ISO 50001 Energy Management System
Case Study

2020 Brazil

Hospital Israelita Albert Einstein

First Brazilian Hospital certified in ISO 50001: Management efforts reduced 2,150 MWh / year

"Einstein's initiatives aim to achieve greater energy efficiency in operations that contributes to its vocation to keep improving itself"

— Junia Gontijo, Engineering and Maintenance Director.

Organization Profile

The Sociedade Beneficente Israelita Brasileira Albert Einstein created the Hospital Israelita Albert Einstein (HIAE) in 1971 with the commitment to offer the Brazilian populace a worldclass health care and today it has become a reference in state-of-the-art treatments and humanized care, and has expanded its borders with social responsibility actions, education, research activities and the commitment to sustainable development, through environmentally and energy efficient solutions adopted.

Morumbi Unit of HIAE, expanded its activities with a new building, all built with sustainability criteria that received the Leed Gold certification, verified by the Green Building Certification Institute (GBCI). It was opened in 2009, with 16 floors, 70,000 square meters of constructed area, 200 new multi-specialty offices, 20 new operating rooms, and 41 apartments for hospitalization/day.

In order to reduce the environmental impact of its operations, Einstein integrated its Environmental Management System (SGA), certified by ISO 14001:2015, with the Energy Management System (SGE), guided by ISO 50001:2011.

Case Study Snapshot	
Industry	Medical - Hospital
Product/Service	Health Care
Location	Morumbi Unit, São Paulo, Brazil
Energy management system	ABNT NBR ISO 50001
Energy performance improvement period, in years	1 year
Energy Performance Improvement (%) over improvement period	9 %
Total energy cost savings over improvement period	$USD 395,896.60
Cost to implement EnMS	$USD 658,000.00
Total Energy Savings over improvement period	16,654 GJ
Total CO_2-e emission reduction over improvement period	159,7 metric tons CO^2 e
Pay back	1,66 year

Business Case

Motivation:

Since 2010, the hospital is committed to mitigating greenhouse gases and managing the impacts and risks of climate change through actions aimed at energy efficiency. HIAE became a signatory to the UN Global Compact and in 2015 started the activities of the Executive Committee to monitor the Sustainability Dashboard.

During 2017, Einstein won the award *"2020 Challenge Climate Champions"* in the category Reducing emissions of greenhouse gases (GHG) from non-energy sources. The award-winning project ensured the 7% reduction in Einstein's total GHG emissions through the reduction in consumption of nitrous oxide (used in anesthesia).

At this same year, electric projects carried out totaled investments of approximately USD 0,6 million in three major actions:

• The exchange of 18,550 conventional lamps for LED lamps,

• Installation of photovoltaic panels for solar power generation; and

• Replacement of vacuum pumps for more modern and more efficient equipment.

The three measures provided a reduction in 2,150 MWh per year in the purchase of energy, which equals 5,66% of annual consumption (Morumbi). It´s equivalent to the consumption of more than 8,6 thousand households.

At this time, the Executive Committee decided to certify the Energy Management System according to ISO 50001. From the top management there was immediate interest since the results would bring contributions such as increased efficiency and impacts on reducing costs and environmental aspects.

The initiative required several actions, among them, the elaboration of a specific training plan, communication and awareness raising among employees and outsourced professionals.

EnMS Drivers:

HIAE has been creating a sustainable approach to an energy management system for several years, supported by a strong commitment from top management: since 2010, with the greenhouse gas emission reduction protocol and after, since 2015, with a systematic approach to the adoption of a 4-step energy management system:

Step 1- Commitment: Insertion of the energy theme in the institution's strategic planning

Step 2- Knowledge: Hire energy management skills, direct or indirectly, for acquisition, performance improvement and consequently reduce the environmental impact.

Step 3 – Solutions: Seek efficiency with successful innovative solutions

Step 4 – Excellence: focus on Sustainability, promoting added value for patients and the population through certifications that bring recognition to society.

EnMS Program:

The institution's expectation is to ensure the best energy performance in its operations, using appropriately the available technologies and keeping its employees aware of the importance of the rational use of energy. As a result, the institution remains in line with the best global practices.

At the beginning of the Project, a cross-functional team of experts was assigned to coordinate the implementation following the PDCA model proposed by the ABNT ISO 50001 standard.

The SGI (Integrated Management System) strategic committee, which involves ABNT NBR ISO 14.001 and ABNT NBR ISO 50.001, together with the team of specialists, established the baseline and establishes new challenges for the integrated system for coming years, the institution provides the necessary resources, supporting the leaders to execute the planned projects. The numbers to be reached are defined based on three factors:

• Reference consumption (baseline);

• New loads (growth);

• Projects to improve efficiency (reductions).

