

Cement Industry

1. Profile of Cement Industry:

The Indian Cement industry is the second largest cement producer in the world, with an installed capacity of 144 million tonnes. The industry has undergone rapid technological upgradation and vibrant growth during the last two decades, and some of the plants can be compared in every respect with the best operating plants in the world. The industry is highly energy intensive and the energy bill in some of the plants is as high as 60% of cement manufacturing cost. Although the newer plants are equipped with the latest state-of-the-art equipment, there exists substantial scope for reduction in energy consumption in many of the older plants adopting various energy conservation measures.

The Indian cement industry is a mixture of mini and large capacity cement plants, ranging in unit capacity per kiln as low as 10 tpd to as high as 7500 tpd. Majority of the production of cement in the country (94%) is by large plants, which are defined as plants having capacity of more than 600 tpd. At present there are 124 large rotary kiln plants in the country.

The Ordinary Portland Cement (OPC) enjoys the major share (56%) of the total cement production in India followed by Portland Pozzolana Cement (PPC) and Portland Slag Cement (PSC). A positive trend towards the increased use of blended cement can be seen with the share of blended cement increasing to 43%. There is regional imbalance in cement production in India due to the limitations posed by raw material and fuel sources. Most of the cements plants in India are located in proximity to the raw material sources, exploiting the natural resources to the full extent. The southern region is the most cement rich region while other regions have almost same cement production capacity.

The Indian cement industry is about 90 years old and its main sources of energy are thermal and electrical energy. The thermal energy is generally obtained from coal, and the electrical energy is obtained either from grid or captive power plants of the individual manufacturing units.

2. Salient features of Indian cement industry

- Indian cement industry is the second largest in the world with an installed capacity of 135 MTPA. It accounts for nearly 6% of the world production.
- There are 124 large plants and around 365 mini plants. The industry presents a mixed picture with many new plants that employ state-of-the-art dry process technology and a few old wet process plants having wet process kilns.
- Production from large plants (with capacity above 1 MTPA) account for 85% of the total production.
- The cement industry has achieved significant progress in terms of reducing the overall energy intensity.
- Dry process plants that the weighted average thermal energy consumption was 734 kCal/kg clinker, and weighted average electrical energy consumption was 89 kWh/tonne of cement. The best energy consumption are 692 kCal/kg. clinker and 66 kWh/ton of cement.

3. Quantitative details:

The energy intensity of the all the dry process plants (cost of energy as percentage of total production cost of packed cement) varies from 29 to 61%. This is observed to vary with the vintage of the plant, the technology employed by the plants and the type of cement produced.

Specific thermal and electrical energy consumption for the plants ranges between 692 – 879 kCal/kg. of clinker and 66 – 127 kWh/ton of cement produced (product mix) respectively. The specific electrical energy also includes the energy consumed in packing, plant utilities and plant lighting. The reasons for wide range in specific energy consumption can be mainly attributed to the differing equipment configuration employed in different sections of the plants by various

cement plants. For example, plants employing ball mills for grinding have reported higher specific electrical energy consumption as compared to plants having vertical roller mills. In addition, other factors like the plant capacity, its capacity utilisation, vintage, product mix, process control system, maintenance aspects, raw material characteristics and above all the management's attitude and operational practices of plant personnel are also important. Besides, various external parameters like quality of coal, raw materials and power supply have their own repercussions. A large number of plants have put in vertical roller mills for raw meal section. The balls mills are still operating in the clinker grinding and coal milling sections in some of the plants. Some of the newer plants have installed roller press and vertical roller mills in the clinker grinding section as well.

Comparison of energy performance of Indian cement industry with other countries reveals that there exists scope for improving the energy performance of the Indian cement industry. The best reported (as per CMA data) energy performance figures in the world are 65 kWh/t of cement and 650 kCal/kg of clinker whereas the best in India is 69 kWh/t of cement and 665 kCal/kg of clinker. This clearly brings out the fact that although we have some of the best plants in the world in terms of energy performance, there are many plants where there exists scope for reducing energy consumption.

Reference:

**Energy Management Policy – Guidelines for Energy Intensive Industry in India,
Chapter 4, pp 36-65 by Bureau of Energy Efficiency**