Global Energy Management System Implementation: Case Study

SIN PAR S.A.
First family owned metalworking SME in Argentina to certify ISO 50001.

PSR PAR S.A.
First family owned metalworking SME in Argentina to certify ISO 50001.

Proud to share who we are

Business Case for Energy Management

Our company is a family owned small and medium sized enterprise that was founded in 1931 manufacturing hand hacksaw blades.

It is located in the city of Quilmes, Buenos Aires province, Argentina, still at the same site of its original foundation. Over the decades it became surrounded by the actual city of Quilmes, being an industry located nowadays in the middle of a city, with a surface of approximately 5,000 m² and 115 employees (for more information visit our website www.sinpar.com.ar).

Despite having to survive many economic and political crises in Argentina over this last 86 years, the company never had to present insolvency or bankruptcy and always focused on sustainability, trying to keep the employment, paying taxes, respecting his staff, customers, suppliers, the environment and caring about its social, economic and environmental impact.

“ISO 50001 is not only for big corporations. I believe SME can take much better advantage of its benefits as they are much faster in implementing improvements.”
—Ing. Manfredo Arheit, CEO

Through the years our company strongly increased its product portfolio, so that we grew from a hand hacksaw blades manufacturer to a company where we thrive to...
satisfy all our customers’ demands for technological solutions in cutting and machining applications, including products like saw blades of all kinds, machining tools for turning, milling, threading, drilling; machines like band saw cutting machines, CNC turning lathes, machining centers; and services like design, engineering, regrinding, resharpening, training, just-in-time delivery, etc.

At the end of the ’90 this growing of the company made it necessary to start professionalizing the management processes. That led us to implement a Quality Management System according to ISO 9001, certifying it for the first time in the year 2000. After a few years of knowing to appreciate the benefits of a management system we started to implement other systems to different issues that we identified as important for our company’s sustainability and where we could find local experts that could help and advise us during the implementation process. So we certified our Environmental Management System according to ISO 14001 for the first time in 2006, and our Occupational Health and Safety Management System according to OHSAS 18001 in 2010.

As a part of our commitment to reduce our environmental impact, we detected that we had to start focusing harder on reducing our energy consumption. Even if at that time energy costs in Argentina were very low. We knew this could not last forever. And even if it did, it still was our responsibility to reduce energy consumption, for the wellbeing of humankind on this planet and especially for the generations to come.

“We can’t only look at the energy bill. We consider it a part of our social responsibility to look much further.”
— Cdor. Rodolfo Arheit, CFO

So when the time came to put our focus on energy efficiency, with all our experience in ISO management systems, for us it was a natural and obvious decision to pick the ISO 50001 norm to implement an Energy Management System that would help us organize and measure our projects, goals and results on the issue.

### Case Study Snapshot

<table>
<thead>
<tr>
<th>Industry</th>
<th>Metalworking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product/Service</td>
<td>Cutting and machining tools and machines</td>
</tr>
<tr>
<td>Location</td>
<td>Quilmes, Argentina</td>
</tr>
<tr>
<td>Energy Management System</td>
<td>ISO 50001</td>
</tr>
<tr>
<td>Energy Performance Improvement Period</td>
<td>1</td>
</tr>
<tr>
<td>Energy Performance Improvement (%) over improvement period</td>
<td>9.1 %</td>
</tr>
<tr>
<td>Total energy cost savings over improvement period</td>
<td>8,400 $USD</td>
</tr>
<tr>
<td>Cost to implement EnMS</td>
<td>9,500 $USD</td>
</tr>
<tr>
<td>Payback period (years) on EnMS implementation</td>
<td>1,1</td>
</tr>
<tr>
<td>Total Energy Savings over improvement period</td>
<td>429 GJ</td>
</tr>
<tr>
<td>Total CO₂-e emission reduction over improvement period</td>
<td>253 TCO₂</td>
</tr>
</tbody>
</table>
Business Benefits Achieved

After 1 year of having implemented and certified our EnMS and using it as a tool for managing our improvements we may not have made representative amounts of savings in USD or TCO₂ compared to other projects around the world, but for our company it has been a big step forward in knowing to use the system and making our first experiences in reducing energy consumption.

Before we implemented the EnMS we had no concrete tools to measure cost reductions through lowering our energy consumption. We were not even focused on it. After implementing it we are already seeing results in money saving (see more detailed information above) and in reducing the risks involved with energy price variations. But we are seeing not only economic advantages. We also see an increased commitment of our employees with the company and brand recognition from our customers, surrounding society and even the government.

EnMS Development and Implementation

Implementing the EnMS took us about 3 years. The implementation costs of about USD 9,500 have almost been recovered through all the money savings generated by different improvements.

“Implementing an EnMS in Argentina was a particular challenge. For many years energy costs were too low to generate consciousness about it.”

