ISO 50001 Energy Management System
Case Study

Brazil

FCA Betim Powertrain

Energy efficiency as an organizational culture

Celebration of the results

Organization Profile & Business Case

The Organization has as its work the manufacture of powertrains for Light Automobiles, has a large fleet of machines, which include Automated Grinding Machine, mechanical lathes, CNC's, Automated Washers, assembly equipment, liquid filtration and reprocessing center, treatment furnaces thermal and others.

All of these represent a high energy consumption, accounting for about 10% of the organization's operating costs.

In addition to the environmental impact of high energy consumption and CO2 emissions, the need to manage these resources is part of the sustainability of the business, since the organization is aware that its activities must be environmentally friendly, so that these resources do not they finish, in addition to the high financial costs that can impact the price of the product and consequently its survival.

Due to this vision, the organization adopts in its organizational strategy, a long-term reduction of energy consumption. This strategy is deployed in specific action plans that are managed by analysts on the shop floor and disclosed to the entire organization.

Case Study Snapshot	
Industry	Automotive
Product/Service	Engines/Transmissions
Location	Betim/MG/Brazil
Energy management system	ISO 50001
Energy performance improvement period	3
Energy Performance Improvement (%) over improvement period	7,45 %
Total energy cost savings over improvement period	$USD 1.430.880,00
Cost to implement EnMS	$USD 65.700,00
Total Energy Savings over improvement period	81.900 GJ
Total CO_2-e emission reduction over improvement period	3.644 t CO2-e

KPI's defined at the highest level of detail are reported monthly in visual management at the production units and are held periodic meetings for discursions of new plans and improvements.

Some programs are carried out to strengthen the culture of energy conservation and to be the basis for reaching the goals, among them we mention:

- Energy Space - Where are inserted the technical information of consumption and loss of energy,

in addition to exposing the people with the best projects;

- Program Recognize - Meeting with managers and Plant manager to recognize the professionals who most collaborate with reduction ideas;
- Focal Point program - In each production unit, an operator is trained to be an energy reference, and thus discusses with the team on the shop floor, KPI results and simple energy reduction measures;
- Energy cards - Are simple documents that are used so that operators and maintenance people can report deviations from normal conditions that impact on energy consumption;
- Energy Team - Group of responsible for various areas that discuss the short, medium and long-term actions at managerial level, the organizational strategies of the requirements of ISO 50.001;
- Cross Project Program - Where energy projects are shared among the companies of the FCA group to accelerate the identification and development of new projects;
- Meetings and Workshops - Are held with technology companies to develop innovation proposals;
- "Energy Challenger" program - Where a challenge was developed with the trainees of the plant, aiming to develop them in the energy culture and to identify new opportunities of efficiency.

Business Benefits

We can identify several benefits from the implementation of ISO 50.001.

First of the benefits is data organization, documentation management. From this moment, it was possible to know the organization situation and to map the main points of weakness.

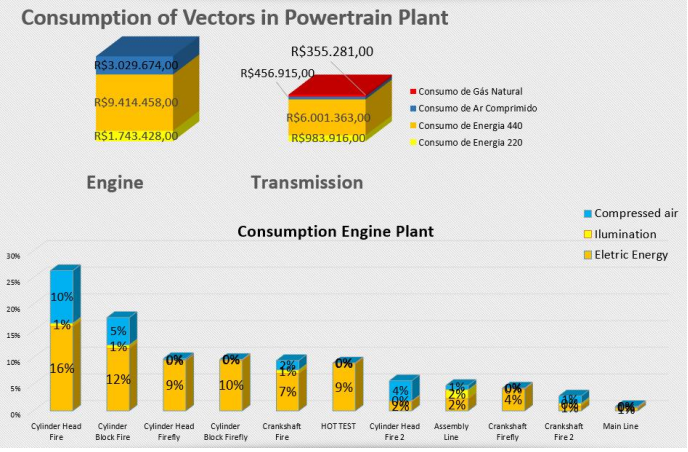

Fig.1 – Deployment of consumption per productive unit

From the organization of the data, it was possible to determine the losses that occurred in the processes, and their typology of loss. Was made a knowledge test with the strategic employees and inserted in the annual plan of training, through a platform called “LATAM ACADEMY”. Specific training was carried out in order to enable them to expand the scope of new ideas, ensuring the results of the organization in a transversal way.

