

ISO 50001 Energy Management System Case Study

2021

Brazil

CRLM - Centro de Reabilitação Lucy Montoro São José dos Campos

(Lucy Montoro Rehabilitation Center)

*First Brazilian public Rehabilitation Center certified to
ISO 50001*



Lucy Montoro Rehabilitation Center

Organization Profile & Business Case

The Lucy Montoro São José dos Campos Rehabilitation Center (CRLM) is part of the Lucy Montoro Rehabilitation Network. Managed by SPDM - Paulista Association for Medicine Development since September/2011, with the mission to supply excellent services in healthcare of people with physical, transitory or definitive disabilities, in need of receiving rehabilitation care, developing their physical and psychological potential, socio-educational and professional.

It performs administrative support activities in general and activities related to the treatment of

interdisciplinary rehabilitation of high and medium complexity.

The care is mainly intended for patients with spinal cord injuries, amputations, physical and cognitive sequelae of traumatic brain injury, cerebral palsy and acquired brain injury - with dysfunction or interruption of limb movements (upper, lower or both), and with severe restriction of mobility.

Case Study Snapshot

| | |
|--|---|
| Industry | Healthcare |
| Product/Service | Public Health |
| Location | Villa Industrial, São José dos Campos - São Paulo |
| Energy management system | ISO 50001 |
| Energy performance improvement period, in years | 3 |
| Energy Performance Improvement (%) over improvement period | 15 |
| Total energy cost savings over improvement period | \$USD 3,183.89 |
| Cost to implement EnMS | \$USD 64,598.45 |
| Total Energy Savings over improvement period | 155.52 GJ |
| Total CO₂-e emission reduction over improvement period | 24.254 metric tons |

Since its inauguration, Senior management has always been concerned with developing sustainable practices, promoting actions and awareness campaigns for the

rational use of water and energy, among other practices focused on encouraging sustainable development.

These actions are aligned with institutional values, ecological, economic, and social sustainability. With goals aiming to reduce greenhouse gas emissions and sustainable development (SDG) of the UN. By providing energy management to improve energy performance, reduce costs and reduce electricity consumption, CRLM places a premium on waste reduction and environmental impact.

Senior management used the Integrated Management System (IMS) to implement the Integrated Quality, Occupational Health and Safety, Environment and Energy Efficiency Policy. As a consequence and result of this work, the unit obtained ISO 9001, ISO 14001, OHSAS 18001 and ISO 50001 certifications.

Business Benefits

Energy Savings

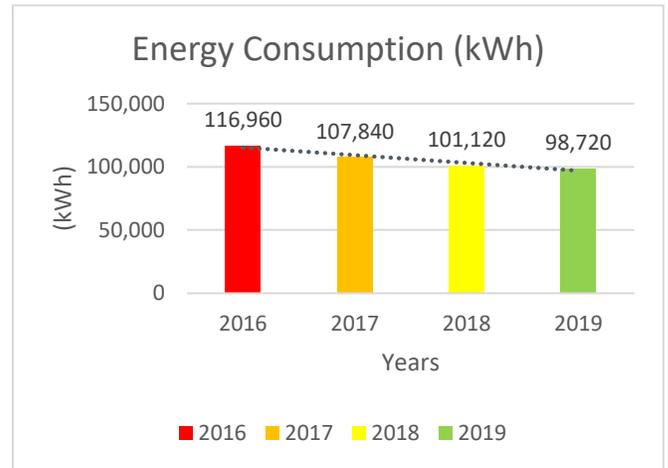
With the actions developed by the Energy Management team, there was a significant reduction in electricity consumption, with 15840 kWh (14%) in 2018 and 18240 kWh (16%) in 2019.

| Global Performance | | | | |
|--------------------|-------|--------|--------|--------|
| Year | 2017 | 2018 | 2019 | Total |
| Savings in kWh | 9,120 | 15,840 | 18,240 | 43,200 |

In the period of two years it was possible to observe approximately 15% of savings in the electric energy consumption at CRLM.

| Global Performance | | | | |
|--------------------|--------|---------|---------|-------|
| Year | 2017 | 2018 | 2019 | Total |
| Savings (%) | -8,00% | -14,00% | -16,00% | -13% |

In 2018, a 2% reduction target was set for electricity consumption compared to 2017, which was successfully achieved. In 2019, the same goal was set and achieved a reduction of 16%.



