

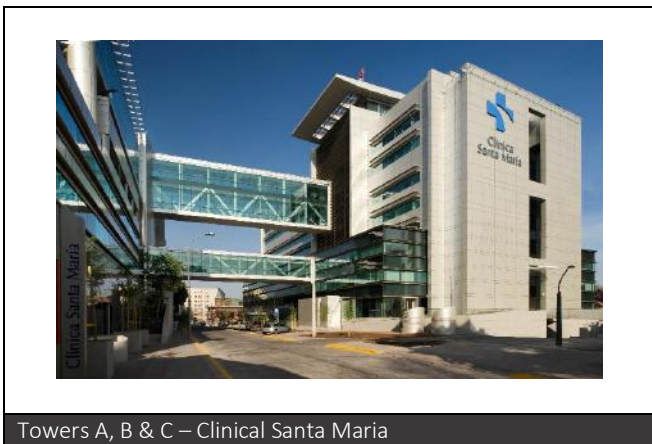
ISO 50001 Energy Management System Case Study

2020

CHILE

Clínica Santa María SpA

The first Chilean healthcare centre to implement and achieve ISO 50001 certification.



Organization Profile & Business Case

Clinica Santa María, a private organization that offers its patients sophisticated healthcare to the highest quality and safety standards, recognizes the importance of preserving the environment and its responsibility with the surroundings for the success of its activities.

In this context, in September 2016 the Clinic achieved the certification ISO 50001 “Energy Management Systems” (EnMS), after almost a year’s work, which made it the first Chilean healthcare centre to receive such important recognition.

From then onwards, energy management has been a fundamental factor for the sustainability guidelines of the organization. In 2017, they obtained a Non-Conventional Renewable Energy Certificate (ERNC), from ENEL (Electricity Supplier), which certifies that 100% of the energy consumed by the Clinic has been delivered to the National Electricity Grid (SEN) by ERNC generation.

Clínica Santa María, has aligned its commitment to the Environment and Sustainability, working on the

Case Study Snapshot

Industry	Healthcare
Product/Service	Private healthcare and medical services
Location	Av. Santa María 0410, Providencia, Santiago, Chile
Energy management system	ISO 50001
Energy performance improvement period, in years	1 year (re-certification)
Energy Performance Improvement (%)	6.31%
Total energy cost savings	127,455 USD
Cost to implement EnMS	143,535 USD
Total Energy Savings	6,732 GJ
Total CO ₂ -e emission reduction	540 tons

“The EnMS allowed us to achieve up to 6% reduction in energy consumption, which resulted in a saving of more than 125,000 USD.”

— John Allen, Operations Manager.

execution of projects to improve energy performance, being some of the main ones: (i) Technological replacement of luminaires; (ii) Operational Control; (iii) Replacement of burners; (iv) Chiller replacement and operational control. These projects that contribute to the improvement of the energy performance and reduce CO₂ equivalent emissions, reinforce the commitment of the energy policy, and at the same time, generate significant economic savings associated with efficient energy consumption.

Business Benefits

The implementation of energy efficiency projects in the Clinic has achieved a systematic improvement in energy performance, resulting in Energy associated economic savings, Reduction of CO₂ emissions, Improvements to the operation and maintenance of equipment and competitiveness against relevant parties.

From the point of view of electricity usage, the projects have resulted in an improvement in performance and consequently a 4.8% saving for the year 2019 equal to USD 91,937. Likewise, in the case of natural gas the improvement in performance resulted in a saving of around 10.4%, approx. USD 35,519.

The investment cost of the 2019 energy management projects and implementation was \$USD 143,535, and the improvement in the clinic's total energy performance corresponds to 6.3% which meant more than 1,870 MWh during 2019. In money, it is equivalent to \$ USD 127,455.

All the above reinforces the guidelines of sustainability for the organization, which gives rise to new projects. In this context, as an objective for 2020, the clinic plans to participate in the Chilean Footprint Project introduced by the Ministry of the Environment, to quantify and certify the reduction of the Carbon Footprint.

In terms of Greenhouse Gases, this means more than 540 tons of CO₂ equivalent, when considering only the energy savings of the previously mentioned projects. However, this will increase when active environmental projects, such as the recycling program, are included.

The benefits of energy performance have given the organization the opportunity to obtain the Energy Efficiency Gold Award issued by the Chilean Ministry of Energy via the Energy Sustainability Agency (ASE).

The Gold Award is the highest commendation, and therefore the Clinic joins a select group of organizations, which lead the way in Energy Efficiency in Chile, and establishes itself as a benchmark in its industry in terms of sustainability.

