
सत्यमेव जयते
PAT
PERFORM, ACHIEVE AND TRADE
ENERGY IS LIFE
BEE
CONSERVE IT
MINISTRY OF POWER
Government of India
July 2012

Contents

1. Introduction

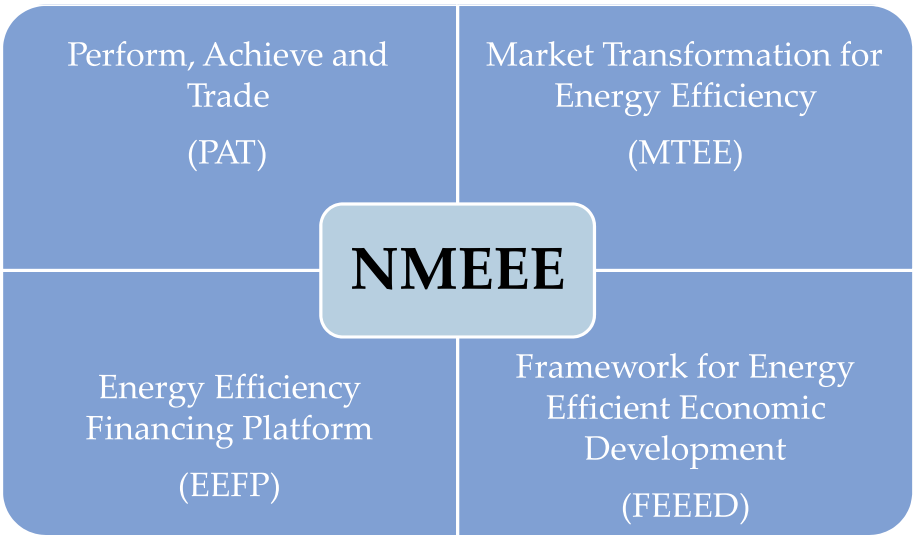
The National Action Plan on Climate Change (NAPCC) released by the Hon'ble Prime Minister on 30th June, 2008, recognizes the need to maintain a high growth rate for increasing living standards of the vast majority of people and reducing their vulnerability to the impacts of climate change. NAPCC outlines a comprehensive policy framework that seeks to protect the poor and vulnerable sections of society through an inclusive and sustainable development strategy, sensitive to climate change. Achieving national growth objectives through a qualitative change in direction that enhances ecological sustainability, leading to further mitigation of greenhouse gas emissions, devising efficient and cost-effective strategies for end user Demand Side Management (DSM), deploying appropriate technologies for both adaptation and mitigation of greenhouse gases emissions extensively as well as at an accelerated pace, and engineering new and innovative forms of market, regulatory and voluntary mechanisms to promote sustainable development are the key strategies of the NAPCC.

National Action Plan for Climate Change (NAPCC)

- **National Solar Mission**
- **National Mission for Enhanced Energy Efficiency**
- **National Mission on Sustainable Habitat**
- **National Water Mission**
- **National Mission for Sustaining the Himalayan Ecosystem**
- **National Mission for a Green India**
- **National Mission for Sustainable Agriculture**
- **National Mission for Strategic Knowledge for Climate**

2. National Mission for Enhanced Energy Efficiency

NAPCC outlines Eight National Missions, representing multi-pronged, long-term and integrated strategies for achieving key goals in the context of climate change. The National Mission for Enhanced Energy Efficiency (NMEEE) is one of the eight national missions with the objective of promoting innovative policy and regulatory regimes, financing mechanisms, and business models which not only create, but also sustain, markets for energy efficiency in a transparent manner with clear deliverables to be achieved in a time bound manner. It also has inbuilt provisions for monitoring and evaluation so as to ensure transparency, accountability, and responsiveness. The Ministry of Power (MOP) and Bureau of Energy Efficiency (BEE) were tasked to prepare the implementation plan for the NMEEE. NMEEE spelt out the following four new initiatives to enhance energy efficiency, in addition to the programs on energy efficiency being pursued. They are:



NMEEE – Four New Initiatives

- ***Perform Achieve and Trade (PAT):*** A market based mechanism to enhance cost effectiveness of improvements in energy efficiency in energy-intensive large industries and facilities, through certification of energy savings that could be traded.
- ***Market Transformation for Energy Efficiency (MTEE):*** Accelerating the shift to energy efficient appliances in designated sectors through innovative measures to make the products more affordable
- ***Energy Efficiency Financing Platform (EEFP):*** Creation of mechanisms that would help finance demand side management programmes in all sectors by capturing future energy savings.
- ***Framework for Energy Efficient Economic Development (FEEED):*** Developing fiscal instruments to promote energy efficiency

3. Perform, Achieve and Trade

Designated Consumers, as notified under the Energy Conservation Act, 2001, account for 25% of the national gross domestic product (GDP) and about 45% of commercial energy use in India. Since year 2000, industrial GDP has been growing at the rate of 8.6% annually, whereas energy use in industry is growing at a comparatively lower growth rate of 5.8%. The lower rate of growth of industrial energy use can be attributed to many reasons. It has been observed that in recent years, industry has been choosing state-of-the-art technologies, which are more energy-efficient. Also, there have been many in-house efforts made by the industry to become more energy-efficient. In order to further accelerate as well as incentivize energy efficiency, the **P**erform **A**chieve and **T**rade (PAT) mechanism has been designed.

PAT is a market based mechanism to enhance cost effectiveness of improvements in energy efficiency in energy-intensive large industries and facilities, through certification of energy savings that could be traded. The genesis of the PAT mechanism flows out of the provision of the Energy Conservation Act, 2001, hereinafter referred to as the Act. Section 14 (e) of the Act empowers the Central Government to notify energy intensive industries, as listed out in the Schedule to the Act, as Designated Consumers (DCs). The Ministry of Power (MoP) has notified industrial units and other establishments consuming energy more than the threshold in 9 sectors namely Thermal Power Plants, Fertilizer, Cement, Pulp and Paper, Textiles, Chlor-Alkali, Iron & Steel, Aluminum and Railways in March, 2007 as DCs.

Minimum annual energy consumption and estimated number of Designated Consumers (DCs) in select sectors

Sector	Minimum annual energy consumption for the DC (tonnes of oil equivalent)	No. of DCs
Aluminium	7500	10
Cement	30000	85
Chlor-alkali	12000	22
Fertilizer	30000	29
Iron and steel	30000	67
Pulp and paper	30000	31
Textile	3000	90
Thermal power plant	30000	144
Total		**478**

4. Target Setting Methodology

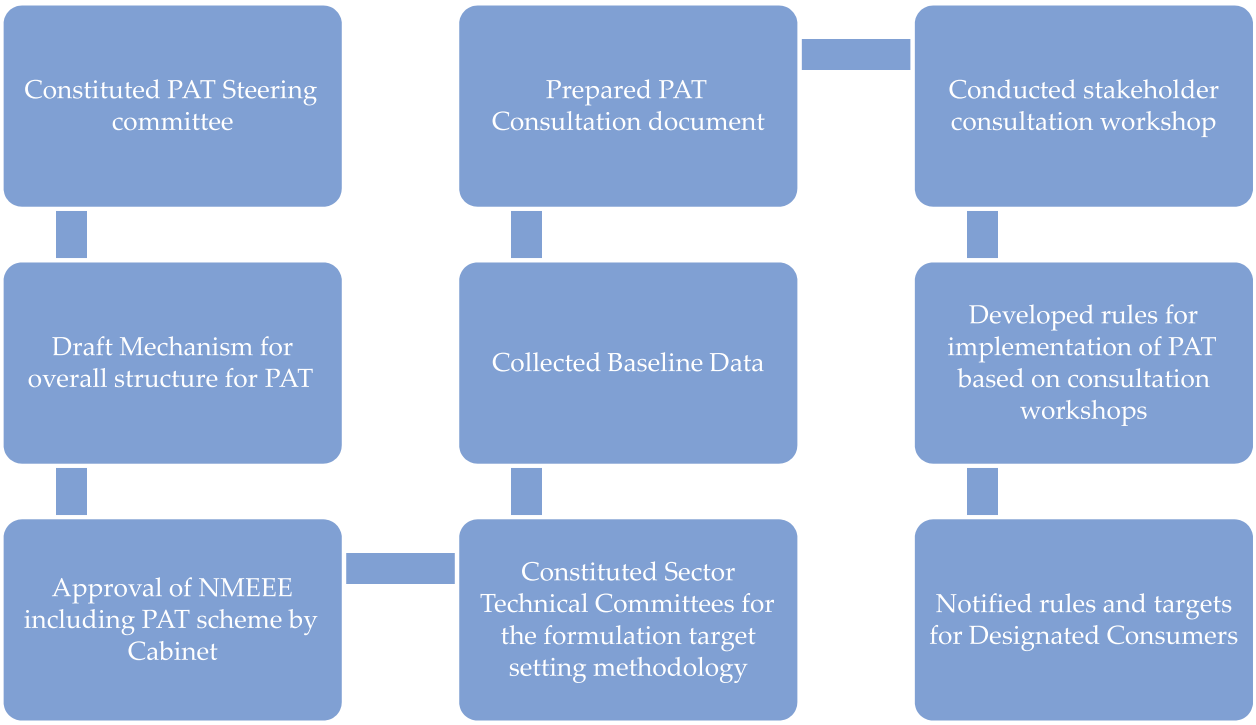
The Bureau of Energy Efficiency (BEE) has carried out the background work to enable design of a transparent, flexible, efficient and robust system for the PAT mechanism. In compliance with the directions of the Prime Minister's Council on Climate Change, BEE consulted all the key stakeholders like Designated Consumers, Energy Auditors/ Managers, Industry Associations, Academician, etc. to solicit comments on the following aspect while framing complete mechanism for PAT scheme:

a) Methodology for establishing the baseline energy consumption

b) Methodology for target setting for each sector

c) The process of measurement and verification, in particular the verification agencies that need to be appointed by BEE for this purpose.

d) The manner in which trading of the certificates can be encouraged, in particular instruments that could increase liquidity in the system.



BEE used steps as mentioned in the diagram for the implementation of the PAT scheme.

As per Section 14(g) of EC Act, 2001 [establish and prescribe such energy consumption norms and standards for designated consumers as it may be considered necessary: provided that the central government may prescribe different norms and standards for different designated consumers having regard to such factors as may be prescribed] the central government can stipulate energy usage norms for designated consumers.

BEE had earlier conducted sector specific studies through various organizations to do the situation analysis. As per the studies, the wide bandwidth of specific energy consumption

(SEC) within an industrial sector is indicative of the large energy-savings potential in the sector. The wide bandwidth is also a reflection of the differences in the energy-saving possibilities amongst plants because of their varying vintage, production capacity, raw material quality, and product-mix. Such wide variation also makes it difficult to specify a single benchmark SEC for the sector as a whole: older plants will find the benchmark impossibly high if it is set at the level of newer plants; newer plants will find it trivial if it is set at the level of older plants. The broad bandwidth of SEC within a sector, and the inability of all plants to achieve a sectoral benchmark SEC, suggests that SEC improvement norms need to be set for individual plants. These SEC improvement targets can be based on the trend of energy consumption and energy-savings potential of the plants. In general, the higher the energy efficiency (or the lower the SEC), the lower the energy-savings potential. Thus, it is evident that it is not feasible to define a single norm/standard unless there is significant homogeneity amongst units in a sector. Therefore, the energy efficiency improvement targets fixed are **"unit specific"**. Each DC is mandated to reduce its SEC by a certain value, based on its current SEC (or baseline SEC) within the sectoral bandwidth.

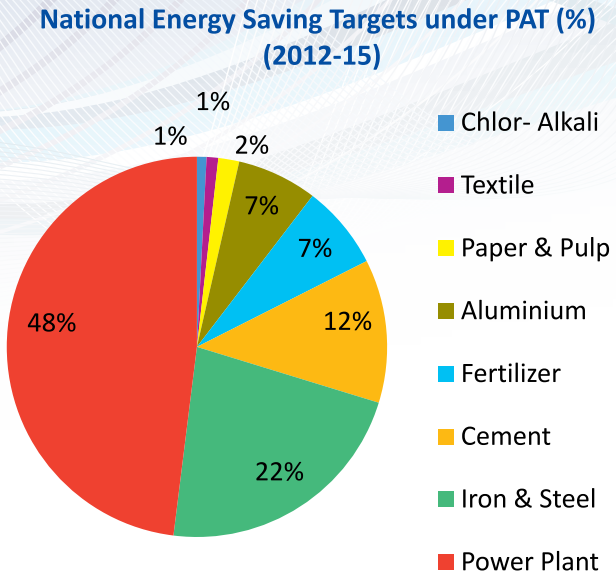
The SEC of an industry is calculated based on Gate-to-Gate concept with the following formula:

$$\text{Specific energy consumption (SEC)} = \frac{\text{net energy input into the designated consumers' boundary}}{\text{total quantity of output exported from the designated consumers' boundary}}$$

and expressed in terms of the metric ton of oil equivalent (toe)/per unit of product. While calculating the total energy input to the plant, all energy sources is converted into single unit i.e. toe (metric ton of oil equivalent) using standard engineering conversion formula.

Sector wise Energy consumption and Energy Saving Targets under PAT Cycle-1 (2012-15)

Sr No	Sector	No. of Identified DCs PAT Cycle-1	Energy Saving Targets under PAT Cycle-1 (million toe)
1	Aluminium	10	0.456
2	Cement	85	0.816
3	Chlor-Alkali	22	0.054
4	Fertilizer	29	0.478
5	Iron & Steel	67	1.486
6	Pulp & Paper	31	0.119
7	Textile	90	0.066
8	Thermal Power Plants	144	3.211
Total		478	6.686



The plant boundary is selected in such a way that the total energy input and the above defined product output is fully captured. Typically it is the entire plant excluding colony, residential complex and transportation system. Similarly, mining operations in case of Iron & Steel, Aluminium and Cement sector are not part of plant boundary. Once the plant boundary has been fixed, the same boundary will be considered for entire PAT cycle.

The energy saving targets of 8 sectors covered under PAT cycle 1 is 6.686 million toe distributed among 478 designated consumers. The reduction target for each plant is based on an objective and transparent basis.

5. PAT Sectors

i. Aluminium

India has the fifth largest reserves of bauxite, the raw material used in production of aluminium, with deposits of about 2.3 billion tons (6.76% of the world deposits). The total aluminium production in India is about 3% of the global capacity.

Aluminium

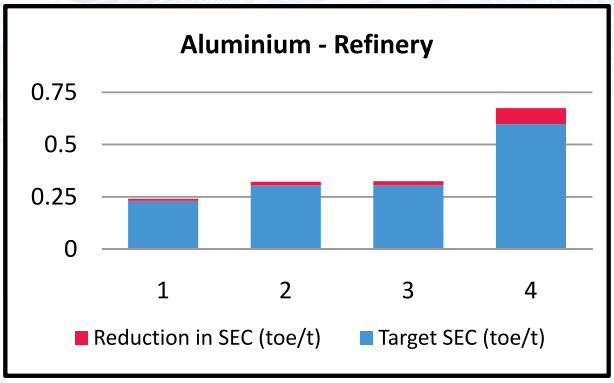
- Refinery,
- Smelter,
- Integrated and
- Cold sheet mill

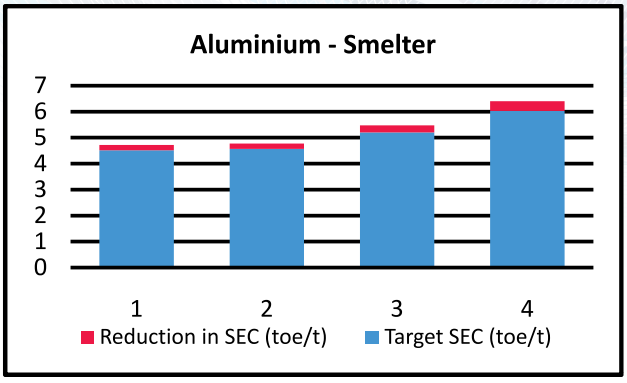
Primary aluminium production is having two major steps: first is refining of bauxite to alumina and second is smelting of alumina to aluminium. Smelting is an energy intensive process and consumes electrical energy, accounting for about 85%–90% of the electrical energy consumption.

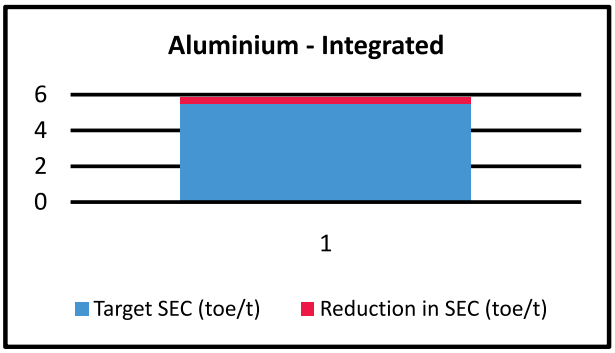
Significant energy conservation opportunities exist in Indian aluminium units in the following areas:

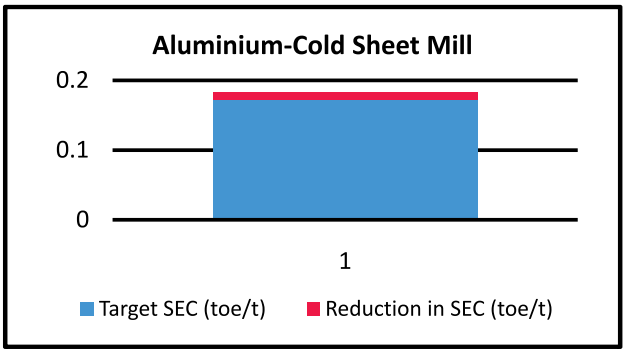
- Primary smelter could be replaced by a point feeder pre-baked (PFPB) smelter with an inert anode/wetted cathode technology.
- Changing of the Soderberg process to the prebaked process.
- Adoption of tube digesters for the dissolution of bauxite and fluidized bed calciners with pre-heaters of anhydrous alumina.
- Improved electrolyte bath technology to minimize the re-oxidation of metal.
- Higher amperage with point feeders and computerized control system.
- Improved performance of carbon anode baking furnaces.

Specific Energy Consumption and Targets – Aluminium









In aluminium sector, to become a designated consumer the threshold limit is 7500 toe and in PAT cycle-I, 10 nos. of designated consumers from Odisha, Karnataka, Jharkhand, Chhattisgarh, Maharashtra and Uttar Pradesh have been identified for which the target have already been notified. Aluminium sector has been categorized on the basis of their process in to four subsector i.e. Refinery, Smelter, Integrated and Cold sheet mill. The total average reported energy consumption of these designated consumers is about 7.71 million ton of oil equivalent/year in the baseline period (2007-10). By the end of the first PAT cycle, the energy savings of 0.456 million ton of oil equivalent /year is expected to be achieved, which is around 7% of total national energy saving targets assessed under PAT.

ii. Cement

India is the second largest cement market in the world, accounting for about 6% of the world's cement production. Despite its potential for rapid growth, the per capita cement consumption in India accounts for 136 kg, which is much lower than the world average (396 kg) and the averages of other developing countries like Brazil (191 kg) and Thailand (366 kg).

