

Case Study: Qualitative

Company name	Yara Animal Nutrition					
Size of company (Based on energy consumption bill)	SMME (R250k –R750k)		Medium (R750k –R24mil)	X	Large (Above 24mil)	
Sector	Agro-processing					
Location	KwaZulu Natal					
Company Contact	Name: Nivona Sewpal			Position: Project Manager		
	Email: nivona.sewpal@yara.com			Telephone: +31 910 5118		
Year joined Project	2015					
Date of Implementation	2016	Duration	12 months			
Utility Intervention	Energy					
Case Study Author	Siraj Williams					
Project Manager	Milisha Pillay					

1. BACKGROUND

1.1 Company profile

As the world's leading fertilizer company and a provider of environmental solutions, Yara's key business of mineral fertilizer production is linked to agricultural productivity and its vision is a world without hunger. Established as Norsk Hydro in 1905, the company listed on the Oslo Stock Exchange as Yara International in 2004, currently employing 16 000 employees in over 60 countries worldwide.

The company has been present and operational in Africa for more than 30 years and remains committed to supporting the full agricultural spectrum from small holdings to full scale commercial enterprises. It follows a strategy of promoting sustainable agricultural operations through promotion of high yielding climate friendly crop nutrition solutions.

1.2 Plant profile

KK Animal Nutrition commenced operation at its current location in Umbogintwini in KwaZulu Natal in 1975. The company was bought out by Yara in 2008. The facility currently employs approximately 122 people. The manufacturing operation comprises of 3 sub-plants (Kalori Process, MCP Process and Kimtrafos P12 Process) which collectively produces animal feed and related products, as well as one warehouse facility. All three plants operate 24 hours a day, 7 days a week. Shutdowns are scheduled to coincide with low production periods and will vary per plant. Each plant will be typically shut down for approximately 4 weeks per year, spread over the 12-month period. The whole facility is shut on public holidays.

1.3 Nature of the challenges

One of the key challenges that underpinned Yara's participation in the IEE Project was load shedding, related to national supply shortages by Eskom and its profound impact on business profitability. The steeply rising cost of electricity was however also a significant driver for the company to reduce their energy consumption as much as possible. The company underwent a general energy assessment in early 2015. They then started implementing energy savings projects on an ad hoc basis. The next natural step was to find a systematic approach of ensuring that the savings were sustained. They went on to participate as a pilot plant in Energy Management Systems expert level training in 2016 and as part of the yearlong training started to establish an ISO 50001 aligned Energy Management System for the site.

A significant challenge during implementation was the lack of management commitment, which started with the Energy Management Representative (who was primarily accountable for energy on site) leaving the company. Other significant structural changes which hampered the implementation of the EnMS, included the following:

- A company merger with a significant change in ownership- this came with a change in strategic business objectives.
 - A high staff turnover at senior level, associated with the merger, which further contributed to the lack of continuity within top management.
 - A lack of consideration for other energy sources on site- The energy review and energy improvement opportunities focused only on electricity with the aim of mitigating the effect of the national supply constraint. Other sources of energy were not considered a priority.
- Figure 1 below shows the energy consumption for the various sources.

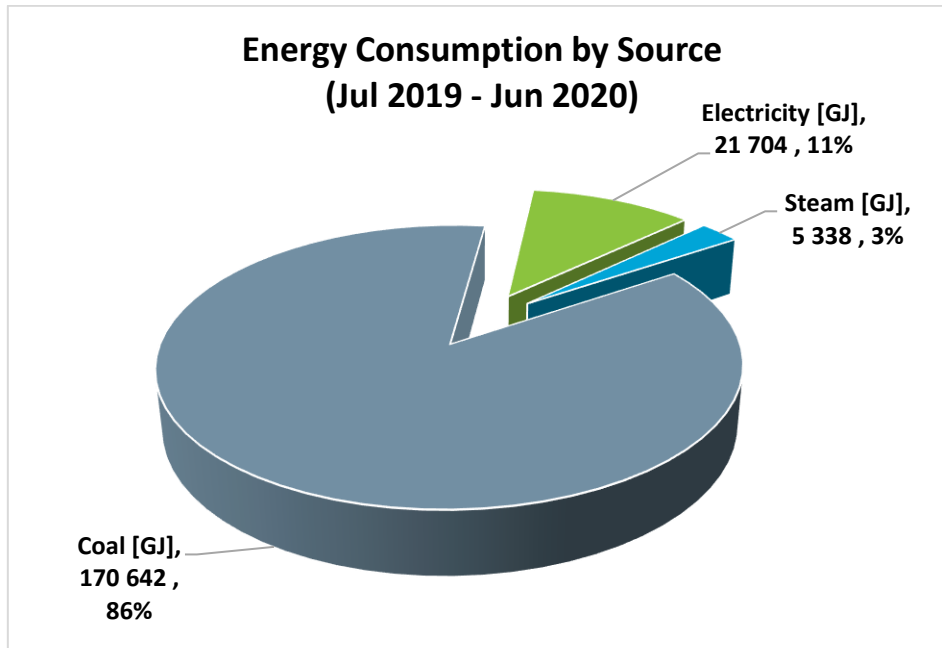


Figure 1: Energy Consumption by Source

- With the management change, focus was solely on maintaining pre-merger production. Further development and maintenance of EnMS was curtailed, and it inevitably fell into disuse.
- Sub-metering, as recommended by the energy assessment, was not installed.

