

ISO 50001 Energy Management System Case Study

Chile

Aguas Andinas S.A.

To convert all waste into usable resources, energy and clean water.



EMS Team in Biofactoría La Farfana

Organization Profile & Business Case

Aguas Andinas S.A. is the largest water utility company in Chile and one of the most important in Latin America. Current vision is to go beyond water, managing resources in a sustainable manner. We are dedicated to our customers 24/7 and ensure the continuity of our services through the efficient management of the underground city. We deliver quality water and convert waste into various resources. We create shared value within our operating environment and are committed to the quality of life and the development of the country.

Aguas Andinas has defined and designed a long-term strategy, called “Santiago Deserves a seven” (*Santiago merece un 7* (SM7)). SM7 consists of seven strategic pillars, which identify the challenges and strategic objectives of the company, integrating the actions, resources and commitments to deliver the sustainable performance of the company.

Case Study Snapshot	
Industry	Sanitary Services
Product/Service	Water production - Wastewater treatment
Location	Santiago, Chile
Energy management system	ISO 50001
Energy performance improvement period	1 year
Energy Performance Improvement (%) over improvement period	7.7%
Total energy cost savings over improvement period	US\$1,062,249
Cost to implement EnMS	US\$95,126
Total Energy Savings over improvement period	(GJ) 59,161
Total CO ₂ -e emission reduction over improvement period	7,683 (metric tons)

“We have set ourselves a new challenge: to evolve from a water utility to an environmental services company with a business model based on the principles of circular economy. That means zero waste, zero pollutant emissions, renewable energy self-sufficiency, preservation of biodiversity, and generation of positive social impact and healthy urban spaces” Narcís Berberana, CEO Aguas Andinas.



[Momentum for Change: Planetary Health - United Nations Award winner 2018](#)

Around 50% of all electric energy consumption is from the operation of two, previously built as wastewater treatment, plants, which are now transformed into Biofactories.

Considering the level of energy consumption, these two sites were the first to implement an energy management system (EnMS), based on ISO 50001, and then had it certified. Besides, both sites can generate energy using biogas as fuel, a by-product of our operations. While La Farfana has a process to methanize biogas producing Natural Gas for approximately 200,000 households; Mapocho-Trebal has a conventional co-generation engine which produces 60-75% of the energy required for its operation.

Energy audits have been completed and good practices have been shared with other sites as part of the EnMS. Other 4 sites: Padre Hurtado, San Antonio, Talagante and the Corporate Building, were also certified in 2018. Therefore, the scope of this Case Study is 6 sites in total.

Business Benefits

EnMS implementation began in 2013 with an energy audit. In 2014 and 2017, we obtained the Gold Energy Efficiency Seal granted by the Ministry of Energy and the Chilean Energy Efficiency Agency. In 2015, we became one of the first companies in the country to receive the ISO 50001 certification. In 2016, we began the implementation of the ISO 50001 in the second site, La Farfana Biofactory.

Different types of benefits have been obtained from the EnMS. Basically, in Biofactories sites the reduction in energy

consumptions has reached approximately 10%, using estimated baseline.

Considering the results of EnMS implementation on all 6 sites, the company has saved more than 59,000 GJ and reduced more than 7,000 metric tons of CO₂e. This is the equivalent of more than US\$1 million of direct savings in electric energy consumption.

In addition, we have seen the benefit of sharing the same efficiency objective among the sites' employees. They have worked together towards the more efficient use of energy, running a wide portfolio of energy efficiency projects. Sharing the previous experience and knowledge resulted in a faster implementation, when the multisite approach was introduced to the EnMS.

The analysis of sites' consumption has led the company to sign new energy supply contracts with lower prices and resulted in additional savings which are not reported here, since the financial impact has been obtained from the negotiations.

Other benefits on the non-financial side are the creation of a new area of knowledge and, consequently, a new organizational area: Energy Management with at least 3 new jobs and new skills development.

Plan

The early stages of energy management began in 2008 with the production of the Farfana biogas and its recovery for domestic consumption in Santiago. Later, both Biofactories, Mapocho-Trebal and Farfana, were ISO 50001 certified in 2015 and 2016 respectively, initiating the EnMS implementation in other parts of the company based on the successful experience in cost reduction and certification. That demonstrates the management commitment to the energy policy.

Financial commitments and resources were obtained by showing cost savings resulting from the EnMS implementation and the improved visibility of the company's sustainability initiatives.

Initial certification demanded additional efforts as it had to be implemented for the first time. Recertification, on the

other hand, implied keeping the system working while extending it to four additional sites using the previously gained experience. That resulted in six sites certified under ISO 50001 standard: the initial two Biofactories La Farfana and Mapocho Trebal and the new ones: Padre Hurtado, Talagante, San Antonio and Corporative Building.

One of the SM7's key components is Circular Economy, which main goals are energy sustainability through lower energy consumption in main production processes and self-generating renewable energy.

The process of understanding energy consumption was developed through the collection and analysis of energy consumption statistical data.