There are about 148 large cement plants in the country with an installed capacity of 219.17 MTPA and more than 350 mini-cement plants

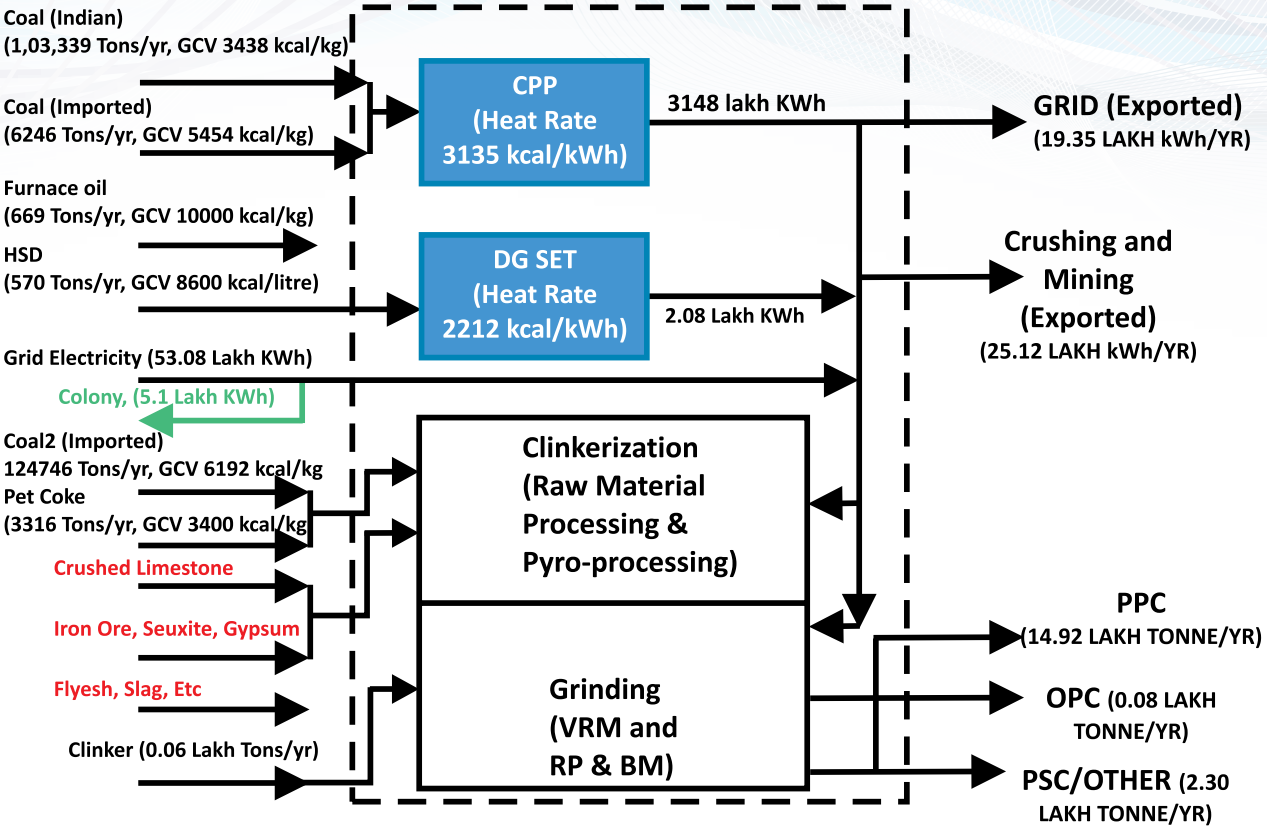
with an estimated capacity of 11.1 MTPA, making the total installed capacity of 230.27 MTPA up to year 2009/10. Due to the demand in the past and recent growth of economy, the capacity of the industry has increased by 21.41 MTPA.

Cement

- Portland Pozzolana Cement (PPC)
- Ordinary Portland Cement (OPC)
- Portland Slag Cement (PSC)
- Wet
- White Cement
- Grinding
- Clinkerization

The cement industry uses coal and electricity as the main sources of fuel. Energy cost accounts for about 40% of the total manufacturing cost in some of the cement plants and coal accounts for 15%–20% of the total production costs. The specific thermal energy consumption and electrical energy consumption for state-of-the-art cement plants are as low as **658** kcal/kg of clinker and **67** kWh/ton of cement, respectively. These are comparable with the best cement plants in Japan, where the specific thermal energy consumption and electrical energy consumption are 650 kcal/kg of clinker and 65 kWh/ton cement respectively. Various energy audit studies have estimated that about 5% energy saving is possible in both thermal energy consumption and electrical energy consumption in cement plants through the adoption of various energy conservation measures.

EXAMPLE – INPUT & OUTPUT FOR A TYPICAL CEMENT PLANT

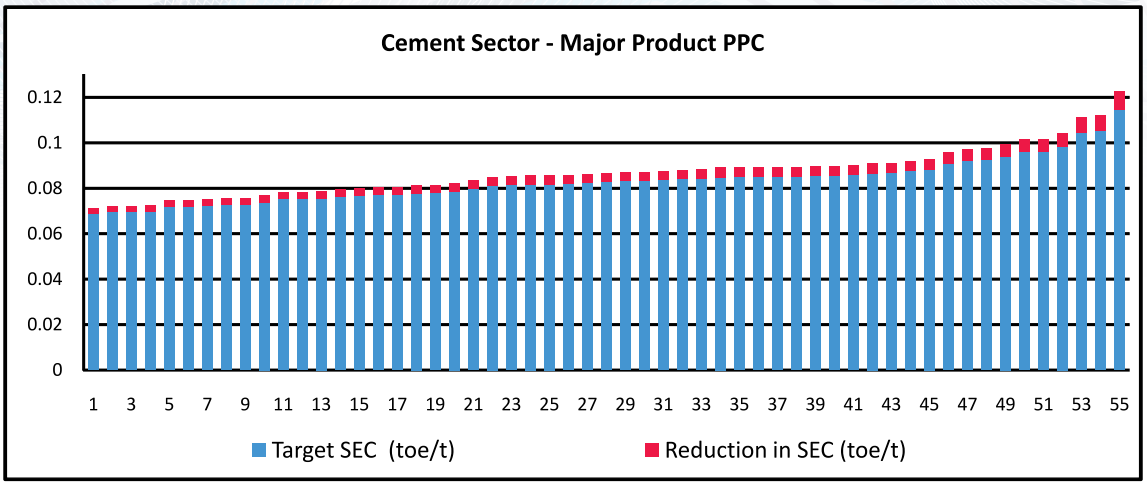


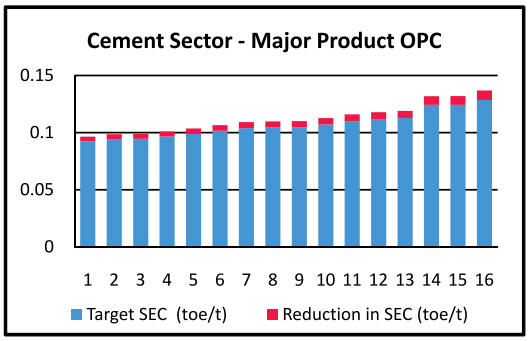
Note: All values presented in the above diagram are average of annual energy consumption of 2007-08, 2008-09, 2009-10

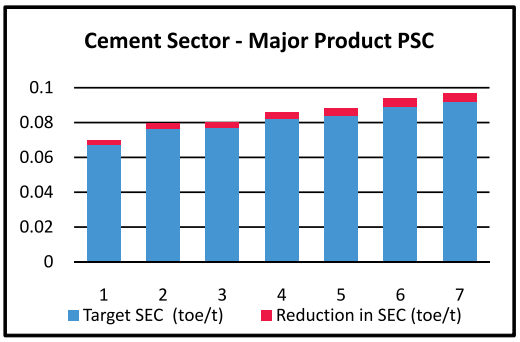
Some of the important energy-efficient technologies that can be adopted in cement plants are outlined below.

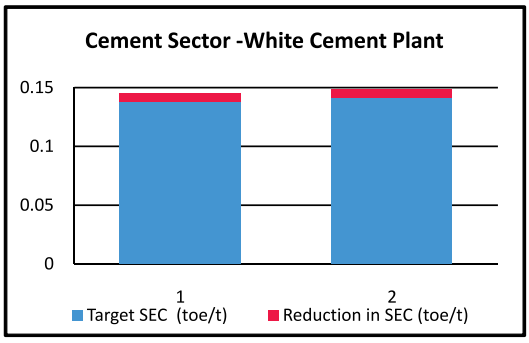
- Blended cement can be manufactured from wastes such as slag and fly ash.
- Vertical Roller Mill (VRM) with high-efficiency separators and high-pressure roller press could be utilised.
- Mechanical conveying system in place of pneumatic conveying
- Effective utilization of compressed air and avoid idle running of equipment.
- Utilization of waste heat to different processes such as drying of raw materials/coal, pre-heater and cooler exhaust gases leads to successful cogeneration as well.

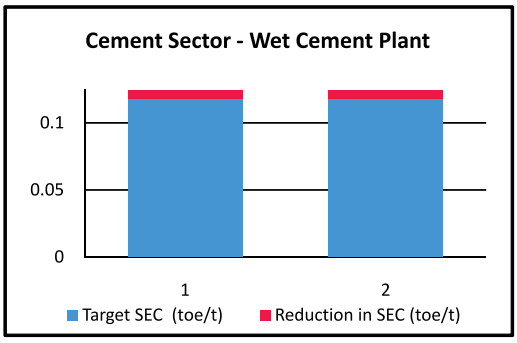
Specific Energy Consumption and Targets- Cement

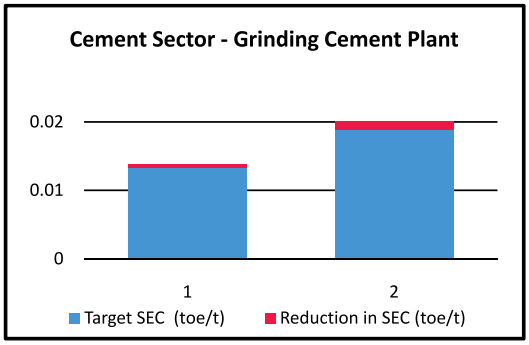


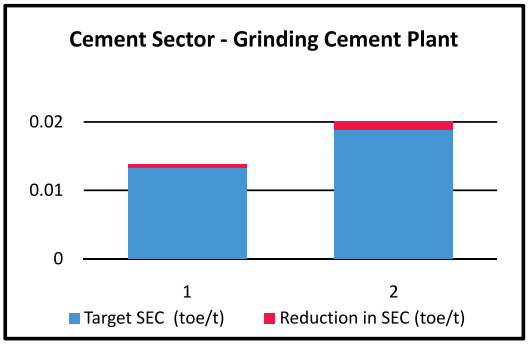












The threshold limit of 30000 toe has been defined in PAT for cement sector, and 85 nos. of designated consumers have been identified from various States.

Cement sector has been categorized on the basis of their product/process in to seven subsectors i.e. Portland Pozzolana Cement(PPC), Ordinary Portland Cement(OPC), Portland Slag Cement (PPC), Wet Plants, White Plants, Grinding Plants and only Clinkerization Plants. The total reported energy consumption of these designated consumers is about 15.01 million ton of oil equivalent (million toe). By the end of the first PAT cycle, the energy savings of 0.816 million ton of oil equivalent /year is expected to be achieved, which is around 12% of total national energy saving targets assessed under PAT.

iii. Chlor – Alkali

The chlor-alkali industry consists of the production of three inorganic chemicals: caustic soda (NaOH), chlorine (Cl2) and soda ash (Na2CO3). Caustic soda and chlorine are produced simultaneously while soda ash is produced during a different process.

Chlor-Alkali

- Membrane
- Mercury

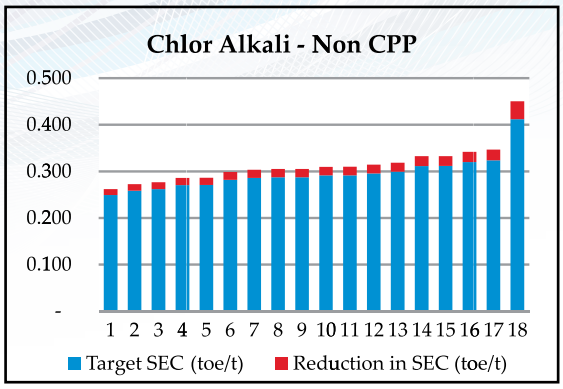
The caustic soda industry in India is approximately 65 years old. There are 40 major caustic soda plants with an average plant size of 150 tons per day (TPD), which is relatively small compared to sizes found in developed countries (500 TPD). During the last five years, caustic soda production has increased at an average annual growth of 4.2%. Production of Caustic Soda during the year 2009-2010 was 23.26 lakh MTPA. The production of caustic soda is associated with chlorine. This inevitable co-production has been an issue for the chlor-alkali industry. Both products are used for very different end users with differing market dynamics and it is only by rare chance that demand for the two coincides. The Indian chlor-alkali industry is driven by the demand for caustic soda, and chlorine is considered a by-product.

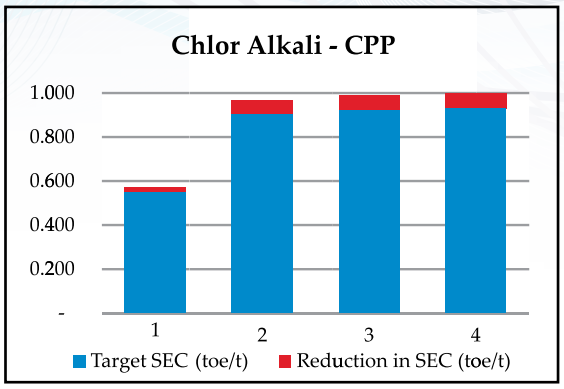
Some of the important energy-efficient technologies that can be adopted in Chlor-Alkali plants are outlined below

- Change of membranes & Electrodes re-coating
- Use a centrifugal chlorine compressors in place of multiple liquid seal (H2 SO4) chlorine compressors
- Use MEG based chlorine evaporators instead of using steam to supply chlorine gas to user industry or in-house consumers
- Optimization of Electrolysers for current consumption by monitoring cell voltages and replacing membranes in time
- Heat recovery by Provision of Brine and Chlorine re-cuperator for pre heating the feed brine towards the Cell

In chlor-alkali sector to become a designated consumer the identified threshold limit is 12500 toe and in first PAT cycle, 22 designated consumers from various States have been identified for which the target have already been notified. Chlor-alkali sector has been categorized on the basis of their process in to two subsectors i.e. membrane based and mercury based. The total reported energy consumption of these designated consumers is about 0.88 million ton of oil equivalent/year.

Specific Energy Consumption and Targets- Chlor -Alkali





Chlor-alkali plants are further divided into two categories i.e. captive based plants and non-captive i.e. Grid connected plants. Specific energy consumption varies from 0.262to 0.997 toe/t of these 22 designated consumers. By the end of the first PAT cycle, the energy savings of 0.054 million ton of oil equivalent /year is expected to be achieved, which is 0.81% of total national energy saving targets assessed under PAT.

iv. Fertilizer

Fertilizer industry in India has grown to its present size during five decades starting with 1960s. With the total production of about 38.6 Million Tons (MT) of fertilizer products containing 16.5 Mt of plant nutrients (N + P2 O5), India is the second largest producer of fertilizers in the world. India with consumption of 28.12 MT of nitrogen (N), phosphate (P) and potash (K) is the third largest consumer of fertilizers in the world. Fertilizer industry in India is world class in terms of size of plant, technology used and efficiency levels achieved. India produces both nitrogenous and phosphatic fertilizers with installed capacity of 12.947 MT nitrogen and 6.201 MT of P2 O5. Urea is the major nitrogenous fertilizer and accounts for 83 % of the total nitrogen production. Other nitrogenous fertilizers are ammonium sulphate (AS) and calcium ammonium nitrate (CAN), which are produced in smaller quantities. Among complex fertilizers, di-ammonium phosphate (DAP) and various grades of NP/NPK are produced. Apart from these, single super phosphate (SSP), also contributes to the phosphate production. There are about 141 fertilizer plants in operation in India. Out of these, 29 units produce urea, 19 units produce diammonium phosphate (DAP) and NP/NPK complex fertilizers, 82 units produce single super phosphate (SSP), 11units produce ammonium sulphate, calcium ammonium nitrate and ammonium chloride. The addition of urea capacity remained unchanged since 1999.

Fertilizer Plants

- Natural Gas, Coal, Naphtha & LSHS (Fuel, feed)
- Urea (Product)
- Ammonia (Product)

India is completely dependent on import of potassic fertilizers mainly as potassium chloride. India produced about 22 MT urea in 2010-11. About 18 MT urea was produced using gas as feedstock, while balance about 4 MT is produced using naphtha and fuel oil as feedstock.

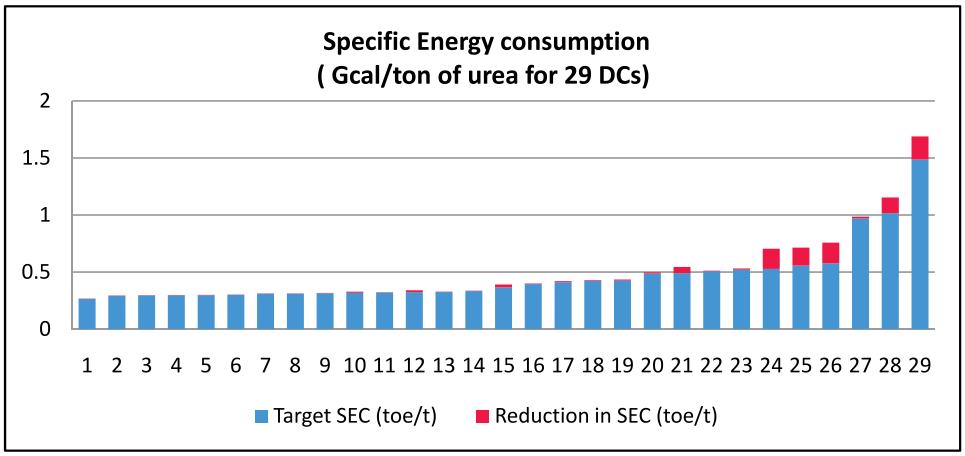
Among all the processes in the fertilizer industry, production of nitrogenous fertilizers is the most energy intensive. Ammonia is used as the basic chemical in the production of nitrogenous fertilizers. Globally, over 80% of all ammonia manufactured is used in the production of nitrogenous fertilizers, and urea is the main nitrogenous fertilizer manufactured in India. The feedstocks used for ammonia production are natural gas, naphtha, and fuel oil. Coal based units have been closed due to non-economic viability and high specific consumption levels. Among the feedstock, natural gas-based fertilizers are the most energy efficient, followed by naphtha-based fertilizers.

