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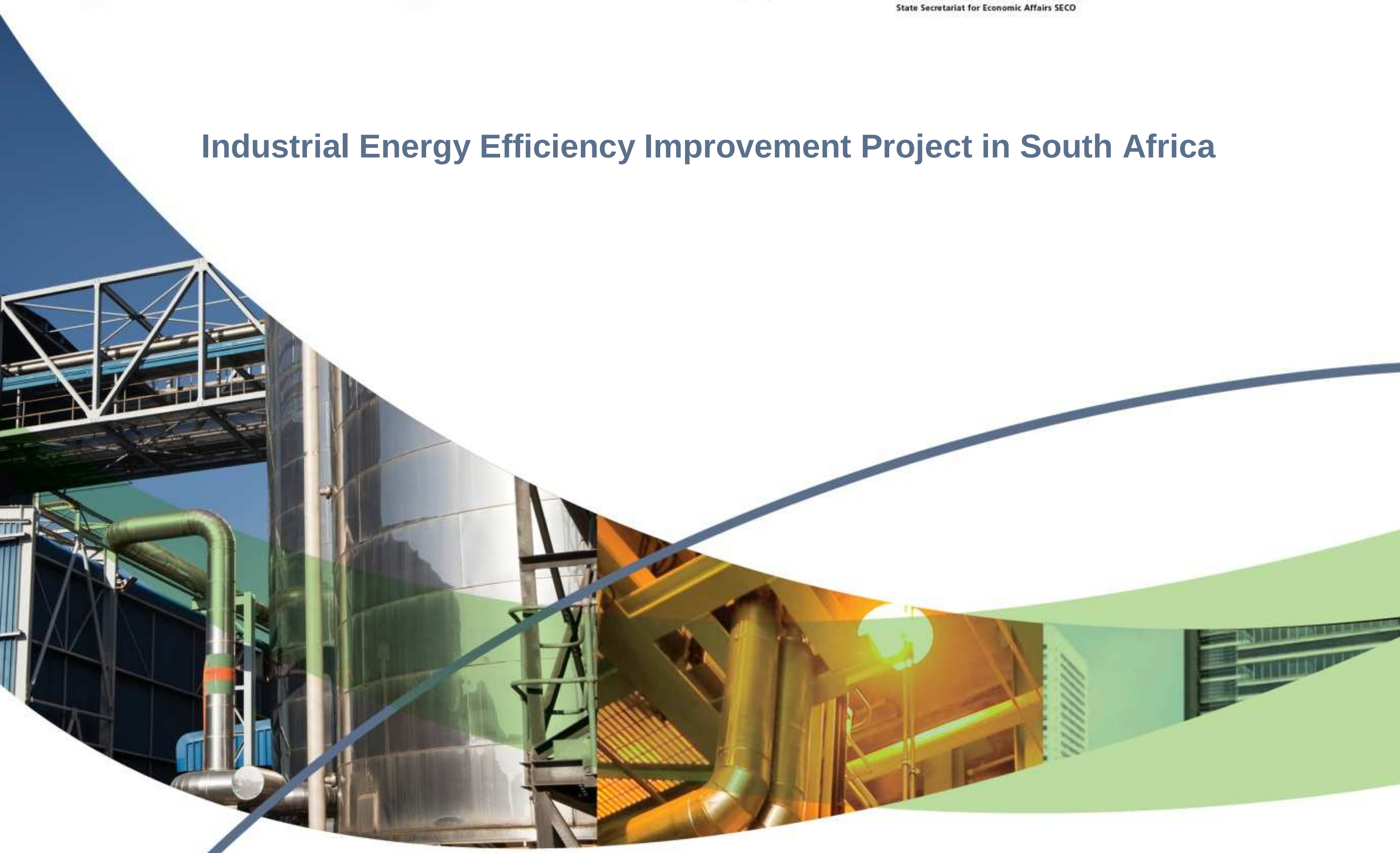
Industrial Energy Efficiency Improvement Project in South Africa



Introduction and Implementation of an Energy Management System and Energy Systems Optimization

CASE STUDY: ARCELORMITTAL SALDANHA WORKS

THE ISSUE AND MAIN FINDINGS

ArcelorMittal Saldanha Works is part of the South African steel industry, producing Hot Rolled Coil (HRC) steel products in Saldanha Bay, which is located on the West Coast of South Africa. The plant mainly focuses on the export market, specifically on Sub-Saharan Africa. In recent years, rising electricity and energy prices combined with the global and South African economic downturn have impacted on the plant's competitiveness, while at the same time AreclorMittal's foreign competitors have not generally experienced the same degree of energy price increase. Therefore, it has been critical for the plant to achieve significant reductions in its production energy intensity in a short period of time to effectively defend its market position in Africa and ensure long-term commercial viability.