Once energy consumption data was quantified, the following evaluation criteria was used to determine main energy uses for each process of the company's sites where the EnMS had been implemented:

1. Evaluation of the processes which consume the most relevant amount of energy in the company.
2. Evaluation of the processes which permit the use of renewable energy.
3. Evaluation of the processes which have seen a steady increase of energy consumption.
4. Evaluation of the processes where energy saving actions or efficiency opportunities have been identified.

The EnMS was applied to multiple sites using individual energy characteristics of each site while employing the same evaluation criteria.

Do, Check, Act

The EnMS committee consists of the senior management and the energy management functional area.

Coordination initiatives were carried out for all the sites, including training for managers and operators, as well as reporting of the Energy Performance Indicators. We have had a total of 400 hours of training, including new workers job inductions. We have also spent over 500 hours in preparation for energy audits.

The motivation of the senior management has been achieved through the benefits obtained in energy from both

savings and efficiency, as well as the improvement ideas of the workers.

The key activities implemented in the plan that improved the energy efficiency were:

- Energy management training of operators and manages.
- Continuous and systematic follow-up of the IDE (Energy Performance Indicators)
- Monthly reports, incidences of the biggest deviations in the energy indicators
- Implementation of the energy measurement equipment technology.
- Quarterly meetings of the EnMS committee.

To verify that the energy performance had improved, a comparison was made to a previously defined baseline. Thus, the methodology to determine the improvement of the energy performance is the comparison between the cumulative percentage variation of the energy consumption and the defined baseline. Using this data, a monthly report is prepared with the tracking of those percentage variations.

To determine the baseline, linear regressions were used to determine the amount of kWh that should be used monthly according to water production levels. The results are summarized in the table below:

Site	[kWh] Total	Saving	%
La Farfana	68.888.135	5.424.848	7,3%
Mapocho Trebal	61.543.665	4.278.437	6,5%
Padre Hurtado	6.587.263	1.026.801	16%
Talagante	4.006.044	-	-
San Antonio	3.268.164	43.273	1%
Corporative Building	1.800.000	100.000	6%
	146.093.271	10.873.358	7,4%
		10.873.358	kWh
		717.641.633	CLP
		1.076.893	USD

All data used in the analysis was collected from the data storage platforms owned by the company and processed by using the commercial software.

Transparency

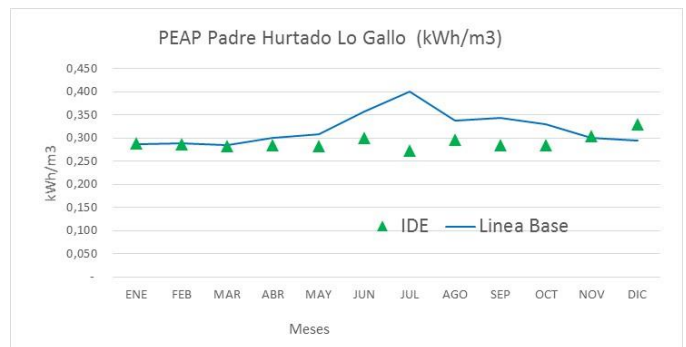
In addition to the annual sustainability report of the company, ISO 50001 certification was also reported through the quarterly meetings of the EnMS committee and monthly meetings of the Integrated Management System committee.

Lessons Learned

- Awareness is important and must set a constant state of mind. Daily work may lead to the remarking and raising of the awareness about what is important for the business and the environment, and how we do things efficiently and according to our principles. Celebrating success and keeping track of actions is important to make energy efficiency a daily task. Therefore, it is imperative to provide specific training and learning from the experience of everyone involved.
- Human factor and “to touch a nerve”. Raising awareness also demands to explain results to all company’s workers and get the numbers down to reality for everyone to understand why it is so important to be efficient and why their job is to help achieve results that are central for the shareholders and all stakeholders.
- To set up challenging and achievable goals. At the beginning of every year, the goal setting process may be adjusted to reality and the true sense of operation strategies. However, these goals can be challenging and move the whole company in line with their objectives.



Energy Measurement Equipment (COM'X)



PEAP Padre Hurtado Lo Gallo (kWh/m3)			
2018	IDE	Linea Base	Desv.
ENE	0,290	0,287	1%
FEB	0,287	0,289	-1%
MAR	0,283	0,284	0%
ABR	0,285	0,302	-6%
MAY	0,282	0,310	-9%
JUN	0,301	0,358	-16%
JUL	0,272	0,401	-32%
AGO	0,297	0,338	-12%
SEP	0,286	0,344	-17%
OCT	0,285	0,330	-13%
NOV	0,305	0,301	1%
DIC	0,331	0,295	12%
Acumulado	0,293	0,306	-4%

Base line of the amount of KWh utilized to produce each m3 and savings calculations

An example: Additional measurement of new certified sites

For the sites of Padre Hurtado and San Antonio, mainly in the drinking water elevators, an electrical parameters measurement equipment (COM'X) was installed, which allowed us to have online data on energy consumption and thus analyze and deliver operational tactics with energy efficiency.

All the energy consumption is gathered using COM'x in new sites. Biofactories have their own set of measurement online equipment. At the end of every month, the energy consumption registered by sites' equipment is compared to supplier's bill and analyzed by every site process owner. Finally, all energy consumption is registered in SAP-BI system.