Most of the existing plants in operation, have upgraded the technology continuously by way of revamp, retrofit and replacements. Some of the major up-gradations are incorporation of radial-axial or radial flow ammonia converters, additional heat recovery from furnace flue gases, revamp of CO2 removal section with better solvent, improved packing of absorption / desorption towers, additional purification of synthesis gas, use of more efficient catalyst, refurbishing or replacement of rotating machines including major compressors and turbines, better heat integration, utilization of low level heat etc.

Four plants using fuel oil as feedstock are preparing to use gas as feedstock with total investment of the order of Rs 5000 core. These plants will be ready to change to gas by the end 2012. . Six naphtha based plants are ready to use gas but do not have pipeline connectivity.

There are 29 urea plants in operation in the country with capacity of 22.21 MT per annum. Most of these plants are of 1980s and 1990s vintage. With continuous efforts for up-gradation of technology, these plants have brought down energy consumption from 8.42 Gcal/t in 1990-91 to 6.24 Gcal/t urea in 2010-11. The major modernization measures include two stage concentration, more efficient trays in urea reactor, recovery of nutrients from process effluents, recycle of treated process condensate, refurbishing or replacement of rotating machines etc. Most urea plants have energy consumption within range of 5.25 to 6.0 Gcal/t urea.

Specific Energy Consumption and Targets- Fertilizers



In Fertilizer Sector, for manufacturing of Urea fertilizer, out of total energy consumed at designated consumer plant boundary, stoichiometric energy of 2.53 Gcal/t Urea is contained in urea product and goes out as such. Thus, the net energy utilized in urea manufacture is total energy input at designated consumers' boundary reduced by 2.53 Gcal/t Urea. The figure is worked out by considering heat energy of ammonia as 4.46 Gcal/t Ammonia and specific consumption 0.567 t of Ammonia / t Urea.

By the end of the first PAT cycle, the energy savings of 0.478 million ton of oil equivalent /year is expected to be achieved , which is 7.15 % of total national energy saving targets assessed under PAT.

v. Iron and Steel

The Indian iron and steel industry can be broadly categorized into integrated steel producers and secondary steel producers. Integrated steel producers have traditionally integrated steel units with captive plants for iron ore and coke, which are the main inputs. Secondary producers use steel scrap, sponge iron/ direct reduced iron (DRI) or hot briquetted iron (HBI) as raw materials. It mainly comprises electric arc furnace (EAF) units and induction furnace units, apart from other manufacturing units like independent hot and cold rolling units, rerolling units, galvanizing and tin plating units, sponge iron producers, pig iron producers, and so on.

The crude steel production during 2008/09 was 54.52 Million ton (MT) as against 53.86 MT in 2007/08, showing an annual growth of 1.23%. Production for sale of total finished steel was 56.39 MT, which is a growth of 0.6% as compared to the previous year. In 2003/04, an average growth of 7.3% in the production of total finished steel was registered. The domestic consumption of the total finished steel declined marginally (by 0.53%) at 51.85 MT. India exports about 3.75 MT of finished steel, which has decreased by 26%, while imports were estimated at 5.77 MT, a decline of 18%.

Iron and Steel

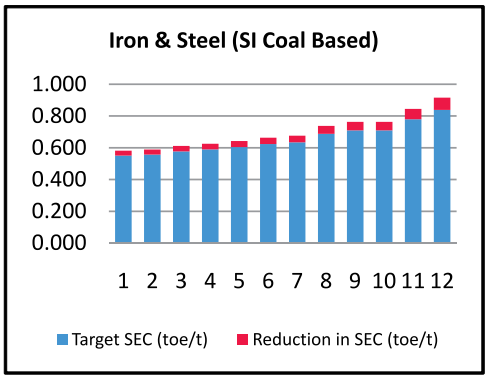
- Integrated Steel Plants
- Sponge Iron
- Sponge iron with SMS
- Sponge Iron with SMS and others
- Ferro alloys
- Ferro Chrome
- Mini Blast Furnace
- Steel Processing unit

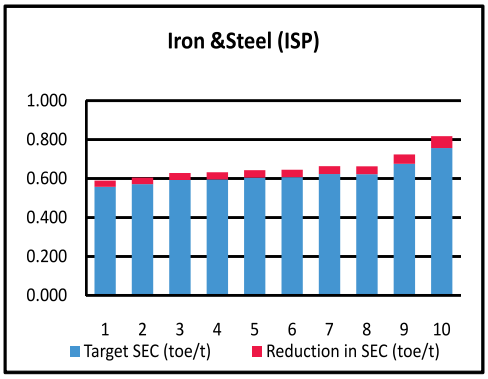
Production of iron and steel involves energy-intensive processes. At present, the specific energy consumption of large integrated Indian steel plants is 6.5–7.0 Gcal/ ton of crude steel as against the international norm of 4.5–5.5 Gcal/ton.

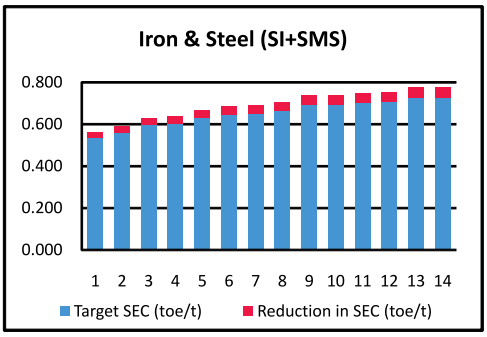
Indian steel plants have undertaken several energy efficiency improvement measures to reduce overall manufacturing costs. Some of the energy-efficient technologies that are actively pursued by the steel industry are as follows.

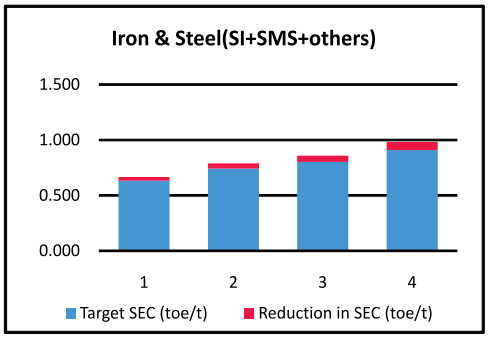
- Installation of energy recovery coke ovens to meet power requirements.
- Installation of top gas recovery turbines in blast furnaces.
- Use of non-coking coal in iron making.

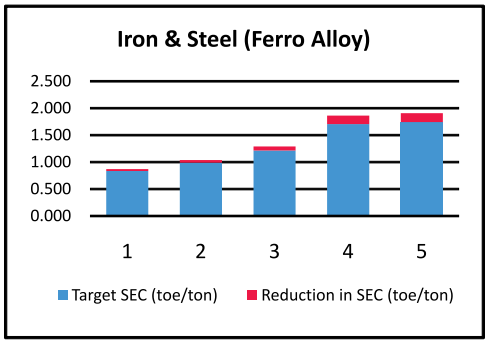
Specific Energy Consumption and Targets- Iron & Steel











Specific energy consumption varies from 0.0527 to 1.907 toe/t for these 67 designated consumers. By the end of the first PAT cycle, the energy savings of 1.486 million ton of oil equivalent /year is expected to be achieved, which is around 22% of total national energy saving targets assessed under PAT.

vi. Pulp and Paper

The Indian pulp and paper industry ranks fifteenth at the global level. However, the per capita consumption of paper in India is low (7.2 kg) as compared to 45 kg in China, 234 kg in Japan, 297 kg in USA, and the global average of 54 kg. There are about 715 paper industries engaged in the manufacture of pulp, paper, and paperboards, of which about 25 units are wood-based mills, 139 units are agro-based mills, and 551 are recycled fibre-based mills. About 98 units with an installed capacity of 1.1 MT have been closed.

Pulp and Paper

- Wood based
- Agro based
- Recycled fiber based (RCF)

The total installed capacity of the paper industry during 2008/09 remained at 9.2 MT. Based on the installed capacities, Indian paper mills are categorized as large mills and small mills. Large mills have an installed capacity of more than 100 tons per day (TPD), while small mills have an installed capacity of less than 100 TPD. The total installed capacity of the paper industry increased to 9.2 MT in 2008/09 from 7.8 MT in 2007/08.

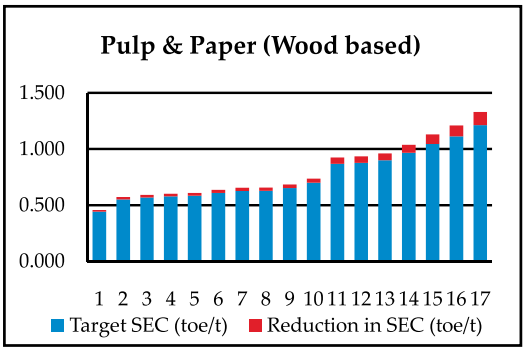
The paper industry uses coal and electricity as the main energy sources. Apart from these, low sulphur heavy stock (LSHS), furnace oil (FO), light diesel oil (LDO), and high-speed diesel (HSD) oil are used for steam generation and captive power generation. Energy costs account for 15%–20% of the total production costs in India as compared to 10% in USA.

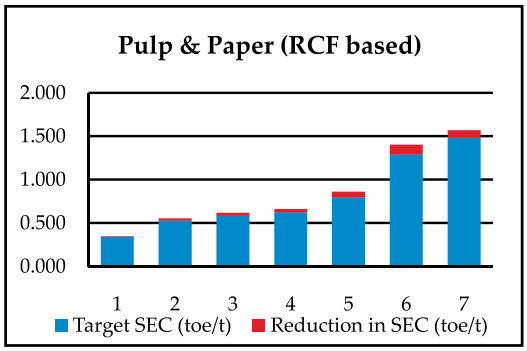
Process optimization, waste heat recovery, and cogeneration systems offer significant scope for improving the performance of Indian paper mills.

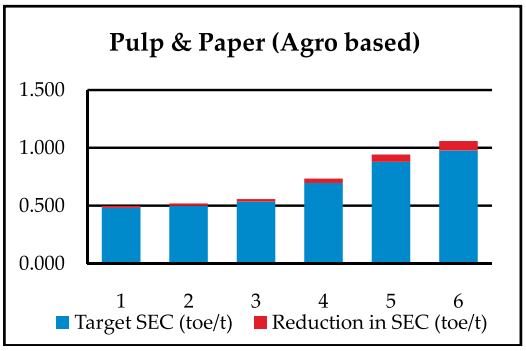
Other energy conservation measures, which require marginal or no investments and would result in 5%–10% energy savings, are listed below.

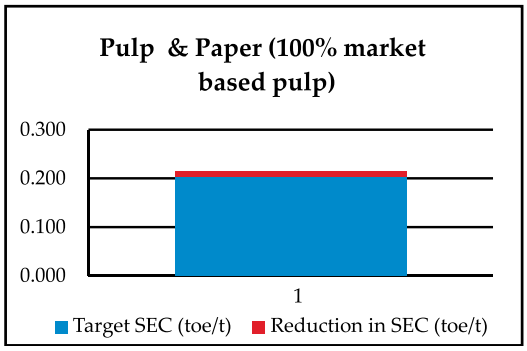
- Excess air control in boilers through ducting design and instrumentation to help in reducing the load on induced draft (ID) fans and forced draft (FD) fans.
- Proper temperature control in slaking and causticizers to reduce steam consumption.
- Better instrumentation loop in agitators.
- Cascading system for efficient use of steam in the dryer section of the paper machine.
- Vacuum piping with minimum bends in the paper machine section.
- Replacement of beaters by double disc refiners in small paper mills.
- Adoption of biomethanation.
- Use of de-silication technology for silica-rich raw materials such as rice straw, bagasse, and bamboo-based raw materials.

Specific Energy Consumption and Targets- Pulp & Paper









In Pulp & paper sector, to become a designated consumer the identified threshold limit is 30,000 toe and in first PAT cycle 31 designated consumers from various states have been identified for which the target have already been notified. Pulp & paper sector has been categorized on the basis of their Raw material in to three subsectors i.e. Wood based ,Agro based, and Recycled fiber based (RCF). The total reported energy consumption of these designated consumers is about 2.08 million ton of oil equivalent.

Specific energy consumption varies from 0.202 toe/t to 0.878 toe/t for these 31 designated consumers. By the end of the first PAT cycle, the energy savings of 0.119 million ton of oil equivalent /year is expected to be achieved, which is around 2% of total national energy saving targets assessed under PAT.

vii. Textile

India ranks second in the textile industry sector in the world. The Indian textile industry contributes about 14% to the industrial production, 4% to the GDP, and 17% to the country's export earnings. The textile industry in India can be classified into the organized sector and the decentralized/rural sector. The organized sector comprises mills, which include the spinning mill or the composite mill. The decentralized power-loom/hosiery and knitting sectors form the largest section of the textile industry. The major sub-sectors of the Indian textile industry consist of the organized cotton/man-made fibre textiles mill industry, man-made fibre/filament yarn industry, wool and woolen textiles industry, sericulture and silk textiles industry, handlooms, handcrafts, jute and jute textiles industry, and textile exports.

Textile

- Processing
- Spinning
- Composite
- Fibre

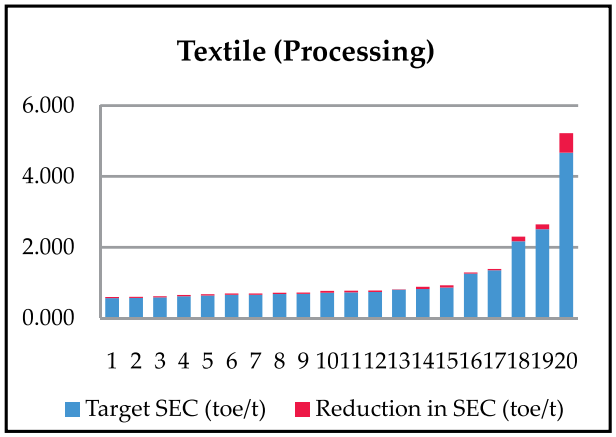
Energy cost in the textile industry accounts for 5%– 17% of the total production cost. Coal and furnace oil are used for the generation of steam in boilers for process heating applications. According to the Asian Regional Research Program in Energy, Environment, and Climate (ARRPEEC) survey, the energy consumption of the textile industry is 3–3.5 kWh/kg of yarn in a modernized spinning mill, 0.09–0.2 kWh/kg of fabric in knitting

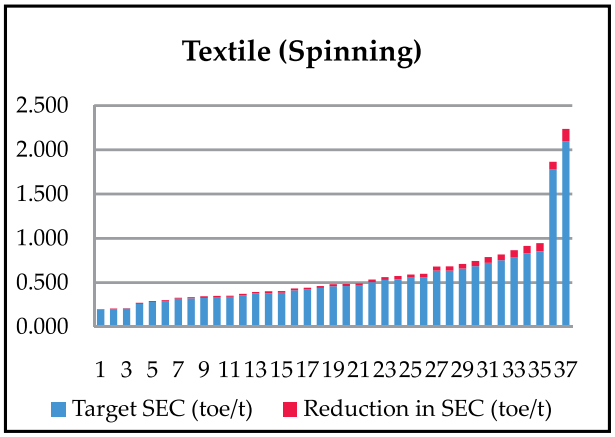
units, and 0.04–0.15 kWh/kg of fabric in dyeing. In fabric dyeing units, consumption of steam may vary from 4 kg to 9 kg of steam per kg of fabric.

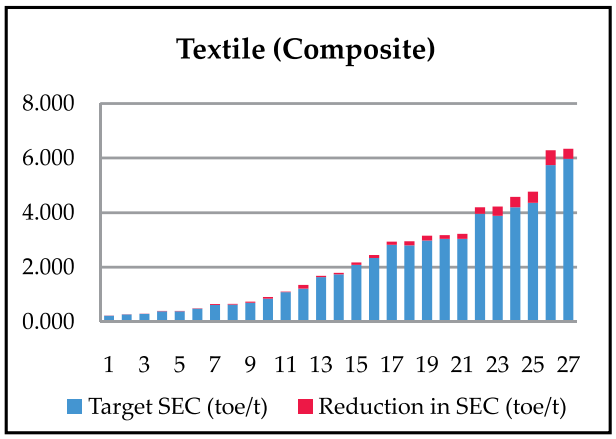
A number of textile units have made significant efforts towards energy conservation through short- and medium-term measures. The reported energy saving potential in textile industries is up to 15%. Various energy saving opportunities applicable to the textile industry include the following.

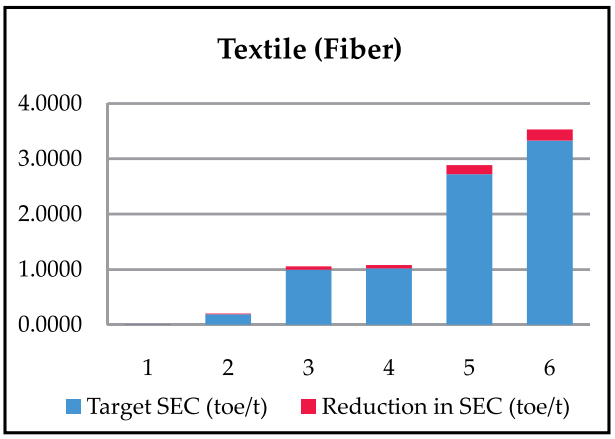
- Use of variable frequency drives for fans of humidification plants.
- Use of smaller wrap diameter spindles.
- Installation of radio-frequency driers.
- Use of foam technique for printing and finishing.
- Use of renewable energy, specifically solar thermal applications for generating low grade heating.
- Energy Efficient automatic waste evacuation system with polymer pipeline.
- Reducing warve-dia of ring spindle.
- Adiabatic Nebulization and similar humidification system.

Specific Energy Consumption and Targets- Textile









In Textile sector, to become a designated consumer, the threshold limit is 3000 toe and in first PAT cycle 90 designated consumers from various states have been identified for which the target have already been notified. Textile sector has been categorized on the basis of their process in to four sub sector i.e. Spinning, Processing, Composite & Fiber. The total reported energy consumption of these designated consumers is about 1.20 million ton of oil equivalent/year.

