

# MSME foundry unit slashes energy bill by 36% through energy efficiency measures

## Background

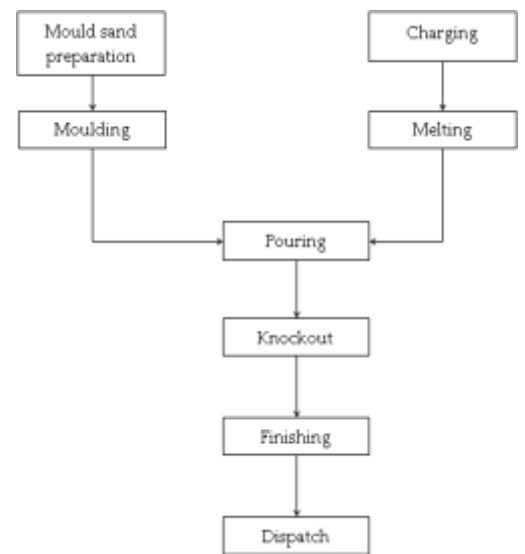
Kolhapur, in Maharashtra, is a foundry cluster. It has around 300 MSME foundries producing about 600,000 tonnes of castings annually, accounting for about 7–8% of India’s total castings production. The production capacity of these units varies from less than 1000 tonnes to over 10,000 tonnes per annum (tpa).

## Unit profile

M/s K11 is an MSME unit manufacturing graded cast iron (CI) castings. The annual production is about 1010 tonnes. The total annual energy bill of the unit was about INR 82 lakhs, which was around 22% of total turnover. The total annual energy consumption was about 161 tonnes of oil equivalent (toe), comprising coke 97% (157 toe) and grid electricity 3% (4 toe).

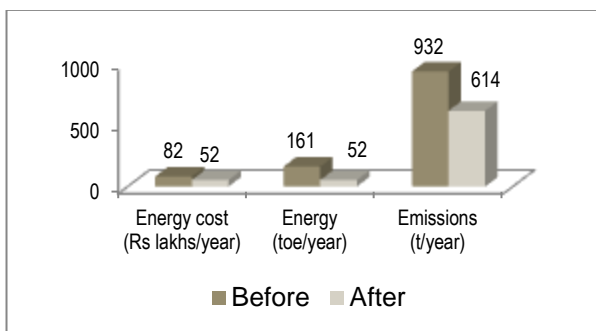
## Process description

The major process steps are mould preparation, melting, pouring, knockout and finishing. Green sand is prepared using sand mixer and manually moulded. The charge is melted in a coke-fired cupola furnace. The liquid metal is poured into moulds, which are left to cool and then ‘knocked out’ manually to yield the castings. The sand is reused, and the castings are subjected to shot blasting and machining to give the finished products.



The major energy consuming equipments used were the coke-fired cupola melting furnace and electrical motors associated with process equipment such as reaction vessels, pumps, etc.

## Overall Impact: post- implementation



**Overall Impact**  
 36% reduction in total energy bill (i.e. annual savings of INR 30 lakhs) with a simple payback of 2 years

*This case study has been prepared under WB GEF Project titled “Financing Energy Efficiency at MSMEs in India”. The project aims to identify, design & implement Energy Efficiency (EE) solutions in 500 MSMEs in 5 clusters with potential of EE investment of more than Rs. 100 crore and reduction in GHG emissions equivalent to 1.2 million tonne CO<sub>2</sub>. This project is being co-implemented by Small Industries Development Bank of India (SIDBI) and Bureau of Energy Efficiency*

# INTERVENTIONS

## Replacement of cupola with induction furnace

### Baseline Scenario

The unit's coke-fired cupola furnace was inefficient, with a coke-to-metal ratio of 1:5.5 compared to design ratio of 1:10.



#### Recommendation

The unit was advised to replace the cupola with a 450 kW induction furnace (500 kg crucible capacity).

### Replacement of two inefficient air compressors with a VFD air compressor

As advised, the unit replaced its two existing air compressors with one screw type variable frequency drive (VFD) air compressor to minimize the unload power consumption. This investment of INR 9.6 lakhs is saving 20,960 kWh annually, equivalent to INR 1.6 lakhs. The simple payback period is 6.2 years.

### Installing energy efficient sand mixer

As advised, the unit replaced its inefficient sand mixer with an energy efficient sand mixer at a cost of INR 4.6 lakhs, saving INR 1.8 lakhs annually with a simple payback period of 2.5 years.

### Installing moulding machine

The average rejections were around 13.5%. As advised, the unit installed a pneumatically operated simultaneous jolt-squeeze moulding machine to bring down rejections to 6%. This investment of INR 5.9 lakhs is saving coke worth INR 5.8 lakhs annually. The simple payback period is one year.

### Implemented Scenario

As advised, the unit replaced its cupola with a 450 kW induction furnace (500 kg crucible capacity).



This investment of INR 29.6 lakhs is saving about 89 toe of energy annually, equivalent to INR 18.8 lakhs. The simple payback period is 1.6 years.

### Installation of shot blast machine

It was found that 25–30% of material charged in cupola comprised runners and risers (foundry returns), which were not shot-blasted. As advised, the unit installed a shot/tum blast machine to remove sand on the runners and risers. This investment of INR 9.2 lakhs is saving coke worth INR 1.6 lakhs annually, with a simple payback period of six years.

### Energy efficient lighting

As advised, the unit replaced its existing 40W FTLs having copper ballasts with 28W FTLs having electronic ballasts, and 250W MVLS with 150W metal halide lamps. This investment of INR 0.7 lakh is saving INR 0.4 lakh annually. The simple payback period is 1.8 years.

Support  
provided under  
the project

- Walk-through & Detailed energy audit
- Identification of energy efficiency interventions in the unit
- Finalization of specifications for the energy efficiency interventions
- Identification of technology providers/vendors
- Facilitation for interactions between unit and technology providers;
- Technical support during commissioning
- Monitoring & Verification

**Disclaimer:** This case study has been compiled by TERI on behalf of SIDBI under WB-GEF Project. While every effort has been made to avoid any mistakes or omissions, these agencies will not be in any way liable for any inadvertent mistakes/omissions in the publication.

**For further information please contact:**

Energy Efficiency Centre, Small Industries Development Bank of India (SIDBI), Ground Floor, E-1, Videocon Tower, Jhandewalan Extension, Rani Jhansi Road, New Delhi-110055, India, Ph. 011 23682473-77, [www.sidbi.in](http://www.sidbi.in)