Given the plant's challenging operating conditions, the first measure taken was to stabilize and increase the reliability of ArcelorMittal Saldanha Works' operations through initiating a World Class Manufacturing (WCM) programme. Stabilized operations then supplied a suitable platform to the Saldanha Plant with which to engage with the Industrial Energy Efficiency Project (IEE Project), where the IEE Project supported the introduction of an Energy Management System (EnMS) and Energy Systems Optimization (ESO) measures in alignment with the requirements of the new International Energy Management Standard ISO 50001 published in August 2011.

This case study shows how the IEE Project has supported ArcelorMittal Saldanha Works in mitigating the challenge of rising energy prices, increasing the reliability of its operations and enhancing the plant's competitiveness and efficiency alongside generating considerable financial, economic and environmental returns.

The IEE Project has empowered ArcelorMittal Saldanha Works' plant engineers with the EnMS and ESO expertise through a EnMS and ESO capacity building programme and has provided ArcelorMittal Saldanha Works with the necessary technical and advisory support throughout the implementation and installation of a tailored Energy Management System as well as various Systems Optimization initiatives. As a result, significant savings have been realized without the need for significant capital investment.

As shown in '*Table One*', by implementing an Energy Management System, ArecelorMittal Saldanha Works has saved roughly ZAR 90 Million within the 2011 period, against a minimal capital investment of ZAR 500,000. The company was able to offset this investment in less than four production days. In addition, even if no further investment to improve energy efficiency is undertaken and assuming that all assumptions are kept constant within the plant, the savings realised in 2011 (roughly ZAR 90 Million), will account for ZAR 362 Million by 2016 (five years after the first investment)[3].

Table One: ArcelorMittal Saldanha Works Plant Energy Efficiency Achievements 2011	
Total No. of Projects	12
Total Investment	R 500,000
Gross Financial Savings for 2011	R 89,699,000[1]
Overall Payback Period (in years)	0.01
Energy Savings for 2011 (GWh)	80
GHG Emission Reduction[2] (tons CO_2)	77,222

This profitability analysis shows that improvements and investments in industrial energy efficiency through the implementation of an EnMS and the different ESO measures not only do not negatively impact on productivity levels, but they also provide an enabling and sustainable business model to increase and enhance the enterprise's competitiveness.

THE APPROACH

After the 2009 South African economic downturn, the ArcelorMittal Saldanha Works basic operating conditions were poor and significant reliability issues were being experienced. This situation impacted negatively on the operational efficiency of the plant, including its energy consumption. In addition, production costs and tax

[1] All the savings reported in this case study consider an electricity price of 422R/MWh.

[2] SA Grid kWh to CO_2 Intensity Factor set at 0.957 Kg/kWh, 'Journal of Energy in South Africa' – Vol 22 No 4; November 2011.

[3] This profitability analysis has been based on the use of a fairly conservative hurdle rate of 12%. 'Hurdle rate' is defined as the actualization rate used to discount cash-flows. In business terms, it represents the interest rate that a company would receive if it deposited the money in the bank rather than investing.

levels were increasing. In order to address these challenges, ArcelorMittal Saldanha Works identified and implemented the following programmes within their Plant:

WCM (World Class Manufacturing) Programme

WCM is a manufacturing improvement programme available within the ArcelorMittal group. Given its less than optimal performance and production conditions, the ArcelorMittal Saldanha Works plant volunteered to become a pilot for the roll out of the WCM within the group. The programme was aimed at restoring basic minimal production conditions and improving reliability and operational stability within the plant.

