

Global Energy Management System Implementation: Case Study

Argentina

Oleoductos del Valle SA

OLDELVAL is the first oil pipeline in South America to certify ISO 50.001

the same time, to contribute to the development and sustainability of the region, the country and the energy policies.”

—Jorge Vugdelija, General Manager



Figure 1. Allen pumping station – Pipeline Network

Business Case for Energy Management

Oleoductos del Valle S.A. (OLDELVAL) transport approximately the 70% of the oil produced in the Neuquen basin, and nearly the 30% of the total production in Argentina. They operate a pipeline system that goes across almost 900 km, crosses four provinces, covers more than 1,700 of piping and the oil is pumped through 16 pumping stations, the dispatch station and the technical offices. OLDELVAL have 164 permanent employees.

OLDELVAL’s shareholding is formed by the main oil producer companies in Argentina, such as YPF, Pampa Energía, Chevron Argentina, Pan American Energy Ibérica, Pluspetrol and Tecpetrol. ISO 50.001 certification, achieved in August of 2017, is the first one in the oil Argentinian sector. Thus, OLDELVAL is expected to become a cultural change agent.

“The EnMS certification is aligned with our mission to become industrial referents, and, at

Case Study Snapshot	
Industry	Crude oil
Product/Service	Crude oil pipeline operator
Location	Cipolletti, Río Negro, Argentina ¹
Energy Management System	ISO 50.001
Energy Performance Improvement Period	One year
Energy Performance Improvement (%) over improvement period	9.5 (%)
Total energy cost savings over improvement period	585,846 \$USD
Cost to implement EnMS	91,425 \$USD
Payback period (years) on EnMS implementation	0.16 (year)
Total Energy Savings over improvement period	94,509 (GJ)
Total CO ₂ -e emission reduction over improvement period	5,342 (Metric tons CO ₂)

OLDELVAL have experience in management systems, in 1997 they became the first ones to certify ISO 14001 for their pipelines, and in 2009, they consolidated the

¹ Technical offices. The certification includes oil pipelines and the 16 pumping stations.

implementations in an Integrated Management System (IMS).

The company realized a Strategic Planning Process that helped establishing the framework for a business model development, being the IMS one of its pillars. Within this framework, energy management became one of the most relevant factors in the strategic planning.

The energy policies that Argentina adopted in the past made the country lose energy self-sufficiency in 2007. At present, Argentina faces the double challenge of reverting this situation through, among other actions, reconciling the energy rates and minimizing its effect on the family economy, and the economic activity competitiveness. In this context, energy efficiency represents a key aspect for Argentina's success.

The energy policy adopted by OLDELVAL has enabled them to contribute to satisfactorily achieve this double challenge. The EnMS implementation represents substantial benefits in their own activity, consuming less energy for the energy transportation. Additionally, adopting the EnMS as one of the pillars for OLDELVAL's Sustainability Plan makes the know-how built-up in the development and implementation process of the standard, available for the small and medium industry, and for the community in general. Thus, the benefits are extended to other actors of society.

Business Benefits Achieved

The adoption of the EnMS has produced several benefits to the organization. From the implementation stage, before reaching the certification, many improvements have been observed in Energy Performance (EP) due to a better understanding in the energy use and consumption.

By the end of the first year, an improvement of 9.5% regarding the EnB of the global EP of the company, measured in kW/m³ of oil transported. This is equivalent to a reduction in energy consumption of 26,253 MWh/year, and represents a saving in the total annual energy cost of 585,846 \$USD. Additionally, the company

has identified other costs that go beyond the economic ones, as for example, a reduction of GHG emissions of 5,342 ton CO₂/y, which has contributed to comply with the *NDC* (Nationally Determined Contributions) for Argentina in 2030.

OLDELVAL is the first company in the oil sector in Argentina, and the first pipeline in South America to certify ISO 50001. This contributes to achieve the company's long-term objective to become an Argentinian industry referent, and especially in its area of influence (Neuquen basin, Vaca Muerta field). In this regard, the *Instituto Argentino del Petróleo y del Gas (IAPG)* (in English, Oil & Gas Argentinian Institute), Comahue Region has awarded the OLDELVAL's EMT (Energy Management Team) the GEOLING award 2017. The objective of this award is to recognize the initiatives and concrete actions arising from people related to the Energy Industry that involve beneficial and sustainable contributions to the industrial field and society.



