

# CLUSTER PROFILE

## MORBI CERAMIC CLUSTER

### Background

The heart of the Indian ceramic industry is at Morbi, about 250 km from Ahmedabad, in the Rajkot district of Gujarat. The main products are wall tiles, floor tiles, vitrified tiles, and sanitary ware. The cluster commands about 70% of the market share of these ceramic products. The ceramic industry's location in Morbi is based on sound logistical reasons: the basic raw materials for making ceramic products—such as various types of clay, red and black soil, minerals such as calcite/ wollastonite, and frits and glazes—are readily available either locally or from neighbouring Rajasthan.

There are 459 industrial units operating in the cluster, of which 178 produce wall tiles, 52 produce floor tiles, 26 produce vitrified tiles, and 43 produce various kinds of sanitary ware. Around 40 units manufacture spray-dried mud, which is supplied to the smaller units. In addition, there are about 120 tile units that produce roofing tiles. The ceramic units may be categorized as small, medium or large, based on their production capacities.

The cluster produces 5.28 million tonnes per year (tpy) of ceramic products. Of this, tile units account for about 5.10 million tpy, and sanitary ware 0.18 million tpy. The production of roofing tiles is about 0.36 million tpy. The annual turnover of the cluster is estimated to be 100 billion (\$ 2.2 billion approx.). The cluster provides direct employment to about 68,000 people. About 50 new wall and vitrified tile units are coming up in the cluster.

There are five main industry associations active in Morbi cluster:

- Gujarat Ceramic Floor Tiles Manufacturers' Association;
- Morbi Sanitary Wares Manufacturers Association;
- Morbi Dhruva Glaze Tiles Association;
- Vitrified Floor Tiles Association
- Roofing Tiles Association.

### Technology status and energy use

The ceramic units use roller kilns for tile manufacturing and tunnel kilns for the production of sanitary ware. Natural gas (NG), charcoal, and lignite are used as fuel in the firing process. More than half of the thermal energy requirement is met through NG. Charcoal and lignite are mainly used in spray dryers. Energy cost comprises 30–35% of the total production cost.

The specific energy consumption (SEC) of ceramic units varies widely with the type of product and processes used. The SEC of a vitrified tile unit ranges between 6.0 and 8.9 GJ/tonne; that of a wall/ floor tile unit varies between 4.8 and 8.8 GJ/tonne; while the corresponding range for a sanitary ware unit is 3.1–4.4 GJ/tonne. It may be noted that many of the small and medium units meet part of their raw material requirement from spray-dried mud manufacturing units operating in the cluster. The main energy consuming processes in tile and sanitary ware units, and the forms of energy used, are listed below.

Profile of ceramic units in Morbi cluster						
Type of unit	Small		Medium		Large	
	Units	Production (tpd)	Units	Production (tpd)	Units	Production (tpd)
Wall tile	43	25	100	35	35	75
Floor tile	8	42	38	56	6	98
Vitrified tile	–	–	22	112	4	224
Sanitary ware	10	4	24	8	9	14
Total	61	71	184	211	54	411

tpd – tonnes per day

Energy use in tiles and sanitary ware units		
Energy centre	Tiles	Sanitary ware
Kiln	Thermal & Electrical	Thermal & Electrical
Air compressor	Electrical	Electrical
Glazing	Electrical	Electrical
Slip section	Electrical	Electrical
Press	Electrical	–
Spray dryer	Thermal & Electrical	–



Annual energy consumption of Morbi cluster		
Fuel	Quantity	Energy share
Charcoal	0.165 million tonnes	10%
Lignite	1.32 million tonnes	29%
Diesel	800,000 litres	1%
NG	660 million Sm <sup>3</sup>	51%
Electricity	1.2 billion kWh	9%
Total energy consumption : 45.8 Peta Joule/yr		
Total CO <sub>2</sub> generation : 3.8 million tonnes per year		
Emission intensity: 0.67 tonne CO <sub>2</sub> / tonne of product		

## Options for energy saving

Morbi is one of the 29 clusters covered under the BEE-SME program, which aims at accelerating the adoption of energy-efficient technology and practices in select clusters. It is also one of the clusters included under the proposed UNIDO-GEF project. Morbi offers potential for various energy-saving options in both thermal and electrical areas. These would help in reducing the energy consumption of the cluster by about 150,000 tonnes of oil equivalent (toe), corresponding to a CO<sub>2</sub> reduction of 0.44 million tonnes. Some of the energy conservation options that can be explored are given below:

### Thermal

- The kiln and spray dryer are the primary consumers of thermal energy offering significant potential for energy saving through measures such as improving insulation of the kiln structure to reduce structural heat losses, gas turbines/gas engines for combined heat and power applications and use of hot air from cooling zone.
- High thermal mass cars are generally used for moving the products through the tunnel kiln. The dead weight



View of a tile unit

of the refractories is quite high, and these are subjected to alternate heating and cooling cycles, resulting in substantial loss of thermal energy. Low thermal mass cars would help in reducing these losses.

- The slurry generally enters the spray dryer is generally at ambient temperature. Preheating of slurry by a solar dryer or heat pump would help in bringing down the energy consumption.

### Electrical

- Use of energy efficient motors in polishing area;
- Replacement of smaller motors with a single large motor;
- Adopting energy efficient motors and variable frequency drives (VFD) in spray dryer, kiln blower, press, and compressor sections; and
- Use of energy efficient hydraulic pumps.

Contributed by SEE-Tech Solutions Pvt. Ltd (Nagpur) and TERI