The IEE Project - Capacity Building Programme (based on ISO 50001 compatible EnMS and ESO)

The IEE Project introduced the ArcelorMittal Saldanha Works plant to the new industrial energy efficiency concepts of Energy Management Systems (EnMS) and Energy Systems Optimization (ESO) with ArcelorMittal Saldanha Works approaching UNIDO in 2010 in order to participate in the capacity building programmes being offered by the IEE Project. This resulted in the participation of ArcelorMittal delegates in a two-day training session on EnMS in January 2011. Recognizing the value of the different training courses offered by the IEE Project, as well as the value-addition that attending personnel on the courses would bring back to the plant, ArcelorMittal Saldanha Works subsequently sent a number of plant managers and engineers to attend a series of EnMS and ESO training workshops. The structure of the IEE Project capacity building programme (both the EnMS and ESO components) is beneficial to enterprises as it does not only focus on technical aspects but it provides learners with a clear understanding on how to efficiently manage energy in an holistic and systematic manner.

Following on from attending the training courses, ArcelorMittal Saldanha Works signed up to become an IEE Project *'Host Plant'*[4] for Pumps and Motors ESO training and secondly as an IEE Project *'Candidate Plant'*[5] for Fans and Pumps ESO expert training courses.

As a result of the engagement with the IEE Project, the following two initiatives have been developed and put into place within the ArcelorMittal Saldanha Works plant:

Energy Strategy

An Energy Manager was appointed in May 2010 to develop and implement an energy strategy for the plant. An energy audit was then initiated to update the list of already identified initiatives with new and additional energy saving opportunities. The Energy Manager was later (Oct-Dec 2011) joined by a further three engineers, forming an 'Energy Team'. The energy team's main focus is the identification of potential energy saving opportunities and the development and implementation of such projects.

Management Infrastructure (MI) – Doing things more efficiently

ArcelorMittal Saldanha Works started the implementation of a Management Infrastructure (MI) programme in Jan 2012. The aim of a MI programme is to improve the effectiveness of an organization, address deficiencies in current practices and remove wastage.

The ArcelorMittal Saldanha Works' MI programme focused on optimally utilizing resources available within the plant, eliminating duplication and wastage within the plant's operations and reporting processes. People were empowered to take decisions with structure and guidance being given in order to ensure that Plan-Do-Check-Act cycles, which lie at the heart of the EnMS methodology, were successfully completed.

As these programmes are part of a sequential and cumulative process of continuous improvement, it is difficult to separate the individual results achieved. However, it is safe to say that in the process of adopting a logical approach to energy management within the Saldanha Works plant, the IEE Project has provided ArcelorMittal Saldanha Works with the tools to introduce and implement a system which integrates energy efficiency into daily management and operational practices, changing the enterprise's culture in a simple and sustainable manner.

[4] The IEE Project defines as 'Host Plant' any South African industrial plant that offers to accommodate project related group training events at its facilities.

[5] The IEE Project defines as 'Candidate Plant' any South African industrial plant that offers its facilities to IEE Project trainees to conduct on-site systems assessments as part of the Expert-level training courses.

IMPLEMENTING AN ENERGY MANAGEMENT SYSTEM THROUGH THE IEE PROJECT

ArcelorMittal Saldanha Works joined the capacity building programme offered by the IEE Project in January 2011 to gain the knowledge and tools needed to achieve and sustain improved energy performance.

As part of the initiative, a team of ArcelorMittal engineers was trained by international experts under the IEE Project on the following topics: Energy Management Systems, Pump Systems Optimization, Compressed Air Systems Optimization, Fan Systems Optimization and Motors Systems Optimization systems[6].

As a result of the training and technical support provided, ArcelorMittal Saldanha Works has successfully implemented an Energy Management System on three of the most significant energy using departments within the plant (iron making, steel making and milling), accounting for 70% of the plant's energy consumption. In addition, the principles of the Energy Management System have already been rolled out to other energy consuming production units within the plant.

The Energy Management System is based on the Plan-Do-Check-Act cycle and it is a structured and holistic approach focusing on all aspects of the production environment that may impact or influence energy usage.

The savings achieved at the Saldanha Works Plant were considerably greater than initially expected and most of the early initiatives were implemented without major capital investment. Standard operational practices were challenged and changed with significant benefits.

“The risk, with the focus on energy, was that it could have been just another initiative and as a new priority would have come along, the EnMS implementation could have been dropped as a result of too few people being dedicated to the cause” says Reinet van Zyl, Energy Manager of ArcelorMittal Saldanha Works. This potential constraint was overcome by absolute commitment by the management team. Not only was the position of Energy Manager created, but 25% of the plant’s budget was allocated to energy performance improvement. This commitment and allocation of resources ensured the successful implementation of the EnMS and the realization of the savings achieved. “Implementing an Energy Management System is the only way to ensure that the knowledge and practices are captured and institutionalized within the corporate culture and not reliant on any specific individual,” says Reinet Van Zyl.

