Global Energy Management System Implementation: Case Study

Argentina

SIN PAR S.A.

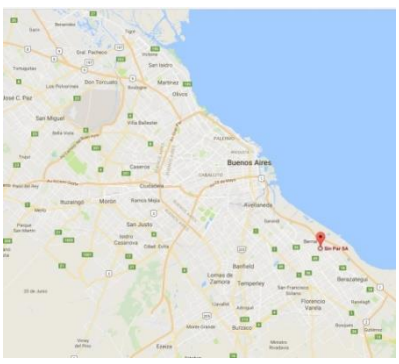
First family owned metalworking SME in Argentina to certify ISO 50001.

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 m^2 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

Industry	Metalworking
Product/Service	Cutting and machining tools and machines
Location	Quilmes, Argentina
Energy Management System	ISO 50001
Energy Performance Improvement Period	1
Energy Performance Improvement (%) over improvement period	9,1 %
Total energy cost savings over improvement period	8.400 $USD
Cost to implement EnMS	9.500 $USD
Payback period (years) on EnMS implementation	1,1
Total Energy Savings over improvement period	429 GJ
Total CO_2-e emission reduction over improvement period	253 TCO_2

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 U$D or TCO_2 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

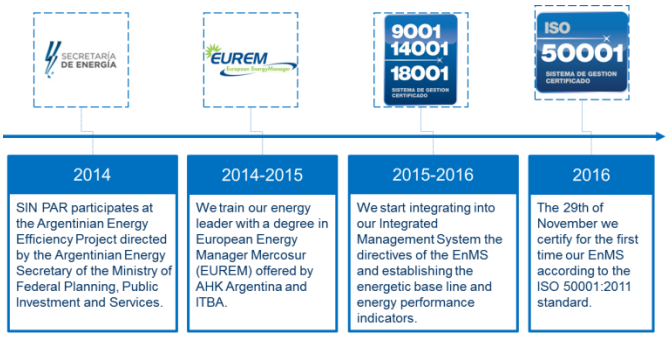
Implementing the EnMS took us about 3 years. The implementation costs of about U$D 9.500 have almost been recovered through all the money savings generated by different improvements.

"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.

Implementation costs	(U$D)
Internal Staff time to develop and implement the EnMS	5.000
Internal staff time to prepare for external audit	500
Additional monitoring and metering equipment installed to meet EnMS requirements	1.300
Third party audit costs	1.200
Technical assistance (hired consultants to assist with EnMS implementation)	1.500
Total	**9.500**

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.

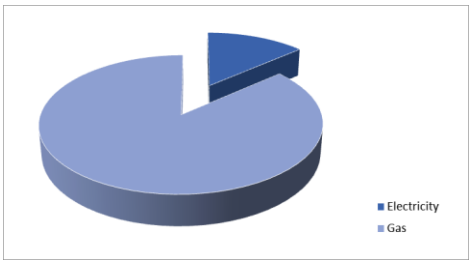
At that point, the Argentinian Government started to [illegible] better to have our management system already active and demonstrating its first results.

Resource	Gas volume (m^3)	Energy (Kw/h)	Percentage (%)	Cost
Electricity	-	380.012	13%	0,02 U$D/Kw
Gas	238.099	2.575.255	87%	0,03 U$D/$m^3$
TOTAL	**-**	**2.955.267**	**100%**	**-**

Energy consumption of production plant by resource (2016)

+439%
+478%

Resource	Gas volume (m^3)	Energy (Kw/h)	Percentage (%)	Cost
Electricity	-	388.811	14%	0,13 U$D/Kw
Gas	211.528	2.474.878	86%	0,14 U$D/$m^3$
TOTAL	**-**	**2.863.689**	**100%**	**-**