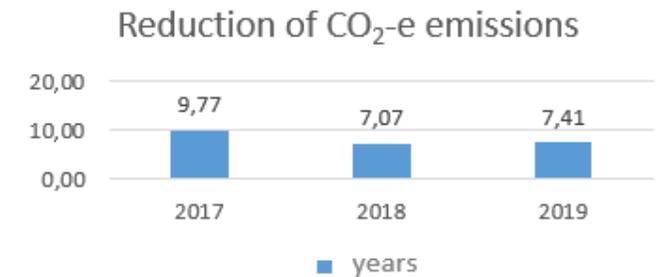
Reduction of CO₂-e emissions

Regarding the reduction of tCO₂e emissions related to electricity consumption, in 3 years the CRLM reduced the emission of 24.254 tCO₂e.

2017: emission reduction of 9.769 tCO₂e.

2018: emission reduction of 7.071 tCO₂e.

2019: reduction of 7.414 tCO₂e.



Costs

In the period of 2 years, the financial savings related to the electricity consumption reduction was approximately US\$ 3,183.94.



For the Lucy Montoro Rehabilitation Center, global energy consumption only considers electricity, as it does not consume natural gas or diesel oil.

Plan

Since the inauguration in September/2011, Senior Management, with a focus on institutional goals, has encouraged the sectors to develop sustainable practices, seeking excellence in their internal processes, especially those that directly impact the environment as a result of their activities.

In these processes improvement, in February 2018, the Integrated Management System implementation project started with the support of Senior Management. The implementation took place in October 2018, the Integrated Management System was implemented to obtain certification is ISO 50001, ISO 14001, ISO 9001, and OHSAS 18001 standards.

Analysis of energy use and consumption

Maintenance Engineering is the area responsible for controlling the acquisition and distribution of energy vectors for the end-users of the processes/areas, as well as the maintenance of equipments. The team carried out a survey of its energy source and areas where machines and equipments that have significant energy use (SEU) are allocated.

The entire CRLM was determined as a border and electricity as the only source of energy used in it, and a

historical survey of consumption for the energy source was carried out, as per the survey in the following:

Global consumption = (Σ electricity consumption) kWh,

It was surveyed the consumption of electricity for the 2016 fiscal year. It was from this point that the improvement in energy performance began to be verified.

| Energy Baseline - 2016 | JAN | FEB | MAR | APR | MAY |
|---------------------------------|-------------|-------------|-------------|-------------|-------------|
| Energy Consumption (kWh) - 2016 | 7.920 | 12.800 | 10.960 | 14.080 | 8.480 |
| Energy Costs (US\$) - 2016 | \$ 1.047,64 | \$ 1.674,88 | \$ 1.385,66 | \$ 1.768,34 | \$ 1.059,25 |

| JUN | JUL | AUG | SEP | OCT | NOV | DEC | Total |
|-------------|-------------|-----------|-------------|-------------|-------------|-----------|--------------|
| 9.440 | 8.560 | 7.600 | 8.720 | 8.960 | 10.160 | 9.280 | 116.960 |
| \$ 1.145,36 | \$ 1.037,49 | \$ 947,68 | \$ 1.076,47 | \$ 1.082,95 | \$ 1.029,72 | \$ 928,32 | \$ 14.183,78 |

Machinery and equipment inventory

For the strategic planning, it was necessary to carry out the equipment mapping and their respective consumption. The power estimation was based on the equipment technical data, taken by consulting manuals and/or in loco, taking in account the equipment installed power multiplied by monthly usage time.