Committee areas:

- GSP - Patrimonial security management
- GEF - Facilities and property management
- GMN - Maintenance management
- GPO - Project and construction management

Objectives and Goals:

The Energy Objectives and Goals were established from the Energy Review, with the premise of meeting the Continuous Improvement of Energy Performance. Top management reviews and annually sets its energy targets on the inputs used in the Morumbi Unit, aiming to achieve:

• Avoid energy consumption;

• Technical excellence on the Use and Consumption of Energy;

• Reduction of specific energy consumption;

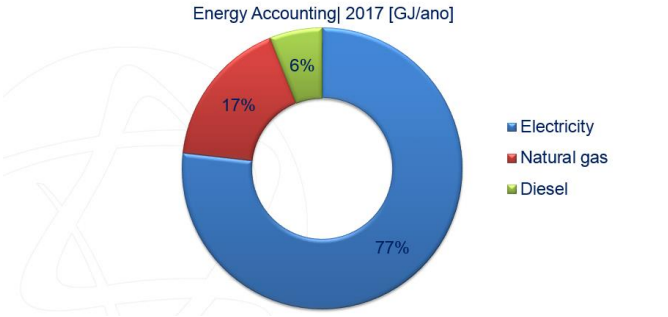
• Continuously improve energy performance;

• Establish a systematic process in Energy Management;

• Promote a culture of environmental responsibility and sustainable development;

• 100% uptime.

Energy Review



Electricity consumption represents about 77% of the total energy consumed, with End Uses are distributed as follows:

- Lighting System;
- Air conditioning;
- IT equipment;
- Electromotive force;
- Data Center;
- Electromedical.

Natural gas represents about 17% of total energy consumption used in operations for water heating in:

- Air Conditioning;
- Water heating for bathing;
- Food preparation.

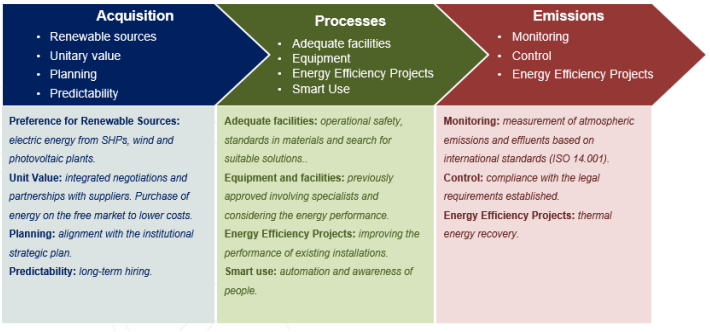
Diesel represents 6% of total energy and it is used as input in the backup generation plant.
Based on the definition of electricity consumption reduction, the baseline was defined based on 2017 consumption. The management flow was established in three large blocks ensuring the institutional guidelines related to energy.

Baseline LBE & IDE

Energy Data - Morumbi Unit in 2017			
Sources	Electricity [MWh]	Natural Gas	Diesel [L]
Consuption	38.054	781.245	295.086

Flow of Energy Management

The management flow was established in three large blocks, where the institutional guidelines that guide actions related to energy are presented.



Baseline period: 2017

Report period: 2018 (1 year or 12 months)

Plan

Based on the standard, a timeline was firstly created by the coordination team that establishes new challenges for the integrated system considering:

Accounting for energy inputs - determinant for the institution to have an effective visibility about the volumetries related to its energy matrix

Identify Significant Uses of Energy - through targeted measurements, the most significant uses of energy are identified. The energy required for air conditioning consumed in the chilled water generation plant stood out as the main use concentrated in a single point.

Establish Objectives and Goals - considering the institution's goal-setting criteria, the identification of the main end uses and the availability of technologies that allow it to improve performance, some projects aligned to the objectives and goals to be achieved.

Do, Check, Act

Develop Action Plan

Already part of the organizational culture, the action plan to implement the ISO 50001 was reinforced through the implementation of the energy management model.

Do

The action plans defined to be executed annually are already part of the organizational culture, thus, the model was reinforced through the implementation of the energy management model.

Check

The highlight for monitoring is the telemetry that was implanted in the cold-water generation center for air conditioning in the hospital. The system allows online monitoring of thermal load, energy consumption and delivered jobs data. Thus, it is possible to visualize the energy performance of the system over time. This fact helps teams to maintain proper performance throughout the 24 hours of the day, every day of the year and enables statistical analysis of data to define new projects and more assertive actions. Besides the telemetry, the implementation of a weather station contributed to reduce the diesel consumption by a more assertive use of the generation plant. It's is driven in the absence of power from the supply network.

