Case Study (EnMS)

Company name	First National Battery (FNB) – Fort Jackson plant					
Size of company (Based on energy consumption bill)	**SMME** (R250k –R750k)		**Medium** (R750k –R24mil)	X	**Large** (Above 24mil)	
Sector	Automotive Manufacturing					
Location	East London					
Company Contact	Name: Chris Roberts			Position: National HSE Manager		
	Email: chrisr@battery.co.za			Telephone: 27 (0) 43 731 1111		
Year joined Project	2018					
Date of Implementation	Feb-Nov 2018	**Duration**		(9 months)		
Utility Intervention	ISO50001:2011 aligned EnMS Implementation					
Case Study Author	Dawie Fourie					
Project Manager	**Inga Magodla**					

1. BACKGROUND

1.1 Company profile

First National Battery (FNB) is part of the METair Group of companies and is one of the largest Battery manufacturing companies in South Africa. FNB is situated in the Eastern Cape and Gauteng Provinces of South Africa, with a Battery Case and Component Injection Moulding facility in East London (Fort Jackson Industrial Area), 2 Manufacturing and Forming facilities in East London (close to the East London Airport) as well as a Waste Upcycling facility for reclamation of raw materials that is situated in Benoni (Johannesburg).

FNB was established in 1931 when the first automotive batteries were produced in East London (South Africa), and remains at the forefront of battery technology and innovation. Batteries produced by FNB reach consumers annually through a strategic network of local distributors and Battery Centre franchises. The batteries are also exported to over 40 countries worldwide. Batteries produced by First National Battery are the first choice amongst South African Original Equipment Manufacturers (OEMs) including Mercedes Benz, Toyota, Nissan, GM SA, BMW, Volkswagen SA,

Renault, Ford, Nissan Diesel and MAN. Further information on FNB is retrievable on their Website: www.battery.co.za.

1.2 Plant profile

The Fort Jackson plant is located in an industrial area in Fort Jackson, East London. This is where the automotive and industrial battery plastic components and casings are molded and manufactured. Of the FNB plants, the Fort Jackson plant stretches over a total site area of 23,000m2 and has a production facility with an area of 7,800m2.

Taken from the 2017 data, the total annual energy supplied to this manufacturing facility was around 3.7million kWh of Electricity. Since the inception of energy management implementation, FNB Fort Jackson plant has implemented many technical and behavioral energy efficiency measures. These will be discussed later, in Section5 of this document.

1.3 Nature of the challenges

Being part of the METair group of companies, who had recent successes in the implementation and certification to ISO50001 that's aligned to IEEP's Energy Management Systems on some of their subsidiary companies, the FNB team were requested to participate through the NCPC program to achieve the same certification. The objective for the team was to achieve certification of the ISO50001 by 2019.

At the introductory meeting between FNB, NCPC-SA and IDM Solutions, Russell Bezuidenhout, Managing Director, challenged the potential of energy saving through this program without investment. He required monthly update and instructed the team not to mention anything about lighting project. A 2% saving realized for this plant is quite an achievement considering that top management did not allow special treatment and support for this project he wanted "business as usual" approach.

It is no doubt that the team moral was challenged by the above statement, however, the savings shows that the team managed top management attitude or barrier as allocation of budget for capital projects is being discussed.

1.4 IEE capacity building programme

Through the IEE capacity building program, the following employees were reached:

2-day End-User EnMS Implementation Training

NAME	POSITION
Chris Roberts	Energy Management Rep (National HSE Manager)
Danie Roberts	Energy Manager SW (Engineering Manager)
Terrance Obaray	Energy Manager SW (Engineering Manager)
Anthony Lottering	Energy Manager BVR (Maintenance Manager)
Robert O'Donoghue	Energy Manager FJ (Engineering Manager)
Shandre Thurston	HSE Co-Ordinator

- Herman Goosen — HSE Co-Ordinator
- Michael Kriedemann — Electrical Service Manager
- Clark Kent — Maintenance Manager
- Ernest Victor — Mechanical Technician
- Zane DeLange — Production Co-Ordinator

Energy Performance Measurement Training (EnPMI Training)

- NAME — POSITION
- Danie Roberts — Energy Manager SW (Engineering Manager)
- Anthony Lottering — Energy Manager BVR (Maintenance Manager BVR)
- Robert O'Donoghue — Energy Manager FJ (E Maintenance Manager FJ)

ISO 50001:2011 have requirements related to ensuring the competency of personnel on the basis of appropriate education, training or experience. competency, as used in ISO 50001, is concerned with the qualities or abilities needed by an individual to effectively perform the responsibilities of their work position.