Variable Affecting Significant Usage: Temperature
 Rated Power = equipment manufacturer Power definition – unit (kWh); No. = Equipment Installed Number

Equipment Power = Rated Power x No. of equipment installed;

Operating hours Number per day = Defined based on the sector's operating time and the unit's employees and managers knowledge;

Operating time* = (operating hour/day) x (operating days);

Total Consumption = (Runtime) x (Rated Power) /1000;
 SEU = (Rated Power) x (Runtime) / (Total Power); %

*The equipment operating time were defined as reported by the employee responsible for each area where the equipment is allocated.

Energy baseline (EnB)

The CRLM Energy Baseline was established to monitor performance and define corrective actions or improvements in energy performance. The Energy Baseline will only change when occurring significant

process changes. After analyzing the database of previous years (as described in the CRLM-MAN-002 SGE-Consumer History record), 2016 was defined as Baseline year, as it is the best quantitative reference and real situation (in relation to equipment and processes that consume and use energy) to monitor energy performance compared to the current year.

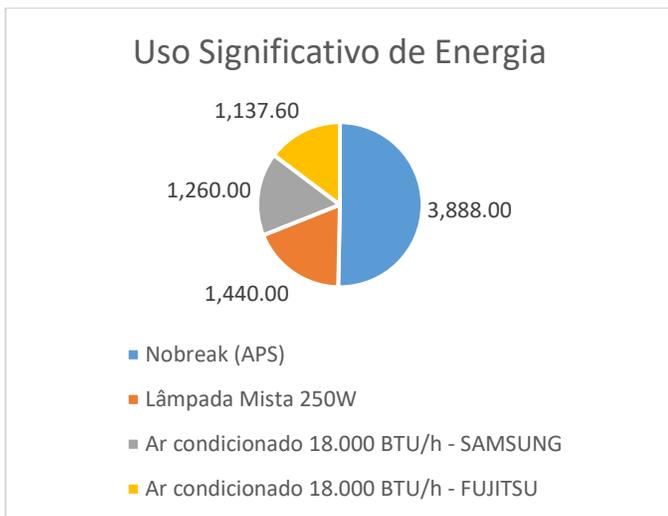
After that, were defined the loads that will be monitored as Significant Energy Use (SEU).

Significant Energy Use (SEU).

It was established the criteria described in the following to determine the significant consumption:

Significant use definition: the three equipment types with the highest consumption rates (more than 2% compared to global consumption).

Equipment or areas that presented energy use with a value greater than or equal to 2% of the global value were evaluated using the consolidated data. The Significant Energy Uses identified in the CRLM-MAN-004 record representatively affect the EnMS. Therefore, it must involve actions to reduce consumption, as well as awareness of the people involved (eg, training of people related to maintenance, awareness of employees regarding the use of SEU).



Setting objectives and goals

The following items are described as part of the objectives of the EnMS:

Promote and disseminate the energy management policy with awareness of 100% of employees, for continuous improvement and actions to curb waste;

Optimization and maturation of the energy management system over time;

Monitor the SEUs for in-depth studies and knowledge of energy consumption behavior;

Encourage the improvement of preventive and corrective maintenance processes and tools acquisition of tools for better efficiency of the management system.

Establish programs to reduce electricity consumption by 2% compared to the previous year, which will be evaluated monthly according to the EnMS-Consumption History record.

Do, Check, Act

Energy Management Team (EnMT)

For the full result of the proposed actions, it was necessary to involve the characterized main units, supported by the senior management: Hospital Maintenance Engineering, Quality and Representatives of the assistance areas of CRLM, forming the energy management system committee responsible for planning and development of EnMS actions. And the energy management team, which is made up of members of the Hospital Maintenance Engineering unit, and defined by the Senior Management, which includes an administrative assistant, an electrician, and a maintenance assistant. The energy management team was responsible for mapping the equipment and its respective consumption.

Do

- Financial resources: the Senior Management, in meetings with the Energy Management System committee, planned the actions to be carried out and made provision for the availability of financial resources

to improve energy efficiency, to meet legal requirements, and to reduce environmental impacts significantly.

