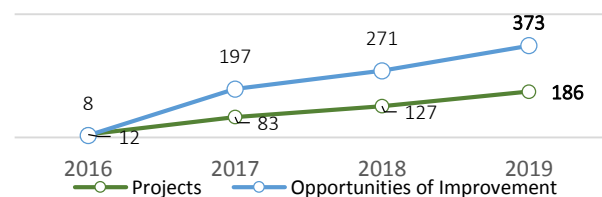


Figure 4. Evolution of energy efficiency projects and improvement opportunities registered.

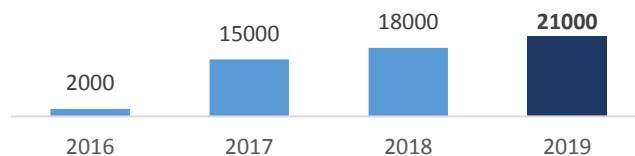


Figure 5. Amount of uses of energy registered each year.

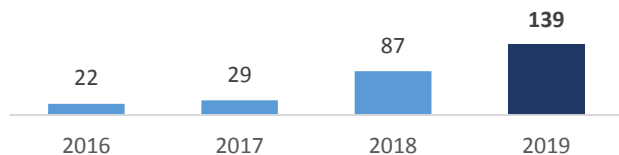


Figure 6. Number of submissions registered thanks to suggestions boxes.

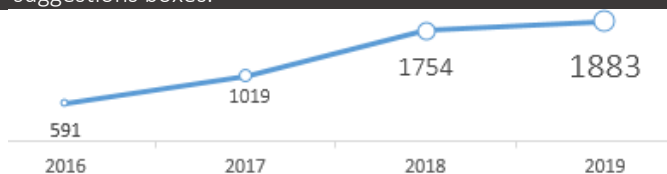


Figure 7. Evolution of staff who participated in the energy efficiency activity.

Transparency

Many announcements were made public throughout the last 4 years of implementation. First, the company announced each certification achieved on its web site and social media platforms. Also, since the declaration of the policy of sustainability, Mastellone Hnos. has prepared and published its sustainability report explaining the main improvements obtained thanks to the EnMS. Apart from this, every time a certification process was completed the company explained what had been done and presented it to this institution (Clean Energy Ministerial – Insight Award 2018 and 2019). Last but not least, Mastellone Hnos. is always looking forward to receiving any organizations/representatives who want to learn about our experience.

Lessons Learned

Should we start the process again, there are a few things we would change:

- First, staff suggestions should be taken more into account. During the first year carrying out energy efficiency projects in Armonía, most of our action plan consisted of projects coming from the EnMT. This was not the case in the Pascual Mastellone Complex, where having more information was useful.
- Sharing information and working with other energy teams from the other plants made synergic work easier
- Using ITC for team meetings and implementation made the process more efficient closing the distance gap.
- During the awareness talks, at first, we focused on WHAT could be done to reduce energy consumption and carbon emissions. With experience we understood that it was better to talk about WHY it is important to use energy efficiently.

Thanks to the tools the company acquired with the first stages of implementation and seeing the benefits that the expansion of the EnMS brings, Mastellone Hnos. began the recertification process of ISO 50001 standard and the inclusion of the remaining industrial complexes in the scope of the EnMS.

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.