2. MEASURES IMPLEMENTED

Yara participated in two separate IEE Project service offerings. These were specifically an Energy assessment in 2015 and EnMS Expert Level Training (through one of their junior project engineers in 2016). Each of the two projects resulted in a variety of potential energy savings opportunities being identified. Recommended actions for implementation were made. Selected interventions have been implemented over the last few years since the Energy Management System Implementation and are listed in the table below. It should be noted that actual energy savings achieved could not be measured or calculated for any of the interventions listed below. This was due to the fact that a credible baseline was not found to be established for any of the significant energy users, nor the site.

Table 1: Savings Opportunities Implemented

Opportunities implemented	Date implemented	Cost	Description
Installation of heat pumps at main ablution	May 2018	R78 000	These were installed to replace existing hot water cylinder units. Energy savings were not measured. However, heat pumps in general often provide savings in the range of 55% to 70%, depending on ambient conditions
Hot Acid Tank Rubber Lining	December 2017	R80 000	The hot acid tank was fitted with a rubber lining that provided thermal insulation, thereby reducing the heat loss from the hot fluid in the tank.
Lighting replacements	Ongoing (60% complete)	R350 000 (to date)	The company embarked on a lamp replacement strategy where all incandescent lamps and other selected high energy lamps are being replaced with an LED equivalent when they fail. It is estimated that approximately 60% of lighting had been replaced by June 2020.
Installation of VSD on Furnace1 Stoker	October 2017	R 35 000	A variable speed drive was installed on the stoker (coal feed) for Furnace 1. This enabled better control of fuel feed in order to maintain an optimum burn ratio
Motor replacement programme	Ongoing	R360 000 (to date)	The company has embarked on a motor upgrade strategy where electric motors are replaced with a high efficiency IE3 equivalent when they fail.
Steam System: Cladding	December 2018	R300 000	Thermal insulation was installed to selected piping as well as the Kalori Drier to reduce heat loss through the steam distribution system.
Replacement of old compressor with new fixed speed compressor	January 2019	R305 000	A compressed air flow study was carried out and the older 45kW unit was found to be marginally undersized which sporadically affected production. It was replaced with a new more efficient 55kW unit.
Installation of soft starters on selected machines	Feb 2019	R175 000	Soft starters were installed on selected high power machines, namely: the wet pugmill, the dry pugmill and the atomizer. Although these improvements were not directly linked to energy savings benefits, they contributed significantly to stabilizing the electrical supply in the plant limiting costly outages due to poor power quality.

3. RESULTS, BENEFITS AND LESSONS LEARNED

3.1 Results

Once the company underwent the energy assessment in 2015, there was definitely a higher level of awareness around energy consumption and use and the potential for achieving energy savings based on the recommendations from the assessment. This raised level of awareness prompted the company to enroll for the EnMS programme.

Although the company may have understood the energy-related benefits of implementing an EnMS, the lack of detail that was applied when conducting the energy review and establishing the system itself made it challenging to quantify the full impact of the energy improvement interventions. The management team within the organization was introduced to the concept and buy in was sought at the inception of the EnMS. However, this was short lived as a change in ownership resulted in a shift in priorities, which in turn resulted in elements of the EnMS not being fully implemented.

The facility (KK Animal Nutrition) in KwaZulu Natal was bought out in 2008 by Yara, the actual handover only commenced in 2015. During the period from 2015 to 2019, the company experienced a number of management changes including a possible further potential buy out. The management changes included various strategic changes, one of which was that energy performance was not regarded as a priority. By mid-2019 the organisational structure regained a measure of stability.

Specific elements that were missing from the energy management system included the absence of an appropriate data collection and sub metering programme to track performance. Although the energy team realised its importance, business priorities were shifted away from energy management.

It is however encouraging to note that the energy team has persisted with improvements despite the challenges. This is clearly demonstrated by the timing of interventions listed in Table 1 above. There have been regular improvements at consistent intervals. In addition, the company has taken a long term sustainable view to replace lighting and electric motors with high efficiency equivalents as a standard operating practice. This demonstrates the key impact of attitude and behaviour change where energy efficiency is slowly being entrenched as part of the daily business culture.

