

# ISO 50001 Energy Management System Case Study

2021

Brazil

## HTEJZ - Hospital de Transplantes Euryclides de Jesus Zerbini

(Euryclides de Jesus Zerbini Transplant Hospital)

*First Brazilian public hospital certified to ISO 50001*



Euryclides de Jesus Zerbini Transplant Hospital

### Organization Profile & Business Case

The Euryclides de Jesus Zerbini Transplant Hospital (HTEJZ) is the first public health center specialized in organ and tissue transplants in Brazil. Managed by SPDM – Paulista Association for Medicine Development since January/2010, its mission is to offer excellent and high complexity healthcare services, training and improving professionals, in accordance with Public Health System in Brazil (SUS) principles, with quality and socio-environmental responsibility. The hospital is a national reference in neurosurgery and vascular microsurgery. It's considered the largest national center in the area of Hematology and Onco-Hematology, the largest World Center for the treatment of complex kidney stones, and the largest Latin American Center for prostatic hyperplasia benign treatment.

Aligned with the global trend to reduce the environmental impacts arising from its activities, the Hospital's Senior Management implemented the Integrated Management System, which, through the

Integrated Policy on Quality, Occupational Health and Safety, Environment and Energy Efficiency, established a commitment to the improvement of energy efficiency, achieving in October/2018 the ISO 50001, ISO 14001, ISO 9001 and OHSAS 18001 certifications.

*" The ISO 50001 certification is the international recognition of the Hospital's efforts to save energy. All energy savings are reversed in a greater number of medical assistance."*

— Dr. Otávio Monteiro Becker Júnior, Technical Director

### Case Study Snapshot

Industry	Healthcare
Product/Service	Public Health
Location	Jardim Paulista, São Paulo, São Paulo
Energy management system	ISO 50001
Energy performance improvement period, in years	2
Energy Performance Improvement (%) over improvement period	9%
Total energy cost savings over improvement period	US\$ 41,104.07
Cost to implement EnMS	US\$ 58,445.65
Total Energy Savings over improvement period	2,189.31 GJ
Total CO <sub>2</sub> -e emission reduction over improvement period	82.02 metric tons

### Business Benefits

#### Energy Savings

In 2018, the actions developed by the Energy Management Team, supported by Senior Management, resulted in a 10% reduction in global energy consumption, equivalent to 1225.51 GJ. In 2019, the global energy saving was 7.86%, equivalent to 963.8 GJ.

Thus, within 2 years, HTEJZ reduced the energy consumption by approximately 9%.

GLOBAL PERFORMANCE		
2018	2019	AVERAGE
-10.00%	-7.86%	-8.93%

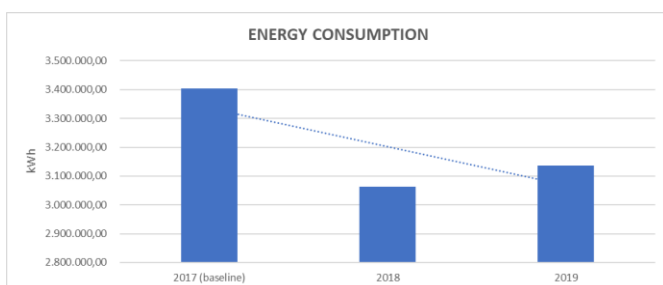
Considering that global energy comprises the sum of the consumption of natural gas, diesel oil and electricity, the reduction obtained in each energy vector is presented below:

ENERGY PERFORMANCE IMPROVEMENT	2018	2019
Natural Gas	-27.58%	-16.71%
Diesel	-15.15%	-27.00%
Electricity	-6.74%	-6.05%

Considering the years 2018 and 2019, the total savings in the consumption of natural gas, diesel and electricity was 2189.31 GJ.

ENERGY SAVINGS	2018	2019
Natural Gas (GJ)	-517.16	-313.36
Diesel (GJ)	-16.48	-29.37
Electricity (GJ)	-691.87	-621.07
Total Energy Savings (GJ)	-1225.51	-963.8

In 2018, the target to reduce 5% in energy consumption was successfully achieved. In 2019, the target was increased to 8% and a reduction of 7.86% was achieved.

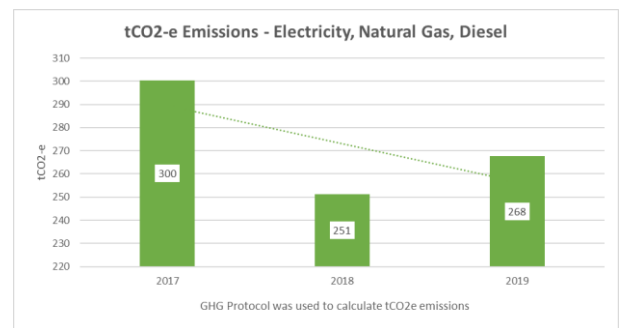


The estimated time of the internal staff for developing and implementing the EnMS was less than half a year.

