Abastible S.A.

Lenga Plant

Aereal view Lenga Plant Abastible S.A.

Case Study Snapshot	
Industry	Energy
Product/Service	Liquefied petroleum gas
Location	Concepción, Biobío
Energy management system	ISO 50001:2018
Energy performance improvement period, in years	1 year
Energy Performance Improvement (%) over improvement period	1.32%
Total energy cost savings over improvement period	18,246 USD
Cost to implement EnMS	31,033 USD
Total Energy Savings over improvement period	89.56 GJ
Total CO_2-e emission reduction over improvement period	7,870 kg CO_{2_eq}

Organization Profile & Business Case

Abastible was founded in 1956 as a subsidiary of the Copec S.A. group of companies. It is one of the market leaders in the liquefied petroleum gas (LPG) and energy solutions industry with operations in Chile, Peru, Ecuador and Colombia. The company has the largest network of distributors in Chile with 10 plants located from Arica to Coyhaique, through which it meets the energy needs of homes, industries, businesses, and other sectors in a safe, timely and environmentally friendly manner.

Motivation and Drivers

Sustainability is an integral part of our mission and purpose as an organization. We believe in striking a balance between economic growth, environmental protection, and social wellbeing. Our roadmap incorporates sustainability to operate and generate value in our supply chain. At Abastible, we are leading the energy transition in the regions where we operate.

We understand that the sustainable management of our organization must permeate our structure, culture and relationship with other stakeholders. Abastible involves its main stakeholders when developing its business and seeks to maximize operational efficiency and continuous innovation, while strictly adhering to regulations, its core values and corporate policies.

One of our 2020 milestones was the creation of our energy policy, which aims to reaffirm our commitment to promoting the efficient use and consumption of energy and conscious and responsible action by all members of the organization. This policy not only demonstrates compliance with current legislation; but also anticipates what is stipulated in the recently-published Energy Efficiency Law No. 21,305.

In line with its energy policy, Abastible successfully implemented its first Energy Management System (EnMS) at one of its main facilities, the Lenga Plant.

"With the implementation of the EnMS at the Lenga Plant, we were able to exceed the energy performance goals set for 2020."

—Paula Frigerio, Development, Innovation and Project Chief Manager

EMS goals and next steps

The EMS implementation allowed us to set goals and targets for the coming years. Lenga main goals for the coming years is to reduce energy intensity 1% each year compared to the previous year, 5% in 5 years. In addition, given the successful results, the EMS will gradually expand to all the company's plants with same goals.

Business Benefits

Experience, accomplishments, and business impacts

Lenga is currently the only liquefied gas plant in Chile with ISO 50001: 2018 certification. Abastible is also the first company to receive the Energy Excellence Seal- Gold category, which is the highest distinction granted by the Energy Ministry and the Chilean Energy Sustainability Agency.

The Energy Excellence Seal-Gold category is awarded once a year to organizations that have comprehensively implemented energy measures through their operations. To be eligible for this award, organizations must have an accredited energy management system in place and specially trained staff in that area.

One of the things that helped Abastible achieve the Energy Excellence Seal was a process of detection and prioritization of opportunities to improve energy performance. This was based on consumption distribution trends observed during the implementation of the EnMS. Then, two of the identified measures were carried out.

Blockchain in the EnMS

Abastible is aware of how hard it is to measure energy savings and reductions in greenhouse gas emissions when implementing an energy efficiency strategy both for its customers and within its own facilities. For that reason, the company developed an innovative savings and emissions reduction service while it was implementing the EnMS. This service is based on the IPMVP international protocol and uses Blockchain technology to provide transparency for the different stakeholders about the methods being implemented and the emissions reductions achieved.

Use of this technology is in line with Abastible's institutional strategy and its sustainable development objectives, which seek to support companies and organizations in improving their productive and environmental performance.

One of the energy efficiency measures developed and implemented by Abastible at the Lenga Plant as part of its EnMS, was validated through this innovative mechanism.

Savings and emissions certificate with Blockchain Lenga Plant, boiler use optimization example (16 08 2021)

As indicated in the certificate shown, the validated energy efficiency measure has managed to accumulate thermal savings of 369,048 kWht and a reduction in greenhouse gas emissions of 84,018 Kg (CO_{2_eq}) since its implementation until July 2021.

"The main change is in the critical view that has been formed as we search for continuous improvement. There is an increasing involvement and participation of the collaborators."

—Marco Betancur, Head of Operations Lenga Plant

Improvements achieved in energy performance

During the implementation of the EnMS at the Lenga Plant in 2019, we set ourselves the goal of achieving a 1% reduction in energy consumption over the following year. We satisfactorily exceeded that goal, improving the plant´s energy performance by 1.32% during 2020.

Abastible based its energy performance improvement calculations on the Lenga Plant´s monthly consumption and production monitoring data. So, the year 2019 was taken as the energy baseline and 2020 as the reporting period.