SELECTED ENERGY SYSTEMS OPTIMIZATION INTERVENTIONS

In 2011, in addition to the implementation of the Energy Management System and with the technical support of the IEE Project international experts, ArcelorMittal Saldanha Works implemented thirteen energy saving projects, under a combination of awareness raising and ESO initiatives, with most of these projects not requiring capital investment.

These projects included: (i) the installation of solar lights and solar geysers; (ii) improvement in energy reporting in terms of completeness and regularity; (iii) more energy focused human resources with the appointment of Energy Project Engineers to support the activities selected by the Energy Manager; and (iv) the implementation of an ‘Energy Matrix Structure’ to identify new energy savings opportunities and monitor the effectiveness of the initiatives being implemented.

Within one year (2011), thanks to these initiatives, ArcelorMittal Saldanha Works reduced its average energy demand by 5.3% against their 2010 baseline values, including a 26% reduction in Liquefied Petroleum Gas (LPG) consumption being achieved within three months (Oct-Dec 2011).

Some of the 13 projects implemented in 2011 by ArcelorMittal Saldanha Works Plant are explained in more details below.

[6] Updated information on the IEE Project Training Courses is available on the project website http://www.iee-sa.co.za

POST-COMBUSTION COOLING RADIAL FAN SYSTEM OPTIMIZATION

In the melt-shop, the flow of post combustion gases generated by the Conarc vessels[7] is induced to a forced draft cooler and bag filters by two radial fans. Each fan is fed by a 11kV electricity supply and is rated at 2.2MW. Due to their large electrical load and high voltage, the two Conarc fans used to be left running even during limited or non-production times due to upstream or downstream production problems (around 30% of the time). After international advice and consultations and between the IEE Project the ArcelorMittal Saldanha Works maintenance team, the Conarc personnel agreed that only one of the two fans was needed during periods when:

- Production is limited.
- Maintenance inspections are scheduled.
- Unplanned production stops occur exceeding two hours

Summary of the ESO Initiative	
System	Post-Combustion Cooling Radial Fans in melt-shop
Energy Source	Electricity
Objective	Minimize the electricity used to filter the Conarc's post-combustion flow into the cooling system.
How	By switching off one of the two 2.2 MW Fans used to filter the post-combustion flow during planned and unplanned stops of production exceeding two hours.
Status	Objective successfully achieved and immediate savings realized. Current average electricity demand of the fan system is 0.71 MW rather than the rated 2.2 MW.

Cooling Radial Fans Savings/year (2011)	
Cost Savings	R 262,000
Energy Savings	622,000 kWh
Cost of Project	0
Payback Period	0
Kg CO_2 Savings	595,851 Kg CO_2[8]

Per annum, the Plant schedules 876 hours of maintenance inspection stops where one fan is switched off. Since the production load during this period is lower than during full production time, it has also been measured that the fan that is left running, has a lower average demand equal to 0.71 MW instead of 2.2 MW.

The implementation of the fans optimization initiative did not require any capital investment and resulted in immediate energy and monetary savings.

WATER COOLING SYSTEM OPTIMIZATION

In the melt-shop, the cooling water system (System One) is a closed loop process which supplies process cooling water to the Conarc vessels. The water in System One is cooled by a bank of 98 air-cooled heat exchangers (ACHEs), each rated at 37kW. Hence, the total power consumed on average by the cooling water system is approximately 3,6MW. The Conarc vessels can operate satisfactorily if process cooling water from System One is supplied at a temperature of up to 40ºC[9]. The temperature that the water reaches during the cooling process is directly correlated to the outside air temperature.

For instance, during daytime, in spring and summer, the temperature of the cooled water produced in System One is significantly higher than the temperature of the cooled water during autumn and winter time when the ambient temperature is cooler. In addition, during summer time, in order for System One to obtain the satisfactory cooling results, all 98 ACHEs need to be operating.

