

Compañía MEGA SA

We add value to Energy.

We are the 1st midstreamer in Argentina certified for ISO 50001:2018



MEGA's Loma La Lata Plant

1. Organization Profile & Business Case

Organization. Compañía Mega SA (we call it just “MEGA”) started operations in April 2001. We process natural gas from the Neuquén Basin (called “VACA MUERTA”), separate its rich components at the Loma de la Lata Plant (Province of Neuquén, Argentina) and return the remaining gas (basically methane) to the main pipelines carrying gas to industrial and residential areas in Argentina.

A pipeline (600 Km, 12” Ø) transporting the rich components, runs through Provinces – Neuquén, Río Negro, La Pampa up to Buenos Aires, where ethane, propane, butane and gasoline are fractionated at the Bahía Blanca Plant. Our Head Office is in the city of Buenos Aires.

Motivations/drivers. Being the natural gas our main “raw material”, a detailed care of the energy we use has been present since the very beginning of our operations.

Our environmental management system was ISO 14001 certified in 2005. Since then, “use of energy” has been treated as an environmental aspect, but it is one out of many. In 2017-2018 we started thinking on how to dig deeper and systematically into the way we used energy and the way we could identify opportunities for improvement. The revision of ISO 50001 in 2018 provided us with an excellent tool to achieve this.

Case Study Snapshot

Industry	Oil and gas
Product/Service	Heavy components from natural gas
Location	Argentina
Energy management system	ISO 50001
Energy performance improvement period, in years	Two years (July 2019/June 2021)
Energy Performance Improvement (%) over improvement period	3,14 %
Total energy cost savings over improvement period	286.071 \$USD
Cost to implement EnMS	874.138 \$USD
Total Energy Savings over improvement period	113.100 (GJ)
Total CO₂-e emission reduction over improvement period	5.546,26 Tn

Role that energy management strategy and underlying rationale. Energy consumption plays a key role. That's why it was always in the frontline of our strategies, with the addition of the adherence to sustainable development and social responsibility principles.

In 2018 we felt that time has reached to improve our energy management. So, during 2019 we developed an energy management system (EnMS) following the requirements of ISO 50001:2018.

Incentives or encouraged your energy management actions. We are a group of 170 people, with a good mixture of experience and knowledge on one side and thrust to know the unknown on the other side. We like to be challenged.



Achieving ISO 50001 certification was a common annual goal for the entire organization, meaning that all employees were involved in achieving it.



Message to members of the energy sub-committee.
Alejandro Fernandez, Ex-General Manager

"We know that our work not only addresses shareholder's expectations, but also looks after communities where we operate, and we are proud in favoring environmental care"

Juan Pablo Sitá – Risk Manager

General communication when the award of the certification was informed to all employees.

2. Business Benefits

We realized that we could improve this business part through a specific energy management system, decreasing costs and increasing benefits for shareholder; we show a solid commitment with the societies where we operate and to contribute to the environment reducing our carbon footprint.

We have been the first midstream company to certify ISO 50001, we firmly believe that our IMS (Integrated management system) is an active part of the business; this certification is profitable and systematically contribute to develop the business. Satisfying the requirements of regulatory authorities, providing added value to clients, to the international insurance market (our operations have world-class insurance), we meet the expectations of the neighboring towns where we operate and demonstrate consistency for all our collaborators (own and contractors). WE ALL WIN, the entire community as a whole!

Improving performance and saving energy

The results of our overall performance are shown in the box on the first page of this report and a special case of an energy consuming system are shown in Section 4.

Cost associated with implementing EnMS

EnMS Implementation Cost & Savings		
Project	July 2019 - June 2020	
	Cost (u\$d)	Savings (u\$d)
Internal Staff time to develop and implement the EnMS	USD 38.400	USD 286.071
External assessment (Fee, transportation, hotels)	USD 13.925	
Internal auditors (transportation, hotels)	USD 2.001	
Specific Legal matrix of EnMS	USD 9.336	
Training for internal auditors (IRAM, IAPG)	USD 2.167	
Additional monitoring and metering equipment	USD 50.000	
Certification Audit ISO 50001:2018	USD 6.833	
Head Office - Intelligent Lighting	USD 51.477	
Optimization of hotoil ignition - LLL Plant	USD 0	
Variation in production process of Gas Separation - Dryers - LLL Plant	USD 0	
Change of lighting system - BB Plant	USD 700.000	USD 286.071
Total EnMS Implementation Cost	USD 874.138	

These results reveal that the investment in the EnMS itself was fully redeemed in one year. Obviously, investment in equipment (e.g., Lighting project in BB)

takes longer. The internal staff time to develop the EnMS was estimated in two persons working fulltime for a year (3480 hours).

