Industrial Energy Efficiency Project in South Africa

Case Study

Company name	**Vito Ice Cream**		
Sector	**Food and Beverage**		
Company Contact	**Name: Samad Razzak**		**Position: General Manager**
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Year joined NCPC Project	**2015**		
Year of interventions	**2016**	Duration (months)	**12**
Utility Intervention	**Refrigeration, Hot Water Boiler, Compressed air and Lighting**		
Case Study Author	**Darrin McComb**		
Project Manager	**Brent Goliath**		

1. BACKGROUND

1.1 Company profile

Vito Ice-cream is an ice cream manufacturer based in Lansdowne, Cape Town. Vito produce lollipops and soft serve ice cream which are sold to customers all around the greater Cape Town area. Vito has 25 staff with 10 part time staff and service the greater Cape Town area.

1.2 Plant profile

Vito Ice Cream o has implemented energy saving interventions relating to the refrigeration systems, compressed air systems, lighting and hot water systems.

1.3 Nature of challenges

Vito Ice cream has experienced significant competition in the frozen desert market and has had to aggressively drive costs down in order to maintain cost competitive.

1.4 IEE capacity building programme

The Maintenance Manager at Vito Ice Cream has attended the Pumps Systems Optimisation (PSO) Training in May 2016 in Cape Town. He found it to be extremely useful in gaining a better understanding of pumps and pump systems in general. He is using the tools and information on a day to day basis in the maintenance related issues on site.

2. KEY ACHIEVEMENTS

Key findings table -

Implementation Period (yyyy-yyyy)	2016 - 2017
Total Number of projects	6
Monetary savings in ZAR	R436,050
Energy savings in KWh	350,000
Total investment made ZAR	R250,000
Payback time period in years	0.6
GHG Emission Reduction (ton CO2)[1]	335

Vito Ice Cream implemented various energy efficiency measures as a part of their savings drive which included Energy Efficient (EE) lighting, insulation, improved HVAC control, rescheduling of production and the switching of fossil fuels in their hot water boiler system. In addition to the energy savings realised, there was an improvement in production controls through maintaining temperature set-points.

3. IMPLEMENTATION OF AN ENERGY MANAGEMENT SYSTEM

There was no formal implementation of an energy management system. The company, however, continued to aggressively cost manage energy through improved maintenance practices and awareness raising..

4. IMPLEMENTATION CHALLENGES

The main challenge to implementing energy conservation initiatives was the lack of financial and human resource. The company targeted energy conservation measures which were no or low cost (less than 1 year payback). Interventions that impacted the production process reliability and quality (i.e. chilled water set-point temperatures were also prioritised.

[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	Utility saving (Units) Period	Investment (ZAR)	Savings (ZAR/year)	Payback (Yrs)	Period	GHG Emission Reduction (Kg CO2/year)
Electricity	Refrigeration	Insulation	18 500	20 000	20 350	1.0	Jan - Dec 2016	17 705
Electricity	Refrigeration	Leak repair and load management	115 000	75 000	126 500	0.6	Jan - Dec 2016	110 055
Electricity	Compressed air	Leak repair and load management	33 000	25 000	36 300	0.7	Jan - Dec 2016	31 581
Electricity	Lighting	EE lighting	30 000	60 000	33 000	1.8	Jan - Dec 2016	28 710
Electricity	All	Production Scheduling	153 500	60 000	168 850	0.4	Jan - Dec 2016	146 900
Diesel	Boiler	Fuel Replacement	0	10 000	51 050	0.2	Jan - Dec 2016	0

5.2 Details of highlights

1. Refrigeration system optimisation
   There were a number of energy conservation measures noted in the cooling systems which included improved insulation, removal of redundant chiller piping and refrigerant leak reduction as well as the management of the compressor load specifically at part load.

Figure 1. Chilled water piping before and after the insulation and pipe diversion project.

In conjunction with the HVAC service provider, the load management issues were addressed and the insulation and notable leaks repaired. The changes not only realised energy savings but improved process controls through maintaining chilled water set-point temperatures.

2. Compressed Air Optimisation
   The hydrovane air-compressor operated continuously at around 30kW even during periods when there was no or low production periods. Repairing obvious leaks and purchasing a smaller 1.5kW compressor for maintenance periods would realise energy savings. This resulted in a 25-30kW reduction in power consumption over those periods.

