Industrial Energy Efficiency Project in South Africa

Case Study

Company name	**Mustek Limited (Gauteng)**		
Sector	**ICT**		
Company Contact	**Name: Pieter van Rooyen**		**Position: Facilities Manager**
	Email: Pieterv@mustek.co.za		**Telephone: (+27) 11 237 1209**
Year joined NCPC Project	**2014**		
Year of interventions	**2015-2016**	Duration (months)	**12**
Utility Intervention	**Central HVAC controller North Building** **Air-conditioner ducting improvement in the Store** **Geysers (kWh savings modelled by GCX) – installed blankets, insulated pipes and reduced set point** **Behavioural, communication, awareness, for example posters** **MST building – installed new inverter aircon** **Despatch and Production area – installed plastic curtains to improve insulation** **Sales door – replaced a large door with double doors that closes better, to improve the building envelope and reduce energy requirements for space conditioning.** **Compressed air system – repaired leaks** **Despatch - sealed the Whirley bird vents for the winter months to reduce heat loss, and then opened again in summer. This not only saved energy but also increased people comfort.** **Production area - replaced the filters on the Production heaters**		
Case Study Author	**Wendy da Cruz [Dacruz@mweb.co.za]**		
Project Manager	**Faith Mkhacwa [FMkhacwa@csir.co.za]**		

1. BACKGROUND

1.1 Company profile

Mustek is the largest assembler and distributor of personal computers and complementary ICT products in South Africa. Mustek is the operational business division of the Mustek Limited Group (established in 1987).

Mustek meets ICT requirements of a wide range of end users through its distributed sales network. It procures, assembles, distributes and services a comprehensive range of ICT products to a network of more than 3600 resellers. Markets served include resellers, government, corporate and parastatal key accounts, mass retailers. Primary products include

desktops, notebooks and tablets, ICT peripherals, POS Point of Sale Systems, enterprise infrastructure, networking, Microsoft volume licencing.

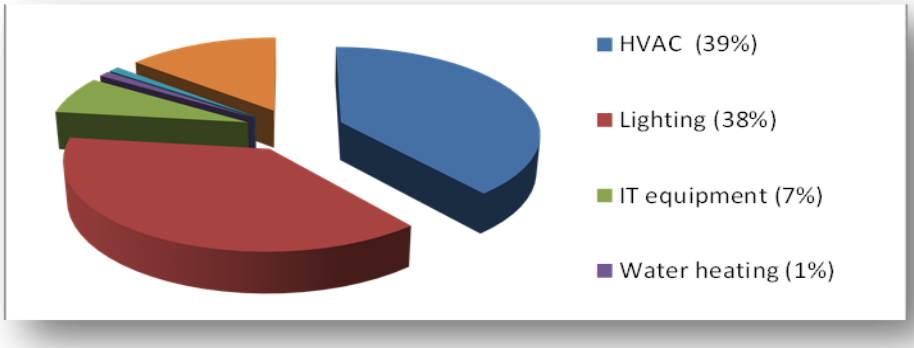
Mustek operations in Midrand, with a staff compliment of approximately 415, include local assembly capabilities of the Mecer brand and repair workshops. The Mustek Service Centre has a large PC board component level repair facility at Midrand, with advanced facilities for activities such as testing, de-bugging, applying Engineering Change Orders, Bios flashing and EPROM re-programming. Mustek uses the latest technology to provide high quality, high productivity results.

This includes workshop repair and on-site services, utilising Mustek's network of countrywide centres and specialist technicians. Whether using consigned or purchased stock Mustek can manage the entire warranty validation, repair and test procedure, and reporting process to meet the widest range of needs.

Mustek has a mature Business Management System (BMS) which successfully maintains ISO 9001 (Quality Management) since 1997, ISO 14001 (Environmental management) 2004 and ISO 20000 (Service Management) 2014, certification and the EnMS ISO 50001 Energy Management was integrated with this BMS.

1.2 Plant profile

Mustek's main energy source is electricity with an annual consumption exceeding 3 MWh, in 2013/14 prior to the EnMS project, and an energy breakdown is as follows:



During 2013 Mustek invested heavily in a PV Solar Plant which was installed both as an energy intervention and to showcase Mustek's involvement in emerging technology.

1.3 Nature of challenges

A Group strategic goal is to focus on operational efficiencies and cost management. In support of this Mustek identified the need to apply a systematic and sustainable approach to improving and managing energy performance and embarked on the EnMS Implementation project.

1.4 IEE capacity building programme

Mustek approached the IEE in 2014 as a means to improve their energy management based on the recommendation of one of the IEE Expert Consultants.