Figure 2. EMT receives the GEOLING award 2017

OLDELVAL is firmly committed to share the acquired experience in EnM with the community, which can be seen in their participation in talks and conferences in joint activities with Cipolletti municipality, and in opening their doors to those companies that want to learn about the EnMS implemented by the company.

“OLDELVAL contribute to optimizing the use of energy by sharing their experience with the industrial sector”

—Carlos Colavita, Cipolletti municipality Economic Development Agency Director

Argentina is a natural gas importing country, and in this context, it is important to mention that the company has reduced its natural gas consumption in 2,229,278 m³ per

year. OLDELVAL contribute, thus, with the national strategy to recover energy self-sufficiency, generating benefits beyond the organization.

“The energy we stop consuming is available for other users”

—Federico Zarate, Chief of Maintenance

EnMS Development and Implementation

For the correct and successful implementation of the EnMS, the company considered two main factors: to identify the enthusiastic people, and to create a cooperative working environment. The management’s leadership and the active involvement have been essential to reach the intended objectives, and, at the same time, to align and integrate the EnMS with OLDELVAL’s internal and external contexts. This is reflected in the definition of the policies, the resources assigned (training of the staff, internal broadcasting and awareness campaigns, external consultancy, etc.), and in the permanent tracking of the progress range of the implementation. It has also been defined that the implementation of the EnMS would reach the whole pipeline system, i.e. the 1,700 pipeline kilometers, the 16 pumping stations, the dispatch station and the technical offices.

Considering the challenge to articulate the management and the specific technical aspects, the “Energy Management Team” was created with the leadership of the Team shared by the person responsible for the IMS and the Chief of Operations, and both comply with the function of representing the Management. The EMT is formed by maintenance and operation referents, QHSE (in Spanish, CASS, Calidad, Ambiente, Salud y Seguridad) and Engineering Department, and they are responsible for leading the activities in their own areas. The EMT also has the support of HR, Purchase, Legal and Informatics Departments.

Then, a gap analysis was carried out to identify the existent elements within the company that were able to be part of the EnMS. The Integrated Management System (formed by the standards ISO 9001, 14001 and

OSHAS 18000) made the reuse of several instruments of the IMS possible, due to the compatibility of several of the requirements of the standards, shortening the implementation time. The process based management allowed the correct integration of the EnMS to the existent IMS.

“Reusing existing procedures, processes and records shortens the implementation time”

—Mónica Carraro, Process Eng., member of the EMT

Together with the gap analysis, workshops and broadcasting activities were carried out so as to gain the staff’s involvement and participation to produce a change in the culture, regarding the “responsible use of the energy resources.”

The initial landmark in the energy planning process was the survey of energy use and consumption with a bottom-up approach. The practical training activities helped delegate the construction of their own use and consumption matrixes for each of the sites that are part of the pipeline system. The activities were later analysed and integrated by the EMT, constructing then the energy use and consumption matrix of the organization. And, based on this last matrix, significant uses were identified according to Pareto’s principle, as the only significance criteria.

Aiming at creating a cultural impact and all the organization’s involvement, OLDELVAL decided to extend the energy management to the other uses, which they named “considerable uses”.

The SEU (Significative Energy Uses) are associated to the company’s main activity, i.e., land oil transportation through pipelines, which is governed by Bernoulli’s principle. This principle is the starting point to identify the relevant variables. The EMT carried out the validation and consistency of the historical data, and, by means of the linear regression, the variables affecting the energy consumption were obtained (pressure differential, flow rate and temperature of the oil being transported).

Using the same participative approach (bottom-up) and the implementation of a suggestions box, the improvement identification process was started according to the requirements of the standard.

The exhaustive work developed during the energy revision stage allowed to reach a better understanding of the energy uses and consumption, and of the relevant variables, which were essential in the EnB construction. This one was developed through the multiple regression method, considering the explanatory variables to avoid multicollinear errors. It is worth mentioning that the EMT also developed EnB for each site and the equipment associated to the SEU to facilitate the tracking and monitoring.

The organization’s EnPIs (Energy Performance Indicators) is defined as the Global Energy Intensity (in Spanish, *Intensidad Energética Global, IEG*) and it shows the energy consumption in kWh per m³ of oil transported, which was integrated to OLDELVAL’s management indicators dashboard in a percentage value (Figure 3).