—Ing. Walter Lirussi, EnM

STEPS TOWARD CERTIFICATION

When we took the decision to start in 2014, the first problem we encountered was that we had no staff members with the necessary knowledge nor did we find experts in Argentina with enough experience to help us implement a system. Then, in 2014 we had the chance to participate at the Argentinian Energy Efficiency Project directed by the Argentinian Energy Secretary of the Ministry of Federal Planning, Public Investment and Services. It was a free of cost project, where a few companies were selected to make an energy efficiency diagnosis.

With this first diagnostic we could know at least where we were and what concrete projects we could start working on. The other advantage of this program was that it included a free of charge training of one of our staff member to become an energy leader. We picked our Production Manager, Ing. Walter Lirussi, and send him to get a degree as a European Energy Manager (EUREM). This degree is a standardized training of further education that enhances the skills of technical experts in the field of energy efficiency improvement (www.energymanager.eu/en). In Argentina it is offered by the German Argentine Chamber of Industry and Commerce (AHK Argentina) together with the renowned Buenos Aires Institute of Technology (ITBA).

After concluding his degree in 2015 and with the help of our external ISO management systems consultant, Walter helped us to define our energy consumption base line and our energy performance indicators. Then we started to integrate into our existing management systems the ISO 50001 concepts (include it into all existing procedures, prepare all additional documentation, train all employees, etc.). This process ended with the certification of our system for the first time the 29th of November of 2016 by the external auditing company TÜV Nord Argentina.

<table>
<thead>
<tr>
<th>Implementation costs</th>
<th>USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Staff time to develop and implement the EnMS</td>
<td>5,000</td>
</tr>
<tr>
<td>Internal staff time to prepare for external audit</td>
<td>900</td>
</tr>
<tr>
<td>Additional monitoring and metering equipment installed to meet EnMS requirements</td>
<td>1,300</td>
</tr>
<tr>
<td>Third party audit costs</td>
<td>1,200</td>
</tr>
<tr>
<td>Technical assistance (hired consultants to assist with EnMS implementation)</td>
<td>1,500</td>
</tr>
<tr>
<td>Total</td>
<td>9,500</td>
</tr>
</tbody>
</table>
TEAM PLAYING

To be able to achieve all EnMS goals every company needs to play in a team. We teamed up with the government (for a diagnostic study and training of our staff), with our external consultants (to help us implement the ISO system and always give us an external opinion on all issues and share with us their experience how things are done elsewhere), with the external audit company (to help us improve our system) and finally with all our employees. Internally we built up an energy efficiency team integrated by our production manager as the team leader, by our IT and mechatronics responsible, technical office assistant, maintenance supervisor, purchase manager, 18001 responsible, 14001 responsible and Integrated Management System responsible. This teams reports directly to the CEO and managers (all KPI are reviewed at periodically meetings) and works closely to HR to make awareness campaigns among the personal (through publications, trainings, etc.).

STARTING TO USE THE SYSTEM

Certification was not the end, it was the beginning! Until then we had only prepared the field by getting tools to work with. Now we had to start using them. As a SME in Argentina, with limited resources and hard to get financial credits at reasonable interest rates, we decided to start with small energy consumption improvements, were the investment could be repaid in less than a year. This also helped us to show quick results to all the organization, motivating all staff members to quicker adopt this new working philosophy.

At that point, the Argentinian Government started to better have our management system already active and demonstrating its first results.

RESULTS

We have been working on several improvement projects throughout our company with concrete money savings:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Gas volume (m³)</th>
<th>Energy (Kw/h)</th>
<th>Percentage (%)</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>-</td>
<td>380.012</td>
<td>13%</td>
<td>0,02 USD/Kw</td>
</tr>
<tr>
<td>Gas</td>
<td>238.099</td>
<td>2.575.255</td>
<td>87%</td>
<td>0,03 USD/m³</td>
</tr>
<tr>
<td>TOTAL</td>
<td>-</td>
<td>2.955.267</td>
<td>100%</td>
<td>-</td>
</tr>
</tbody>
</table>

Energy consumption of production plant by resource (2016)

<table>
<thead>
<tr>
<th>Resource</th>
<th>Gas volume (m³)</th>
<th>Energy (Kw/h)</th>
<th>Percentage (%)</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>-</td>
<td>388.811</td>
<td>14%</td>
<td>0,13 USD/Kw</td>
</tr>
<tr>
<td>Gas</td>
<td>211.528</td>
<td>2.474.878</td>
<td>86%</td>
<td>0,14 USD/m³</td>
</tr>
<tr>
<td>TOTAL</td>
<td>-</td>
<td>2.863.689</td>
<td>100%</td>
<td>-</td>
</tr>
</tbody>
</table>

But we have also been working on other goals that can’t be valuated in direct money saving yet:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Gas volume (m³)</th>
<th>Energy (Kw/h)</th>
<th>Percentage (%)</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gas</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
EXAMPLE 1
Gas consumption reduction: 59%.
Return on investment: 0.97 years.

