

A CHEMICAL UNIT IN ANKLESHWAR, AC01, ADOPTS ENERGY CONSERVATION MEASURES

Replacement of low efficiency, manually controlled NG Burner by energy efficient automatic burner in boiler

Tags

Sub-sector: Chemicals
Location: Ankleshwar
Partners: World Bank-GEF, SIDBI, BEE, TERI
Year: 2013

Background

The Ankleshwar chemical cluster is one of the five MSME clusters targeted under the GEF–World Bank project titled ‘Financing Energy Efficiency at MSMEs’ being implemented by Bureau of Energy Efficiency (BEE). Under this project, TERI conducted a study in June–July 2012 in order to obtain a comprehensive profile of the Ankleshwar cluster and understand the energy related cluster dynamics. Following the study, TERI initiated walk-through surveys and detailed energy audits in different types of chemical industries in the cluster. These studies have helped in identifying a number of energy conservation measures that could be adopted by units in the cluster.

Intervention

A small-scale chemical unit, AC01, expressed interest in adopting energy efficiency measures and approached TERI for specific recommendations. The unit, established in 1988, manufactures different categories of textile chemicals, dyes and intermediates like violet acid, Koch’s acid, Mixed Cleve’s acid, Chicago acid and benzoyl H acid. The total installed capacity is 240 tonnes per year. The total production during 2011–12 was about 192 tonnes. TERI conducted a walk-through energy audit of the unit in March 2013, and followed this up with a detailed energy audit during April–May 2013 covering all energy intensive equipment/ systems that were in operation.

The total annual energy consumption of the unit was estimated to be 146 tonnes of oil equivalent (toe), of which thermal energy accounted for 115 toe (78%) and electricity, 31 toe (22%). Natural gas (NG) is used in the low pressure steam generator and hot air generator (HAG) to cater to the direct and indirect heat requirements of the reaction and drying processes. High speed diesel (HSD) is used in diesel-based backup power generators to meet the electricity demand during the non-availability of power from the grid. Electricity is used in auxiliaries of the thermal system, pumping system, process agitators and lighting system.

TERI identified and recommended several energy conservation options for the unit, including:

- Replacement of the existing manually controlled NG burner in the boiler with an automatic double stage burner to ensure the complete combustion of the fuel
- Installation of economizer in the boiler for waste heat recovery from flue gases to preheat the boiler feedwater
- Replacement of old and inefficient air compressor with energy efficient compressor of similar capacity
- Periodic maintenance of the HAG to optimize the dry flue gas losses
- Re-designing of 'tray dryer' to improve the heat utilization in dryer chamber
- Improvement of insulation in the HAG and associated ducts to avoid surface heat losses
- Installation of automatic power factor controller at main incomer to maintain the unity power factor and thereby avoid the billing penalty

Investments, energy savings, and other benefits

After considering the various energy efficiency options, the unit replaced the existing low efficiency burner in its boiler with an automatic double-stage burner in June 2013. The new energy efficient burner allows operation at both full and part loads, reducing the need to turn the burner on and off and thereby offering better performance. The unit undertook post-installation trials in association with TERI and the technology provider to confirm the performance of the new system. The results of the trials were successful: the boiler is operating with an oxygen level of 3% and no carbon monoxide (CO) formation was reported in the flue gases, indicating the proper combustion of the fuel.

The annual energy saving from this implemented measure is estimated to be 3793 standard cubic metres (SCM) of NG, equivalent to an annual monetary saving of 1.39 lakh rupees. The unit has made an investment of Rs 1.53 lakh rupees for installation of the energy efficient burner, which is expected to be recovered in a year.



Low efficiency single stage burner



Energy efficient double-stage burner