## Reduction of CO<sub>2</sub> emissions

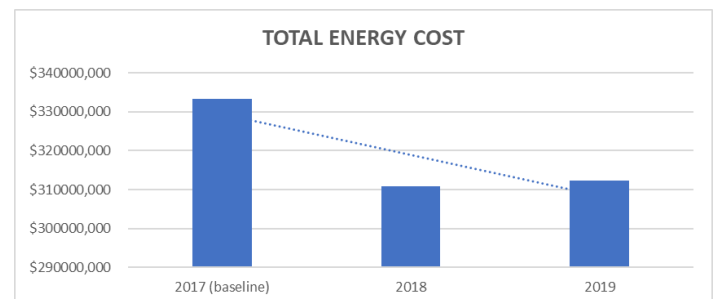
In two years, the Hospital reduce 82.02 tCO<sub>2</sub>e related to electricity consumption, natural gas, and diesel oil:

- 2018: emission reduction of 49.19 tCO<sub>2</sub>e.
- 2019: reduction of 32.83 tCO<sub>2</sub>e.



## Costs

The savings related to the reduction of consumption of natural gas, diesel oil and electricity was approximately US\$ 41,104.07, corresponding to a cost reduction of approximately 12.5% over 2 years.



In two years of investment, costs directed to the implementation of ISO 50001 and improvement of the hospital's energy performance were approximately US\$58,445.65.

## Plan

Since its reopening in January/2010, the Transplant Hospital has developed and implemented several social and environmental responsibility programs, bearing in mind its environmental concern with climate change and

the environmental impacts resulting from its activities. As a strategic goal of the institution, programs are promoted annually to train and raise awareness of employees and third parties, in addition to actions aimed at protecting and restoring the environment.

Thus, in 2018, the Integrated Management System was implemented, encompassing the initial certification of the ISO 50001, ISO 14001, ISO 9001, and OHSAS 18001 standards: an initiative by Senior Management in the quest for improving hospital processes and, consequently, for improving energy efficiency.

### Analysis of energy use and consumption

For this analysis, the institution identified the use of three energy vectors, defined all areas of the Hospital as borders and carried out a survey of the consumption history for each energy vector, which are: electricity, natural gas, and diesel oil.

### Machinery and equipment inventory

The Maintenance Engineering, Clinical Engineering, Information Technology, Food and Nutrition Unit, Hospitality and Environmental Management teams carried out the mapping of processes and the inventory of machines and equipment, registering their respective consumption potencies.

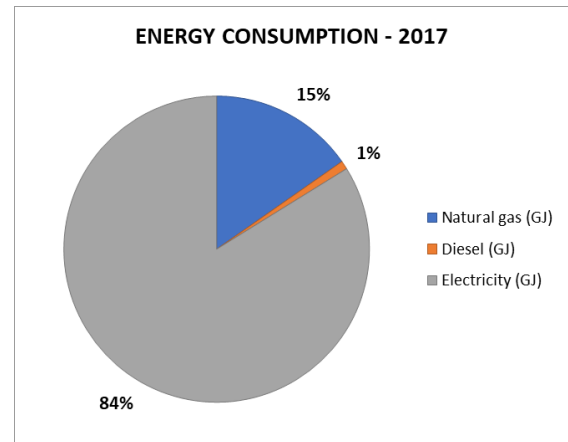
The consumptions were obtained through the telemetry system (Smartenergy), with instantaneous data collection. This system was acquired to support the Energy Management System in analyzing energy consumption and defining improvement strategies.

For locations that do not have the telemetry system, the power of the equipment was obtained by consulting technical manuals and consumption was estimated taking into account the installed power of the equipment multiplied by the monthly use time.

### Energy baseline (EnB)

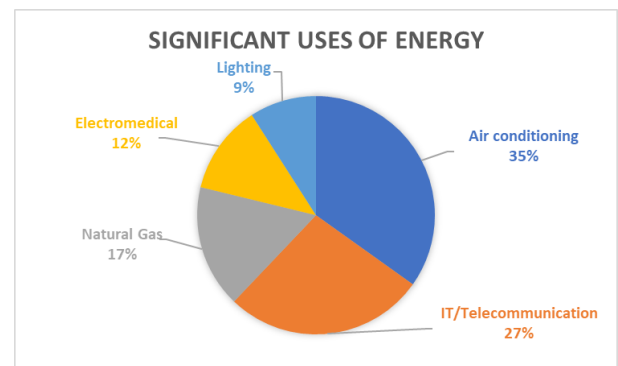
The year 2017 was defined as the Hospital's Energy Baseline, as it is the period with the best representation of the hospital's reality in relation to energy

consumption, infrastructure and number of medical assistance.