At FNB, the work positions associated with significant energy have been identified and competencies defined. Through the IEE Projects capacity building program, many of the FNB employees that influences significant energy uses were capacitated. The list above is only depicting those who were covered in formal training events. Although the implementation was a supported program, the number of staff trained indicates that change management happened possibly due to the 2% improvement in energy consumption.

2. KEY ACHIEVEMENTS

Key findings table

Implementation Period (yyyy-yyyy)	2018-2019
Total Number of project	7 (one project in progress)
Monetary savings in ZAR	6 completed Projects (R66, 220)
Energy savings in GJ	6 completed Projects (177 GJ)
Total investment made ZAR	nill
Overall % of total consumption saved	2%
Total Savings from no cost interventions	R42, 298
Payback time period in years	Less than 1 year
GHG Emission Reduction (ton CO2)[1]	47

Number of females employed prior to implementation	Not measured
Number of females employed after implementation	Not measured

The FNB team started EnMS implementation, ISO50001 aligned program, in February 2018. Management commitment was sought first, followed by appointing resources and assigning responsibilities to carry out the requirements of ISO50001. The Energy Team as well as appointed Energy Manager and Energy Management Representative, with the assistance of IDM Solutions (as EnMS implementation consulting firm), engaged in a few Energy Planning sessions, with emphasis on creating alignment to scope and boundaries, creation of an Energy policy, objectives and targets.

A focused Energy Technical review with the emphasis on highlighting energy management gaps and capability gaps of the energy influencers was done next. Once these gaps were highlighted an action plans was created to align with the objectives and targets. Part of the action plan was behavioral as well as technical activities that would enable the team to successfully manage their energy to achieve the objective.

For the Fort Jackson plant, budget limitations prevented the implementation of capital projects, so the focus was in the direction of operational and maintenance control. The study highlighted 7 projects of low and no cost and 0 capital projects. Due to limited time of implementation and resource constraints, only 6 of the 7 low and no cost projects were completed, which saved about 2% of annual consumption. The one partially completed project has not been included in the final savings calculation.

3. IMPLEMENTATION OF AN ENERGY MANAGEMENT SYSTEM

Energy management is a culture for continual improvement of energy performance and efficiency that's integrated within an organization's everyday business practices. Energy is a critical component to many organization's operations. It's important to realize that energy can be managed and controlled.

Managing energy use in any facility is a team effort and needs to be structured to ensure the journey reaches all in the organization. At FNB, the PDCA cycle (Commit, Plan, Do, Check & Act) methodology was used. The number of staff trained above indicates sustainable improvement drive and commitment to maintain the realized savings.

Through this implementation a focus on identified SEUs was emphasized and maintained. The Scope and Boundaries for Fort Jackson included all operations and energy sources available on-site except transport fuel. A company-wide "FNB EL and JHB" energy policy was approved after alterations for alignment to assure achievable target for all 4 x demonstration plants.

During the Plan phase, the Energy review was done which highlighted, through data collection and analysis, the SEUs and relevant variables for ensuring that correct EnPIs were

set-up. This gave rise to the Opportunities list, which was used to create an action list in lie with the objectives and targets.

Continual Improvement of Operation and Maintenance control and the implementation of the action plan were the most significant activities of the Do phase. Constant monitoring and measurement of the EnPIs during this phase also allowed for quick reaction to deviations, which gave rise to corrective and preventive action tracking. Linking operational continuous improvements ideas to the already existing suggestion scheme was also a highlight in this step. Figure 1 below shows amount of improvement that can be realized due to operational and maintenance improvement. It also indicates how losing the momentum can negatively impact ones implementation. The chart shows blue line for actual savings and green line for target savings. It is clear that has not been met however energy performance is improving and requires sustainability in the plant. Unfortunately FNB electricity billing comes after 1 and ½ month period which led to no analysis for the outstanding 3 x months.