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[7] The Steel Making Department at the ArcelorMittal Saldanha Works Plant features two Conarc vessels (convertor arcing combination) with a shared set of electrodes (AC) and a single oxygen lance moving between the two vessels which induces the metal to melt. The advantage of this process is that it is flexible in terms of input mix as far as liquid iron, DRI and scrap combinations are concerned.

[8] SA Grid kWh to CO_2 Conversion Factor set at 0.957, 'Journal of Energy in South Africa' – Vol 22 No 4; November 2011.

[9] For security reasons System One is armed with two sets of 'temperature alarms': a '*high temperature alarm*' which is set at 55ºC and a '*high-high temperature alarm*' which is set at 60ºC. If the temperature of the water reaches 60ºC, the system automatically trips.

Summary of the ESO Initiative	
System	Water Cooling System (ACHEs)
Energy Source	Electricity
Objective	Optimize water cooling system so as to maintain the same water flow rate but reduce the ACHEs needed to operate the system
How	Maintain temperature of the water supply set at a constant level throughout the year
Status	Objective successfully achieved and immediate savings realized.

Water sets points Savings/year (2011)	
Cost Savings	R 1,371,680[10]
Energy Savings	2,839,000 kWh
Cost of Project	0
Payback Period	0
Kg CO_2 Savings	2,719,648 Kg CO_2[11]

In order to optimize the water cooling system, it was acknowledged by the Energy Team in conjunction with IEE Project experts, that by maintaining the temperature of the water supply as close as possible to summer temperatures (roughly 40 ºC) throughout the year, the number of ACHEs operating could be significantly reduced. After an accurate system assessment, it was decided that during autumn and winter time, the temperature of the water should be respectively increased from 29ºC to 39ºC and from 24ºC to 34ºC. The energy system optimization initiative only modified the temperature level of the water in System One and maintained the original water flow rate in order to ensure good distribution in regard to the system's cooling requirements.

Currently, after the ESO intervention, with an average winter air temperature of 16ºC, it is possible to turn off around 35% of the ACHEs. With an average ambient temperature of 23ºC, only 80% of the ACHEs need to be operated. From the start of this project, savings have been realized and seem to confirm all the optimization assumptions.

LADLE HEATING STATION SYSTEM OPTIMIZATION

Summary of the ESO Initiative	
Process	Ladle Heating Stations
Energy Source	Liquefied Petroleum Gas (LPG)
Objective	Prevent unnecessary utilization of the burners in the ladle stations
How	Switch off the burners in the station if no ladle is present
Status	Objective successfully achieved and immediate savings realized.

Water sets points Savings/year (2011)	
Cost Savings	R 250,000
Energy Savings	17,519,567 Kwh[12]
Cost of Project	0
Payback Period	0
Kg CO_2 Savings	4,204,696 Kg CO_2[13]

Throughout the iron making, steel making and casting operations, molten metal is transported between stations in refractory lined ladles which have a capacity of 100 tons for liquid iron and 175 tons for liquid steel. Across the plant there are several ladle stations equipped with covers and burners where ladles can be placed in order to remain hot in between operations. Ladle stations are also used to pre-heat empty ladles or, in some cases, to fire new or repaired refractory linings. The burners are fired up by directly reduced (DR) gas[14] produced by the Midrex process[15]. In case of poor or inconsistent quality and quantity of the DR gas, LPG is used instead.

[10] Plant utilisation for System One is around 90% (7,884 hours/year) if planned maintenance is taken into account.
[11] SA Grid kWh to CO_2 Conversion Factor set at 0.957, 'Journal of Energy in South Africa' – Vol 22 No 4; November 2011.

[12] In 2011 ArcelorMittal Saldanha Works saved 1.5 Kg LPG per ton of Hot Rolled Coil produced in the ladle heating process. The company has produced 949,570 tons of HRC in 2011. The Specific Energy Content *(kWh/kg_{LPG})* used is 12.3. Source: Directorate General for Energy, Save II Programme, European Commission; http://www.engineeringtoolbox.com/co2-emission-fuels-d_1085.html.

[13] The Specific CO2 Emission Factor (kg CO2/Kg LPG) used is 2.952 as per http://www.engineeringtoolbox.com/co2-emission-fuels-d_1085.html

[14] Directly reduced (DR) gas is produced in the Midrex Process on-site and it is therefore available at no cost but its quality and availability can vary.
[15] In the ArcelorMittal Saldanha Works Plant, the Midrex Process is used to produce Directly Reduced Iron (DRI) within the iron making session. The Midrex Process is based on three main stages: reduction, reforming and heat recovery.

