

EFFICIENCY SOLUTIONS FOR INDUSTRIAL HEAT

CASE STUDY

INDUSTRIAL ENERGY ACCELERATOR



Lotus Garments Suez Canal, Egypt

Sector
Textiles

Intervention
Integration of solar thermal system and heat system optimization

Timeframe
2020

Energy consumption in the textile industry

From spinning and weaving to chemical processing, finishing fabrics and machine sewing, the energy consumption involved with textile production is vast. In fact, the textile industry remains one of the least energy efficient industries in the world. The Carbon Trust reports that almost half of the CO₂ emissions embodied in global clothing production arise from the generation of electricity.¹ The meteoric rise of 'fast fashion' has contributed to an even greater demand for fossil fuel based energy to keep up with demand. However, partly due to the emergence of new technology in recent years, there are plenty of ways the textile industry can make huge energy savings. If you add renewable energy applications into the mix, the possibilities to reduce emissions are even more significant.

Company profile

Founded in 1994, Lotus Garment Group has grown to become a premier clothing manufacturer and exporter. Specialising in the production of denim, the group provides around 16 million jeans to well known European and North American brands including Levi, GAP, Lee, Wrangler, Polo Ralph Lauren and more.

The energy optimization solution

Denim manufacturing is particularly challenging from a sustainability perspective. But, the Lotus Group has long embraced opportunities to optimize its production processes and mitigate environmental impacts. The company has done this through constant investment in research and development as well as maintaining internationally regarded sustainability standards. When it came to optimizing its energy system, the Lotus Group seized the opportunity to partner with UNIDO.

Focusing on its Suez Canal factory, which specialises in ironing raw materials for the production of ready-to-wear garments, UNIDO worked with the Lotus Group to investigate new ways it could reduce energy consumption. The Suez Canal factory contains around 50 ironing units that operate using steam. The plant's thermal energy system is powered by a diesel fire tube steam boiler, which has a 0.5 Ton/hr capacity.

Working with UNIDO's energy management specialists, Lotus Garments identified four key opportunities to improve its energy management system in its Suez Canal plant.



Thermal insulation

Insulation of pipes, tanks, fittings, and machines is a general principle that should be applied in all steam consuming processes in the factories. UNIDO's proposed to fix the insulation at multiple parts of the Suez plant's steam system. The collective energy, emissions and costs savings achieved through proper insulation can be enormous. Non-energy benefits can also be realised, particularly through improving workplace safety by reducing plant equipment surface temperature from 170 °C to 34 °C.

Capex	20 USD/meter
Energy savings	3,968 kWh/year/meter
Payback	0.13 years
CO ₂ reduction	1.28 tCO ₂ /year/meter



Burner efficiency

The Suez plant's excess air was not automatically controlled in the boiler, thus the air to fuel ratio was not optimal and led to an unnecessarily high gas bill. UNIDO proposed to install an online combustion gas analyzer and manual adjustment of the air damper to improve burner efficiency. This solution can be achieved at a low cost, yet achieve huge CO₂ emission reductions.

Capex	1,750 USD
Energy savings	59,755 kWh/year
Payback	0.75 years
CO ₂ reduction	16 tCO ₂ /year

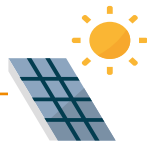
¹ Carbon Trust (2011), 'International Carbon Flows: Clothing.'



Automating boiler blowdown

The boiler blowdown process removes water from a boiler to dispose of chemical impurities. The Suez plant has a fixed rate of blowdown, which did not make changes in makeup and feed water conditions, variations in steam demand or the actual concentration of dissolved solids in the boiler's water. UNIDO proposed to install an automatic control system which tailored blowdown rates depending on relevant variables.

Capex	7,000 USD
Energy savings	61,830 kWh/year
Payback	2.85 years
CO ₂ reduction	16 tCO ₂ /year



Integration of solar thermal

Solar heating technologies collect thermal energy from the sun and this heat can be used for low to medium temperature industrial heating processes. Heat in the lower temperature range (<100 °C) can easily be achieved with systems commercially available, such as flat plate collectors (FPC) and evacuated tube collectors (ETC). The scenario envisioned for Lotus Group's Suez plant was to preheat boiler feedwater by recovering energy from exhaust gasses and blowdown water. The boiler would then be heated using a solar thermal system, installed on the roof, which could dramatically reduce the diesel energy consumed by the boiler.

Capex	100,550 USD
Energy savings	287,655 kWh/year
Payback	8.9 years
CO ₂ reduction	77 tCO ₂ /year
Annual cost savings	11,320

Overall potential impact

With an upfront investment of 110,630 USD, the potential overall impact of UNIDO's four key energy optimization recommendations include:

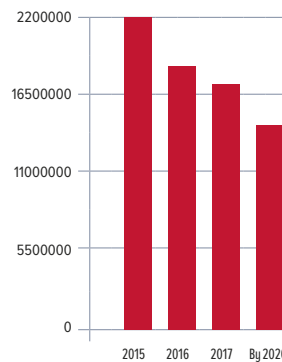
Thermal energy savings: up to 702,790 kWh/year, representing about 33.6% of the plant's total energy consumption (13.8% is due to the integration of the solar thermal systems)

Financial savings: 27,670 USD/year,

CO₂ emissions reduction: 192 tCO₂eq/year.

In addition to these savings, indirect non-energy benefits such as enhanced workplace safety, worker morale and reputation management with global buyers could also be greatly enhanced.

Electricity consumption



Natural gas consumptions

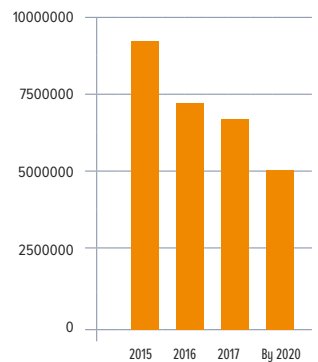


Figure 1. Lotus Group's overall energy consumption targets. See the Group's company profile for more information regarding its sustainability targets: <https://www.lotusgarments.com/company/>.

Lessons learned

1. Thermal insulation is a quick win. It saves energy with very low upfront costs, high impact and low payback.
2. Boiler optimization requires relatively minimal effort, but offers high impact on energy consumption and CO₂ emissions reduction.
3. Boiler waste heat utilization is not a common practice, however, it is one of the most cost effective to achieve energy savings.
4. It's critical for a plant to optimize its energy management system through efficiency measures before investing in renewable applications. This way energy demand can more accurately be understood before investments are made into solar thermal.

About the energy efficiency solutions series

The Accelerator is drawing on its collective wealth of experience and expertise to produce a series of knowledge kits on industrial energy efficiency. These cover five key energy efficiency solutions: Energy Management System; efficiency solutions for Motor-Driven Systems; for Industrial Heat; for Industrial Cooling; as well as Energy Metrics and Performance Indicators. Find out more: www.industrialenergyaccelerator.org/efficiency-solutions/

Ready to take the next step in your energy performance measurement and monitoring journey?

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For more information about UNIDO's EnMPI and industrial energy efficiency benchmarking training programmes contact Marco Matteini: M.MATTEINI@unido.org.

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