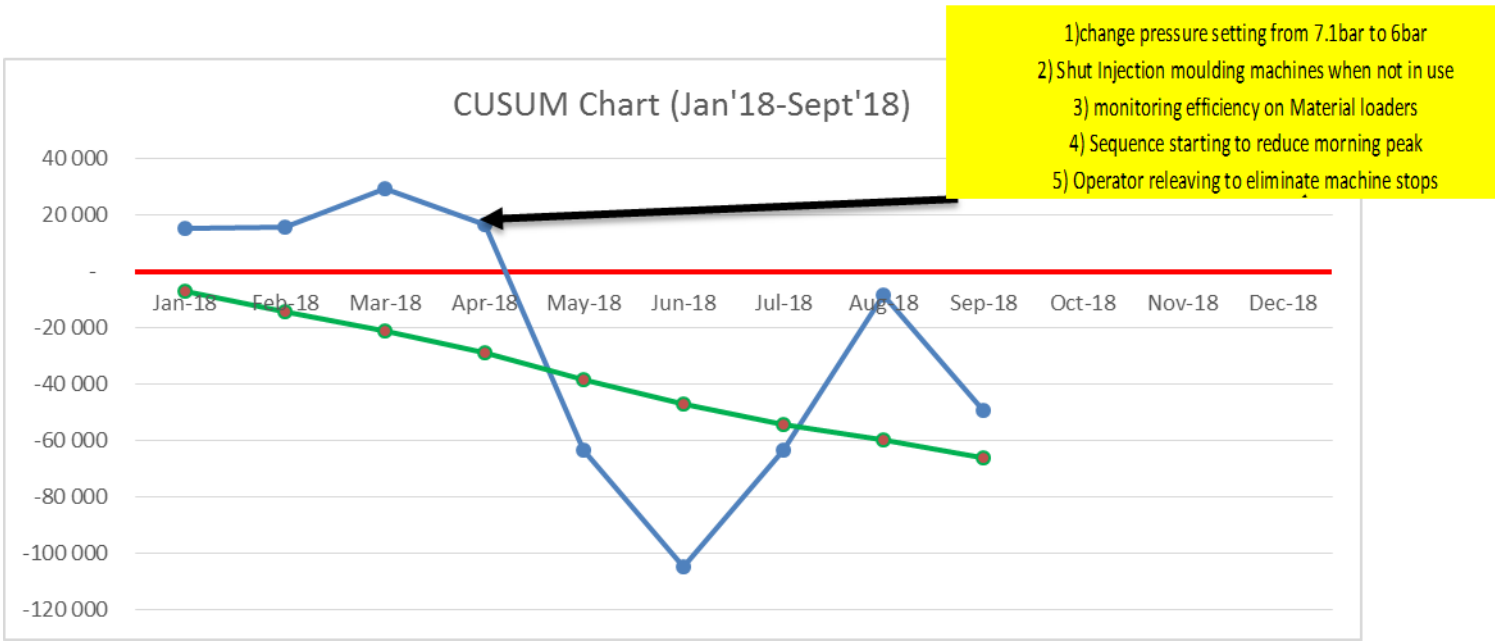

Figure 1CUSUM graph generated using 2017 baseline indicating actual savings versus target savings

At FNB, in the Checking phase, all were pulled together to ensure the management system was live, with documentation and records as well as internal audits and management reviews. Training and communication with employees about the EnMS system was used as the link to ensure all employees are aligned, knowledgeable and competent. Involvement of the external service consultants is also being considered. An internal audit is also planned to take place in April 2019 and a consensus finding regarding the deviation observed here will be explained and verified,

4. IMPLEMENTATION CHALLENGES

Availability of human resource (& time) to manage EnMS – Schedule for was reached to ensure commitment of resources.