Using the Excel data analysis tool, we drew a linear regression of the energy production and consumption monthly values and verified the validity of the model with the help of the statistical parameters of the regression. With the resulting equation, we forecasted energy consumption for the year 2020.

Model variable	kWh per unit	Probability	R2	Critical F-Value
Global production (ton)	16.68	1.30E-11	0.99	7.27E-11

We then determined our target energy performance improvement by comparing the actual energy consumption value with the model value for 2020, as indicated in the following equation:

$$\left[\frac{\text{2020 modeled energy consumption} - \text{2020 actual energy consumption}}{\text{2020 modeled energy consumption}}\right] x100$$

The details of the values used, are presented in the table below:

	2020 Modeled	2020 Actual
Energy [GJ]	6783	6694

This resulted in an energy performance improvement of 1.32% at the Lenga Plant during 2020.

Other benefits

In addition to all the energy benefits realized, the implementation of the EnMS at the Lenga Plant has helped to reinforce the operational management methodology, leading to the identification of improvement opportunities by all the people who work at Abastible, It has also focused the company on autonomous maintenance and given operators the information and authority needed to address and solve problems as soon as they are detected.

For employees, this initiative has introduced a new challenge to their daily routine, requiring an improvement in the way they do things but, at the same time, giving them a useful tool to operate efficiently.

Lenga Plant team

The implementation of the EnMS has significantly increased the level of energy culture within the Plant, leading to greater synergies and better communication between the different areas (maintenance, operations, innovation, production, engineering, and projects). This has enabled more fluid development of projects and a much broader organizational impact.

Cost of implementing EnMS

A summary of the main costs associated to the development, implementation and maintenance of the energy management system is shown in the table below, detailing the internal and external time required for different stages of the process, installed equipment, audit costs, technical assistance among others.

Cost to implement	Cost to implement ($USD)
Internal Staff time to develop and implement the EnMS (aprox.)	$3,729
Internal staff time to prepare for external audit	$621
Additional monitoring and metering equipment installed to meet EnMS requirements	$0
Third party audit costs	$7,069
Technical assistance (e.g. hired consultants to assist with EnMS implementation)	$18,178
Other (e.g. internal communications)	$1,436
Total	**$31,033**

The Third-party audit costs and the technical assistance were cost paid to externals. Internal Staff cost is an estimated value.

Savings from the EnMS

The savings from the EnMS were due to operational changes, there were no savings related to projects with capital investment. Therefore, 100% of the overall cost savings was due to operational savings.

Plan

Top Management

Abastible is a company that is leading the transition towards cleaner energy sources in the country. Because of this, it is essential to adopt the best international practices in energy efficiency which we can then pass on to our customers. In that regard, implementing an EnMS was a natural step for us, as the benefits were evident, and it aligned with the company's strategy and with the country´s future regulatory framework on energy efficiency.

The idea of implementing the EnMS arose from the management areas of Development, Innovation and Projects and was executed jointly with Operations Management as part of the organizational strategy for sustainable development

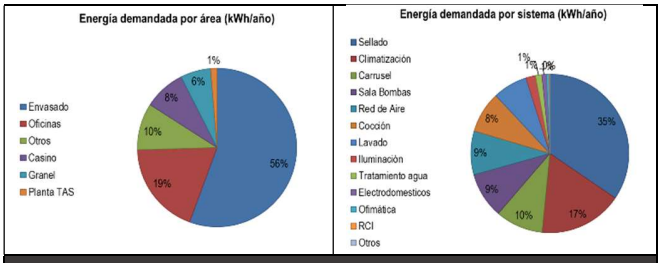
When the decision was made to start with the pilot plan at the Lenga Plant, the objective was to continue working to expand this management system to the rest of the company.

Energy Planning

Energy use and energy consumption data were collected at the Lenga Plant, considering all energy sources and energy consuming processes. An account was made of all the energy consuming equipment, including their power and hours of use. Billing information was collected for the different energy sources and a consumption analysis was conducted.

The distribution of energy consumption was analyzed by area and by system, thus determining the equipment and/or processes that make significant use of energy (SEU).

We identified that the systems with the highest electrical demand in the Lenga Plant were: the cylinder filling carousel (23%), the pump room (22%) and the air network (21%) respectively; while the systems with the highest demand for LPG were the cylinder sealing systems (61%) and HVAC (26%).



Energy consumption distribution by area (left) and by system (rigth) in Lenga Plant

The processes with the highest energy consumption and /or with the greatest potential for improvement were defined as those that would be prioritized for focusing available resources.

The people that affect or may affect the significant energy uses (SEU) and the relevant variables for each SEU were determined, after which it was possible to perform

correlation and linear regression analyses with the energy consumption data, verifying in each case the statistical parameters that validate the model.