Textile plants are further divided into two categories i.e. captive power plant based plants and non-captive i.e. grid connected plants. Specific energy consumption varies from 0.199 to 5.2 toe/t across the sector except couple of outliers. By the end of the first PAT cycle, the energy savings of 0.066 million ton of oil equivalent /year is expected to be achieved, which is 0.99% of total national energy saving targets assessed under PAT.

viii. Thermal Power Plants

India is the sixth largest in terms of power generation. About 65% of the electricity consumed in India is generated by thermal power plants, 22% by hydroelectric power plants, 3% by nuclear power plants and rest 10% from other alternate sources like solar, wind, biomass etc. 53.7% of India's commercial energy demand is met through the country's vast coal reserves. The country has also invested heavily in recent years on renewable sources of energy such as wind energy. As of April 2012, India's installed Renewable energy generation capacity stood at about 24,503 MW.

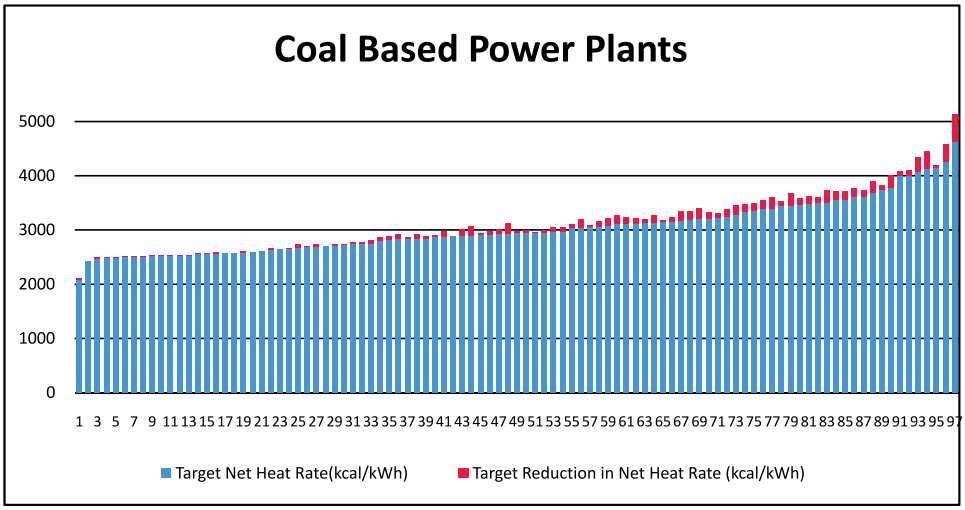
Due to India's economic rise, the demand for energy has grown at an average of 3.6% per annum over the past 30 years. At the end of April 2012, the installed power generation capacity of India stood at 2,01,637 MW, while the per capita energy consumption stood at 813.5 kWh (2010-11).

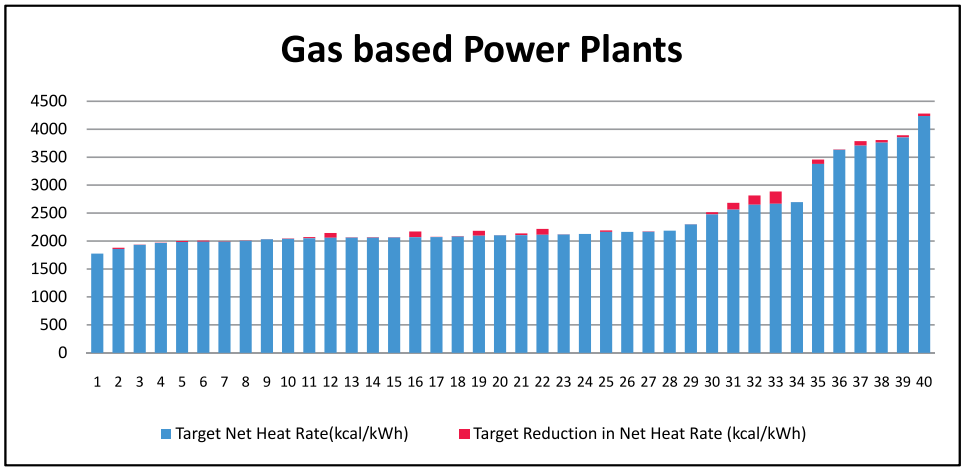
Thermal Power Plants

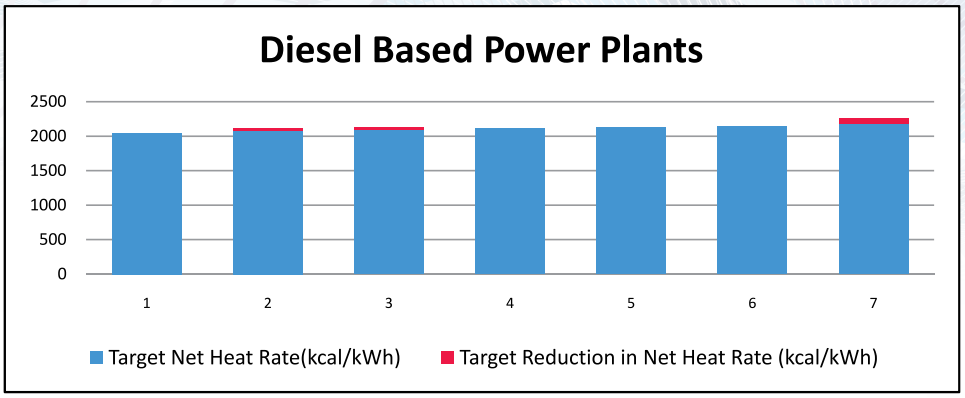
- Coal
- Gas
- Diesel

In Thermal Power Plant sector to become a designated consumer the identified threshold limit is 30000 toe and in first PAT cycle 144 designated consumers from various states have been identified for which the target have already been notified. Thermal Power Plant sector has been categorized on the basis of their fuel input in to three subsector i.e. gas, oil and coal based plants. The total reported energy consumption of these designated consumers is about 104 million ton of oil equivalent. By the end of the first PAT cycle, the energy savings of 3.211 million ton of oil equivalent /year is expected to be achieved, which is around 48% of total national energy saving targets assessed under PAT.

Specific Energy Consumption and Targets- Thermal Power Plants







Specific energy consumption (net heat rate) varies from 1774 kcal/kWh to 5134 kcal/kWh for these 144 designated consumers.

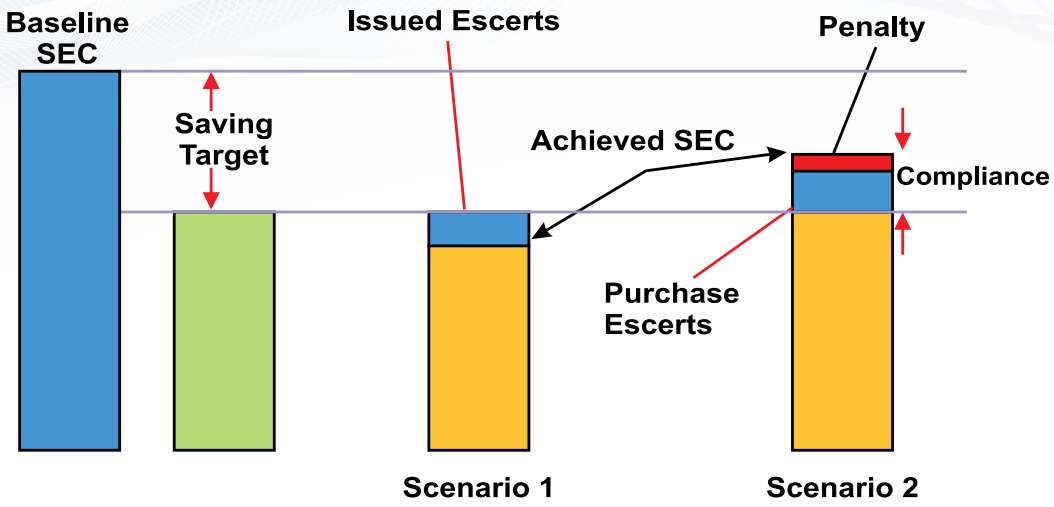
6. Next Steps

An ESCert will be an instrument issued by Ministry of Power/BEE for a one ton of oil equivalent of energy savings achieved by the designated consumer, over and above the target savings. Each certificate will be unique tradable commodity which will be traded in two exchanges i.e. Indian Energy Exchange (IEX) and Power Exchange of India (PXIL). First ESCert will be issued after completion of one financial year in 2013-14. For the issuance of ESCerts and compliance of PAT scheme, following time lines needs to be followed by each designated consumer.

Description	Mandatory	Voluntary
Submission of Form 1	Once in a year	NA
Submission of Form A (Performance Assessment Document)	Once in 3 years	Before Compliance year
Submission of Form B (Verification by Accredited Energy Auditor for Verification)	Once in 3 years	Before Compliance year
Issuance of ESCerts	Once in 3 years	Before Compliance year
Submission of Form D (Performance Compliance Document)	Once in 3 years	NA

After submission of Form 1 and Form A, the Designated Consumer has to hire an accredited energy auditor, from the list of BEE empanelled accredited energy auditors for the verification of these forms. Accredited energy auditor will verify Form 1 and Form A and submit certificate of verification through Form B to BEE within 3 months from the last day of the financial year. This process is mandatory after the last financial of the cycle, whereas designated consumer can submit these documents after verification in the voluntary phase for issuance of ESCerts.

Concept of Target, Compliance, Escerts & Penalty



When a designated consumer achieve and surpass the target, it can sell its excess savings in the form of Energy Savings Certificates (ESCerts), and if a designated consumer fails to achieve its targets, it must purchase the appropriate number of ESCerts to "meet" its energy savings targets. Monitoring and verification of energy savings will be conducted by Accredited Energy Auditors through a transparent system.

Example

- Specific Energy Consumption (SEC) in Baseline year: 10 TOE/unit of production
- Baseline Production: 10000 units
- Target: 4% reduction in SEC
- SEC in the target year: 9.6 TOE/unit production
- For ESCerts or Penalty:

– Reduction requirement: 4000 TOE
– Scenario 1 (Achieved SEC = 9.8): -2000 TOE (Penalty)
– Scenario 2 (Achieved SEC = 9.4): +2000 TOE (ESCerts)

The Rules for the PAT scheme were notified by the Central Government on 30th March, 2012 and provides complete mechanism to be followed by the designated consumer. The notifications of the targets and the Rules are available at www.bee-india.nic.in

7. Conclusion

Introduction of Perform, Achieve and Trade Scheme for Energy Intensive Industries improves energy efficiency and facilitates cost effectiveness by certifying energy saving that could be traded due to its market based mechanism. The 478 designated consumer plants offer an energy saving potential of 6,686,000 ton of oil equivalent/year(6.686 million toe/year) at the end of first phase of PAT Cycle (2012- 2015).

PAT is one of the most promising initiatives to achieve the goal by implementing Best Available Practices and Technologies in the identified sectors through economical viable projects. Broader implementation of sectoral crediting mechanisms could ensure that low-carbon technologies are also used more widely, which in turn would encourage Indian industries to invest in these technologies.

8. Annexure 1: Notification of Targets

MINISTRY OF POWER

NOTIFICATION

New Delhi, the 30th March, 2012

S. O. 687(E).- In exercise of the powers conferred by clause (g) and (n) of section 14 of the Energy Conservation Act, 2001 (52 of 2001), the Central Government, in consultation with the Bureau of Energy Efficiency, hereby specifies for the designated consumers mentioned in column (2) of the following Sector Table, the energy consumption norms and standards mentioned in the corresponding entry in column (4) of the said Sector Table as the energy consumption norms and standards for the period from 2012-13 to 2014-15 in relation to their current level of energy consumption, being the baseline energy consumption norms and standards mentioned in column (3) of the said Sector Table, established under the Energy Conservation (Energy Consumption Norms and Standards for Designated Consumers, Form, Time within which, and Manner of Preparation and Implementation of Scheme, Procedure for Issue of Energy Savings Certificates and Value of Per Metric Ton of Oil Equivalent of Energy Consumed) Rules, 2012, namely:-

SECTOR TABLE

(i) Aluminum

S. No.	Designated consumer	Baseline energy consumption norms and standards in metric ton of oil equivalent (TOE) per unit of product for the baseline year (average of three years).		Energy consumption norms and standards in metric ton of oil equivalent (TOE) per unit of product for target year.
(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/Ton of product)	Product Output (Ton)	Specific energy consumption (TOE/Ton of product)
1	Hindalco Industries Limited Post Bag-1, Belgaum, Pin-590010 Karnataka	0.241	376733	0.231
2	Vedanta Aluminium Ltd P. O. Lanjigarh , via Biswanathpur Dist .- Kalahandi, Pin-766027 Odisha	0.322	762195	0.304

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/Ton of product)	Product Output (Ton)	Specific energy consumption (TOE/Ton of product)
3	National Aluminium Company Limited Mines & Refinery Complex, Damanjodi, Dist- Koraput Pin-763008 Odisha	0.325	1559767	0.307
4	Hindalco Industries Limited Muri, Ranchi, Pin-835101 Jharkhand	0.674	121583	0.598
5	Bharat Aluminium Company Limited P.O. Balco Nagar, Korba, Pin-495684 Chhattisgarh	4.718	252305	4.514
6	Hindalco Industries Limited Hirakud Smelter, Hirakud, Dist-Sambalpur, Pin-768016 Odisha	4.776	130520	4.567
7	National Aluminium Company Limited S & P Complex, At/Po: Nalconagar, Dist-Angul, Pin-759145 Odisha	5.474	383988	5.199
8	Vedanta Aluminium Limited Village - Burkhamunda, P.O. Sripura, Jharsuguda, Pin-768202 Odisha	6.405	215641	6.028
9	Hindalco Industries Limited P. O. Renukoot, Dist- Sonbhadra, Pin-231217 Uttar Pradesh	5.858	388869	5.512
10	Hindalco Industries Limited Plot No. 2, MIDC Taloja, A.V, Navi Mumbai, Dist Raigad, Pin-410208 Maharashtra	0.183	53320	0.172

(ii) Chlor-Alkali

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/Ton of product)	Product Output (Ton)	Specific energy consumption (TOE/Ton of product)
1	Aditya Birla Chemicals India Ltd. Garhwa Road, PO: Rehla, Dist. Palamau, 822124 Jharkhand	0.997	90,777	0.928
2	Aditya Birla Nuvo Ltd. (Indian Rayon) Unit: Indian Rayon, Caustic & Power Plant, Veraval, Dist. Junagarh, 362266 Gujarat	0.273	94,527	0.259
3	Chemplast Sanmar Limited Melavanjore, Karaikal Region, U.T. of Puducherry Puducherry	0.335	49,942	0.313
4	Chemplast Sanmar Ltd. Plant-[3] Veerakkalpudur, Raman Nagar Post, Mettur Dam, Salem District Tamil Nadu	0.333	57,808	0.312
5	DCM Shriram Consolidated Ltd (Shriram Vinyl & Chemical Industries) Chlor Alkali Plant, Shriram Nagar, Kota-324004 Rajasthan	0.305	106,142	0.287
6	DCW Ltd. Sahupuram, Tutucorin District, 628229 Tamil Nadu	0.303	85,678	0.286
7	Grasim Industries Limited, Chemical Division Chemical Division, Birlagram, NAGDA, 456331 Madhya Pradesh	0.310	226,141	0.291

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/Ton of product)	Product Output (Ton)	Specific energy consumption (TOE/Ton of product)
8	Gujarat Alkalies and Chemicals Ltd. At & PO: Dahej, Taluka: Vagara,Dist. Bharuch, 392130 Gujarat	0.262	266,402	0.249
9	Gujarat Alkalies and Chemicals Ltd. P.O. Petrochemicals, Dist. Vadodara, 391346 Gujarat	0.277	179,708	0.262
10	Gujarat Fluorochemicals Ltd. Plot No: 12/A, Dahej GIDC Complex, Vagra, Bharuch - 392130 Gujarat	0.286	54,736	0.271
11	Heavy Chemicals Division, TPL Manali Express Highway, Chennai-68 Tamil Nadu	0.571	60,682	0.548
12	ABCIL Renukoot Chemical Div. (Kanoria Chemicals and Industries Ltd.) P.O. Renukoot , Sonebhadar Uttar Pradesh	0.347	96,637	0.324
13	Lords Chloro Alkali Ltd. SP-460, M.I.A., Alwar, 301030 Rajasthan	0.450	45,329	0.412
14	Meghmani Finechem Ltd. CH-1, CH-2; Dahej Industrial Estate, Vill: Dahej, Ta: Vagra, Dist: Bharuch, 392130 Gujarat	0.967	61,796	0.902
15	Punjab Alkalies & Chemicals Ltd. Nangal Una Road, Naya Nangal,Dist. Ropar, 140126 Punjab	0.319	88,959	0.299

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/Ton of product)	Product Output (Ton)	Specific energy consumption (TOE/Ton of product)
16	Reliance Industries Ltd., Manufacturing Division, Dahej, Vagra, Bharuch, 392130 Gujarat	0.310	173,885	0.291
17	Shriram Alkali & Chemicals 749, GIDC Industrial Estate, Jhagadia, Dist. Bharuch , 393110 Gujarat	0.990	112,135	0.922
18	SIEL Chemical Complex Village Khadauli, Sardargarh, P.B. No: 52, Rajpura, Dist. Patiala Punjab	0.305	75,833	0.287
19	Sree Rayalseema Alkalies & Allied Chemical Ltd. Gondiparla, Kurnool Andhra Pradesh	0.333	116,716	0.312
20	The Andhra Sugar Ltd , Chamical & Fertilizer Division. Saggonda, Gopalpuram Mandel, W.G., 534318 Andhra Pradesh	0.342	99,180	0.320
21	Travancore Cochin Chemicals Ltd. Udyogamandal, Kochi, 683501 Kerala	0.299	50,430	0.282
22	United Phosphorus Ltd. 750 G.I.D.C., P.B. No. 9, Jhagadia, Bharuch, 393110 Gujarat	0.286	58,333	0.271

(iii) Textile

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
1.	Aarti International Ltd. Village Uchi Mangli, P.O. Ramgadh, CHD road Ludhiana Punjab	0.403	25605	0.386
2.	Abhishek Industries Ltd (Home Textiles) Mansa road, Vill-Dhaula, Dist-Barnala Punjab	0.223	27650	0.219
3.	Abhishek Industries Ltd. (Yarn Division) Raikot Road Barnala, 148101 Punjab	0.204	41377	0.200
4.	AK Spintex Ltd 14th km stone, Chittorgarh Road, Bhilwara Rajasthan	0.697	9633	0.659
5.	Alok Industry VAPI (Integrated Textile Solution) Survey NO 254/261/268 Vill -Balitha, PO-BOX NO 43, VAPI, 396191 Gujarat	0.619	31961	0.584
6.	Anant Spinning Mills (a Unit of Vardhman Textile Ltd.) Plot no-1A, New Industrial area, Mandideep, Dist- Raisen, 462046 Madhya Pradesh	0.351	14355	0.338
7.	Anant Syntex Limited PB no-107, Vill -Gathila Khera, Chittor road, Bhilwara, 311001 Rajasthan	0.883	9098	0.821