Lack of EnMS knowledge – Training needs analysis completed, and training introduced – Awareness training, Two Day EnMS Training as well as EnPMI training offered for influencers of Energy.
Exclusive focus on first cost for capital expenditure instead of LCC – Purchasing Training offered to Procurement and purchasing staff, as well as checklist created for consideration of energy efficiency when purchasing energy related equipment. An email went out to all suppliers stating the intention f evaluating all potential equipment purchases on the basis of energy efficiency.
Energy focus is not a priority - The management team created awareness and effective reporting of energy performance to bring energy into focus and top of mind. Started linking the already existing suggestion system to consider energy improvement suggestions as well.
Absence of energy saving targets – Developed target and objective of saving and highlighted the intention of continuous improvement of energy efficiency, consumption and use.
Complexity of the Plants, and interlinkages. Energy analysis were performed to make the flow of energy and relevant variables more understandable for purposes of reducing the effects of complexity.
Budget for Energy Projects not available – Only no cost energy saving initiatives were considered and implemented

5. HIGHLIGHTS OF OPERATIONAL/ESO INTERVENTIONS

5.1 Summary of all interventions

Energy uses/users	Energy Sources	Intervention	Utility saving Period	Investment (ZAR)	Savings (ZAR/year)	Payback (Yrs)	Utility saving (Units) GJ	GHG Emission Reduction (tonnes CO2/year)
Electric Motors	Electricity	Reduce consumption, replace with high efficient motor	2018		10,071	immediate		
Electric Motors	Electricity	Start Motors sequentially to reduce start-up currents overlapping	2018		8,057	immediate		
Chiller efficiency	Electricity	Improve variation and product cycling schedule	2018	---	6,042	immediate	177	47
Chiller efficiency	Electricity	Reduce chiller condensing temperature/ pressure	2018		20,142	immediate		
Compressed Air	Electricity	Eliminate compressed air cleaning	2018		17,880	immediate		
Compressed Air	Electricity	Reduce compressor output pressure	2018		4,028	immediate		
TOTAL					**66,220**		**177**	**47**

6. BENEFITS AND LESSONS LEARNED

1.1. Benefits

Impact of Energy Savings can have far reaching benefits, not only for the organization, but also for the individuals (employees) at work and at home. For the organization, these savings could be accumulated and be plowed back for use as funds for other energy projects. This would alleviate the pressure on limitations to capital budgets and create a source of income that continuously feeds energy improvement within the organization. Other benefits such as Carbon emissions reduction would be a direct effect in this case.

For the employee at home, with the knowledge gained from the program, the same capability can be of assistance in managing their energy at home. This would result in monetary savings, which is a positive economic benefit on a personal level. At Work, the employee with this new knowledge can also use the same to record improvement suggestions, which could realize incentives, as for most suggestion schemes, and would have a positive morale spin-off. The benefits, sometimes it's direct and sometimes indirect, it is difficult to measure and verify, but can make significant contributions to climate change.

1.2. Lessons

Throughout the implementation process there were many key moments where the initiative could go wrong. Keeping focus on a few points prevented this from happening. The ten points highlighted below are what we've found to be the major drivers of success for the FNB EnMS implementation:

- Find alignment to the Group objectives early in the process and align EnMS objectives.
- Ensure top management commitment is active, not just words.
- Integrate EnMS with existing management systems.
- Align the way measurement is done, KPIs = EnPIs where applicable else inform and encourage change management.
- Ensure efforts for implementation are streamlined to current organizational design/culture.
- Assign appointment to individuals with authority within the organization.
- Use correct data collection and analysis protocols and define correct SEUs.
- Energy Team to meet regularly and coordinate/communicate effectively.

- Be positive and always look for improvement opportunities.
- 100% employee engagement, with 80% focus on significant energy uses.

7. FUTURE PLANS

The table below shows opportunities identified, but still in progress. The total value of these opportunities is R8,057k with a potential of 21.56GJ of energy savings and a total estimated mount of 6.23 tons of CO2 emissions. More opportunities to be highlighted at the next scheduled technical review in early 2019. The team has a budget constraint but are allowing time during weekends for the maintenance team to slowly implement the opportunities.

				Subtotals	5,990		6,230	8,057			0.2%
Description of Opportunity	**Service**	**Investment Class**	**Capital Cost**	**Potential payback (years)**	**Estimated Savings**				**Person Responsible**	**Target Completion Date**	**Status**
					kWh elec	**kWh fuel**	**C02**	**Financial**			
Turn lights off in warehouse when not required, replace clear sheeting to optimise natural light.	Lighting	Med	No cost	N/A	5,990		6,230	8,057	store man	10/1/2018	in progress