Figure 2. Pictures of the 37kW hydrovane and the smaller 1.5kW Stanley compressor

3. Energy Efficient Lighting
   There were 18 x 400W High Pressure Sodium (HPS) lights in the production area. These were constantly switched on despite some of the lines not being operational.

   The HPS lights were replaced with 80W energy efficient lights. With a cumulative demand reduction of 5.7kW.

4. Production Schedules
   There was a high electrical baseload during production periods as a result of constant electrical usage (hydrovane air compressor, lighting, chiller systems). Minimising low production periods would realise savings.

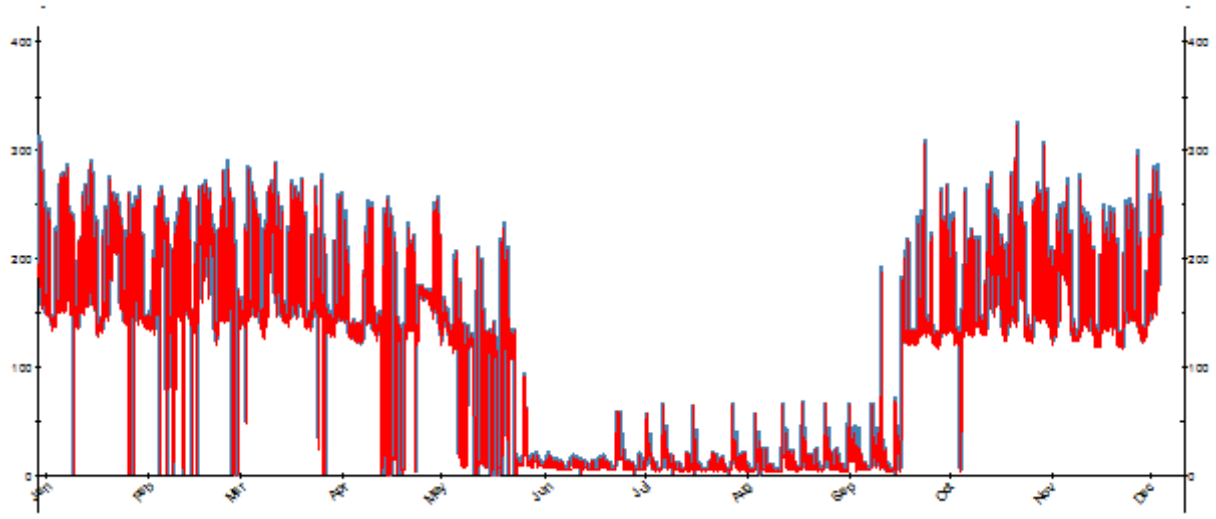

Figure 3. Demand profile of Vito for 1 year.

Vito compressed their production to 4 days per week (previously 5) by working slightly longer days and eliminating Fridays which were usually low volume days. The estimated energy savings as a result of the shift were calculated to be 153,500kWh / annum.

5. Fuel replacement
   Vito purchase diesel fuel for the hot water boiler at roughly (R297 / GJ ~ R12.50 / l). Paraffin offered roughly the same energy per litre but at a significantly reduced cost (~R83 / GJ reduction in costs)

   Vito fitted appropriate burner nozzles and utilised paraffin for the combustion processes. This resulted in a 35% reduction in costs for hot water processes. The maintenance staff also noted reduced maintenance requirements in burning the cleaner fuel.

6. BENEFITS & LESSONS LEARNED

6.1. Benefits

- There were improved process controls as a result of maintaining the chilled water temperature set-points which would impact on quality of the product.
- The persistent ammonia smell in the utilities area was alleviated through leak repair.

6.2. Lessons

- Significant energy savings could be realised through low or no cost energy conservation measures.
- Vito operates in a very competitive market. The aggressive energy reduction drive realised tangible savings despite lower production volumes for the year.

"The energy efficiency assessment helped to identify and prioritise potential interventions which has proved to be invaluable for the company's savings programme"

Samad Razzak – Managing Director

7. FUTURE PLANS

A new automated cleaning in place system was being commissioned which would realise improved cleaning capability while reducing the energy requirement for the cleaning processes.