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
8.	Arihant Spinning Mills P.B. no-21, Industrial Area, Mlerkotla, 148023 Punjab	0.371	20743	0.357
9.	Arisht Spinning Mills PB no-1, Sai road, Baddi, Nalagarh, Dist-Solan, 173205 Himachal Pradesh	0.440	16740	0.420
10.	Aruppukottai Sri Jaya Vilas Ltd., Cotton Spinning Mills, 'A' Unit Malakadamangalam, 626129 Tamil Nadu	0.561	6826	0.529
11.	Arvind Ltd. PO-Khatraj, Tal-Kalol, Dist-Gandhinagar, 382721 Gujarat	2.954	17750	2.798
12.	Arvind Products Ltd. (Div. Ankur Textile) Outside Raipur Gate, Ahmedabad, 380022 Gujarat	1.791	3857	1.734
13.	Auro Spinning Mills (A Unit of Vardhman Textiles Ltd.) Sai road, Baddi, Nalagadh, Dist. Solan, 173205 Himachal Pradesh	0.484	12666	0.459
14.	Banswara Syntex Ltd. Banswara Rajasthan	0.496	16359	0.478
15.	Bharat Vijay Mill 7- Garnala, Kalol Dist, Gandhinagar Gujarat	1.108	6380	1.086

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
16.	Birla Cellulosic Birladam, Kharach, Kosamba(RS), Bharuch, 394120 Gujarat	1.080	76854	1.018
17.	Birla Textile Mills (A Div. of Chambal Fertiliser & Chemicals Ltd.) Sai road, Baddi, Dist-Solan, 173205 Himachal Pradesh	0.489	20175	0.464
18.	Bombay Rayon Fashions Ltd Doddaballa pura Area, Banglore Karnataka	2.298	6874	2.167
19.	BSL LIMITED(Processing Division) PB no-16, Mandpum, Bhilwara, 311001 Rajasthan	0.762	9446	0.716
20.	BSL Limited PB no-17, Mandpum, Bhilwara, 311001 Rajasthan	0.736	5058	0.697
21.	BTM Industries Ltd. 13 km stone, Vill-Pur, Gangapur road, Bhilwara Rajasthan	0.811	6493	0.797
22.	Century Enka Limited MIDC, Bhosari, Dist. Pune, 411026 Maharashtra	1.055	22849	0.995
23.	Century Rayon (A Div. of Century Textiles & Ind. Ltd.) PB No-22, Murbad Road, Shahad, Dist. Thane, 421103 Maharashtra	0.0102	5982471	0.0101

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
24.	Chamunda Synprocess (India) Pvt. Ltd. Paldi-Arjia road, Vill- Govindpur, Bhilwara, 311001 Rajasthan	0.720	5137	0.679
25.	DCM Textiles PB No-59, Near Mela ground, Hisar Haryana	0.290	14520	0.281
26.	Deepak Spinners Ltd. 121, Industrial area, Baddi, Dist. Solan, 173205 Himachal Pradesh	1.863	8328	1.778
27.	Eurotex Industries and Exports Limited Plot no-E 23, MIDC, Gokil Shirgaon, Kolhapur, 416234 Maharashtra	0.710	6346	0.658
28.	G.P.I.Textiles Ltd. Bharatgarh road, Nalagarh, Dist. Solan, 174101 Himachal Pradesh	0.349	20754	0.336
29.	Gokak Textile Limited Gokak mills Division, Gokak falls, Dist-Belgaum, 591308 Karnataka	0.199	19981	0.195
30.	Indian Rayon (A unit of Aditya Birla Nuvo Ltd.) Veraval, Dist. Junagadh, 362266 Gujarat	2.885	16795	2.720
31.	Indo Count Industries Limited D-1, MIDC, Gokil Shirgaon, Kolhapur, 416234 Maharashtra	0.818	6155	0.752

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
32.	J. C. T. Limited Phagwara G.T. Road, Phagwara, 144401 Punjab	4.577	6513	4.196
33.	Janki Corp Limited Mandpiya Choraha, Chittor road, Bhilwara Rajasthan	0.596	15230	0.568
34.	Jawahar Shetkari Sahakari Soot Girni Ltd Hutatma Shirishkumar nagar, Morane pr.L, Dist -Dhule, 424001 Maharashtra	0.346	10292	0.327
35.	Kanchan India Ltd. Pur-road, Bhilwara Rajasthan	0.714	13212	0.674
36.	Kumar Cotton Mills Pvt. Ltd. SI No-108/1, BD, Narol Court, Narol, Ahmedabad, 382402 Gujarat	5.220	2700	4.667
37.	L.S.Mills Ltd., 'B' B unit, Cumbum road, Muthu Thevandatty, Theni, Dist. Madurai Tamil Nadu	0.658	5447	0.626
38.	Loyal Textile Mills Ltd. 21/4 Mills Street, PB no-1, Kovilpatti, 628501 Tamil Nadu	0.395	14689	0.384
39.	M/s Grasim Bhiwani Textiles Ltd. Unit: Bhiwani Textile Mills & Elegant Spinners PB No-#4, BTM road, Bhiwani, 127021 Haryana	2.448	10946	2.341

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
40.	Mafatlal Industries Limited Textile Division, Nadiad Unit PB No-#55, Kapadvanj Road, Nadiad, 387001 Gujarat	3.175	4824	3.039
41.	Maharaja Shree Umaid Mills Limited Pali marwar, 306401 Rajasthan	0.646	24493	0.616
42.	Malwa Cotton Spinning Mills Ltd Raikot road, Barnala, 148101 Punjab	0.334	12397	0.323
43.	Malwa Cotton Spinning Mills Ltd. Village-Patlian, Tehsil-Paonta Sahib, Dist-Sirmour, 173025 Himachal Pradesh	0.591	9178	0.555
44.	Modern Terry Towel Ltd. PB No-6, Sanandkadi Road, Ahmedabad Gujarat	6.283	2502	5.738
45.	Morarjee Textiles Ltd Plot no-G-2, MIDC, Butibori, Post-Salaidhaba, Nagpur, 441110 Maharashtra	4.221	2932	3.883
46.	Nahar Industrial Ent Ltd Vill- Jalalpur, PO-Dappar, Dist-Mohali Punjab	0.270	12619	0.258
47.	Nahar Industrial Enterprises Ltd. 6th Mile stone, Tijara-Alwar road, Bhiwadi, 301018 Rajasthan	0.481	18379	0.457

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
48.	Nahar Spinning Mills Ltd. Village-Simrai, Mandideep, Dist-Raisen, 464992 Madhya Pradesh	0.681	10220	0.634
49.	Nitin Spinners Limited 16-17 km stone, Chittor road, Hamirgadh, Dist-Bhilwara, 311025 Rajasthan	1.349	23531	1.216
50.	Orient Syntex (Prop: APM Industries Ltd.) SP-147, industrial area, Bhiwadi, Dist. Alwar Rajasthan	0.788	13379	0.723
51.	PBM Polytex Limited Opp Station, Petlad, Dist-Anand, 388450 Gujarat	0.743	6745	0.686
52.	Pee Vee Textiles Ltd. N.H. 07, Post-Jam, Tal- Samudrapur, Dist-Wardha, 442305 Maharashtra	0.272	20090	0.267
53.	Priyadarshini Sahakari Sootgirni At-Tande, Shirpur-Chopara road, Shirpur, Dist. Dhule, 425405 Maharashtra	0.301	19655	0.291
54.	RSWM Ltd Unit Mandpam PB no-13, Chittorgarh road, Mandpum, Bhilwara, 311001 Rajasthan	0.946	7128	0.852
55.	Ranjan Processors (A Unit of Ranjan Polyster Ltd.) 11-12 km stone, Vill- Guwardi, Chittor road, Bhilwara Rajasthan	0.651	10250	0.617

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
56.	Rajasthan Textiles Mills Bhawani Mandi, Rajasthan 326 502 Rajasthan	0.914	17439	0.830
57.	Rankas Texfab Pvt. Ltd. (Bhairvnath Industries) Survey No-145/A, Pipleg-purana road, Piplej, Ahmedabad, 382405 Gujarat	2.644	2406	2.504
58.	Raymond Limited(Textile Division) B1, AKVN Growth Center, Kailash nagar, Bore gaon Dist-Chhindwara Madhya Pradesh	6.339	4317	5.977
59.	Raymond UCO Denim Pvt. Ltd Plot-C1, MIDC, Lohara, Yavatmal, 445001 Maharashtra	3.156	11954	2.977
60.	Raymond Zambaiti Limited Plot no-T1, Kagal Hatkanagle, 5 star, MIDC, Kasaba Sangaon, Dist-Kolhapur, 416216 Maharashtra	4.772	1247	4.360
61.	Reliance Chemotex Industries Ltd. Vill-Kanpur, Udaipur, 313003 Rajasthan	0.572	8692	0.537
62.	Rishab Spinning Mills Jodhan (Prop. Nahar Spinning Mills Ltd.) VPO-Jodhan, Dist. Ludhiana, 142029 Punjab	0.329	18622	0.317
63.	Rolex Processors Pvt. Ltd. 13-14km stone, Vill-Pur, Gangapur road, Bhilwara, 311802 Rajasthan	1.386	3857	1.348

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
64.	Ronak Processors (P) Ltd. G-138 to 142, 4th phase, Riico industrial area, Bhilwara Rajasthan	0.924	7047	0.856
65.	RSWM Limited, Ringas SP-1, industrial area, Ringas, 332404 Rajasthan	0.533	7539	0.503
66.	RSWM Ltd PB no-28, Kharigram, Gulabpura, Bhilwara Rajasthan	0.598	20257	0.561
67.	RSWM Ltd Rishabhdev, Udaipur Dist, 313802 Rajasthan	0.865	14072	0.787
68.	RSWM Ltd PB No-34, Vill-Lodha, Banswara, 327001 Rajasthan	2.175	2536	2.090
69.	RSWM LTD. (Fabric Div.) LNJ Nagar, Mordi, PB no-28, Dist-Banswara, 327001 Rajasthan	1.688	2520	1.637
70.	Sangam (India) Ltd., (Processing, Flock & Weaving Division) Outside Octroi post, Vill-Atun, Chittorgarh road, Bhilwara, 311001 Rajasthan	0.908	10514	0.847
71.	Sanghi Spinners India Limited Post-Sanghi Nagar, Mandalhayath Nagar, Ranga Reddy (Dist.), 501511 Andhra Pradesh	0.402	11244	0.375

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
72.	Sarvodaya India Limited (Formerly - Shree Charbhuja Processors Ltd.) Plot no-A-44(45, 46, 57, 58, 59), Ricco Growth Centre, Swaroopganj, Chittor road, Bhilwara, 311001 Rajasthan	0.781	8907	0.733
73.	Shri Ramalinga Mills Ltd. A unit, 212 Ramasamy Nagar, Amppukottai, 626159 Tamil Nadu	0.460	12611	0.438
74.	Shriram Rayons Shriram Nagar, Kota, 324004 Rajasthan	3.532	10218	3.330
75.	Sona Processors I Ltd Indra colony, Police line, Chittor road, Bhilwara, 311001 Rajasthan	0.672	10212	0.636
76.	Spentex Industries Ltd. A-31, MIDC industrial area, Butibori, Nagpur, 441122 Maharashtra	0.210	17487	0.205
77.	STI India Limited Rau pithampur link road, The Mhow Dist-Indore, 453332 Madhya Pradesh	4.194	15203	3.958
78.	Sulzer Processors Pvt. Ltd. Opp-railway station, Mandal, Bhilwara Rajasthan	0.693	8196	0.655
79.	Surya Lakshmi Cotton Mills Ltd Village-Nagardhan, Tal. Ramtek, Dist. Nagpur Maharashtra	2.937	3809	2.820

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
80.	Swastika Suitings Ltd 7-14 industrial area, Pur road, Bhilwara Rajasthan	0.770	6190	0.723
81.	The Bombay Dyeing & Manufacturing Co. Ltd. B-28, 5 star, MIDC, Ranjangaon, Tal. Shirur, Dist.Pune, 412220 Maharashtra	1.287	7280	1.253
82.	The Bombay Dyeing & Mfg. Co. Ltd. Plot no-1, Industrial area, MIDC, Patalganga, Tal. Khalapur, Dist. Raigad, 410220 Maharashtra	0.202	126560	0.191
83.	TPL Industries Limited 11/12 km, Chittor road, Guwardi, Bhilwara, 311001 Rajasthan	0.592	8901	0.564
84.	Valli Textile Mills A unit of Loyal Textile Mills Ltd., N.Venkateshwara Puram, Post-Sathur, 626205 Tamil Nadu	0.293	14292	0.287
85.	Vardhman Fabrics (Unit of Vardhman Textiles Limited) Vill-Plikarar Talpura Rehti road, Tehsil-Budhni, Dist. Sehore, 466441 Madhya Pradesh	3.222	18940	3.036
86.	Vardhman Spinning & General Mills Chandigarh road, Ludhiana, 141011 Punjab	0.396	22081	0.384

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
87.	Vardhman Yarn Plot No-A1-A6, New industrial area, Phase 2, Satalapur (Mandideep), Dist-Raisen, 462046 Madhya Pradesh	2.235	16090	2.097
88.	Vardhman Yarns & Threads Ltd-Unit -1 PB no-18, Phagwara road, Hoshiarpur , 146001 Punjab	0.683	6535	0.634
89.	Winsome Textile Industries Ltd 1-industrial area, Sai road, Baddi, Dist Solan, 173205 Himachal Pradesh	0.394	10846	0.377
90.	Winsome Yarns Ltd Village- Kurawala, Barawal Road, Dist-Mohali Punjab	0.432	11401	0.413

(iv) Pulp& Paper

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
1	BILT Graphic Paper Products Ltd, Village BhadalwadiBhigwan, Tal - Indapur, Dist-Pune, Pin-413105 Maharashtra	0.215	176365	0.203
2	ITC Limited-PSPD UnitBhadrachalam, Andhra Pradesh	0.457	434504	0.443

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
3	Tamil Nadu News Print and Papers Limited Kagithapuram, Gram Newsprint, Dist- Karur, Pin-639136 Tamil Nadu	0.572	248461	0.550
4	Century Pulp and Paper Ghansyamdham, Lalkua, Dist. Nainital, Pin-262402 Uttarakhand	0.591	258965	0.568
5	JK Paper Ltd Unit: CPM, PO Central Pulp Mills, Fort Songadh, Dist-Tapi, Pin-394660 Gujarat	0.601	96110	0.577
6	BILT Graphic Paper Products Ltd. P.O. Ballarpur Paper Mills., Dist-Chandrapur, Pin-442901 Maharashtra	0.609	137090	0.584
7	Star Paper Mills Limited B.D. Bajoria Road, Saharanpur, Pin-247001 Uttar Pradesh	0.636	70755	0.609
8	The Andhra Pradesh Paper Mills Limited Unit APPM, Rajahmundry, Pin-533105 Andhra Pradesh	0.655	94096	0.627
9	The West Coast Paper Mills Ltd. P.B. No. 5, Bangur Nagar, Dandeli, Pin-581325 Karnataka	0.218	172404	0.215
10	Seshasayee Paper and Boards Limited Pallipalayam, Erode, Pin-638007 Tamil Nadu	0.684	120693	0.652

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
11	JK Paper Mills At/PO: Jaykaypur, Rayagada, Pin-765017 Odisha	0.736	134891	0.700
12	Ballarpur Industries Ltd. Unit Sewa, Gagnapur, Jeypore (RS),Dist. Koraput, Pin- 764002 Odisha	0.924	71627	0.867
13	Mysore Paper Mills Ltd. Paper Town Post Bhadravati – 577302 Karnataka	0.934	103205	0.875
14	Ballarpur Industries Ltd. Unit: Shree Gopal -BILT, Yamunanagar, Pin-135001 Haryana	0.960	81454	0.898
15	Nagaon Paper Mill PO: Kagajnagar Jagiroad, Pin-782413 Assam	1.037	110487	0.966
16	Cachar Paper Mill P. O. Panchgram, Dist-Hailakandi, Pin-788802 Assam	1.129	73982	1.044
17	The Sirpur Paper Mills Limited Kaghaznagar, Adilabad, Pin-504296 Andhra Pradesh	1.209	91712	1.112
18	Orient Paper Mill P.O. Amlai Paper Mill, Dist. Shahdol, Pin-484117 Madhya Pradesh	1.329	64783	1.211
19	ITC Ltd. Tribeni West Bengal	1.570	25149	1.482

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
20	Hindustan Newsprint Limited Kottayam Kerala	0.660	108221	0.623
21	Emami Paper Mills Limited Balgopalpur, Post-Rasulpur, Balasore, Pin-756020 Odisha	0.555	103931	0.528
22	Rama Newsprint and Papers Ltd., Village Barbodhan, Taluka Olpad, Dist- Surat, Pin-395005 Gujarat	0.616	123273	0.584
23	NEPA Limited Nepanagar, Dist. Burhanpur, Pin-450221 Madhya Pradesh	0.861	41522	0.797
24	ITC Ltd. , Kovai Thekkampatty Village, Mettupalayam, Coimbatore, Pin-641113 Tamil Nadu	0.348	89085	0.341
25	Shree Bhawani Paper Mills Limited Industrial Area One, Sultanpur Road, RaiBareili, Pin-229010 Uttar Pradesh	1.402	20852	1.293
26	ABC Paper Ltd. Village Sailakhurd , Dist- Hoshiarpur Punjab	0.498	55039	0.481
27	Sukhumbari Straw Products Ltd. 32 KM, Chanduasi Road, Village-Devri, Dist- Moradabasd, Pin- Uttar Pradesh	0.518	74321	0.500

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
28	Shree Shyam Pulp & Board Mills Ltd 5th KM Store, Moradabad Road, Kashipur, L.S. Nagar Uttrakhand	0.557	53994	0.536
29	Delta Paper Mills Ltd. Vendra, Palakoderu Mandal, West Godavari Dist, Pin-534210 Andhra Pradesh	0.735	28175	0.698
30	Abhisek Industries Ltd. Mansa Road, Dhaula, Barnala Punjab	1.058	86367	0.981
31	Satia Paper Mills Ltd. Muktsar-Malout Road, Village-Rupana, Muktsar, Pin-152026 Punjab	0.942	54929	0.881

(v) Iron &Steel

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
1	Essar Steel Ltd. 27 KM, Surat- Hazira Road, Hazira Gujarat	0.590	3428667	0.558
2	Rashtriya Ispat Nigam Ltd Vizag Andra Pradesh	0.605	3289000	0.571
3	SAIL Rourkela Steel Plant Rourkela Odisha	0.629	2100914	0.592