The Facilities Manager and ISO Administrator, with their assistants, attended the IEE Project 2-Day EnMS End User course and the Facilities Manager subsequently continued and achieved CEM (Certified Energy Manager) qualification.

2. KEY ACHIEVEMENTS

Key findings table -

Implementation Period (yyyy-yyyy)	**2015-2016**
Total Number of project	**10**
Monetary savings in ZAR	**R243 100**
Energy savings in KWh	**243 150kWh**
Total investment made ZAR	**R 147 850**
Payback time period in years	**< 1 year**
GHG Emission Reduction (ton CO2)[1]	**233 ton CO_2**

3. IMPLEMENTATION OF AN ENERGY MANAGEMENT SYSTEM

Corporate Commitment

Mustek strives to manage all capital including Financial, Manufactured, Human, Social and Relationship, Intellectual and Natural capital. Natural Capital is defined as "all renewable and non-renewable environmental resources and processes that provide goods or services that support the past, current or future prosperity of the organization" including energy.
One of the Group Strategic Goals is to "Focus on operational efficiencies and cost management". Although energy reduction has been an area of action to support this strategic

[1] SA Grid kWh to CO2 Conversion Factor set at 0.957 as per the 'Journal of Energy in South Africa' – Vol 22 No 4; November 2011.

objective for several years, it has been ad hoc. The reason for embarking on the EnMS Implementation Project was to introduce a more systematic approach to managing Mustek's energy performance and the improvement thereof.

Top management's commitment to energy management and performance improvement was included in the SHEQ Policy revision which was signed in March 2015 and published on the Mustek website.

Mustek EnMS

The approach taken from the energy perspective was to establish a broad-based energy team with representatives from all departments, including management from Sales, Service, Warehouse, ISO, under the leadership of the Facilities Manager. From the management system perspective, Mustek has a mature and effective "Business Management System, BMS, into which the EnMS was integrated. Two key additions to this BMS were the EnMS Tool (energy data and records management) and an Energy Planning and Management procedure. These formalize the energy review activities and management, including Significant Energy Uses (SEUs) identification, driver and baseline development, Energy Performance Indicators (EnPIs), improvement opportunities and legal compliance.

Communicating the importance of energy performance

Energy awareness campaigns were initiated and integrated with other SHEQ communication strategies. Emphasis was placed on seeking improvement suggestions from management and staff, and examples ranged from installing plastic curtains for improved insulation, to sealing airconditioning ducting where it is no longer in use.

Management System and Certification Approach

The integration of the EnMS was successfully included in the BMS internal audit in December 2015. Mustek's early decision to seek ISO 50001 certification was moderated to a commitment to conform with this international standard and to ensure inclusion of energy as one of the environmental aspects covered during the ISO 14001 certification activities.

Objective setting for future improvement

In order to ensure on-going continual improvement, Mustek has set objectives and targets for reducing electricity consumption, and quantified these for the next three years.

4. IMPLEMENTATION CHALLENGES

Behavioural Change

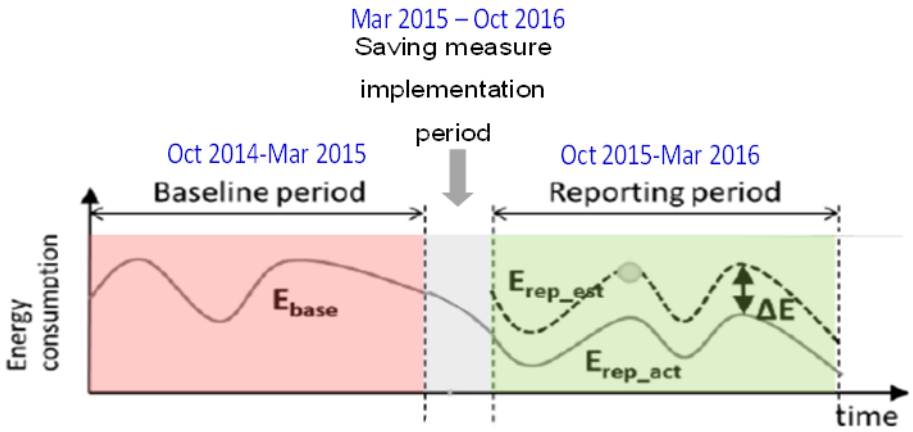
Although trying to make people aware and understand their role and encouraging them to change remains a challenge, the overall consensus from the EnMS implementation has been that the formal ISO 50001 approach is better than informal.

