Industrial Energy Efficiency Project in South Africa

Case Study

Company name	**Tupperware**		
Sector	**Consumer Goods**		
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Year joined NCPC Project	**2013**		
Year of interventions	**2014-2015**	Duration (months)	**24**
Utility Intervention	**Compressed air and process heating**		
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Project Manager	**Faith Mkhacwa**		

1. BACKGROUND

1.1 Company profile

Tupperware has been designing products for over 60 years that help simplify people's lives. Saving time and money for the consumer by helping to keep food fresh has always been one of Tupperware's most important goals. Tupperwares has many manufacturing sites globally including the Brakpan based facility in South Africa.

1.2 Plant profile

The Brakpan plant utilises extrusion moulding processes to manufacture various containers. These processes are intensive energy users specifically on the electrical resistance heating technologies and hydraulic motor driven extruders. The opportunities realised were in lighting, compressed air systems as well as the process heating applications.

1.3 Nature of challenges

Tupperware as a global concern is constantly benchmarking each of its sites against one another and the South African plant is noted as being less efficient in terms of electrical energy utilisation than other plants. Part of the reasons are that older equipment is normally relocated to South Africa for use due to the cost of energy being lower historically.

1.4 IEE capacity building programme

Staff members have attended the Energy Management System training courses and have realised that systemic changes are needed to implement lasting changes.

2. KEY ACHIEVEMENTS

Key findings table -

Implementation Period (yyyy-yyyy)	2014-2016
Total Number of projects	Three
Monetary savings in ZAR	R572,042
Energy savings in KWh	607,638
Total investment made ZAR	R949,205
Payback time period in years	1.7
GHG Emission Reduction (ton CO2)[1]	548,400

Tupperware installed insulation jackets, new lighting systems as well as a compressed air leak detection and repair programme.

3. IMPLEMENTATION OF AN ENERGY MANAGEMENT SYSTEM

A formal energy management system has not been implemented as yet.

4. IMPLEMENTATION CHALLENGES

Staff turnover in key positions relating to electrical energy and plant maintenance resulted in a significant loss in momentum in implementing a formal Energy Management System.

[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.

5. HIGHLIGHTS OF OPERATIONAL/ESO INTERVENTIONS

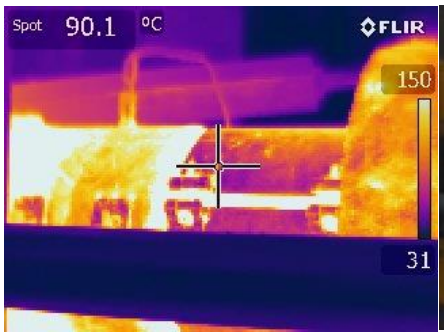
5.1 Summary of all interventions

Resource	Carrier	Intervention	Period	Investment (ZAR)	Savings (ZAR/year)	Payback (Yrs)	Utility saving (Units)	GHG Emission Reduction (Kg CO2/year)
Extruder	Electricity	Insulation	2014-2016	R 40 000	R 96 360	0.4	175 200	157 838
Lighting	Electricity	EE Lighting	2015-2016	R 859 205	R 343 682	2.5	312 438	281 476
Compressed air	Electricity	Leak minimisation	2015-2016	R 50 000	R 132 000	0.4	120 000	109 091

5.2 Details of highlights

Extruder Insulation

- Many of the extruder barrels were not insulated despite being at temperatures of over 200°C. The calculated energy losses for the uninsulated sections using 3EPlus insulation software was 1.7kW per meter. Roughly 15 meters of barrel were not insulated.



- The sections of the extruder barrels were insulated using removable lagging in order to facilitate maintenance on the extruder heating bands.
- Insulation resulted in a 10kW reduction in demand which equates to 87,500kWh/annum reduction in consumption.

Lighting

- The plant had a number of lighting types including Mercury Vapour, High Pressure Sodium, T8 lighting as well as a few incandescent lights. The total lighting load was calculated to be 118kW (~ 81,000kWh / month).
- Energy Efficient T5 lighting was installed to replace the HID lamps and older T8 lighting.
- The result was a 26kW reduction in demand for lighting (~26,000kWh/month)

Compressed air leak detection

- Routine compressed air leak detection audits were implemented and the leakage rate found to be in the vicinity of 250,000kWh / annum.
- All of the identified leaks were repaired.
- A conservative reduction of 50% of the leakage rate identified would yield 110,000kWh / annum reduction.

6. BENEFITS & LESSONS LEARNED

6.1. Benefits

- Tupperware now contracts a service provider to conduct routine leak detection tests on the compressed air lines which has a direct impact on job creation
- The lighting retro-fit resulted in a significant improvement in light levels at the working plane.
- The working environment close to the extruder barrels improved with less heat being radiated and there was a reduction in burn risk due to the lagging covering the hot surface.

6.2. Lessons

- There was early commitment to implementing more identified opportunities but unfortunately the project lost momentum due to changes in staffing.
- The IEE should consider providing additional implementation support .
- Tupperware is a part of a global group who are constantly benchmarking against one another. The South African operation is unfairly viewed as a "poor" performing plant which is attributable to the inheritance of older, less efficient machinery.
- There are significant opportunities for realising energy savings but these will only be realised if the organisational structure responds to energy efficiency initiatives.

7. FUTURE PLANS

There were a number of opportunities that were not implemented which will be looked into in the coming year or two. These include:

1. Compressed air optimisation strategies.
2. Daylight sensors for lighting.
3. Improved control on the HVAC system for the blow moulded line.
4. Advanced energy monitoring on each injection moulding machine to increase utilisation.