The above has meant a renewal of the commitment of all the employees in this area, as well as an increase in their competitiveness with the main players in the market, thanks to the added values that this distinction provides.

These values have now become of great interest to the patients who regularly seek not only quality services, but also those that contribute to the sustainability of the planet.



Figure 1: Clinica Santa María receive Energy Efficiency award

Plan

The implementation of an EnMS originated from an objective proposed by the Operation Management, associated with the operational efficiency of its operation, which results in the reduction of electric power consumption. In this context, a search for some regulations to determine the consumption was conducted, and the decision was made to implement an EnMS based on the ISO 50001 standard; an activity that ended with certification at the end of 2016.

The above represented a great achievement for the organization, which didn't have any ISO based management systems. It also enabled it to become the first and only Healthcare Centre in the country to be certified under this standard.

Along this line, the Senior Management of the Clinic, via its current Operations Manager, was the main instigator of this project. Therefore, the commitment required for the regulations, which is the basis for any Management System, was more than explicit and willing to deliver all

the necessary financial and human resources to achieve the implementation of the EnMS and ensure that the EnMS is fully aligned with the Group's strategy and objectives.

Re-certification

During the follow-up audit of the EnMS (in 2018), the following observations were made by the External Auditor: (i) Energy Planning should be updated on a more technical and deeper level; (ii) The indicators were linked to bed-days which didn't allow the energy performance to be measured correctly. With this in mind, during 2019, Senior Management and the Clinics Energy Manager, planned to professionalize the EnMS via an external consultant specializing in energy efficiency and a Centralized Control System (CCS) for technical support of the data reporting and controlling. These strategies ratify the commitment of Senior Management, in addition to being key decisions for the fulfilment of the proposed energy goals and objectives, strategy and guidelines of the organization.

Energy Planning

During 2019, the re-implementation of the EnMS at a more professional and transversal level in the Clinic, involved the incorporation of other relevant Deputy Managers to the energy team. In addition, an extensive energy diagnostic process was developed, and the following noteworthy result was obtained: 64% of energy consumption corresponds to Electricity and 36% to Natural Gas. (Figure 2)

Faced with this scenario, and to obtain an adequate and representative energy baseline (as mentioned in the follow-up audit), information was collected from the CCS, and consumption data gathered for Towers A, B and C via meter readings. This enabled the identification of significant energy uses, which correspond to the following: (i) In the case of electricity the cooling system (58%), is mainly associated with chillers, and cooling towers; (ii) In the case of natural gas, the heating usage (97%), is principally for the boilers.

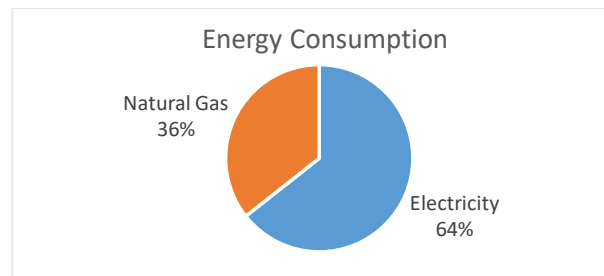


Figure 2: Clínica Santa María's energetics distribution

Do, Check, Act

The implementation carried out during 2016, organizationally only included the Clinics Energy Manager and the technical areas belonging to the Deputy Management of Operations. The process was led by the Environment and Sustainability area, which also assumed responsibility for Energy Management.

For the re-implementation in 2019, the decision was made to incorporate all the relevant parties such as infrastructure, finance, legal, organizational development, training and risk prevention and hospitality, into the energy team.

The main support of the System lies with Operations Management, who are responsible for channelling the necessary resources for its operation.

Operationally, the EnMS works thanks to the Deputy Management of Operations and its areas identified as significant energy uses such as Industrial and Sanitary Equipment, Electricity and Air Conditioning. They were the main installers and supervisors of the different activities that enabled the improvement in energy performance:

- The replacement of luminaires began in 2017 and ended in 2018, achieving an annual saving of 749,304 kWh in electricity, which corresponds to a saving of USD 76,564.
- At the beginning of 2019, the burners in the boilers were changed, achieving an annual energy saving of 660,328 kWh, resulting in an annual saving of USD 26,313.

- The implementation of Operational Controls for Chillers associated with external temperatures began in early 2019, and generated savings of 853,361 kWh per year, equivalent to USD 88,531.