Performance Monitoring

- Means of measurement and monitoring - continuous
- Management reports - bimonthly (SGI strategic committee)
- Corporate goals - annual
- Internal and external audit cycles - annual
- Periodic critical reviews in the SGI strategic committee - annual

Act

The SGI team monitors the energy performance, evaluate data and decide on actions to be taken, whether actions aimed at seeking even better performance, or to correct any deviations from the established values. In case of deviations greater than 3% actions are taken by the team. A common practice for all hierarchical levels, including the CEO.

SGI team:

Business Benefits

Savings in energy consumption

All targets were achieved according to performance indicators. There was a **reduction of 2,150 MWh of electricity** per year, which is equivalent to **5.66%** of the Morumbi Unit's consumption. Even with the increasingly intense use of technology to carry out health care activities, a practice directly associated with the increased demand for electricity, as well as the fact that the institution is in a growth process, it is possible to verify that the actions implemented have ensured that a significant amount of energy is no longer consumed.

Important to also mention that Internal staff team to develop and implement the EnMS was less than a half year of equivalent staff time

Use of Renewable energy

The solar self-generation system represents yet another source of clean energy to supply the institution's consumption. It will supply 0.4% of the energy consumed at the Morumbi Unit, and reinforces Einstein's commitment to using energy with low environmental impact. This made it possible to increase the share of renewable energy by 6.8%.

A premise in this respect is that all energy consumed is 100% from hydroelectric sources and does not involve flooding of large areas (SHP- small hydroelectric plant).

Water savings of 9% or 27,600 m3 in 2018

Diesel reduction from 13,036 GJ to 9,797 GJ (24%)

Natural gas reduction of 96,627m³ (9%)

Reduced energy costs

The data obtained indicate that relevant financial values in terms of expenses have been avoided. Calculations point to numbers that exceed USD 0.198 million per year.

Reduced CO2 emissions

HIAE has sought to reduce greenhouse gas (GHG) emissions since 2013, several measures allowed a 40% reduction in the annual consumption of the gas, between 2013 and 2018

Recycled Waste evaluation

More than 50% of non-hazardous waste collected at HIAE were intended for recycling; previous year the recycled share represented less than 30%

Management culture in the organization

The institution's management culture allows for fluid and positive communication, in this sense, the implementation of the ISO 50001 management model took place quite smoothly, as it found a fertile environment at all hierarchical levels.

Commitment to Sustainability

The institution's commitment to sustainability has been a reality for a long time so the implementation of ISO50.001 had an immediate interest since it would bring contributions towards increasing efficiency and reducing environmental aspects and impacts.

HIAE also stands out for its social responsibility arm, with this, each dollar saved through efficiency actions means more health care actions in the public network, in the more than 24 free service addresses offered to the population.

Awareness of all

Increasing the level of employee awareness allows them to take more control to achieve energy efficiency goals, which has also led employees to adopt a healthy, safe and environmentally conscious lifestyle, both at work and at home;

Transparency

Transparency is a daily practice at HIAE and when it comes to Sustainable programs, it is no different. Besides the public Annual Sustainability Report, available in our website, the information related to ISO 50001 implementation and its results were widely publicized in corporate channels, national and international hospital sector websites, and disseminated among the actions of the Brazilian Ministry of Mines and Energy for having a state-owned company as the internal auditor of the certification process (Eletrobras).

Lessons Learned

Understanding the importance of the Energy Management System (SGE)

As the institution has in its history a firm commitment to high performance and the constant search for excellent results, robust management models are always welcome as it creates opportunities to consolidate results already achieved and also a performance improvement.

Employee engagement

Institutional commitment, coupled with people's engagement, was the key to the success of the initiatives. The focus was to involve more and more people responsible for the end uses.

The perennial maintenance of the Energy Management System (SGE)

To maintain the results, HIAE understands that it is essential to act on two major fronts.

The first is day-to-day management, in which the following factors are critical:

• Training of teams;

• Periodic inspections;

• Operations performance indicators.

The second major front is Promotion, Awareness and Recognition, whose critical factors are:

- Awareness campaigns;
- Events to promote related topics;
- Management recognition for the results delivered by bi monthly reports from SGI strategic committee.
- Internal and external audit cycles - annual
- Periodic critical reviews in the SGI strategic committee - annual

Main challenges:

- Maintain the reduction of energy consumption with the insertion of new technologies and electrical equipment and keep financial resources in each budget cycle.

- Develop healthy partnerships with suppliers, including diagnosis, solution proposition and continuous training.

- Have good financial attractiveness – Current Payback 1,66 year