Non energy benefits An unexpected very good result: both plants (Bahia Blanca and Loma de la Lata) did not have in the past the chance to see each other very often and to share experiences (good and bad) to improve this gap we formed an energy committee in each site, afterwards merged in only one committee.



If implemented across multiple sites. We are not a multisite company; our plants play different roles (office, processing, pipeline, and fractioning) within the organization.

3. Plan

Commitment of top management. We did not have to gain commitment from top management. They were whose pushed us to move forward.

They decided to assume the overall responsibilities of the Energy Team and keep an eye on the EnMS and on its results, through the regular reporting from the committees. The Risk Manager acted as the bridge between the operational and strategic levels.

Process of understanding energy consumption and use. We started developing our EnMS with the exhaustive search of the data we had available of the last 2-3 years of operation. Then, we checked the reliability of those

data and carefully selected those that were going to be used for the initial energy review.

Suddenly we were faced with an energy map of both plants that allowed us to start becoming aware of details that were somehow hidden behind other operational considerations.

Then, we decided to develop three levels of data: level 1 (overall energy consumption of the company), level 2 (overall energy consumption of the two plants and level 3, use and consumption of individual equipment/systems in each site.

“I was very pleasantly surprised by the commitment to energy matters of our people”.

Andrés Scarone – Recently nominated as General Manager

How did you ensure that the EnMS would support the strategy and targets of your organization?

During 2019, top management monitored monthly the evolution of indicators Levels 1 and 2.

Early 2020 the General Manager requested the Energy Team to develop Level 1 indicators per product (ethane, butane, propane, gasoline, CO₂). This would allow Top Management to add energy considerations into the strategy of the company.



Reviewing and analyzing energy use, deciding where to focus resources and prioritizing action.

The first energy review was carried out with data from 2018/2019. The criteria used to select the SEUs were: 1) large energy consumption (e.g.: In Bahía Blanca the four distillation units), 2) large energy conversion units (e.g.: In Bahía Blanca boilers to generate steam) and 3) Largest consumption of each type of energy (e.g. in Bahía Blanca the electrical compressor of propane associated with the refrigeration system).

Then we started planning what indicators we should use. During 2019, we used simple ratios indicators: energy (TJ) / product processed (Tn). We decided to keep an eye on their values every month and to calculate annual indicators for planning purposes. With the EnMS fully operative, we started to dive deep into each of them identifying how the relevant variables could impact on the indicators.

If the EnMS was for multiple sites? We are not a multiple site company.

How was your top management involved in the implementation process? As we said previously, we did not have to involve them, the other way round. Top management conform MEGA's Energy Committee at a strategic level and monitors regularly our energy performance.

Financial commitments and resources The processes to finance projects come from our own utility, each year a budget is prepared and submitted to the shareholders' board, the MEGA management team explains the purpose of the investments and the board approves or rejects; in energy matters always have been approved the investments. As an example of this, the company decided to invest in a 30 million USD project, which comprehends the replacement of three new compressed gas systems. In February 2020, the works in Unit 230 started, finishing with the complete change of the turbine and the compressor. Besides, in Unit 220, the turbine has been replaced while the works for the

replacement of the old compressor are still being carried out. Finally, the replacement of the complete system in Unit 210 is planned to be accomplished by March 2022. We expect an increase in energy efficiency of 5% of the total energy consumption of the Loma La Lata Plant.

4. Do, Check, Act

Describe the implementation process. It was quite beneficial having a mature IMS (integrated management system) to support the implementation process, from which we borrowed all elements that were common. We reviewed all processes and procedures to check if minor changes had to be introduced. The only brand-new process we had to define was the performance of the energy review, definition of targets and indicators.

Examples of this are: a) measuring instruments and equipment (relevant to Use's) that were included in the list of critical items, and therefore calibrated and/or maintained systematically, b) definition of which process variables were energetically critical and c) Operations and Maintenance personnel made aware accordingly.

How did you implement operational control? The concern on energy issues was born with the company and reinforced with the implementation of an environmental management system (ISO 14001), which considers the consumption of resources a significant environmental impact. Therefore, the control over production and maintenance processes had already embedded energy concerns. Nevertheless, we reviewed again our processes to be sure that we captured the benefits of the closer look that ISO 50001 requires.

List the key activities identified and implemented that improved energy performance validate and verify results.

All improvement projects are associated with the identified SEUs or to opportunities that offer a significant efficiency improvement. Each indicator has a baseline, usually calculated during a 12 months period. The

baselines are reviewed every year and changed if necessary. Where necessary, we performed regression analysis and ANOVA (Analysis of Variance) to determine which variables were relevant.

During 2015 to 2017, for example, we have been working in the operation of the hot oil furnace necessary for the thermodynamic process of separation of the heavy components of the natural gas, showed energy savings and reduction of emission of CO₂ of 5-7%.