In order to finance these projects, the support of Senior Management was fundamental and is reflected in the Operations Management team, who have managed all the economic and human resources to successfully fulfil the planning objectives and goals set year after year according to the commitments taken on by the organization.

Energy Performance and Savings Verification

The improvement in energy performance, due to the realization of the principal projects, was determined based on the construction of an energy baseline and its comparison with consumption after the implementation of each project.

For the replacement of luminaires back in 2017, the baseline was obtained from the information gathered from the implementation of the project, via a field survey of the luminaries that were replaced and from measurements taken from lighting control boards.

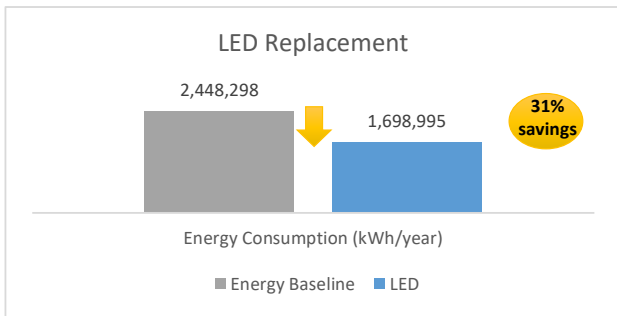


Figure 3: Led replacement energy savings

For the project regarding the installation of boiler burners, a baseline was built from the natural gas consumption of the boilers in tower C during 2018, their function being to heat the Clinic according to the ambient temperature and comfort levels. This way, the independent variable would correspond to Heating Degree Days (HDD) that are mathematically related in with a linear regression. According to the correlation obtained, the necessary adjustments were made to

estimate the calculation of the energy baseline (Figure 4).

In the case of the Chillers, the baseline is under construction as energy and temperature meters were fitted to each Chiller as of July 2019. This information will, after recording 12 months of data, allow the verification of the savings

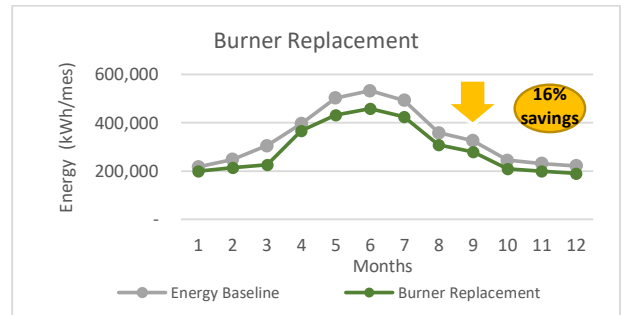


Figure 4: Burner replacement's energy baseline curve

However, baselines were established for the overall electricity usage and for each tower, where the key variable corresponds to the Cooling Degree Days (CDD) and a R² equal to 0.80 was obtained, that according to the protocol of measurement and international verification of projects (IPMVP) corresponds to a valid and significant correlation.

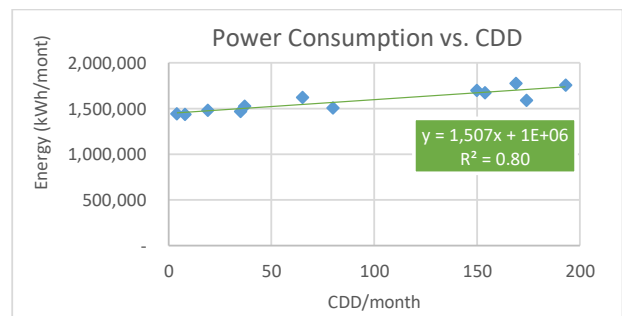


Figure 5: Linear regression for Electricity consumption

Quality of Information

To validate these results and improve the quality and quantity of information to be managed, Clinica Santa Maria determined the need to integrate a Centralized Control System (CCS). It fulfils the function of recording information such as electrical variables, internal data and

environmental data amongst others, via diverse sensors and energy measurement equipment. The data can be used to generate trends and reports that enable the creation of baselines and deviations in critical energy performance indicators (EnPIs), among other key parameters.

The implementation of the CCS will be finalized during 2020 and will become part of a large Operational Control Center (OCC), whose objective will be to safeguard and monitor the operation of the Clinic's facilities via security cameras and the operational control of all aspects currently controlled by the CCS.