RESULTS

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

Improvements			Annual consumption			Annual energy saving	Annual cost saving	Investment	Return on investment in years
Nº	Description	Energy source	Before	After	Unit				
1	Reduce general tap water consumption	water	394	86	m3	309	USD 827	USD 0	-
2	Reduce water consumption at workpiece cleaning line 811	water	18	9	m3	9	USD 23	USD 0	-
3	Install water efficient toilet flush buttons	water	3.035	2.232	m3	803	USD 2.152	USD 783	0,36
4	Change night lights to LED	electricity	5.902	1.807	kWh	4.095	USD 525	USD 83	0,16
5	Improve light system sector GAR	electricity	167	19	kWh	148	USD 19	USD 0	-
6	Improve light system HHRR office	electricity	536	402	kWh	134	USD 17	USD 0	-
7	Change to LED light new production hall	electricity	25.872	11.642	kWh	14.230	USD 1.823	USD 9.692	5,32
8	Reduce compressed air leaks	electricity	7.854	1.200	kWh	6.654	USD 853	USD 413	0,48
9	Change to LED light administration office	electricity	3.120	1.575	kWh	1.545	USD 198	USD 330	1,67
10	Change spot lights sector bandsaws	electricity	161	54	kWh	107	USD 14	USD 0	-
11	Reduce energy consumption main air	electricity	1.200	1.080	kWh	120	USD 15	USD 0	-
12	Improve light system storage area 1 and 2	electricity	8.500	2.400	kWh	6.100	USD 782	USD 482	0,62
13	Improve gas system of furnace line 108	gas	2.190	31	m3	2.159	USD 312	USD 233	0,75
14	Improve gas system of furnace lines 107 and 109	gas	4.380	61	m3	4.319	USD 624	USD 467	0,75
15	Improve sealing of furnace C21	gas	2.858	1.183	m3	1.675	USD 242	USD 234	0,97

Annual energy consumption (before improvements)	1.678	TOTAL energy	1.120	66,8%	water	m3	USD 8.425	TOTAL money saving
	339.654		33.133	9,8%	electricity	kWh		
	164.300	savings	8.153	5,0%	gas	m3		
TCO2 emision	2.778	TCO2 savings	253	9,1%	TCO2			

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

Other improvements	Goal
16 Buy energy from renewable sources	Guarantee that least a percentage of our electricity consumption was produced from renewable sources.
17 Renegotiate energy contract	Optimize energy purchase contracts.
18 Communication channel	Open direct communication channels for staff and community to receive improvement suggestions related to energy efficiency.
19 Electronic invoices	Send invoices to customers directly as PDF files, without the need to print and scan.
20 Measure and record energy variables	Be capable of recording parameters of general electricity consumption for better analysis.
21 Install internal measuring devices	Be capable of recording parameters of electricity consumption of each sector and specific machines.
22 Treatment and reuse of water	Reuse the wastewater from the water jet cutting machine for other production processes.
23 Install flowmeter	Install separate flowmeter for better water consumption analysis.
24 Reduce 5% TCO2 emission	Reduce 5% TCO2 emission to the atmosphere.
25 Record on/off time of main air compressor	Obtain information about the real working time of the main air compressor.
26 Record on/off time of secondary air	Obtain information about the real working time of all secondary air compressors.

EXAMPLE 1

Gas consumption reduction: 59%.
Return on investment: 0,97 years.

Section: Heat Treatment
Equipment: Exoterm 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 ºC
- 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 workinig temperature down to 60 ºC
- 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

	Isolation (mm)	On time (min/hs)	On time (hs/day)	Daily consumption (m^3)	Annual consumption (m^3)	annual cost (U$D)
Start situation	38	7,27	2,9	7,83	2.858	413
Improvement	51	3,00	1,2	3,24	1.183	171
Annual saving					**1.675**	**242**

Associated costs:

5 hours manpower for installation of new isolation	47 U$D
12 m^2 of new isolation material SCR Fiberglass	150 U$D
200 aluminium POP type rivets	9 U$D
3 hours manpower for adjustment of frame joints and changing of sealing strips	28 U$D
Total	**234 U$D**

"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

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

	Daily use (hs)	Consumption (m^3/hs)	Consumption (m^3/day)	Annual consumption (m^3)	Annual cost (U$D)
Start situation	24	0,25	6	2.190	316
Improvement	1,2	0,07	0,084	31	4
Annual saving				**2.159**	**312**

Associated costs:

4 hours manpower for installation of new pilot transformer	38 U$D
3 hours manpower for intallation of electronic ignition system, the flashing electric transformer for the ignition spark and cables	31 U$D
1 electronic ignition system	52 U$D
1 magnet valve	14 U$D
1 flame sensor	57 U$D
1 mounting base for flame sensor	5 U$D
10 m cables	6 U$D
1 flashing electric transformer TC1LVCA	31 U$D
Total	**233 U$D**

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.
- Having experience with ISO Management Systems like ISO 9001 and 14001.
- 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.

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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Accelerating the Transition to Clean Energy Technologies

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