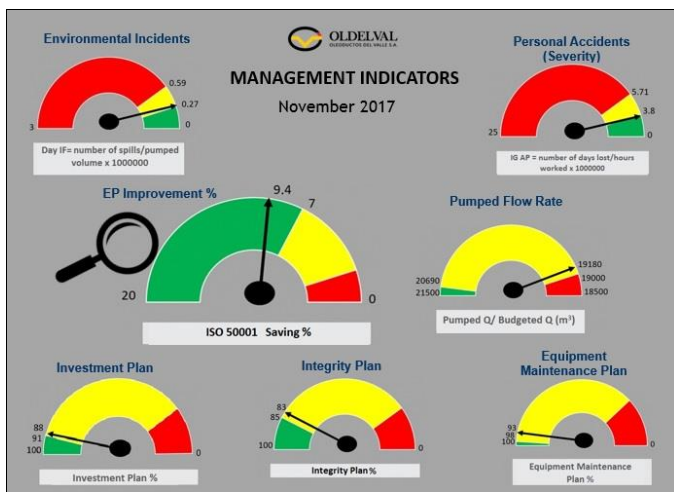


Figura 3. Management Indicators Dashboard

In addition, other EnPIs were defined considering “who” impact on the EP with their activity and their management capacity (deviation identification and correction), as for example IEUS (SEU energy intensity), IEUC (CEU, considerable energy uses, energy intensity),

consumption affectation index by maintenance, equipment efficiency, hours of operation, etc.

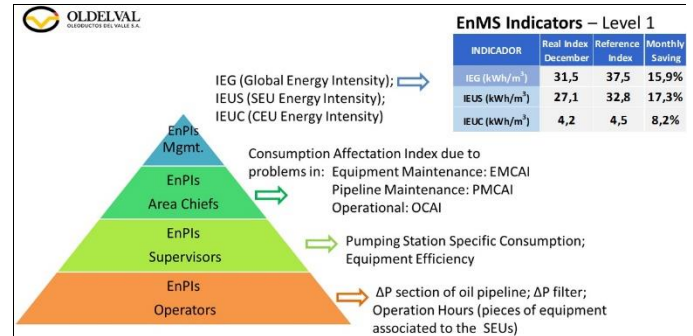


Figure 4. – EnMS Indicators – EnPIs management level

The development of the action plan considered not only the EP improvement, but also the EnMS improvement. Among the main improvement actions carried out, the following can be mentioned: pumping configuration modification, adaptation of the control logic for equipment use optimization and measuring improvement plan, among others. The expected results and how to measure them, and their impact on the EP were defined, resources were assigned and the time limits and the people in charge were defined for each action.

The development, implementation and certification process for the EnMS was done in nine months’ time, and it was wholly financed with the organization’s own resources.

OLDELVAL invested the total amount of \$USD 91,425 in training activities adapted to their needs, their own staff was assigned to the project, broadcasting and awareness campaigns were prepared, external consultancy was hired for the EnMS development and implementation.

As it has been previously mentioned, the economic benefits after a year time reached \$USD 585,846, which represent a repay period of about two months’ time.

To determine the EP improvement, each site records every day the energy consumption and the appropriate variables. With the same frequency, the operational CCT²

² Control Center

consolidates and integrates the information to monitor the whole pipeline system.

So that the senior management can track and monitor the EP, the EnMS indicators are monthly prepared and analyses. The factor used to standardize the information is the oil flow rate transported.

The improvement in the EP arises from comparing the real energy consumption measure of the organization against the consumption estimation according to the EnB.

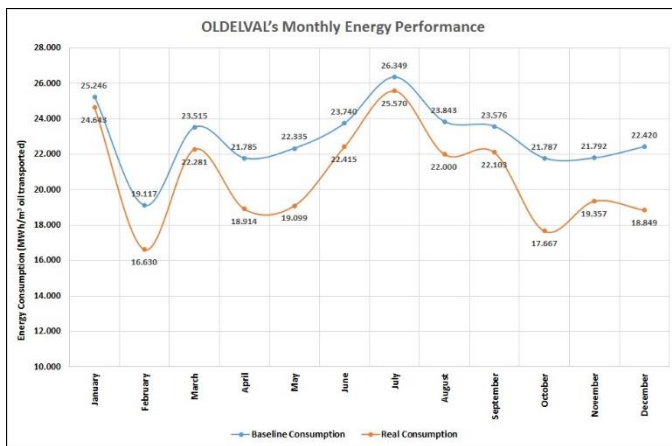


Figure 5. Organization's EP tracking (EnB vs. EnPI)

To track and monitor the EnMS an EnB and EnPI control board was constructed in an Excel document, which is fed with data from SCADA and manual records.