The results were very positive, increasing the number of projects year by year, allowing a reduction of approximately 81,900 GJ and consequently 3,644 t CO2e.

The financial impact of these initiatives has been highlighted each year, even with the reduction of energy prices, due to the improvement of the condition of the rains and increase of the water reservoirs in the last two years, since we have as a renewable energy matrix, provided by hydroelectric.

These initiatives generated a revenue of approximately $ 1.5 million, which has helped the company in its sustainability plan.

We adopted the GJ indicator per unit produced, since it better portrays the factory reality. According to the table below, we were able to observe the reduction of the indicator without a change in the considered perimeter that is, adopting the same scope in the three years.

Powertrain GJ/u.p.		
Results 2016	**Results 2017**	**Results 2018**
0,444	0,392	0,377

Plan

Leadership involvement in the organization was natural due to the importance of certification for market opening, and the EnMG became strategy when it was possible to analyze all the opportunities involved to highlight the image and the costs of the organization, this process was gradual and is being improved more and more, but started with the compression of the numbers of consumption, definition of the targets, detailing of the largest consumed and consequent the results.

In detailing these activities we have:

Analysis of Energy Consumption

Initially a financial survey of the impact of costs with the energy vectors was carried out, and this value was compared with other expenses of the organization, such as Manpower, Maintenance Materials, Logistics, Food and etc. It was verified that the cost with Electric Power vectors was close to 10% of the total cost.

EnMG x Strategic Management of the Organization

It was necessary to align the EnMG with the strategic management of the organization, so that the actions that were developed would be reasonable.

A work team composed of specialists from different areas was chosen, and with autonomy to expand the actions.

Fig.2 – Energy work team

A critical factor for the organization was the retention of high investments, since Brazil is experiencing a recession, it was necessary for EnMG to be able to support projects that were low investment and provide results.

Energy Review

A manual survey was carried out with the help of portable devices from the consumption map of the factory. Later, a measurement system was acquired, which provides online and periodic reports according to the needs of the user.

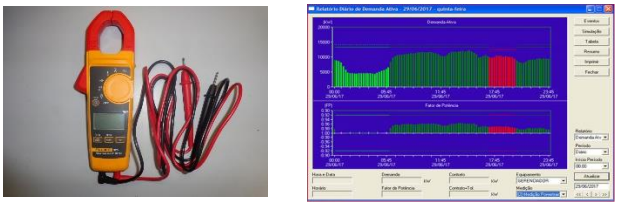

Fig.3 – Manual Measurement & Control Equipment

Thus, it was possible to obtain a mapping of the main consumers of energy vectors of the plant. Using the MECE methodology, the typologies of energy losses were segregated, for example losses of unnecessary consumption, losses due to excess consumption, losses due to lack of optimization and etc.

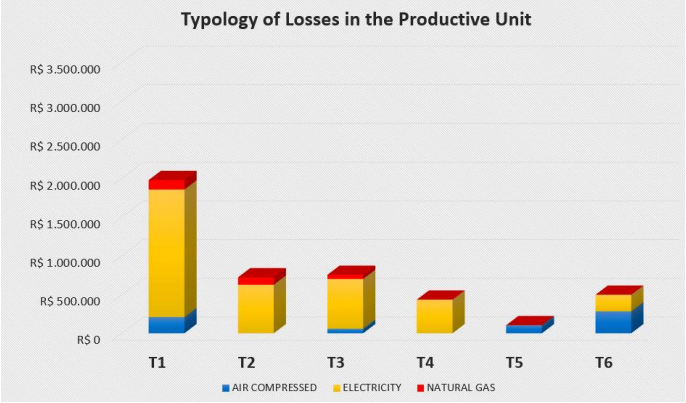

Fig.4 – Detail of the typology of Loss of Energy Vectors

Thus, were defined the machines with the highest losses and what possible projects were applicable to these machines.

This same process was applied to not only electric power, but also compressed air and natural gas.

"The ISO with its requirements, propitiated the beginning of this whole process of valorization of the energy culture"

—Natã Ramos, Leader Pilar Energy

Do, Check, Act

The implementation process of the plan was developed by a multidisciplinary team, composed of specialists in the areas of Environment, Maintenance, Production, Infrastructure and distribution center.