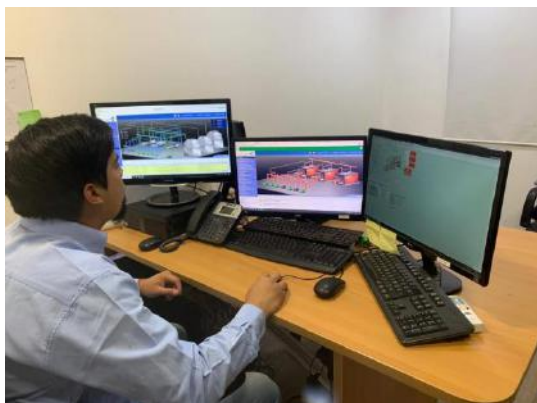


Figure 6: CCS's Operator

The project has more than 4,000 measuring points for the three towers, which will allow the EnMS to be updated and incorporate more precise indicators that will really enable the measurement of energy performance in a disaggregated way across the facilities.

Operational Control

In order to maintain efficient operation of the significant energy consumers that may affect the energy performance of the EnMS, improvements associated with the operational control of key equipment such as the Chillers have been implemented. The Chillers initially operated 24/7 without considering the thermal requirements associated with the internal and ambient variables of the Clinic.

Procedures have been established that regulate and identify the operating parameters of the Clinics critical equipment, as they are an essential part of the CCS and

will also hopefully result in an improvement in energy performance.

All this has been accompanied by an intense training process for the personnel (internal and external) operating the EnMS and their respective critical areas.

In total, 100% of the external personnel (61 workers) associated with the daily operation and maintenance of critical equipment have been trained.

Awareness and Training

Training in energy efficiency and Management Systems is a key element and it has begun with the formation of the Energy Manager as an ISO 50001 Internal Auditor. This way, the person in charge of the system has a solid base to disseminate what is related to the EnMS more efficiently.

According to this, Clinica Santa Maria has determined that any new employees who will work in the significant energy use areas, with the operation of critical equipment and its impact on the EnPIs, will attend training workshops conducted by external consultants or qualified internal staff.

In addition, dissemination and awareness campaigns have been developed to motivate and instruct all employees of the Clinic in good energy efficiency practices, using all the available communication platforms.

Tools and Other Resources

The EnMS has fostered initiatives associated with energy efficiency, and motivated the implementation of sustainability measures within the Clinic, incorporating projects related to the recycling of residues similar to household waste, discarded at its facilities.

The project called "Reciclar es Sanar" (Recycling is the Cure), has resulted in an increase of 38% over the previous year, of the amount of material recycled, 43 tons of recycled waste, which is equal to the prevention of more than 2,000 tons of CO₂ equivalent.

"At Clinica Santa Maria we are proud of our strategy focused on the sustainability of our facilities, achieving, thanks to the EnMS and the recycling plan, a reduction of more than 2,500 tons of CO2 equivalent."

— John Allen, Operations Manager.

It is in this context that the Clinic has decided to take another great step based on the benefits of its current EnMS. It intends to implement an Environmental Management System (EMS), based on ISO 14001, so that, this way, it can integrate both initiatives into a solid Sustainability Management System.

This improvement comes hand in hand with the efforts made over the years by the Operations Management team and all its areas.

On the other hand, the impact of the SGE has allowed other processes of the Organization to intervene, such as procurement and human resources. Regarding the first, technical specifications of critical equipment and energy efficiency criteria have been incorporated, mainly in line with the LEED certification of buildings for the area of air conditioning and lighting.

Transparency

Transparency in information is a fundamental value of the organization, and it is carried out by regularly providing information to all the employees and patients. In this way, the organization effectively communicates all relevant information, achievements and objectives via mailing, the intranet, magazines, newsletters and television screens. In addition to the above, the energy

efficiency policy is published in the main entrance of every tower (A, B and C).

Another medium where information is communicated to the public is the clinic's website, (www.clinicasantamaria.cl), where it is possible to view information related to the energy policy and other news relevant to the sector.

Lessons Learned

Implementing and maintaining an Energy Management System is not an easy task for any organization, given that it requires a steadfast commitment from Senior Management and all of the employees.

For Clinica Santa Maria, one of the main difficulties in the process was overconfidence in the level of depth of the processes that were incorporated within the scope of the recently redeployed EnMS.

After several months of operation, difficulties were identified regarding the efficient flow of information. Lack of participation and / or interaction with other areas of the organization hampered the effective implementation of energy efficiency improvements. These difficulties revealed that the Clinic needed a more complex EnMS to meet its needs.

If a new implementation process should be carried out:

- the services of an energy efficiency specialist would be chosen early to save time on implementation activities.
- the areas involved at a transversal level would be included, to actively participate in energy management.

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/energymangement.