- Lighting: replacement of all 534 CRLM fluorescent lamps with LED lamps.
- Telemetry: acquisition of telemetry instruments and software use license (SmartEnergy) for daily monitoring of electricity consumption.
- Energy Efficiency Blitz: daily rounds carried out by the electrician in the CRLM sectors, with the registration in a checklist of the energy waste found, with notification to the sectors through stickers attached to the doors of the sectors.



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

- Purchasing: The Senior Management, in its strategic planning, defined that one of the requirements for the purchase of machinery and equipment is the presentation of better energy performance. A procedure was developed containing the methodology for the acquisition of products and services and guidelines for the selection, evaluation, and reassessment of suppliers. The use of a specific memorandum for the purchase of products or services critical to the EnMS was implemented, with criteria for evaluating the energy performance of the product to be purchased.
- IMS software for managing legal requirements, risks and opportunities, and dealings with non-conformities

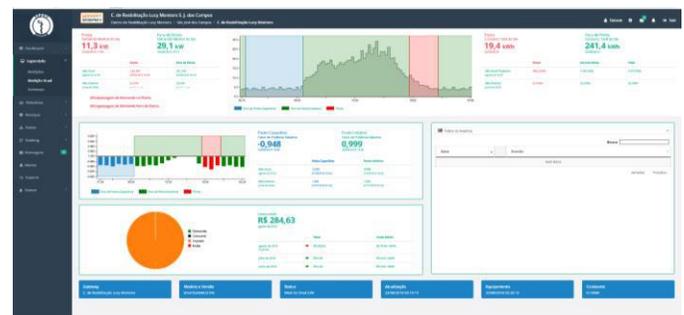
(use of the PDCA methodology): acquisition of software for managing the IMS.

- Training and awareness: implementation of a training and awareness program aimed at the EnMS, targeting all employees. Suppliers involved with the management of SEUs were included in the training and awareness program.

Check

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

In addition to telemetry, monthly, electricity consumption data are collected from bills provided by the power distribution company EDP SP and a control spreadsheet is filled with this data, for monitoring and following up.



- Internal and external audits (third part): annual, to monitor the performance of the IMS and EnMS.
- Annual critical analysis of Senior Management: discussion of EnMS and IMS results, objectives and goals definition for the next cycle (year), allocation of financial resources definition, ongoing actions monitoring, analysis of the changing need of the Baseline (period of 12 months) in case of changes in the institution that impact the EnMS.

Act

In meetings with the Energy Management Team (EnMT) and in the annual review of the EnMS, key managers analyze the performance of the EnMS. The Energy

Management Team (EnMT) and Senior Management are also responsible for developing actions to improve the EnMS, after perceiving opportunities in the Integrated Management System (IMS).

Energy Performance Improvement

In the first year of implementation of the IMS and EnMS, we observed that the actions developed by the Energy Management Team (EnMT) with the support of Senior Management resulted in the achievement of the stipulated goal, with a reduction of 16% in electricity consumption, with an energy performance marked by accentuated improvement.

| Global Performance | | | |
|--------------------|--------|---------|---------|
| Year | 2017 | 2018 | 2019 |
| Reduction (%) | -8,00% | -14,00% | -16,00% |

The performance of each energy vector and the overall performance were obtained through the formula:

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

Transparency

The ISO 50001 certification was disclosed on the Lucy Montoro Rehabilitation Center website, on the intranet, and the unit's existing bulletin boards, for the knowledge of employees, patients, visitors, and third parties.

Since 2015, CRLM has been a member of the Global Green and Healthy Hospitals 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, to progressively reduce 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, CRLM has already reduced its CO₂e emissions by more than 63.91 tCO₂e.

What We Would Have Done Differently

The identification of the actions described in the following was possible due to the maturation of the Energy Management System (EnMS):

- Schedule the implementation with a longer time in advance and more intensive training.
- Investment in the technology and information park or alteration of the rent contract, which represents 11% of the significant energy use (SEU), in favor of improving energy performance.
- Designate responsible for each sector at CRLM to act as the first barrier in combating the waste of electricity, with the Energy Efficiency Blitz as the second barrier.

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.