### Significant Energy Use (SEU)

Significant energy use (SEU) was defined as all equipment whose energy consumption (Electric, Natural Gas or Diesel Oil) is equal to or greater than 2% in relation to the global consumption of the HTEJZ.



### Action planning

It was defined that actions without the need for investment would be implemented immediately, and actions aimed at SEU would be prioritized.

- Conduct training and awareness regarding the EnMS to all employees, in addition to third parties involved with the management of SEUs. Deadline: immediate start.
- Carry out daily rounds with a focus on verifying energy waste. Deadline: immediate start.

- Create a procedure with the methodology to carry out the products or services acquisition and evaluation with an impact on the EnMS, since one of the requirements for the machinery and equipment purchase is the better energy performance presentation. Deadline: immediate start.
- Replace air conditioning equipment with new equipment, considering classification A in the PROCEL seal for energy efficiency and using ecological gas, to comply with the Kyoto Protocol. Term: continuous action, carried out as the old devices fail to function.
- Acquire a software license to manage the Integrated Management System for managing legal requirements, risks, and opportunities, and non-conformity dealings (use of PDCA methodology). Deadline: March/2018.
- Perform an internal audit. Deadline: July/2018.
- Perform an external audit. Deadline: August/2018.
- Install automatic reactive compensation system (capacitor bank) in power transformers to correct the power factor and improve the electrical energy efficiency distributed to hospital areas. Deadline: August/2018.
- Acquire telemetry instruments and software licenses for electricity consumption daily monitoring. Deadline: December/2018.
- Replace 100% of fluorescent lamps with LED lamps. Deadline: December/2018.
- Replace the cooking pots in the Food and Nutrition Unit (kitchen) with more efficient technologies. Deadline: April/2019.

### Setting objectives and goals

Aiming to reduce significant environmental impacts, due to the reduction of natural resources and alteration of the air quality, the HTEJZ's Senior Management set a target to reduce 5% in the global consumption of electricity, considering the EnB, prioritizing actions aimed at SEUs. For 2019, a target to reduce the global consumption of electricity by 8% was applied.

## Do, Check, Act

### Energy Management Team (EnMT)

For the result of the proposed actions, it was necessary to involve the units characterized as key, supported by the top management: Hospital Maintenance Engineering, Clinical Engineering, Hospitality, Environmental Management, Food and Nutrition Unit, Information Technology and Transportations Department of Euryclides de Jesus Zerbini Transplant Hospital.

### Do

- Financial resources: the Senior Management, in meetings with the Energy Management Team, planned the actions to be carried out and made provision for the availability of financial resources to improve energy efficiency, meet legal requirements, and reduce significant environmental impacts. **Action completed.**
- Training and awareness program Implementation. **Action completed.**
- Energy Efficiency Blitz: Daily rounds carried out by the hospital's electricians in the HTEJZ sectors, with energy waste found registration in a checklist, with notification to the sectors through stickers attached to the doors of the units. **Action completed and performed continuously.**



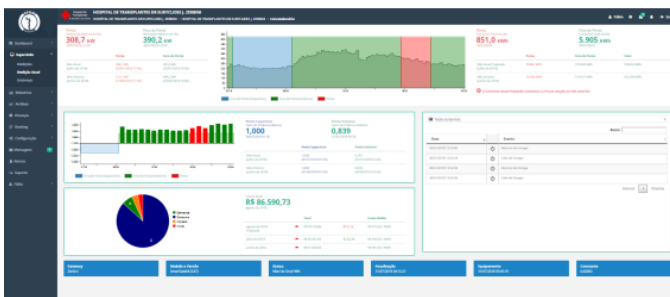
This procedure was intended to monitor the units' energy use awareness. Upon receiving a waste notification, the sector manager must carry out an awareness-raising action with the unit's employees.

- Procedure Creation containing the methodology for the products and services acquisition and guidelines for the supplier's selection, evaluation, and reassessment. Specific form implementation for the critical products or services purchases considering EnMS. Action completed.
- Air conditioning equipment replacement. Action in progress.
- IMS management software acquisition: Action completed.
- Capacitor bank acquisition. Action completed.
- Telemetry and Smart Energy software acquisition for electrical consumption monitoring. Action completed.
- Replacement of all 4,100 fluorescent lamps with LED lamps. Action completed.
- Two combined ovens monitoring to replace cooking pans. Action completed.

### Check

- Energy consumption monitoring: performed daily through the Smart Energy software, at points with installed telemetry equipment. This system allows monitoring of electrical consumption 24 hours a day, every day of the year.