**Section:** Heat Treatment
**Equipment:** Externum furnace with a gas burner of 25,000 Kcal/hs
**Application:** keep metallic workpieces dry during intermediate production processes

**Start situation:**
- working temperature set at 80 °C
- burner on for 7.27 min/hs
- furnace walls isolated with glass wool of 38 mm thickness
- 24 hs operation, 365 days a year

**Improvement:**
- set working temperature down to 60 °C
- burner on for 3 min/hs
- change thermal isolation for SCR Fiberglass of 51 mm thickness
- improve closing of doors by adjusting the frame joints and changing the sealing strips

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### Isolation (mm) On time (min/hs) On time (hs/day) Daily consumption (m³) Annual consumption (m³) Annual cost (USD)

<table>
<thead>
<tr>
<th>Start situation</th>
<th>38</th>
<th>7.27</th>
<th>2.9</th>
<th>7.83</th>
<th>2.858</th>
<th>413</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement</td>
<td>51</td>
<td>3.00</td>
<td>1.2</td>
<td>3.24</td>
<td>1.183</td>
<td>171</td>
</tr>
</tbody>
</table>

**Annual saving**

### Daily use (hs) Consumption (m³/hs) Consumption (m³/day) Annual cost (USD)

<table>
<thead>
<tr>
<th>Start situation</th>
<th>24</th>
<th>0.25</th>
<th>6</th>
<th>2.190</th>
<th>316</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement</td>
<td>1.2</td>
<td>0.07</td>
<td>0.084</td>
<td>31</td>
<td>4</td>
</tr>
</tbody>
</table>

**Annual saving**

### Associated costs:
- 5 hours manpower for installation of new isolation isolation
- 12 m² of new isolation material SCR Fiberglass
- 200 aluminium POP type rivets
- 3 hours manpower for adjustment of frame joints and changing of sealing strips

Total: 234 USD

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EXAMPLE 2
Gas consumption reduction: 99%.
Return on investment: 0.75 years.

**Section:** Heat Treatment
**Equipment:** 3 tempering furnaces with natural draught burners with pilot flame
**Application:** tempering of metallic workpieces

**Start situation:**
- the furnaces are on for 11 hs a day, but the pilot flames stay on for 24 hs, 365 days a year
- the pilot flames don’t have safety sensors

**Improvement:**
- replace the pilot flames with an electronic ignition system commanded through a magnet valve
- addition of a flashing electric transformer for the ignition spark
- installation of flame sensors

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### Associated costs:
- 4 hours manpower for installation of new pilot transformer 38 USD
- 3 hours manpower for installation of electronic ignition system, the flashing electric transformer for the ignition spark and cables 31 USD
- 1 electronic ignition system 52 USD
- 1 magnet valve 14 USD
- 1 flame sensor 57 USD
- 1 mounting base for flame sensor 5 USD
- 10 m cables 6 USD
- 1 flashing electric transformer TC1LVCA 31 USD

Total: 233 USD

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“We recommend starting with small, quick and cheap improvements, to get a fast return on investment. This will motivate your staff to continue and generate new money resources through savings.”

—Ing. Cristina Arheit-Zapp, COO
Lessons Learned

Although we had a lot of experience with ISO management systems, as we implemented the ISO 50001 system, we realized that to be able to measure the results of the implementation of improvements we needed much more detailed information about our energy consumers throughout the company. That meant to install more measuring instruments and first of all measure and analyze where the biggest consumers are to focus on first.

The second lesson was that once we had the statistics of how many energy was consumed by each sector or equipment, and analyzed what we could do to reduce it, it was not always necessary to replace old equipment with new one. There is many small, often unseen, auxiliary equipment that consumes more energy throughout the year than the main production machines. And some other times small process setting changes can reduce consumption at incredible levels.

The third lesson we learned was that not all improvements necessarily cost money. There are many daily unconscious behaviors of people that waste energy, like getting out of your office for lunch and not switching off the light, or get home and leave your PC on all the night, etc. There are many things than can be done through training and making people aware about using energy rationally. And people tend to be very thankful for the information as they also start using it at home to reduce energy costs there too. This also improves the commitment of our employees with our company and with adopting faster energy efficient behaviors.

“There is many small, often unseen, auxiliary equipment that consumes more energy throughout the year than the main production machines.”
—Ing. Walter Lirussi, EnM

Keys to Success

- The unconditional support of the owner and CEO of the company.
- Starting with small, quick and cheap improvements, to get a fast return on investment.
- Train a staff member as an Energy Manager to lead the project.
- Make awareness campaigns for reducing energy costs at home, generating more commitment of employees with the company.
- Team up with external consultants and experts.