ENERGY EFFICIENCY SERVICES LIMITED
A JV of PSUs under the Ministry of Power

Ministry of Micro, Small and Medium Enterprises,
Government of India

PROMOTING MARKET TRANSFORMATION FOR ENERGY EFFICIENCY IN MICRO, SMALL & MEDIUM ENTERPRISES

Ministry of micro, small and medium enterprises (MoMSME), Government of India in association with United Nations Industrial Development Organization (UNIDO) is implementing a project funded by Global Environmental Facility (GEF) titled "Promoting Market Transformation for Energy Efficiency in Micro, Small and Medium Enterprises" in India. Energy Efficiency Services Limited (EESL) is the implementing partner for the project.

The overall project objective is to promote the implementation of energy efficiency in the MSME sector; to create and sustain a revolving fund mechanism to ensure replication of energy efficiency measures in the sector; and to address the identified barriers for scaling-up energy efficiency measures and consequently promote a cleaner and more competitive MSME industry in India. The project envisages to extend support to 470 MSME units across 10 identified energy intensive MSME clusters with a target of reduction of energy consumption by 110,000 tonnes of oil equivalent and greenhouse gas emissions by 1 million tonnes of CO2 emission, leveraging an investment of USD 150 million towards energy efficiency, during its tenure.

CASE STUDY - 9

Installation of Micro Turbine
(200 kW)

Objective:

In the textile manufacturing process, boiler is used as a key utility device to provide steam at required quantity and pressure for various process requirements. Boilers of rated capacities between 4 t/h to 12 t/h are most commonly used in the cluster. Most of these boilers are designed for a delivery pressure of 10 kg/cm.2. The process pressure requirement in typical textile processing units varies from 3.5 – 4 kg/cm2. To meet the process pressure requirement, a pressure-reducing valve (PRV) is used in the steam line. There is significant energy loss in PRV. The project envisaged saving in terms of energy through installation of Micro Turbine in place of PRV

Implementation:

The unit has a 12 TPH coal fired boiler operating at a pressure of 16 kg/cm^2. Steam is used at a pressure of 4 kg/cm^2 in the process. The pressure reduction was done using a PRV. The project supported installation of a microturbine in place of the PRC to generate captive power for the unit.

Principle:

The enthalpy difference due to the differential pressure and temperature in the generation end and process end of a boiler can be effectively utilized to generate power using a microturbine also known as steam back pressure turbines. Steam back pressure turbines are non-condensing turbines that expand higher pressure steam through a turbine. Shaft power is produced when a nozzle or stator directs jets of high-pressure steam against the blades of the turbine's rotor. The rotor is attached to a shaft that is coupled to an electrical generator. The steam turbine reduces the pressure of the steam that is subsequently exhausted. The electricity produced in this way reduces the need for power from the grid, cutting utility bills and overall carbon footprint. The greater the difference between the price of electricity and the price of gas or oil to fuel the steam boiler, the greater the savings.

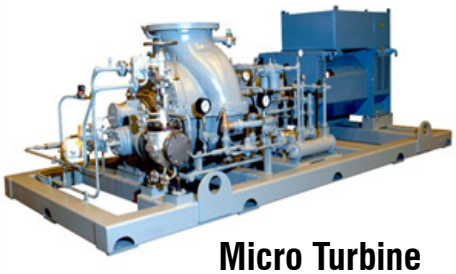
Unit Profile

Imperial Dyeing Ltd was incorporated in the year 1995. Located in Kadodara, Surat, the unit has both dyeing and printing facility in their premises.

Benefits

- Reduction in energy by 8-12%
- Maintenance cost reduction
- Leads to reduction in GHG emissions

PRV



Micro Turbine

Project Economic

Savings
₹ 41,79,000

Investment
₹ 48,78,000

Payback
1.4 Years

Project Impacts

557,262 kWh of annual electricity generated

47.92 TOE of annual energy savings

500 tCO_2 GHG emission reduction per year

Cost Economics

Annual electricity generated	557,262 kWh/y
Annual Cost Savings	Rs 41,79,000 per year
Annual GHG Emission Reduction	500 tCO_2 per year
Investment	Rs 48,78,000
Simple Payback	1.4 years

Replication Potential

The technology has significant replication potential in across all industrial process. In Surat Textile Cluster, the replication potential is expected in 20% of the units i.e. around 40 units.

Calculation

Power Generated (kW) = Q*(h 2-h1) * η (system)/860

Q= steam flow rate (kg/h)

h 2=enthalpy of saturated steam (kcal/kg)

h 1=enthalpy of feed water (kcal/kg)

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