The knowledge of this team was developed after GAP's survey and these members were qualified as internal auditors.

Fig.5 – Internal Audit Training

Working groups have been developed at the Latin American level with the coordination of managers and directors, in order to monitor results and support actions.

Some activities were fundamental to reach the energy efficiency result:

- Daily and monthly reports of energy vector results
- Annual reports of losses to be attacked by the operational teams
- Inclusion of energy projects in the unit's project management system
- Recognition of the best projects and the leaders who developed it
- Expansion of the knowledge of the systems of installation and feeding of vectors for the employees, so that they could develop actions

With the actions, we have been able to verify an efficiency important throughout the period, the numbers that we work in the indicators, is the numbers that we collect in the reports of our concessionaire (CEMIG), and the numbers of production are validated according to the customs of the organization through the system of tax notes.

The methodology to verify an energetic improvement is carried out in order to compare the reduction of the GJ / u.p indicator, when there is no significant change of machine park and / or increase of people.

We determined the baseline in the year 2016, since we had a significant change in the manufacturing and structuring of the plant, and after that period, there were no further changes in the perimeter, the reporting period pointed to a scenario with fewer fluctuations, which made possible a clearer view of the results.

We have an integrated energy management system and an intranet site, in the first, we can extract the information to hold the conference and monitor the data daily, the site has the updated documents that are requirements of the standard. In addition, we have an expert team of Energy Vectors that accompanies 24 hrs all supplies to the factory.

The reduction target was distributed to all factory specialists by means of individual objectives.

Subsequently, was carried training out so that they could have autonomy in the use of the integrated system, and could thus study their sector and look for opportunities for improvement.

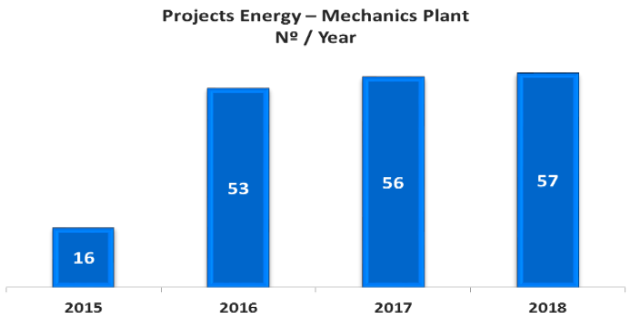

Fig.6 – Improvement of Number of Energy Projects / year

One of the important aspects of this new behavior was the inclusion of the procurement sector in the efficiency process. Due to the updating of the acquisition rules, it was possible to start processes to purchase more efficient equipment, such as electric motors, LED lights, air conditioners with inverters, among others.

The audit preparation should take place naturally. First announcements are made through the organization, and best practices are selected for presentation by the leaders themselves.

It is really important during this process, that the supporting documents are in areas of common access and registered, for better location.

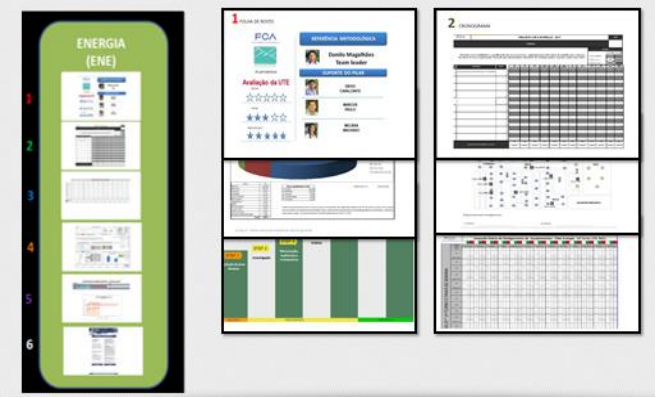

Fig.7 – Visual Energy Management of Operating Units

As Third-party audits, we have DNV as certifier, where the results of energy efficiency and other items of the standard are verified.

Transparency

Our certificate was published on the company intranet, available for consultation of all our employees and a copy is posted on strategic areas of the company.

Externally the certificate was published on the website, available to the public in general.

Lessons Learned

- It would develop the shop floors and reference people in a more agile way, instead of concentrating information on few people;
- It would provide simpler systems to be managed, facilitating the management;
- It would develop a more attractive and easy-to-access visual management, helping people to learn in a variety of ways.

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/energymanagement.

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