In addition to telemetry, monthly is registered the consumption of electricity, natural gas, and diesel oil in a spreadsheet after receiving the invoices issued by concessionaires and suppliers, where are observed the Hospital's energy performance.



- Monthly meetings with the EnMT: analysis of results and definition of action plans when deviations are observed.

- Energy performance indicator (EnPI): considering that the global energy consumption is equal to the sum of the consumption of electricity, natural gas, and diesel oil, the EPI used in the years 2018 and 2019 **was calculated using the "Good" methodology, using the formula:**

$$\left( \frac{\text{baseline period global energy intensity} - \text{reporting period global energy intensity}}{\text{baseline period global energy intensity}} \right) \times 100$$

- Annual target for 2018: 5% reduction in global energy consumption.
- Annual target for 2019: 8% reduction in global energy consumption.
- Internal and external audits: annual, monitoring the IMS performance.
- Annual critical analysis of Senior Management: discussion of EnMS and IMS results to define goals and targets for the next cycle (year), allocation of financial resources, monitoring of ongoing actions, analysis Baseline (period of 12 months) in case of changes in the institution that impacts the EnMS.

### Act

In the monthly meetings with the EnMS committee and in the annual critical analysis of the EnMS, the key managers analyze the performance of the EnMS and, in case of deviations above 10% in relation to the stipulated target, they develop critical analysis and treatment for the deviation using the PDCA method. The Commission and Senior Management are also responsible for developing actions to improve the EnMS, after perceiving opportunities in the Integrated Management System.

### Energy Performance Improvement

In the first year of IMS implementation, it was observed that the actions developed by the EnMS committee resulted in the stipulated goal achievement, with a 10% reduction in global energy consumption, with a marked



## improvement in energy performance.

ENERGY CONSUMPTION	2017 (baseline)	2018	2019
Natural Gas (GJ)	1,875	1,358	1,562
Diesel (GJ)	109	92	79
Electricity (GJ)	10,271	9,579	9,650
<b>TOTAL CONSUMPTION (GJ)</b>	<b>12,254.85</b>	<b>11,029.34</b>	<b>11,291.06</b>
<b>GLOBAL PERFORMANCE</b>		<b>-10.00%</b>	<b>-7.86%</b>

Each energy vector performance and the overall performance were obtained through the formula below, using the "Good" methodology. The temperature was considered as a relevant variable since the "air conditioning" group is the main SEU in the Hospital and has a direct relationship with its variation.

$$\left( \frac{\text{baseline period energy intensity} - \text{reporting period energy intensity}}{\text{baseline period energy intensity}} \right) \times 100$$

## Awards

The implantation result of ABNT NBR ISO 50001 allowed HTEJZ to participate in the Healthy Hospitals Seminar with the Project "Energy Performance and Efficiency". The project receives the "Friend of Environment Award", promoted annually by the Health Department of the State of São Paulo. This award recognized the Hospital's efforts in its actions related to the Energy Management System, aiming at sustainability and environmental protection.



## Transparency

The hospital's ISO 50001 certification was disclosed on the Transplant Hospital website, on the intranet and on the Hospital's bulletin boards, for the knowledge of employees, patients, visitors.

Since 2015, HTEJZ has been a member of the Green and Healthy Hospitals Global Network and is part of the Healthy Hospitals Project (partner of the international organization Health Care Without Harm). We participate in the Energy Challenge, Climate Health Challenge, Health Without Mercury, and Health Service Waste Challenge projects, annually carrying out the greenhouse gas inventory, which is reported to the Healthy Hospitals Project, with the objective of progressively reducing emissions of greenhouse gases. With the implementation of these projects and, consequently, with the actions aimed at ISO 50001 certification, in the last 5 years the hospital has already reduced its CO<sub>2</sub>e emissions by more than 1,200 tCO<sub>2</sub>e /year.

## What We Would Have Done Differently

The identification of the actions described below was possible due to the maturation of the Energy Management System.

- Designate responsables for each sector of the Hospital to act as the first barrier in combating the waste of electricity, with the Energy Efficiency Blitz as the second barrier.
- Set the goal in the medium and long term to ensure continuous improvement and success while on the path to more challenging achievements.
- Investment in the automation of the refrigeration and air conditioning, which represents 35% of the significant use of energy, to improve energy performance.

The Energy Management Leadership Awards is an international competition that recognizes leading organizations for sharing high-quality, replicable descriptions of their ISO 50001 implementation and certification experiences. The Clean Energy Ministerial (CEM) began offering these Awards in 2016. For more information, please visit [www.cleanenergyministerial.org/EMAwards](http://www.cleanenergyministerial.org/EMAwards).