Common practice at ArcelorMittal Saldanha Works was that the burners were left running even when no ladles were in the station, resulting in wasted DR fuel gas and LPG. The general perception in the plant was that, if the burner would be switched off, the gas would need to be flared, losing its economic value. In addition there was insecurity regarding the reliability of the burner start up mechanisms.

No capital investment was required to ensure the success of this ESO initiative, however a behavioural and cultural change was needed among the ladle station's operating staff. Only after having understood the benefits and the reasons behind this particular optimization project, did the ladle station's operating staff start to embrace the change and make sure that the burners would be switched off when not required. Since the beginning of the implementation of the initiative in April 2011, the inclusive team approach adopted was reinforced by constant measurement of progress. In order to reduce the risks (and fears) related to the reliability of the burners start up mechanisms, a review for the upgrade of the burner control systems was also initiated.

OVERALL LPG OPTIMIZATION AND REDUCTION

The most significant improvement in the energy consumption profile of the ArcelorMittal Saldanha Works plant is given by the overall reduction achieved with respect to the plant's LPG consumption.

A dedicated optimization initiative was launched in October 2011 with the aim of reducing the plant's LPG consumption by 50%. Furthermore, a severe LPG shortage forced the plant to review standard operational assumptions and practices.

Summary of Initiative	
Process	LPG Reduction
Energy Source	LPG
Objective	Reduce LPG consumption by 50% by changing operating philosophy and practices
How	(i) Holes in the Corex repaired; (ii) Change in perceptions and practices on site
Status	26% LPG consumption reduction achieved in 2011. An additional 30% LPG consumption reduction expected for 2012.

Water sets points Savings/year (2011)	
Cost Savings	R 52,000,000
Energy Savings	62,005,555 Kwh[16]
Cost of Project	0
Payback Period	0
Kg CO_2 Savings	14,881,333 Kg CO_2[17]

Within a three-month time period (by end of December 2011) the plant's energy team managed to achieve a 26% LPG consumption reduction, which translated to roughly ZAR 52 Million worth of savings. In addition, the plant's LPG consumption was expected to decrease by a further 30% by the end of 2012, thus surpassing the original 50% LPG consumption reduction target.

The main approach used during the implementation of this ESO initiative sees, once again, awareness-raising as one of the key elements necessary for the achievement of a transformative and sustainable result. Ample attention has indeed been given to behavioural changes and adjustment in the plant's operating philosophy. In addition, in order to ensure maximum results, a hole in the Corex producing liquid iron was identified and repaired, thereby restoring basic operating conditions. This not only increased the reliability of production, reducing the number of unplanned stoppages but, it also resulted in increased availability of DR gas, which is released during the Midrex process and is then filtered by the system to be used for general heating purposes instead of LPG.

[16] In 2011 ArcelorMittal Saldanha Works saved overall 11 Kg LPG/ton DRI produced. The company has produced 458,282 tons of DRI in 2011. The Specific Energy Content (kWh/kg_{LPG}) used is 12.3. Source: Directorate General for Energy, Save II Programme, European Commission; http://www.engineeringtoolbox.com/co2-emission-fuels-d_1085.html.

[17] The Specific CO2 Emission Factor (kg CO2/Kg LPG) used is 2.952 as per http://www.engineeringtoolbox.com/co2-emission-fuels-d_1085.html