Meanwhile, during 2019 and 2020 we implemented a company-wide program to address the electrical energy consumption due to lighting, inside buildings, along the external perimeter and at the Head Office.

Energy performance improvement report We present the overall results of two years running: 12 months (July 2020 to June 2021) as the reporting period and 12 months (July 2019 to June 2020) as the baseline period.

During 2019, while implementing the management system, we opted for efficiency indicators; during 2020 we started an analysis the use of the combination of efficiency and consumption indications, according to the user's needs.

When analyzing relevant variables in the 2nd and 3rd Level indicators (equipment/systems), we found acceptable linear models with only one relevant variable (usually production). Below we provide details of an example of how we calculated our performance improvement:

The analysis was made as follows:

- Collected monthly data on production and energy consumption from July 2019 till June 2020 (baseline period) and from July 2020 till June 2021 (reporting period). Natural gas represents 92% of this consumption.
- Made a linear regression analysis on daily bases, what allowed us: a) to consider the different numbers of days that there are in a month along the year, and b) to remove some outlier days due to abnormal operational conditions of the plant. All remaining data on production (Tn)

were within three standard deviations from the mean.

- the regression analysis showed the following results for the overall:

<i>R square</i>	<i>Adjusted R square</i>	<i>F ratio</i>	<i>Significance F</i>	<i>Significance criteria</i>
0,595	0,545	19,76	p = 0,002152	p < 0,10

- we tested the coefficient "b"

<i>"b" Standardized error</i>	<i>p-value</i>	<i>Significance criteria</i>
3,19	0,01100	P < 0.10

- having confirmed the validity of the model, we calculated:

<i>reporting period modeled energy consumption</i>	<i>reporting period measured energy consumption</i>	<i>energy savings</i>
3603,1 TJ	3490,3 TJ	113,1 TJ

Finally, we got the performance improvement:

3,14%

This improvement in Level 2 was mainly due to two important actions at level 3 in the Natural Gas Dehydration System. The first was the optimization of the use of the adsorption capacity of the molecular sieves, obtaining an improvement of **57.5%** in fuel gas consumption. The second improvement consisted on turning off a gas compressor where its operation was not required, obtaining an improvement in electrical consumption of **55%**. It should be noted that both improvements were achieved without any investments, just changing the operational procedures, and training the staff.

The Excel program not only provided us with an easy way to see trends via spread sheets, but also was useful to calculate all issues around regression and model validation

did top management provide motivation and support?

All members of the top management are members of the MEGA's Energy Committee. This committee directs the EnMS at a strategic level, approving all energy objectives

and associated eventual need for resources and regularly reviewing the EnMS's outcomes.

How did you engage employees in energy management? Was new training needed?

The energy Committees had 4 regular members in each plant but, depending on the issues to be dealt with in each meeting, other employees were invited to participate from areas like Environment, Safety, Contractors. The training was carried out during the Committees meetings, where the requirements of ISO 50001 were analyzed in detail. All employees and contractors had a clear idea of what a management system was, after so many years operating an IMS.

Did procurement process change?

We reviewed the purchasing process and the engineering process. They were sound and mature processes, which needed the addition of the concern of energy in purchasing (specification, purchasing, contractors, outsourced processes) and in engineering (basic design, detail design, construction, commissioning and operation).

How did you prepare for the 3rd party audit?

We are quite used to receive audits (after almost 20 years of being certified) so this was just one more. In 2019, we performed two cycles of internal audits to be sure that every was working as expected.

5. Transparency

The certification was notified internally and externally through our official communication channels. (YouTube, LinkedIn and Internal Communication Platform "CLICK")

<https://www.youtube.com/watch?v=gC3Jz-qb2dk>

https://www.linkedin.com/posts/ciamega_eficiencia-energia-sustentabilidad-activity-6625101881863655424-gAa4

6. What you would have done differently

We are reviewing continuously what we did and what we will do better if the need arises. There are two issues we could have done better:

- Indicators. We started defining only efficiency performance indicators. After a year, we started becoming aware that in some cases, depending on their users, consumption indicators could make the energy savings more easily visible and could also simplify the application of normalization and regression concepts. We are reviewing this issue to find out the best combination of indicators for MEGA.
- Energy committees. We started with two committees, one in each plant. Being the output of one plant the input to the other plant; the processes are closely related and what occurs in one plant can significantly impact the other one. Being separate committees, they could neither learn from each other nor easily share experiences and knowledge. We are planning to merge both of them into only one committee.

"ISO 50001 certification encouraged us to optimize our facilities and our processes. Diving into the energy world gave us a better understanding of MEGA's energy matrix and had an impact in our decision-making process".

Federico Rodriguez Urroz, BB's energy committee leader.