Do, Check, Act

First activities were related to the development of an energy policy, creation of a management team, collection and analysis of data to determine energy use and consumption.

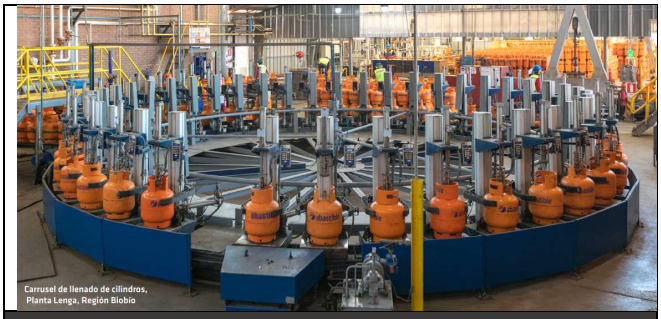
The energy policy is the document that formally expresses the organizational commitment to continuous improvement of energy performance, therefore the importance of its establishment and communication inside the company at the beginning of the EnMS implementation.

Simultaneously, a context analysis was carried out considering the basic pillars of Abastible's organizational strategy, the main stakeholders and risks, and the opportunities detected.

Key people from the different areas were identified in accordance with the ISO 50001:2018 requirements. Meetings were held to detect existing gaps for each process. With this information, an energy management team was formed to ensure suitable distribution of roles and responsibilities among team members and to promote continuous improvement of the EnMS.

The scope of the energy management system implemented are the processes carried out at the Lenga Plant. However, many of the EnMS-related processes, such as communication, design, and others, take place at Abastible´s main headquarters or other facilities, so the initial gap analysis was of vital importance. During the gap analysis r with the people in charge of each process, the best way to address the changes was determined, always keeping in mind the objective of gradually replicating the process for the other plants.

Through the analysis of the energy consumption and relevant variables, which in the case of the Lenga Plant were production and HDD, we were able to determine seven energy performance indicators that allow monthly monitoring of the plant´s energy performance. Each of the indicators is compared with an energy baseline and if significant deviations are detected, action plans are drawn up.



Cylinder filling carousel, Lenga Plant

During the energy review, a survey and prioritization of energy improvement opportunities was also carried out, considering factors such as the investment cost, the estimated energy savings during the planned useful life, the payback period, and the cultural impact.

Based on the energy performance indicators and the opportunities for improvement detected, energy objectives and goals were established while the managers involved, provided the necessary resources to accomplish them.

The goal for 2020 was an improvement of 1% in comparison to 2019, that goal was satisfactorily exceeded, improving the plant´s energy performance by 1.32% during 2020.

The energy performance improvement calculations were based on monthly consumption and production monitoring data. A linear regression was made using the Excel data analysis tool and the values for 2020 were modeled using the forecasting technique as indicated within the Business Benefits secction.

The action plans drawn up for each area during the gap analysis were adjusted according to the results obtained during the energy review and the communications and training plan for the EnMS was implemented. That not only involved the different members of the organization,

but also led to the start of awareness and education campaigns that are vital for obtaining lasting results and achieving continuous improvement of the system.

Subsequently, the first internal audit was carried out, during which all the EnMS documentation was reviewed. Interviews were conducted with representatives of all the areas involved, verifying compliance with the requirements in each case. Once the process was completed, an audit report was prepared detailing the identified non-conformities and the main conclusions. For non-conformities, root cause analyzes were carried out and action plans were formulated to resolve the problem.

After the internal audit was complete, the first management review was done, where the most important results of the EnMS implementation process were presented. In addition, the action plans proposed for the different processes were analyzed and decisions were made regarding the next steps to be taken to ensure continuous improvement of the EnMS energy performance, starting with the planning of the new cycle. As a final phase of the implementation process, an external certification audit was carried out in two phases: a first documentary or preparatory phase and a second phase to verify the effective implementation of the EnMS.

Transparency

Abastible is aware of the importance of communicating our achievements in a clear and transparent way to our stakeholders. That is why we address the energy performance improvement in our annual Sustainability Report with concrete numbers.

Always seeking to transmit clear and reliable data in our reports, we obtained a certificate of energy and greenhouse gas emissions savings for one of the measures implemented at the Lenga Plant through Blockchain technology. This measure consisted of a decentralized and independent system that guarantees transparency and global recognition, since its records are unalterable and traceable

Additionally, our efforts were recognized by the Energy Ministry and the Energy Sustainability Agency, which awarded us the highest category of its Energy Excellence Label, the Gold category, thus giving visibility to our commitment to sustainability.

What We Would Have Done Differently

If we were to do it all over again, we would have increased the resources available for:

- Training and awareness for the EnMS team and plant personnel
- Training on energy efficiency and management issues for energy management team leaders
- Follow-up of the EnMS activities by leaders (fixed and dedicated time)
- Implementation of relevant improvement opportunities.