Baseline Establishment

The biggest challenge was the attempt to establish a regression baseline. Variables considered and analysed included production, ambient temperature and occupancy. Although a 2011 energy audit provided a baseline regression of occupancy and temperature, this could not be replicated

with the current 2015 data. The reason appeared to relate to the on-going improvement initiatives which resulted in a changing energy consumption pattern. Consequently, absolute consumption was adopted after discussion with the NCPC-SA Technical Manager. Hemant Grover. A further challenge was access to electrical energy data. For example, there was an initial lack of data from the PV Solar installation.

The following model adopted from ISO 50006 represents the savings model adopted for the Mustek savings:



Source: Adapted from ISO 50006

5. HIGHLIGHTS OF OPERATIONAL/ESO INTERVENTIONS

5.1 Summary of all interventions

During 2015, as part of the EnMS ISO 50001 project, the underlying success in terms of energy saving was not large individual projects, but rather a multifaceted approach of many small initiatives, summarised as follows:

Resource	Carrier	Intervention	Utility saving (Units) Period	Investment (ZAR)	Savings (ZAR/year)	Payback (Yrs)	Period	GHG Emission Reduction (Kg CO2/year)
1. HVAC	Electricity	Central HVAC Controller North Building	105 712	R11 000	R105 712	< 2 months	Intervention implemented May 2015	101 ton CO_2
2. HVAC	Electricity	Air-con ducting improvement in the Store	55 810	R 22 750	R 55 810	< 5 months	Intervention implemented April 2015	53 ton CO_2
3. Geysers	Electricity	Geysers (kWh savings modelled by GCX) – installed blankets, insulated pipes and reduced set point	38 873	R 7 113	R38 873	< 2 months	Intervention implemented May 2015	37 ton CO_2
4 Behavioural	Electricity	Behavioural,communication, awareness, for example posters	42 755	R106987	R 42 705	< 2.5 years	Oct 2015 to March 2016	31.2 ton CO_2
5,6,7 & 8 Building envelope	Electricity	5.Despatch and Production area – installed plastic curtains to improve insulation 6.Sales door – replaced a large door with double doors that closes better, to improve the building envelope and reduce energy requirements for space conditioning. 7.Despatch - sealed the Whirley bird vents for the winter months to reduce heat loss, and then opened again in summer. This not only saved energy but also increased people comfort.						
8 Heating	Electricity	8.Production area - replaced the filters on the Production heaters						
9 Compressed air system –	Electricity	9. Leak repairs						

10 Air-conditioning	Electricity	10.Inverter aircon - MST building – installed new inverter aircon						

5.2 Details of highlights

Stores Air conditioner Ducting

The single most cost effective improvement during the six-month period of this case study related to the Stores air conditioning. This was an area constituting nearly 25% of the South Building that was previously a production area and hence required air conditioning. Although this area was converted to storage space several years ago, the air conditioning was left in place until the energy team identified it during a walk-through to identify opportunities for savings. The lesson learnt was that any change needs to be analysed for potential energy impacts.

PV Solar Plant

In addition to the energy saving initiatives reflected in the Table above, the PV Solar Plant was upgraded by replacing all inverters, and although this plant was commissioned prior to the EnMS Implementation project, it is worthy of mention that during the past 12 months it generated nearly **300 000 kWh and avoided more than 287 tonnes of carbon dioxide emissions.**

6. BENEFITS & LESSONS LEARNED

- From a corporate governance perspective, the Mustek Board Sub-Committee for Social and Ethics provided invaluable support by encouraging energy savings and overseeing energy performance.
- Electricity savings of 15% assists Mustek's competitiveness by reducing costs as well as contributing to the company's environmental commitments related to resource efficiency and carbon emission reduction.
- Baseload reduction – the Metering on Line installation enabled monitoring of the baseload after hours. From this, the importance of energy vigilance was emphasised, awareness was created and controls put in place.

Quotable quotes

- There is always more you can do, if you look at the details.
- Reducing our electricity consumption from Eskom lowers costs and raises Mustek's profile as a leading provider of renewable energy technology by reducing GHG emissions. (Quoted from the Mustek 2015 Integrated Annual Report).
- Mustek strives for efficiency enabling the company to do more with less.
- Mustek walks the talk in implementing its own product range related to emerging renewable energy PV technology.

7. FUTURE PLANS

Commitment to ongoing energy reduction

Mustek intends to utilize the ISO 50001-based EnMS in order to sustain energy improvements and to ensure continual improvement of energy performance.

Energy neutral production

Mustek is investigating the viability of an independent assessment to enable marketing of "carbon neutral production" of Mecer machines.

Benchmarking

Mustek plans to investigate the use of SANS 204 for benchmarking of energy per square meter to compare Mustek's energy performance to other in similar sectors.