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
4	SAIL, Bokaro Steel Plant Ispat Bhawan, Bokaro steel city Jharkhand	0.643	3766642	0.605
5	Bhilai Steel Ltd Bhilai Chhattisgarh	0.632	5116000	0.595
6	Tata Steel Limited Bistupur, Jamshedpur Jharkhand	0.646	5741167	0.607
7	Durgapur Steel Plant Durgapur, Burdwan West Bengal	0.663	1905000	0.623
8	JSW Nagpur Maharashtra	0.663	2610000	0.622
9	Jindal Steel & Power Limited Post Box No. 16, Kharsia Road, Raigarh Chhattisgarh	0.724	1653775	0.676
10	SAIL, Burdwan Burnpur near Asansol, Dist-Burdwan, West Bengal	0.818	424935	0.757
11	Tata Sponge Iron Limited P.O. Joda, Dist- Keonjher Odisha	0.581	359333	0.551
12	Hare Krishna Metallics Ltd. Plot No.20, Kashan kandi road, Village & Post Hirebaganal Karnataka	0.589	81271	0.557
13	Gopani Iron & Power Pvt Ltd. A-22 MIDC Growth Centre, Tadali, Chandrapur Maharashtra	0.626	86820	0.590

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
14	Sree Mataliks Ltd. Loidapada, PO. Guali, Barbil, Dist. Keonijhar Odisha	0.642	125761	0.604
15	Shraddha Ispat Pvt. Ltd. Survey NO. 53/1, Village- Santona, Taluka-Sanguem Goa	0.676	68292	0.634
16	Hospet Ispat Pvt Ltd Sy No. 2 Allanagar, Bagnal Road, Dist-Koppla. Karnataka	0.763	52792	0.710
17	Ambey Metallic Ltd. Plot No. 69-75, 143-160 Pissurlem Industrial Estate Pissurlem, City-Sattari Goa	0.845	27357	0.779
18	Rashmi Sponge Iron & Power Ltd. 90, Phase 2, Siltara Industrial, Grouth Center, Siltara, Raipur Chhattisgarh	0.915	26114	0.838
19	Welspun Maxsteel Ltd. Salav, Raigarh Chhattisgarh	0.167	579529	0.158
20	API Ispat & Powertech (Pvt.) Limited Near Industrial Growth Cente, Siltara, Raipur Chhattisgarh	0.763	64916	0.710
21	S.K.Sarawagi & Corp.Pvt Ltd Plot No-38/41, Vill-Sankra, Phase-II, Siltara Industries area, Raipur Chhattisgarh	0.560	54005	0.533

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
22	Welspun Steels Ltd. Welspun City, Survey No.650/652, Village-Versamedi TA-Anjar (Kutch) Gujarat	0.592	134450	0.562
23	BMM Ispat Ltd. 114, Danapur Village, Hospet Taluk, Dist-Bellary Karnataka	0.637	176186	0.602
24	Monnet ISPAT & Energy Ltd. Monnet Marg Mandir, Hasoud, Raipur Chhattisgarh	0.693	316508	0.652
25	Anjani Steel Ltd. Athagarh, Cuttack Odisha	0.704	104391	0.662
26	Top Worth Iron & Steel Pvt Ltd. Borai Industrial Growth Centre, Village Rasmada, Durg Chhattisgarh	0.736	111420	0.691
27	Crest Steel & Power Pvt Ltd Village:Joratari, post:Mangatta, Dist:Rajnandgaon Chhattisgarh	0.739	74208	0.693
28	Goa Sponge & Power ltd. Survey No. 58/59/60, village Santona Goa	0.750	100126	0.703
29	Gallent Metal Limited Near Toll Gate, Village - Samakhyali, Taluka - Bhachau, Kutch Gujarat	0.752	147899	0.704
30	Nalwa Steel & Power Ltd Gharghoda Road, Taraimal, Raigarh Chhattisgarh	0.775	220856	0.724

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
31	Singhal Enterprises Pvt. Ltd. Raigarh, Gerwani, Tharaimal, Raigarh Chhattisgarh	0.779	199519	0.728
32	Godavari Power & Ispat Ltd Plot No. 428/2, Phase - I, Industrial Area, Siltara, Raipur Chhattisgarh	0.666	326850	0.633
33	Shri Bajaran Power & Ispat Ltd. Village Borjhara, Urla - Guma Road, Raipur Chhattisgarh	0.858	99734	0.803
34	Vandana Global Ltd. Siltara Industrial Growth Center, Phase II, Siltara, Raipur Chhattisgarh	0.982	127680	0.909
35	Hira Power & Steel Ltd. Urla Industrial Complex, Raipur Chhattisgarh	0.870	38130	0.836
36	JSL Stainless Steel Ltd. KNIC , Raipur Road Odisha	1.037	86937	0.989
37	Hira Ferro Alloy Ltd. Plot nos. 567 B, 568 & 553 B, Urla industrial Complex, Raipur Chhattisgarh	1.290	35025	1.215
38	MSP Steel & Power ltd. Raigarh, chhattisgarh	1.861	23256	1.706
39	Shyam Century Ferrous (A Division of Century Plyboards (I) Ltd.) Dist- Ribhoi, Meghalaya Meghalaya	1.907	19344	1.743

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
40	Indian Metal & Ferro Alloys P.O.KaliaPani, Sukinda, Jajpur Odisha	0.766	133673	0.725
41	Navabharat Ventures Ltd. Khadagprasad Meramandali Rly Station, Dist:-Dhenkanal Odisha	1.140	30640	1.050
42	Balasore Alloys Limited Balgopalpur, Balasore Odisha	0.326	83936	0.306
43	Sunflag Iron & Steel Co. Ltd Bhandara Road, Nagpur Maharashtra	0.235	797322	0.226
44	Neelachal ISPAT Nigam Limited Kalinga Nagar Industrial Complex, Duburi, Jajpur Odisha	0.297	2873603	0.283
45	ISPAT Industries Ltd. Gitapuram, Dis-Raigadh Maharashtra	0.469	249000	0.446
46	Jayaswal Neco Industries Ltd. Siltara Growth Centre, Siltara, Raipur Chhattisgarh	0.502	501713	0.461
47	JSW Ltd. Vasind Maharashtra	0.0527	624860	0.0511
48	VISA Steel Ltd. Kalinganagar Industrial complex Odisha	0.551	694534	0.501
49	Action ISPAT & power Pvt. Jharsuguda Odisha	0.597	103318	0.567

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
50	Bhushan Steel Ltd. Raigarh Maharashtra	0.058	860712	0.056
51	Bhushan Steel Limited. 23, Site-iv, Sahibabad Uttar pradesh	0.056	1022056	0.054
52	Lloyds Steel Industries Ltd. Lloydsnagar, Bhugaon Link Road, Wardha Maharashtra	0.103	726460	0.100
53	Welspun Corp ltd. Welspun City, Survey No.665, Village-Versamedi TA-Anjar (Kutch) Gujarat	0.103	630800	0.100
54	ISPAT Industries Ltd. Kalmeshwer, Nagpur Maharashtra	0.119	547300	0.116
55	SMC Power Generation Ltd. Hirma, Jharsuguda Odisha	0.539	105094	0.512
56	Satyam Iron & Steel Pvt. Ltd. G-7, Mangalpur Industrial Area, Raniganj Burdwan West Bengal	0.663	47193	0.623
57	Mahendra Sponge & power Ltd. Siltara , Raipur Chhattisgarh	0.670	47856	0.632
58	Jai Balaji Industries Ltd. Barai Industrial Growth Centre, PO- Rasmada Dist. Durg Chhattisgarh	0.629	91364	0.595

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
59	Hariyana steel and power Ltd Kanchanahalli, Sathenahalli Post, Shantugrana Hobli, Hassan TQ. Karnataka	0.738	45544	0.688
60	Aarti Steels Pvt. Ltd. Ghantikhal, PO:Mahakalabasta, Via- Athagarh, Dist:Cuttack Odisha	0.790	145758	0.743
61	Usha Martin Limited PO.147, Jamshedpur, Phase V, Aditya Indutrial Area, Gamharia, Dist:Saraikela Jharkhand	0.238	624301	0.229
62	M/S Mukund Ltd. Thane- Belapur road, Dighe Kalwa Maharashtra	0.079	406934	0.077
63	Orrisa Sponge Iron & Steel limtied P.o : Palaspanga, DIST : Keonjhar Odisha	0.685	119441	0.645
64	SKS ISPAT & Power Limited Village:Siltara, Raipur Chhasttisgarh	0.981	183667	0.932
65	Adhunik Metaliks Limited Chadrihariharpur, Dist Sundergarh Odisha	0.764	290533	0.741
66	Visvesvaraya Iron and Steel Plant Bhadravathi, Shimoga Karnataka	1.187	136000	1.132
67	Llyods metals & Energy Limited Plot No. A 1-2, , M I D C Area, Ghugus; Chandrapur Maharashtra	0.609	184742	0.575

(vi) Fertilizer

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
1	BVFCL, Namrup-II Brahmaputra Valley Fertilizers Corporation Limited ,Namrup, P.O- Parbatpur, Distt-Dibrugarh Pin Code – 786623 Assam	1.689	72992	1.487
2	BVFCL, Namrup-III Brahmaputra Valley Fertilizers Corporation Limited ,Namrup, P.O- Parbatpur, Distt- Dibrugarh Pin Code – 786623 Assam	1.154	203702	1.016
3	NFL , Panipat National Fertilizers Limited , Gohana Road, Panipat, Pin Code – 132106 Haryana	0.758	504297	0.576
4	NFL, Bhatinda National Fertilizers Limited, Sibian Road, Bathinda, PinCode -151003. Punjab	0.714	521225	0.557
5	NFL ,Nangal National Fertilizers Limited, Naya Nangal, Distt. Ropar , Pincode -140126. Punjab	0.704	489008	0.528
6	GNFC ,Bharuch Gujarat Narmada Valley Fertilizer Company Limited ,P.O. Narmadanagar, District Bharuch Pin Code - 392015 Gujarat	0.545	621418	0.490

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
7	RCF, Thal Rashtriya Chemicals & Fertilizers Ltd. (Thal Unit), Tal Alibag, Dist Raigad -Pin Code -402208 Maharashtra	0.391	1839342	0.366
8	KRIBHCO Hazira Krishak Bharati Cooperative Ltd, P.O. KRIBHCO NAGAR, Dist Surat , Pin Code- 394515, Gujarat	0.340	1754549	0.323
9	NFL, Vijaipur - I National fertilizers Ltd, Vijaipur Dist: Guna , Pin code: 473111 Madhya Pradesh	0.328	881318	0.319
10	NFL, Vijaipur - II National fertilizers Ltd, Vijaipur Dist: Guna, Pin code: 473111 Madhya Pradesh	0.298	918058	0.295
11	RCF, Trombay -V Rashtriya Chemicals & Fertilizers Ltd.,(Trombay). Mahul Road Chembur, Mumbai ,Pin Code: 400074 Maharashtra	0.497	306905	0.487
12	SFC, Kota Shriram Fertilizers & Chemicals, Kota Plant, Shriram Nagar, Kota - 324 004 Rajasthan	0.512	385728	0.507
13	IFFCO Phulpur - I Indian Farmers Fertilizer Co-Operative Limited , Phulpur P.O Ghiyanagar, Dist. Allahabad ,Pin Code – 212404 Uttar Pradesh	0.428	671636	0.423

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
14	GSFC Baroda Gujarat State Fertilizer Corporation ,P.O. Narmada nagar District, Bharuch, Pin Code - 392015 Gujarat	0.399	294602	0.395
15	MFL , Manali Madras Fertilizers Limited ,Ennore Express Highway ,Manali, Chennai Pin Code – 600068 Tamil Nadu	0.532	427517	0.520
16	ZIL Goa Zuari Industries Limited Jai Kisen Bhawan , Zuari Nagar,Goa ,Pin Code :403 726 Goa	0.435	398578	0.425
17	MCFL Mangalore Mangalore Chemicals & Fertilizers Ltd , Panambur, mangalore ,PinCode -575010 Karnataka	0.420	379667	0.410
18	IFFCO Phulpur - II Indian Farmers Fertilizer Co-Operative Limited , Phulpur P.O Ghiyanagar, Dist. Allahabad ,Pin Code – 212404 Uttar Pradesh	0.328	921630	0.325
19	NFCL Kakinada - II Nagarjuna Fertilizers & Chemicals Ltd , Nagarjuna Road, Kakinada East Godavari District Pin Code – 533003 Andhra Pradesh	0.312	643638	0.309

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
20	CFCL, Gadepan - I Chambal Fertlizers and Chemicals Ltd. P.O :Gadepan , Dist. Kota, Pin Code: 325208 Rajasthan	0.312	977947	0.309
21	NFCL Kakinada - I Nagarjuna Fertilizers & Chemicals Ltd , Nagarjuna Road, Kakinada East Godavari District Pin Code – 533003 Andhra Pradesh	0.303	761280	0.300
22	IFFCO, Aonla - II Indian Farmers Fertilizer Co-Operative IFFCO Aonla unit, P.O IFFCO Township , Bareilly Pin Code - 243403 Uttar Pradesh	0.300	1002626	0.297
23	CFCL Gadepan -II Chambal Fertilizers and Chemicals Ltd. Gadepan , Dist. Kota, Pin Code: 325208, Rajasthan	0.299	1005027	0.296
24	TCL, Babrala Tata Chemicals Ltd,Babrala Indira Dham, Babrala Dist -Budaun , Pin Code - 242021, Uttar Pradesh	0.268	1107238	0.265
25	IFFCO Aonla - I Indian Farmers Fertilizer Co-Operative Ltd IFFCO Aonla unit P.O IFFCO Township , Bareilly Pin Code – 243403 Uttar Pradesh	0.317	954258	0.314

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/T of product)	Product output (Ton)	Specific energy consumption (TOE/T of product)
26	IGFCL, Jagdishpur Indo Gulf Fertilizers , Jagdishpur Industrial Area, Sultanpur, Pin Code -227817 Uttar Pradesh	0.294	1016129	0.291
27	Kribhco Shyam Krbhco Shyam Fertilizer Limited , Village & Post Office : Piprola, Shahjahanpur , Pin Code - 242001 Uttar Pradesh	0.323	915095	0.320
28	IFFCO Kalol Indian Farmers Fertilizer Co-op Ltd Kalol Unit, P.O.Kasturinagar, Dist Ghandhinagar, Pin code – 382423. North Gujarat Gujarat	0.337	568187	0.333
	Major Product Ammonia			
29	FACT Udyogmandal (Ammonia)* The Fertilizers and Chemicals Travancore Limited ,Udyogamandal divison ,Udyogamandal, Pin Code - 683501 Kerala	0.985	137004	0.970

(vii) Cement

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/ton of product)	Equivalent Major Product Output (tons)	Specific energy consumption (TOE/ton of product)
Major Product Portland Pozolona Cement (PPC) Plants				
1.	Ambuja cement ltd., Suli P.O. Darlaghat Tehsil Arki Distt. Solan-171102 Himachal Pradesh	0.0712	3820641.73	0.0684
2.	Lafarge India Pvt. Ltd (Sonadih Cement Plant) PO - Raseda, Via - Balodabazar, Dist - Raipur, Pin - 493332 Chhattisgarh	0.0721	2463398.65	0.0692
3.	Lafarge India Pvt.ltd (Arasmeta cement Plant) Gopalnagar, Dist:-Janjgir Champa Chhattisgarh	0.0722	2533507.82	0.0693
4.	Ultratech Cement Limited, Hirmi Cement Works P.O. Hirmi-493195 Distt. Raipur Chhattisgarh	0.0725	3780724.90	0.0695
5.	Ultratech Cement ltd (Reddipalyam Cement Works) P.O. Reddipalyam Dist.-Ariyalur-621704 Tamil Nadu	0.0746	1480812.84	0.0715
6.	Ultratech Cement Ltd. (Rawan cement Works) Grasim Vihar Vill. Po. Rawan Tehsil Sigma Dist. Raipur-493196 Chhattisgarh	0.0747	2339088.36	0.0716
7.	The India Cements Ltd., Dalavoi Cement nagar-621 730, Sendurai (t.k.), ariyalur (d.t) Tamil Nadu	0.0753	1709858.56	0.0722

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/ton of product)	Equivalent Major Product Output (tons)	Specific energy consumption (TOE/ton of product)
8.	Ultratech Cement ltd. (Vikram cement Works) P.O. Khor-458470 Distt.- Neemuch Madhya Pradesh	0.0755	4939800.15	0.0723
9.	Chettinad Cement Corporation Ltd., Dindigul Rani Meyammai Nagar, Karikkali Post,Guziliamparai (VIA),Dindigul Distt.PIN:624703 Tamil Nadu	0.0756	1662268.02	0.0724
10.	Maihar Cement_Unit-II, Satna Post-Sarlangar Maihar Dist- satna Madhya Pradesh	0.0768	2027853.30	0.0735
11.	Prism cement Works, Satna Vill. Mankahari Tehsil- Rampur bghelan Satna 485111 Madhya Pradesh	0.0783	3363293.63	0.0749
12.	Jaypee Bela Plant, Rewa P.o. Jaypeenagar Distt. Rewa Madhya Pradesh	0.0785	3525291.63	0.0750
13.	ACC Ltd. (Gagal Cement Works -I) P.O.Barmana, Distt Bilaspur, Pin – 174013 Himachal Pradesh	0.0788	2109124.09	0.0753
14.	ACC Ltd. (Gagal Cement Works -II) P.O.Barmana, Distt Bilaspur, Pin – 174013 Himachal Pradesh	0.0796	2310003.56	0.0760
15.	Jaypee Rewa Plant , Rewa P.o. Jaypeenagar Distt. Rewa Madhya Pradesh	0.0800	4492400.00	0.0764

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/ton of product)	Equivalent Major Product Output (tons)	Specific energy consumption (TOE/ton of product)
16.	The India Cements Limited, Sankarnagar Sankarnagar-627 357, Tirunelveli District, Tamil Nadu	0.0803	1784532.49	0.0767
17.	Chettinad Cement Corporation Ltd., Puliyur Kumara rajah Muthiah Nagar, Puliyur, C.F., Karur District, Pin: 639114. Tamil Nadu	0.0803	1257603.02	0.0767
18.	Dalmia Cement (Bharat) Ltd, Trichy Dalmiapuram-621651 Trichy Distt. Tamil Nadu	0.0812	3668817.90	0.0775
19.	Shree Cement Ltd. Beawar Bangur Nagar, PostBox NO.33, Beawar, Distt.Ajmer Rajasthan	0.0813	4508726.04	0.0776
20.	Kalyanpur Cement Ltd, Bihar P.O. Banjari Dist. - Rohtas- 821303 Bihar	0.0821	604895.52	0.0783
21.	Madras Cements Ltd (Alathiyur Work) Alathiyur Work, Cement Nagar, Sendurai Taluk, Ariyalur, Pondichery, Chennai - 621730 Tamil Nadu	0.0835	3195018.66	0.0796
22.	ACC Ltd. (Kymore Cement Ltd.) P.O. Kaymore Tehsil-Vijraghavegarh Distt. Katni -483 880 Madhya Pradesh	0.0850	4591973.50	0.0810