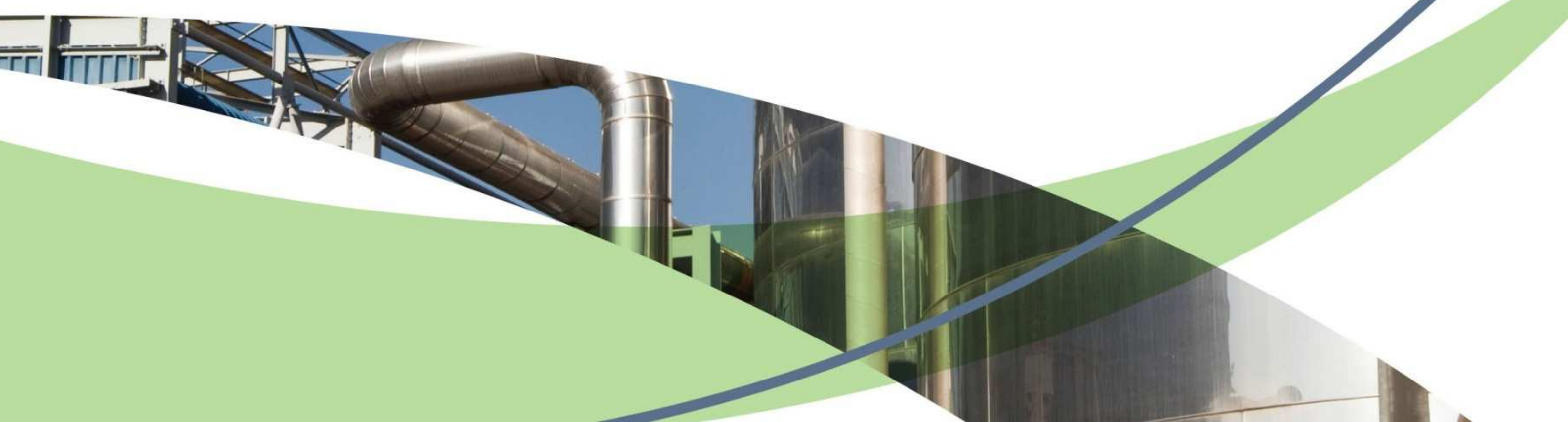
The Midrex process (part of the iron making session, producing Directly Reduced Iron (DRI)) was historically one of the largest LPG consumers. Through the ESO initiative, the higher quality and quantity of DR gas was adequate for heating purposes and the stability of its supply allowed the Midrex operators to optimize the DRI making process which started to out-perform, in terms of heating capabilities, the previous scenario which used LPG.

ADDITIONAL ENERGYSAVING PROJECT COMPLETED IN 2011

In addition to the initiatives presented above, more optimization projects have been implemented during the course of 2011 at the ArcelorMittal Saldanha Works plant - see Table Two, which briefly shows the projects implemented, and the energy and monetary savings achieved within the year 2011 as well as the respective capital investment undertaken.

Table Two: Additional Energy Savings Projects Completed in 2011 by ArcelorMittal Saldanha Works Plant

System / Process to be Optimized	Project Objective	kWh Savings	ZAR Savings	Capital Investment (ZAR)
Compressed Air System	Repair Leaks & prevent wastages	2,350,400	1,207,000	0
Power Optimization	Power Optimizers installed in main building. Target: 10% V drop, 7% kWh saving	55,091	120,000	500,000
Low Production Periods	Increase awareness – 'switch off what is not required' (Jun/Aug/Sep)	31,687,198	13,308,000	0
Load Shedding	Utilizing chemical energy during winter peak tariff (2% moved to outside peak)		5,000,000 (R20,000,000 planned 2012)	0
Conarc Vessels	Reduce foamy slag, optimize transformer operation & DRI quality	42,180,000	17,715,000	0
Mill Ancillary	Switch off possible systems during standing times	876,000	464,000	0



