case study

ENERGY SYSTEMS OPTIMISATION (ESO)

Da Gama Textiles

Textiles – ESO Candidate Plant for a Steam System Assessment (2012)

BACKGROUND

Da Gama Textiles is a large manufacturer of bleached, dyed and printed fabrics. The company purchases raw fabric and also weaves roughly 50% of its fabric requirements on site. The company produces 1.3-1.5 million metres of fabric per month and employs 600 people. The manufacturing facilities comprise a large single textile mill in Zwelitsha, King Williamstown, in the Eastern Cape. Da Gama's products are distributed to the southern African region to more than 200 individual customers.

Da Gama's Zwelitsha textile mill was constructed in 1946, and its steam system is dated. The company employs a diverse mix of manufacturing technologies including weaving, washing, bleaching, dyeing, printing, heat treatments and others, many of which require steam for their operation. While most of the investments made by Da Gama since the original assessment have been in the area of production capacity, these newer technologies have nevertheless had some flow-through benefits for steam system efficiency.

KEY FINDINGS

Over the period 2012-2015, seven projects were undertaken, resulting in a total energy saving of 40 678 869 kWh, valued at R 9 492 000. With an investment of R 1 320 000, the payback was 0.14 years. A reduction of 10 431 tonnes CO_2 was achieved.

IEE Project capacity building programme

Due to many employee-related changes and changes in company ownership, no formal training has been conducted yet. However, the company has now appointed several young engineers, all of whom will have a role to play in steam systems optimisation going forward, and these employees will be given the opportunity to obtain formal training. Significant capacity building was achieved over the course of the project through the engagements between UNIDO steam systems experts and Da Gama's staff.

IMPLEMENTATION OF ENERGY SYSTEM OPTIMISATION

Da Gama Textiles focused on 'low-cost/no-cost' implementation options in the generation, distribution and condensate return areas of the steam system. The approach was system-wide, often with baskets of projects implemented concurrently in the various areas.

A number of interventions were implemented (see Summary of Interventions table below) – from improved control of boiler feed water quality; to training of boiler operators to standardise work practices and raise efficiency levels; sourcing of an alternative coal supply, since the coal used at the time of the original assessment was of very poor quality and was impacting negatively on both boiler efficiency and uptime; changing coal handling practices to reduce breakage levels and fines; and installation of several new, energy-efficient production lines and the decommissioning of several older production lines.

IMPLEMENTATION CHALLENGES

- The company faced a number of reliability problems with regards to the boilers. Da Gama Textiles carried out significant maintenance on the boilers retained for service, and is now reaping the rewards of a more stable boiler

operation.

- Access to skilled staff in the face of tight budgets and a general scarcity of skills in South Africa (exacerbated by the plant's location) made it difficult to gain traction around implementation. An experienced, retired engineering professional assisted with implementation and is mentoring young engineers.
- Funding for implementation projects has been a challenge given the cost pressures faced by the industry. Since the original assessment, Da Gama Textiles has been acquired by a new owner which improves access to funding. Gain-sharing projects are being pursued with various service providers in the 'green investment' space. The increased cash flows arising from implementation to date also make further implementation more readily possible.

SUMMARY OF INTERVENTIONS

Intervention	Implementation	Investment (ZAR)	Savings (ZAR/year)	Pay-back (Yrs)	Energy saving (kWh/yr)	GHG emission reduction (Kg CO2/yr)
Steam generation system						
Addressed problems with incoming water and condensate quality to ensure that feed water conductivity is consistently below 50µS/cm, thereby reducing blowdown.	2013-15	0,00	1,359,000	0.00	6,607,127	1,694,294
Switched to an alternative, higher- quality coal supply. Modified coal handling work practices to limit breakage.	2014-15	0,00	1,331,000	0.00		0
Improved boiler management and maintenance practices	2013-15	20,000	1,170,000	0.02	6,091,078	1,562,115
Insulated over 3 km of steam lines across the factory and removed defunct steam piping and dead legs.	2014-15	1,000,000	4,446,000	0.22	22,809,948	5,849,252
Condensate recovery system						
Replaced leaking glands/packed seals with mechanical seals on condensate return pumps, reducing leakage and condensate loss. Fixed de-superheaters, installed new control systems and reduced temperature set-points in order to reduce flash losses due to passing traps.	2014-15	200,000	852,000	0.23	3,472,777	890,539
Conducted a detailed steam trap audit and repaired 10% of passing traps.	2013-15	100,000	247,000	0.4	1,254,781	321,769
Steam distribution system						
Repaired steam leaks.	2013-15	0,00	87,000	0.00	442,558	113,487

LESSONS LEARNED

- While high levels of awareness about steam system efficiency and monitoring of such were in place, a detailed understanding of the technical drivers of steam system efficiency was lacking. This is where the assessment of the site and subsequent engagement played an important capacity building role.
- The input and cooperation of staff and management are critical success factors. The Industrial Energy Efficiency project is a facilitator and enabler of change, but relies on process owners to effect that change.
- The initial spark for change facilitates yet more change. Additional opportunities were thus identified by those working at the mill.