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/ton of product)	Equivalent Major Product Output (tons)	Specific energy consumption (TOE/ton of product)
23.	Penna Cement Industries Ltd. Nalgonda Vill. Ganeshpahad Post:-Wadapally, Distt. Nalgonda Andhra Pradesh	0.0852	1291097.78	0.0811
24.	Ultratech Cements Ltd (Awarpur Cement Works) P.O. Awarpur Cement Project, Taluka: Korpana, Dist. Chandrapur – 442917 Maharashtra	0.0856	3991608.15	0.0815
25.	Ambuja Cement Ltd. Ambujanagar P.O Ambujanagar, Tal-Kodinar, Dist-Junagadh, Pin-362715 Gujarat	0.0856	5466373.46	0.0815
26.	Ambuja Cement Ltd (Maratha Cement Works) Village: Upparwahi, Taluka: Korpana, Distt: Chandrapur – 442908 Maharashtra	0.0857	3388848.57	0.0816
27.	Ambuja Cement Ltd, (Bhatapara Cement Works) P.O. Rawan Tehsil Baloda Bazar Dist.-Raipur Chhattisgarh	0.0862	2022309.11	0.0821
28.	The India Cements Ltd, Vishnupuram Vishnupuram, wadapally post, Distt.-Nalgonda -508355 Andhra Pradesh	0.0867	2786769.58	0.0825
29.	The India Cements Ltd., Sankari SANKARI WEST, SALEM - 637 303, Tamil Nadu	0.0873	672185.45	0.0830

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/ton of product)	Equivalent Major Product Output (tons)	Specific energy consumption (TOE/ton of product)
30.	Birla Cement Ltd. Chittorgarh Sector-3, Madhav Nagar, PO: Cement Factory, CHANDERIA - 312021 DISTT. : CHITTORGARH Rajasthan	0.0873	987678.68	0.0831
31.	JK Lakshmi Cement Ltd., Sirohi P.o. Jaykaypuram distt. Sirohi Rajasthan	0.0877	4481291.93	0.0834
32.	Orient Cement, Devapur Devapur Dist. Adilabad- 504218 Andhra Pradesh	0.0881	3098834.09	0.0837
33.	Meghalaya Cements Ltd. Thangskai Village P.O. Lumshnong Distt. Jaintia Hills-793 200 Meghalaya	0.0884	650752.70	0.0840
34.	Chanderia cement Ltd., Chittorgarh Sector-3, Madhav Nagar, PO : Cement Factory, CHANDERIA - 312021 DISTT. : CHITTORGARH Rajasthan	0.0890	1731405.89	0.0845
35.	Rain Cement limited Unit-1, Nalgonda Ramapuram village Mellacheruvu Mandal Nalgonda Distt. Andhra Pradesh	0.0891	1189273.89	0.0847
36.	JK Cement limited, Nimbahera Kailash Nagar-I Nimbahera Distt. Chittorgarh, Rajasthan Rajasthan	0.0892	3305505.26	0.0847
37.	Birla Corporation Ltd. (Satna Cement Works) P.O. Birla Vikas, Distt.- Satna , Madhya Pradesh	0.0892	2841472.57	0.0848

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/ton of product)	Equivalent Major Product Output (tons)	Specific energy consumption (TOE/ton of product)
38.	Ambuja Cement Ltd. Rabriyawas Teh: Jaitaran, Dist: Pali- 306709 Rajasthan	0.0893	2916130.15	0.0848
39.	Ultratech Cement Ltd. (Aditya Cement Works) Adityapuram Sawa – Shambhupura Road Dist. Chittorgarh- 312613 Rajasthan	0.0896	4160666.96	0.0851
40.	ACC ltd. (Chanda Cement Works) PO. Cementnagar Dist Chandurpur 442502 Maharashtra	0.0898	1188494.71	0.0852
41.	Shree Cement Ltd. Ras Bangur City RAS, Tehsil Jaitaran-306107,Dist: Pali Rajasthan	0.0903	5424050.18	0.0857
42.	Zuari Cement Ltd. , Nalgonda Sitapuram Works Donadapadu Nalgonda Distt. Andhra Pradesh	0.0910	1444263.42	0.0863
43.	Century Cement , Baikunth Baikunth, Dist. Raipur-493116, Chhattisgarh	0.0911	1917933.92	0.0865
44.	ACC Ltd. (Wadi Cement Works) Wadi Pin:-585225 Distt.-Gulbarga Karnataka	0.0922	5205902.19	0.0874
45.	Maihar cement Unit-1, Satana Post-sarlangar maihar Dist- satna Madhya Pradesh	0.0929	1916033.55	0.0880
46.	Mangalam Cement Ltd., Kota P.O. Aditya nagar (Morak) Distt. Kota, Rajasthan	0.0957	1918625.63	0.0906

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/ton of product)	Equivalent Major Product Output (tons)	Specific energy consumption (TOE/ton of product)
47.	ACC Ltd (Lakheri Cement works) P.O.Lakheri Dist.- Bundi -323 603 Rajasthan	0.0971	1210539.37	0.0918
48.	Manikgarh Cement, Chandrapur Post-Gadchandur Tah.-Korpana Dist-Chandrapur Maharashtra	0.0975	1881976.30	0.0921
49.	Ultratech Cement ltd. (Kotputli cement Works) V & P. O. Mohanpura, Tehsil: KotputliDist. Jaipur, PIN 303108, Rajasthan	0.0993	1643937.72	0.0937
50.	The India Cements Ltd Yerraguntla Yerraguntla Works, Yerraguntla -516309 Andhra Pradesh	0.1015	737750.02	0.0958
51.	Dalla Cement Factory (Unit of Jaiprakash Associates Limited) S.H. 5 kota P.O. Dalla Distt.Sonebhadra Uttar Pradesh	0.1016	1883873.66	0.0958
52.	Kesoram Cement (Prop. Kesoram Industries Ltd.,) Basantnagar P.O., Dist. Karimnagar, Andhra Pradesh	0.1042	1521847.95	0.0981
53.	Andhra cement Ltd., Guntur Durgapuram, Dachepalli Guntur Distt. 522414 Andhra Pradesh	0.1111	901739.38	0.1042
54.	Malabar Cement Ltd. Palakkad Walayar, Palakkad, Kerala - 678 624 Kerala	0.1121	520817.52	0.1050

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/ton of product)	Equivalent Major Product Output (tons)	Specific energy consumption (TOE/ton of product)
55.	Panyam Cements & Minerals Industries Ltd Cement Nagar, Distt. Kunool-518206, Andhra Pradesh	0.1227	570431.10	0.1143
Major Product Ordinary Portland Cement (OPC) Plants				
56.	The K C P Ltd., Cement unit- Macherla Macherla-522426, Dist. Guntur Andhra Pradesh	0.0965	749537.31	0.0924
57.	Binani Cement Ltd., Sirohi Binanigram tehsil-Pindwara Distt-Sirohi-307031 Rajasthan	0.0986	4097795.92	0.0943
58.	Ultratech Cement Ltd (Gujrat Cement Ltd.) Village: Kovaya, Taluka: Rajula City, Dist. Amreli- 365 541 Gujarat	0.0988	5551353.17	0.0945
59.	Ultra Tech Cement Ltd (Naramada Cement) P.B.no-10,babarkot Village, Pin code: 365540,Dist:Amreli Gujarat	0.1011	1618506.94	0.0966
60.	My Home Industries Ltd., Nalgonda Mellacheruvu-508246 Nalgonda Distt. Andhra Pradesh	0.1036	2510059.37	0.0989
61.	The India Cement Ltd., Malkapur Works SY No.-51, Malkapur Village Malkapur Post, Tandur, Ranga reddy Distt. - 501157 Andhra Pradesh	0.1066	1432509.58	0.1016

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/ton of product)	Equivalent Major Product Output (tons)	Specific energy consumption (TOE/ton of product)
62.	Ultratech Cement Ltd (Rajshree Cement Works) Adityanagar Malkhed Road-585292, Dist.- Gulbarga Karnataka	0.1091	4243556.66	0.1039
63.	Vasavadatta Cement, Gulbaraga Sedam-585222 Gulbaraga Distt. Karnataka	0.1099	3730929.49	0.1046
64.	Penna Cement Industries Limited, Boyareddypalli Boyareddypalli, Yadiki Mandal, Anantapur Distrtic, Pincode : 515408, Andhra Pradesh	0.1101	1260383.26	0.1047
65.	Shree Digvijay Cement Co. Limited, Jamnagar PO. Digvijaygram, Sikka Dist. Jamnagar, Gujarat	0.1127	948758.12	0.1072
66.	Gujarat Sidhee cement Ltd., Junagarh Sidheegram Veraval-Kodinar Highway dist. Junagarh Gujarat	0.1160	1324531.90	0.1101
67.	The India Cement Ltd. Chilamkur Chilamkur Post, Kadapa Dist-516310 Andhra Pradesh	0.1179	1222181.05	0.1118
68.	Rain cement Ltd Unit-II, Kurnool Sreepuram,Boinchervupally (V),Peapully (M),Kurnool Dist-518220 Andhra Pradesh	0.1190	979298.65	0.1128
69.	Tata Chemicals Limited, Mithapur Mithapur-361345, Dist: Jamanagar, Gujarat	0.1319	418043.72	0.1242

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/ton of product)	Equivalent Major Product Output (tons)	Specific energy consumption (TOE/ton of product)
70.	Saurashtra Cement Ltd, Ranavav Near Railway Station, RANAVAV - 360560 , Dist - PORBANDAR Gujarat	0.1319	1433187.48	0.1243
71.	Sanghi Industries Ltd., Kutch PO.Sanghipuram, TA-Abdasa Dist-Kutch , Gujarat	0.1368	2315329.96	0.1286
	Major Product Portland Slag Cement (PSC) Plants			
72.	OCL India Ltd, Odisha P.O: Rajgangpur, Dist: Sundergarh, Pin: 770017 Odisha	0.0700	2345958.15	0.0674
73.	ACC Ltd (Chaibasa) Chaibasa Jinkpani Dist Singhbhoom-833 215 Jharkhand	0.0794	2225051.76	0.0761
74.	Ultratech Cement ltd (AP Cement Works) Bhogasamudram-515415,Tadipatri,Anantapur Distt, Andhra Pradesh	0.0802	4623915.47	0.0768
75.	Penna Cement Industries Ltd., Anantpur Talaricheruvu mandal anantpur Andhra Pradesh	0.0859	1792310.65	0.0820
76.	ACC Ltd (Bargarh Cement Works) Cement Nagar, PO- Bardol, Dist. Bargarh - 768038 Odisha	0.0881	1355911.77	0.0840
77.	ACC Ltd (Jamul Cement Works) P.O. Jamul Cement Works District Durg Pin- 490 024 Chhattisgarh	0.0936	1411921.77	0.0890

(1)	(2)	(3)		(4)
	Name, Address and State	Specific energy consumption (TOE/ton of product)	Equivalent Major Product Output (tons)	Specific energy consumption (TOE/ton of product)
78.	Heidelberg Cement India Ltd, Tumkur PO:Ammasandra.Tq:Turuvekere. Dt:Tumkur. Karnataka	0.0968	423298.95	0.0918
	White Cement Plants			
79.	JK white Cement, Nagaur PO.Gotan-342902 Dist.- Nagaur Rajasthan	0.1452	307926.48	0.1379
80.	Ultratech Cement Ltd., Unit- Birla White D-7 Shastri Nagar Jodhpur-342003 Rajasthan	0.1485	458535.33	0.1409
	Wet Cement Plants			
81.	ACC Ltd. (Madukkari Cement Works) P.O.Madukkari Dist.Coimbatore Tamil Nadu	0.1241	975013.08	0.1181
82.	DCM Shriram Consolidated Ltd, Kota Shriram nagar Distt. Kota Rajasthan	0.1245	392571.99	0.1184
	Only Grinding Plants			
83.	ACC Ltd. Tikaria Cement Works PO- Gauriganj District -Chhatrapati Shahuji Maharaj Nagar, Uttar Pradesh	0.0139	2532930.21	0.0133
84.	Ambuja Cement Limited, Ropar Vill.-Doburji P.O. Lodhimajra Distt. Ropar -140113 Punjab	0.0201	2800401.57	0.0189
	Only Clinkerization Plant			
85.	Diamond Cement Prop. Heidelberg Cement, Damoh Village Narsingarh Dist.-Damoh Madhya Pradesh	0.1257	1222000.00	0.1193

(viii) Thermal Power Plant

S. No.	Designated consumer	Baseline energy consumption norms & standards in kcal per unit of net electricity produced for the baseline year (average of three years).		Energy Consumption norms & standards in kcal per unit of net electricity produced for the target year.
(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
1	Gas Turbine Power Station Andhra Pradesh Gas Power Corporation Ltd. Vijjeswaram Andhra Pradesh	1936	1560	1931
2	GMR Vemagiri Power Generation Limited, Rajamundry Vemagir Vill, Kadiyam Mandal, East Godawari Dist.-533125 Andhra Pradesh	1774	2917	1774
3	Kothagudam Thermal Power Station (Combined, 720 MW) Paloncha, Khammam Dist - 507115 Andhra Pradesh	2973	4370	2935
4	Kothagudam Thermal Power Station Stage V (500 MW) Paloncha, Khammam Dist - 507115 Andhra Pradesh	2565	3502	2556
5	Lanco Kondapalli Power Private Limited Ida Kondapalli, Ibrahim Patanam, Krishna Dist. - 521228 Andhra Pradesh	2007	2409	1988

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
6	NTPC Ltd. Ramagundam Super Thermal Power Station P.O. Jyothi nagar, Dist. Karim Nagar-505215 Andhra Pradesh	2520	19990	2498
7	NTPC-Simhadri Vishakhapatanam-531020 Andhra Pradesh	2490	7820	2468
8	Ramagundam Thermal Power Station Ramagundam Dist. Karim Nagar - 505208 Andhra Pradesh	2885	446	2885
9	Rayalaseema Thermal Power Project V.V. Reddy nagar, Kadapa Dist. - 516312 Andhra Pradesh	2529	5804	2522
10	Reliance Smalakot Thermal Power Station IDA Peddapuram, Samalkot Andhra Pradesh	2106	1213	2080
11	Spectrum Power Generation Ltd., East Godavari Uppada beach Road, Kakinada -533448 Andhra Pradesh	2123	1452	2117
12	Vijaywada (Dr. Narla Tata Rao) Thermal Power Station Ibrahimpatnam, Krishna Dist. - 521456 Andhra Pradesh	2571	9074	2566
13	Kathalguri Gas Based Power Plant , NEEPCO AGBP, NEEPCO Ltd, Bokuloni Chariali, Dibrugarh - 786191 Assam	2683	1714	2561

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
14	Lakwa Thermal Power Station Maibella, P.O. Suffry, Sivasagar-785689 Assam	4279	615	4237
15	Namrup Thermal Power Station, APGCL P.O. NTPS , Namrup Dibrugarh-786622 Assam	3808	550	3759
16	Barauni Thermal Power Plant Begusarai Bihar	5134	732	4618
17	NTPC Ltd- Kahalgaon P.O. Kahalgaon, STPS, Bhagalpur-813214 Bihar	2614	8225	2605
18	ACB (India) TPPs Pvt Ltd. Chakabura, Korba Chhattisgarh	4181	183	4143
19	Dr. Shyamaprasad Mukharjee Thermal Power Station Korba CSPGCL, Korba (East) Korba-495677 Chhattisgarh	2738	3488	2671
20	Hasdeo Thermal Power Station Korba (West) CSPGCL, Korba West, Darri, Korba-495450 Chhattisgarh	2871	5751	2802
21	Jindal Power Limited, Tamnar O.P. Jindal Super Thermal Power Plant, P.O. Tamnar, Tahsil Tamnar, Raigarh-496107 Chhattisgarh	2526	7486	2518

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
22	Korba (East) Thermal Power Station Korba East , Dist. Korba - 495677 Chhattisgarh	3334	2773	3199
23	NTPC Ltd-Korba Vikas Bhawan, Jamnipali, Korba - 495450 Chhattisgarh	2526	16722	2515
24	NTPC Ltd-Sipat P.O. Ujjwal Nagar, Dist. Bilaspur-495555 Chhattisgarh	2491	5877	2484
25	NTPC SAIL Power Co. Pvt. Ltd. (500 MW) Joint Venture of NTPC & SAIL, Purena , Bhilai East-490021 Chhattisgarh	2741	3178	2704
26	R R Energy Ltd., Raigarh NH-200, Jharsuguda Road, Near KIT College, Garhumaria, Raigarh-496001 Chhattisgarh	4084	105	3985
27	Indraprastha Gas Turbine Power Station Indraprasth Power Generation Co. Ltd, IP Estate, Ring road , New Delhi-110002 Delhi	2815	1308	2649
28	NTPC Ltd-Badarpur Badarpur, New Delhi, 110044 Delhi	2988	4897	2942
29	Pragati Power Station - 1 IP Estate, Ring Road, New Delhi-110002 Delhi	2068	2352	2061

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
30	Rajghat Power House (Indraprastha Power Generation Company Ltd.) Rajghat Power House , Ring Road, New Delhi-110002 Delhi	4011	696	3766
31	Goa Power Station (Reliance Infrastructure Limited) Opposite Sancoal Industrial Estate, Zuari Nagar. Goa	2136		2104
32	Akrimota Thermal Power Station, Kutch Nani Chher, Tal. Lakhapat, Kutch-370602 Gujarat	3376		3237
33	Dhuvaran CCPP , Anand Ta-Khambhat, Dist. Anand Gujarat	2183		2096
34	Essar Power Ltd, Hazira 27 Km, Surat-Hazira Road, Surat-394270 Gujarat	2072		2063
35	Gandhinagar Thermal Power Station (Gujarat State Electricity Corp. Ltd) Gandhi Nagar Gujarat	3016		2929
36	Gujurat Paguthan Energy Co. Pvt ltd., Bharuch Vill Paguthan, Bharuch Palej Road, Bharuch-392015 Gujarat	2010		2004

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
37	Kutch (Lignite) Thermal Power Station, Gujarat State Electricity Corp. Ltd. SKV Nagar, Taluka Lakhpat, Dist. Kutch-370601 Gujarat	4096		3996
38	NTPC Ltd - Jhanor Gandhar, Bharuch P.O. Urja Nagar, Dist. Bharuch-392215 Gujarat	2075		2072
39	NTPC Ltd - Kawas , Surat P.O. Aditya Nagar, Kawas, Surat-394516 Gujarat	2070		2062
40	Sabarmati Thermal Power Station Torrent Power Ltd, Ahmedabad-380005 Gujarat	3103		3027
41	Sikka Thermal Power Station, Jamnagar (Gujarat State Electricity Corporation Ltd.) GSECL, Sikka, Dist. Jamnagar-361141 Gujarat	3450		3277
42	Surat Combined Cycle Power Station, Gujarat State Electricity Generation (GSEC) Vill. Mora, P.O. Bhatha, Surat Hazira Road, Surat-394510 Gujarat	2071		2049