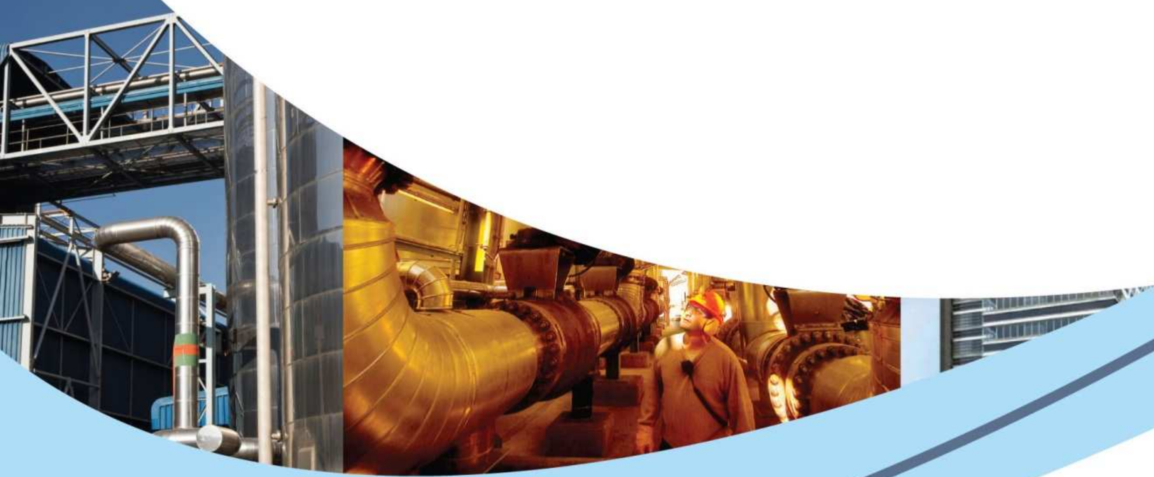
LESSONS LEARNED

The energy and financial savings achieved by ArcelorMittal Saldanha Works Plant surprised all involved as most of the savings achieved did not require capital investment. Even before joining the IEE Project, the Saldanha Works Plant was attentive to the energy consumption of the large energy users within the plant.

However, early process optimization was implemented in silos and no coordination or overall optimization strategy was in place, limiting the efficiency of the initiatives put in place. The IEE Project assisted Saldanha Works in analysing the plant's energy consumption in a systematic and holistic manner, thereby teaching the plant's engineers on how to optimize across processes throughout the systems.

The main lessons learned and steps followed by the ArcelorMittal Saldanha Works plant that resulted in savings of approximately ZAR 89 Million within one year (2011) were as follows:

- Management commitment is key to success. It will be thanks to the buy in of the high-level management that resource allocation (both personnel and capital funding) happens.
- ArcelorMittal Saldanha Works made energy a priority for the firm. The energy team put in place allowed the plant operators to understand the process required and the benefits that EnMS and ESO implementation would yield, and allowed for increase information sharing.
- ArcelorMittal Saldanha Works joined the IEE Project to be a Host and Candidate plant. Numerous training courses were hosted on-site and trainees conducted a range of system optimization assessments within the plant identifying numerous energy savings possibilities.
- The engineers in the plant were technically capacitated with respect to EnMS and ESO methodologies implementation, through the IEE Project training courses. As behavioral and corporate culture are the most difficult to achieve, but are extremely beneficial and sustainable over time, it was key for the plant to raise employee awareness at all levels on energy matters and the benefits of energy efficiency.
- The establishment of a systematic approach to energy through the implementation of an Energy Management System and Management Infrastructure programme was undertaken. Putting in place an EnMS will in fact limit the risk of improvements being linked to, and supported by, a single person rather than by the company culture
- Recommendations suggested during the energy audit were implemented and the results were constantly monitored.
- Constant reporting to top management on the achievements and challenges encountered helped reinforce the commitment and provided security with respect to the effectiveness of the decisions taken.



The Industrial Energy Efficiency Improvement Project (IEE Project) was introduced in South Africa by the United Nations Industrial Development Organisation (UNIDO) after rolling blackouts in 2008 exposed the country's acute shortage of electricity. It is a collaborative initiative between the South African government through the Department of Trade and Industry (the **d**ti) and the Department of Energy (DoE), the Swiss State Secretariat for Economic Affairs (SECO) and the UK Department for International Development (DFID). The Project is implemented by UNIDO and is hosted by the National Cleaner Production Centre of South Africa (NCPC-SA) at the Council for Scientific and Industrial Research (CSIR).

The IEE Project contributes to the sustainable transformation of energy usage practices in South African industry and aims to enhance national energy security, contribute to job creation and the reduction of greenhouse gas emissions. It facilitates the implementation of the new South African Energy Management Standard under the framework of the recently released international Energy Management Standard ISO50001, as well as building the capacity to introduce a systems optimization approach in industry in South Africa.

The Project currently focuses on a number of key industrial sectors which have the potential to bring about significant reductions in the overall energy consumption of the country, including agro-processing, chemicals and liquid fuels, metals processing and engineering, automotive manufacturing, and mining. The objective is to contribute to the Government's national energy demand reduction target of 15% by the year 2015 for the industrial and mining sectors, and 12% for the country as a whole.

ENQUIRIES

For more information about the training workshops and participation opportunities:

www.iee-sa.co.za | Tel: 012 841 2768 (Pretoria), 021 658 3983 (Cape Town) or 031 242 2365 (Durban)

For more information about partnership opportunities:

www.unido.org | Tel: 012 394 1567 (Pretoria)