In the case of specific improvement actions, during the analysis and definition process, the method to measure and verify the energy saving is identified.

As part of the implementation plan for ISO 50001, it was defined that the EnMS verification should be done during the first year by means of a specific audit program (internal and third parties' audits), which was not related to the IMS audit program.

Once the operational and maintenance activities that impact on the SEU have been identified, the operational and range criteria were defined so as to keep them under control, and they were aligned with the existent IMS tools. Once the pieces of equipment associated to SEU were identified, it was defined, together with

Operations, to maximize the operation hours according to efficiency. Besides, the failure history was revised to identify recurrent problems and work on their causes.

The results of all this process were informed to the staff by means of trainings in the sites reached by the EnMS.

OLDELVAL's management took part in the information activities explaining the project, highlighting the importance and competitive advantage of having an EnMS, and inviting the staff to take part in the challenge.

Specific training activities, developed in all the sites that form part of pipeline system, were defined. They were based on theoretical and practical activities to favor the staff's involvement and participation. The operators and supervisors from the sites integrating the oil transportation system, after participating in the training workshop, prepared their own energy use and consumption matrix. The EMT integrated the information from all the sites, and once the use and consumption matrix of the organization was obtained, they gave their feedback showing the results that had been obtained with contribution of all the units.

The EMT members were trained as internal auditors, and some of them took the leader auditor course. Together with the external consultant, they made internal audits with the purpose of monitoring the EnMS's progress and development; training the staff, and reinforcing the capacities in the audited sectors and processes.

The major motivation of the staff was related to the tangibility and practicality of the EnMS, as it allows to prioritize and focus on the important aspects, making the daily tasks easier. A suggestions box has also been used for the participation of all the personnel, own and contracted, the best ideas were awarded a prize, and resources for its implementation were assigned.

"I like this system as it helps me organize my work judiciously."

—Gastón Gader, Operations Chief.

For the EnMS's development and implementation, guidelines and other standards from the ISO 50000 series

were used. Resources and existing tools within the organization were also used, such as: operational and maintenance data bases; work processes and procedures from the IMS; internal communications channels, as the intranet; audiovisual means; billboards; e-learning tools; non-conformity management platform, and improvement opportunities, etc. The Engineering Department were using a guaranteed data sheet for their specifications, and it was modified so that the Purchase Department could consider not only the initial investment, but also the energy operational costs.

The identification of the resources and existent tools, and their adaptation to the requirements of the standard have contributed to the development of an agile and practical system that naturally merged with the energy management daily activities.

Lessons Learned

The main challenge was the management of any kind of change, rather than the EnMS specific aspects.

“The key thing is to find the enthusiastic people that push the project forward.”

—Jorge Vugdelija, General Manager

The EMT was formed with the referent people from the different areas that comprise the company, most of them from the administrative headquarter. This made the articulation easier and gave agility to the EnMS development. However, during the implementation stage, delays were observed due to the fact that there were not representative people from the different sites in EMT, so that, then, they could give rapid answers locally. To immediately correct this situation, an EMT

visit program to the sites was developed, and as a corrective action, it was defined to integrate to the EMT the referent people from the east and west areas.

The cultural change was one of the project objectives, and to achieve it, it was necessary to involve all the staff with the EnMS. The SEU identification was associated to only four pieces of equipment, out of the more than five hundred, placed in two sites, out of a total of eighteen.

This is how the CEU (Considerable Energy Uses) arise. They allowed to define indicators and improvement objectives for the whole organization. All the staff took part and there were good results, as the case of the Headquarters (technical and operational offices) that reached up to the 17% of improvement with respect to its EnB.

Keys to Success

- Management’s commitment and involvement during the whole process.
- Identification and addition of enthusiastic people.
- Creating an EnMS in a participative manner contributes to the feeling that system belongs to EVERYONE and not only to the EMT.
- Participative activities and acknowledgement help the staff involvement, the same as team work.
- A good gap analysis allows to identify that existent things can be benefited from, and make a work plan with clear objectives for the things absent.
- A good energy revision is essential to assess the initial EP, and to define the EnMS objectives.

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.