Whilst the company may not be able to verify actual savings achieved, it certainly has taken steps in the direction towards long term sustainability. Personnel within the HESQ Department have also been appointed with energy performance being included in the job description and measures are being taken to improve the development of the EnMS.

The company has set the objective to complete a full implementation of the EnMS, with a further long term objective being to achieve ISO 50001 certification. A new energy team has been formed which includes the appointment of an energy manager for the site. Formal appointment letters have been drafted, with a detailed energy review to commence in 2021. Awareness sessions have also been conducted in 2020 to raise the profile and boost the success of the implementation planned for 2021. Energy KPIs have been introduced within Yara plants worldwide and more recently at the facility in KwaZulu Natal. A CAPEX plan that includes the installation of electrical sub-metering, has already been approved for 2021.

3.2 Benefits

- The EnMS programme has created awareness that resources can be managed and optimized within the company. This change in approach was extended to operations, where a renewed focus on operational discipline was implemented.
- Specific changes implemented to the dry and wet pugmills as well as to the Kalori drier have resulted in improvement in production flow and more importantly, less rework.
- This in turn has resulted in increased buy in from management who have now provided additional support for the EnMS awareness campaign.
- **Impact of savings on other socio – economic factors**
- The facility is located within an industrial complex and uses shared services for steam. Improvements in process heat efficiency have thus had an effect on the steam suppliers, and has also contributed to the reduction of steam usage at the industrial complex.
- **Other unintended consequences arising from the savings like product quality, staff morale, production output, etc.**
- The improved lighting installed has also resulted in OHS Act compliance as well as a boost in personnel morale.
- The newly restructured HESQ Department now includes energy in its portfolio to track the company contribution towards global climate change goals.

3.3. Lessons

- **Lessons learned by the company through the process**
- It is important to ensure that the “energy manager” who is tasked with undertaking the Expert training and implementing the EnMS at the site is at a level of authority (with regards to energy consumption accountability) that is able to influence future decisions related to energy consumption and reduction. This will enable the individual to obtain buy-in from the Management team such that the EnMS can be driven forward at the appropriate levels and the relevant resources allocated
- Risks associated with financial and organisational stability could have a significant effect on the effectiveness of the implementation of an EnMS. Implementing a robust framework to support the EnMS could assist in mitigating these risks.
- It is important to review all energy sources during the planning phase of the EnMS to ensure that the most appropriate direction is taken with regard to focusing on improvement areas.
- A good sub metering and data collection plan will allow for a more quantity oriented approach to energy management and will often unlock further hidden potential opportunities for improvement. It allows for a more accurate determination of significant energy users and energy balances, and also provides the basis for sound financial evaluation of projects.
- Analysis of metering and other relevant collected data will also allow for the development of energy performance models that are more reflective of the plant operations and can be used to more accurately forecast consumption and provide a basis for tracking energy performance and measuring savings.

The company has taken the lessons learnt as a guide to improving their EnMS and ensuring that the basics are built on a good foundation.

- **Lessons learned by the IEE Project for the company's future consideration**
 - a. Understand the external context of host and candidate plants more fully by reviewing financial and organisational stability and determining company strategic objectives and priorities.
 - b. Offer a more structured follow-up support programme to companies facing challenges with the implementation of an EnMS.
 - c. Provide specific assistance for submetering, data collection and analysis to ensure that credible energy performance models are developed.

- How has the IEE project impacted on the company competitiveness and business culture?

The IEE project has resulted in the company taking a long term stance towards sustainable business practices. Initially borne from a need to manage the electrical supply shortage, the company has since realised the benefits of energy management and have taken positive steps towards entrenching the culture of continual improvement from an energy perspective.

“Maintaining a system will assist in continuity especially during company mergers”

4. FUTURE PLANS AND CONCLUSION

- Despite the challenges of a change in ownership and business priorities, the company is committed to completing a new energy review and updating its EnMS accordingly to ensure that the core elements are presented in a robust and structured format.
- This would include the installation of electrical sub-metering and improved data management in order to track energy performance more accurately,
- A new updated energy review is planned for 2021, including the establishment of a new baseline and energy performance models.
- The company also plans to raise energy awareness within the energy team to ensure the correct level of technical knowledge exists within the organization.
- Other specific projects planned include:
 - A full steam system efficiency study (2021/2022)
 - An upgrade to the hot acid (2021)
 - An investigation of a coal to natural gas conversion (2022/2023)

Despite the organizational challenges experienced over the past few years, the company have implemented a number of energy improvement interventions, and is slowly entrenching the culture of improving energy performance through the implementation of the fundamentals of an EnMS. Now that the company has achieved a measure of organisational stability, it plans to further develop, update and implement a full Energy Management System for the site in 2021.