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
43	Surat Lignite Power Plant (Gujarat Industries Power Company Ltd.), Surat GIPCL, Nani Naroli, Tk. Mangrol, Dist. Surat-394110 Gujarat	2898		2866
44	UKAI Thermal Power Station GSECL, Vidyut Bhawan, Racecource, Vadodara - 390007 Gujarat	3050		2953
45	Utran Gas Based Power Station (Gujarat State Electricity Corp.) GSECL, Utran-390007 Gujarat	2303		2298
46	Vadodara Gas Power Station, (Gujurat Industries Power Company Ltd) P.O. Petro Chemicals , Vadodara-391346 Gujarat	2173		2166
47	Vatva Combined Cycle Power Plant, Torrent Power Ltd. G.I.D.C. Phase IV, Ahmedabad-382445 Gujarat	2163		2163
48	Wanakbori Thermal Power Station , Kheda Taluka Thasra, Dist. Kheda-388239 Gujarat	2887		2820
49	NTPC Ltd - Faridabad Tigaon Road, Vill Mujedhi, Faridabad - 121004 Haryana	2001		1983

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
50	Panipat Thermal Power Station - I HPGCL, Assandh Road, Vill. Assandh, Panipat-132105 Haryana	3060		2892
51	Yamuna Nagar Thermal Power Station Yamuna Nagar Haryana	2878		2836
52	Bokaro Thermal Power Station, Damodar Valley Corporation BTPS "B", Bokaro Thermal, P.O. Bokaro-829107 Jharkhand	3560	3180	3374
53	Chandrapura Thermal Power Station , Damodar Valley Corporation Bokaro Dist. Jharkhand	3188	2120	3038
54	Jojobera Power Plant (TATA power Co.) P.O. Rahargora, Jamshedpur-831016 Jharkhand	2977	2649	2908
55	Patratu Thermal Power Station Hazaribagh Jharkhand	3534	992	3438
56	Tenughat Thermal Power Station, TVNL TVNL, Bokaro Jharkhand	2936	1850	2899
57	Bellary Thermal Power Station Kudathini, Bellary Dist. -583115 Karnataka	3123	2694	2930

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
58	Raichur Thermal Power Station (Karnataka Power Corp. Ltd.) Shakti Nagar, Raichur-584170 Karnataka	2807	9681	2743
59	Toranagallu Thermal Power Station (JSW Energy Ltd.), Bellary (600 MW) Toranagallu, (P.O), Bellary (Dist)-583123 Karnataka	2422	2103	2420
60	Toranagallu Thermal Power Station (JSW Energy Limited) (260 MW) Toranagallu, (P.O), Bellary (Dist)-583123 Karnataka	2515	2082	2503
61	Yelahanka D. G. Power Plant, Bangalore S.N. Halliport - Doddaballapur Road, Bangalore-560064 Karnataka	2124	372	2079
62	Brahmapuram DG Power Plant KSEB, Kochi Kerala	2115	175	2074
63	BSES Kerala Power Project Udyogamandal, Kochi-683501 Kerala	1969	590	1965
64	Kasargod DG Power Plant KPCL, Kasaragod Kerala	2265	69	2166
65	Kozhikode Diesel Power Project KSEB, Nallalam, Kozhikode-673027 Kerala	2150	350	2115

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
66	NTPC Ltd - Kayamkulam (Rajiv Gandhi Combined Cycle Power Plant) P.O. Choolatharuvu, Dist. Alappuzha-690506 Kerala	1994	2016	1988
67	Amarkantak Thermal Power Station, Chachai, (Phase II + III) Chachai Madhya Pradesh	3498	1662	3354
68	NTPC Ltd -Vindhyachal Vindhya Nagar, Dist. Singrauli-486885 Madhya Pradesh	2532	24892	2521
69	Sanjay Gandhi Thermal Power Station MPPGCL, Birsinghpur , Dist Umaria-484552 Madhya Pradesh	3402	7138	3192
70	Satpura Thermal Power Station MPPGCL, Sarni Madhya Pradesh	3681	6408	3444
71	Bhusawal Thermal Power Station, MAHAGENCO Deep Nagar, Tah. Bhusawal, Dist. Jalgaon-425307 Maharashtra	3218	2801	3107
72	Chandrapur Super Thermal Power Station , MAHAGENCO Urja Nagar, Chandrapur-442404 Maharashtra	2920	13942	2827
73	Dahanu Thermal Power Station Thane Dist- 401608 Maharashtra	2535		2523

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
74	Khaperkheda Thermal Power Station , MAHAGENCO Khaperkheda, Tah. Saoner, Dist. Nagpur -441102 Maharashtra	3016		2888
75	Koradi Thermal Power Station, MAHAGENCO Koradi, Tq. Kamti, Dist. Nagpur Maharashtra	3600		3393
76	Nasik Thermal Power Station, MAHAGENCO Eklahare, Nasik-422105 Maharashtra	3215		3067
77	New Parli Thermal Power Station, MAHAGENCO Parli Vaijnath, Dist. Beed-431520 Maharashtra	3276		3098
78	Paras Thermal Power Station, MAHAGENCO Paras, Vidyut Nagar, Paras(C.R.) Tq. Balapur, Dist. Akola-444109 Maharashtra	3346		3156
79	Parli Thermal Power Station, MAHAGENCO Dist. Parli Vaijnath, Dist. Beed-431520 Maharashtra	3346		3190
80	Trombay Combined Cycle Power Plant(Tata Power Company) Chambur-400074 Maharashtra	2107		2101

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
81	Trombay Thermal Power Station (Coal & Oil) (Tata Power Company) Chambur-400074 Maharashtra	2570		2547
82	Uran Gas Power Station, Mahagenco Raigarh-400702 Maharashtra	2046		2038
83	IB Thermal Power Station, Orissa Power Gen. Co. Ltd Jharsuguda-768234 Odisha	2708		2699
84	NTPC Ltd -Talcher Kaniha P.O. Deepsika, Angul-759147 Odisha	2492	22389	2480
85	NTPC Ltd-Talcher Thermal , Angul P.O. Talcher, Angul-759101 Odisha	3196	3259	3130
86	Puducherry Gas Power Plant (Puducherry Power Corporation Ltd.) Puducherry Puducherry	2699	236	2697
87	Guru Gobind Singh Super Thermal Power Station, Ropar Roop Nagar- 140113 Punjab	2922	9008	2830
88	Guru Hargobind Thermal Power Plant, Lehra Mohabbat Dist. Bathinda-151111 Punjab	2672	7033	2637

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
89	Guru Nanak Dev Thermal Plant, Bhatinda Bhatinda Punjab	3485	2532	3329
90	Dholpur Combined Cycle Power Station Dholpur-328001 Rajasthan	2184	2297	2184
91	Giral Lignite Power Limited Barmer-344001 Rajasthan	4337	467	4058
92	Kota Super Thermal Power Station Kota- 324008 Rajasthan	2862	9047	2830
93	NTPC Ltd - Anta Dist. Baran -325209 Rajasthan	2091	2689	2081
94	Raj West Power Ltd. Barmer Rajasthan	3723	3612	3559
95	Ramgarh Gas Thermal Power Plants Jaisalmer Rajasthan	2886	334	2666
96	Suratgarh Super Thermal Power Station Sri Ganga Nagar-335804 Rajasthan	2740	8812	2687
97	Basin Bridge Gas Turbine Power Station Chennai-600012 Tamil Nadu	3457	105	3379

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
98	Ennore Thermal Power Station Chennai Tamil Nadu	3891	1563	3682
99	GMR Energy Ltd, Chennai Basin Bridge , Chennai -600012 Tamil Nadu	2047	1214	2047
100	Kuttalam Gas Turbine Power Station Nagapattanam Tamil Nadu	2170	450	2067
101	Lanco Tanjore Power Co.Ltd, ABAN Power Co.Ltd Karuppur, Thanjabur Dist. Tamil Nadu	2127	777	2127
102	Madras Aluminum Company Salem Tamil Nadu	3624	686	3470
103	Madurai Power Corporation Pvt Ltd. Samayanallur, Madurai-625402 Tamil Nadu	2141	547	2141
104	Mettur Thermal Power Station, Salem Tamil Nadu	2739	5982	2715
105	Neyveli Thermal Power Station - I (Expansion) Neyveli Lignite Corp., Neyveli-600007 Tamil Nadu	2999	2858	2938
106	Neyveli Thermal Power Station 1 Neyveli Cuddalore Tamil Nadu	4453	3335	4131

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
107	Neyveli Thermal Power Station- 2 Neyveli Cuddalore Tamil Nadu	3222	9069	3148
108	North Chennai Thermal Power Station TNEB, Chennai-600120 Tamil Nadu	2696	4332	2684
109	Pioneer Power Ltd. (Penna Electricity Ltd) Valantharavai, Ramnad Dist. 623536 Tamil Nadu	2514	332	2477
110	PPN Power Generating Co. Ltd. Chennai Tamil Nadu	1879	2176	1857
111	Samalpatti Power Company Pvt Ltd., Krishnagiri Krishnagiri Dist, -635206 Tamil Nadu	2124	563	2124
112	ST-CMS Electric Company Pvt. Ltd. Uthanjal, Cuddalor Dist. 607804 Tamil Nadu	2963	1660	2939
113	TCP Limited Chennai Tamil Nadu	3598	464	3487
114	Thirumakottai (Kovil Kalapal) Gas Turbine Power Station, Mannargudi-614017 Tamil Nadu	2216	599	2113
115	Tuticorin Thermal Power Station Tuticorin Tamil Nadu	2777	7050	2738

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
116	Valuthur Gas Turbine Power Station Ramanathapuram, -623536 Tamil Nadu	2144	625	2058
117	Agartala Gas Turbine Power Plant, NEEPCO NEEPCO, Agartala-799008 Tripura	3788	648	3707
118	Baramura Gas Thermal Power Plant, Baramura Teliamura, West Tripura-799205 Tripura	3639	162	3631
119	Rokhia Gas Thermal Power Plant, Rokhia Rokhia, Sonamura-799102 Tripura	3892	418	3852
120	Anpara Thermal Power Station, Sonebhadra Sonebhadra Dist. Uttar Pradesh	2643	10579	2640
121	Harduaganj Thermal Power Station Kasimpur , Aligarh-202127 Uttar Pradesh	4585	611	4247
122	NTPC Ltd - Auraiya Dist. Auraiya-206244 Uttar Pradesh	2190	4017	2163
123	NTPC Ltd - Dadri Gas GB Nagar Dist-201008 Uttar Pradesh	2037	5243	2031
124	NTPC Ltd - Dadri Coal GB Nagar Dist-201008 Uttar Pradesh	2580	6903	2558

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
125	NTPC Ltd -Rihand P.O. Rihand Nagar, Sonebhadra-231223 Uttar Pradesh	2512	15752	2491
126	NTPC Ltd- Singrauli P.O. Shakti Nagar, Sonebhadra-231222 Uttar Pradesh	2577	14949	2568
127	NTPC Ltd -Tanda Dist. Ambedkar Nagar-224238 Uttar Pradesh	3083	3114	3051
128	NTPC Ltd- Unchahar (Feroze Gandhi Thermal Power Project), Raibareli Raibareli-229406 Uttar Pradesh	2596	8152	2586
129	OBRA Thermal Power Station Obra, Sonebhadra-231219 Uttar Pradesh	3731	4466	3601
130	Panki Thermal Power Station Kanpur Uttar Pradesh	3710	1057	3557
131	Parichha Thermal Power Station Jhansi Uttar Pradesh	3046	3305	2969
132	Bakreswar Thermal Power Station Birbhum-731104 West Bengal	2974	4253	2873
133	Bandel Thermal Power Station Tribeni, Hoogly. West Bengal	3731	2006	3503

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
134	Budge Budge Thermal Power Station South 24 Parganas West Bengal	2669	4095	2644
135	Durgapur Thermal Power Plant (Durgapur Projects Ltd) Durgapur West Bengal	3317	2582	3214
136	Durgapur Thermal Power Station , Damodar Valley Corp. Ltd. Durgapur West Bengal	3278	1677	3134
137	Kolaghat Thermal Power Station, WBPDCL Salt Lake City, Kolkata-700098 West Bengal	3246	6632	3105
138	Mejia Thermal Power Station , Damodar Valley Corporation Durlavpur, Bankura Distt. West Bengal	2781	6163	2739
139	New Cossipore Thermal Power Sattion New Cossipore West Bengal	3818	353	3743
140	NTPC Ltd -Farakka Murshidabad Dist West Bengal	2596	10144	2574
141	Sagardighi Thermal Power Station Murshidabad Dist West Bengal	3584	2912	3465

(1)	(2)	(3)		(4)
	Name, Address and State	Net Heat Rate (Kcal/ KWh)	Net Product Output (Million Units)	Net Heat Rate (Kcal/KWH)
142	Santaldih Thermal Power Station Dist. Purulia-723146 West Bengal	3768	1292	3600
143	Southern Replacement Thermal Power Station C.E.S.C. Ltd. Kolkata West Bengal	3154	1003	3057
144	Titagarh Thermal Power Station North 24 Parganas West Bengal	3182	1729	3145

The designated consumers referred to in column (2) of the sector table above shall comply with the energy consumption norms and standards specified against their name in column 4 of the said Sector Table by the target year 2014-15.

[F. No. 10/6/2008-EC]
JYOTI ARORA, Jt. Secy.

9. Annexure 2: PAT Rules

Ministry of Power

Notification

New Delhi, the 30th March, 2012

G.S.R. 269(E).- In exercise of the powers conferred by clauses (f),(g), (k), (la)and (laa) of section 56, read with clauses (g) and (o) of section 14, sub-section (1) of section14Aand section 14B of the Energy Conservation Act, 2001 (52 of 2001), the Central Government hereby makes the following rules, namely:-

1. Short title and commencement.- (1) These rules may be called the Energy Conservation (Energy Consumption Norms and Standards for Designated Consumers, Form, Time within which, and Manner of Preparation and Implementation of Scheme, Procedure for Issue of Energy Savings Certificate and Value of Per Metric Ton of Oil Equivalent of Energy Consumed) Rules, 2012.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. Definitions.-(1) In these rules, unless the context otherwise requires, -

(a) "Act" means the Energy Conservation Act, 2001;

(b) "baseline year" means the year in which the base level of energy consumption is used as a reference point for establishment and assessment of performance with regard to compliance of energy consumption norms and standards under rule 4 and rule 6 respectively;

(c) "certification" means the process of certifying the verification report or check-verification report by the accredited energy auditor to the effect that the entitlement or requirement of energy savings certificate is quantified accurately in relation to compliance of energy consumption norms and standards by the designated consumer during the target year;

(d) "check-verification" means an independent review and ex-post determination by the Bureau throughthe accredited energy auditor, of the energy consumption norms and standards achieved in any year of the three year cycle which have resulted from activities undertaken by the designated consumer with regard to compliance of the energy consumption norms and standards;

(e) "cycle" means the period of three years available to a designated consumer to comply with the energy consumption norms and standards;

(f) "energyconsumption norms and standards" means the specific energy consumption of the designated consumerfor the specified year notified under clause (g) of section 14;

(g) "Form" means the form annexed to these rules;

(h) "Rules 2007" means the Energy Conservation (the form and manner for submission of report on the status of energy consumption by the designated consumers) Rules, 2007 notified in the Official Gazette vide number G.S.R 174 (E), dated the 2nd March,2007;

(i) "Rules 2008" means the Energy Conservation (Form and Manner and Time for Furnishing Information With Regard to Energy Consumed and Action Taken on Recommendations of Accredited Energy Auditor) Rules, 2008 notified in the Official Gazette vide number G.S.R 486(E), dated the 26th June,2008;

(j) "Schedule" means the Schedule annexed to these rules;

(k) "section" means a section of the Act;

(l) "specific energy consumption" means the ratio of the net energy input into the designated consumers' boundary to the total quantity of output exported from the designated consumers' boundary, calculated as per the following formula:-

specific energy consumption =

$$\frac{\text{net energy input into the designated consumers' boundary}}{\text{total quantity of output exported from the designated consumers' boundary}}$$

and expressed in terms of the metric ton of oil equivalent (toe)/per unit of product;

(m) "targetyear" means the year by which a designated consumer shall achieve compliance with the energy consumption norms and standards;.

(n) "verification" means a thorough and independent evaluation by the accredited energy auditor of the activities undertaken by the designated consumer for compliance with the energy consumption norms and standards in the target year compared to the energy consumption norms and standards in the baseline year and consequent entitlement or requirement of energy savings certificate;

(o) "year" means the financial year beginning on the 1st day of April and ending on the 31st day of March following.

(2) Words and expressions used herein and not defined but defined in the Act shall have the meanings respectively assigned to them in the Act.

3. Establishment of energy consumption norms and standards.-(1)The Central Government, in consultation with the Bureau, shall establish, amend or rescind the energy consumption norms and standards for designated consumers as notified under clause (g) of section 14.

(2) The energy consumption norms and standards shall be specific for every designated consumer and shall be determined as under:-

(a) where energy audit of the designated consumer' plant has been completed, energy saving measures and action plan for their implementation has been finalised in consultation with the energy manager of the plant under regulations 4 and 5 of the Bureau of Energy Efficiency (Manner and Intervals of Time for Conduct of Energy Audit) Regulations, 2010,the energy consumption norms and standards shall be based on the timely submission of Form 2 and Form 3 under Rules 2008;

(b) where energy audit of the designated consumers' plant has not been completed or undertaken, the energy consumption norms and standards shall be determined taking into account the following factors, namely:-

(i) average rate of reduction in specific energy consumption across all the designated consumer sectors' determined on the basis of the analysis of data of the last three years;

(ii) policy objectives of keeping the target of reducing the specific energy consumption a few percentage points above the average rate of reduction

keeping in view the incentive provided through the issue of energy savings certificate.

(3) Where the energy consumption norms and standards have been determined in accordance with clause (a) or clause (b) of sub-rule (2),the said methodology shall not be reviewed after the commencement of the energy consumption norms and standard notified under clause (g) of section 14.

(4) The designated consumers shall achieve compliance with the energy consumption norms and standards as notified under clause (g) of section 14 within a period of three years from the date of commencement of the said notification.

4. Procedure for establishment of energy consumption norms and standards.-(1)For the purpose of establishment of energy consumption norms and standards, the technical committee set up by the Bureau shall-

(a) calculate specific energy consumption in the baseline year and projected specific energy consumption in the target year covering different forms of net energy going into the boundary of the designated consumers' plant and the products leaving it over the relevant cycle on a gate-to-gate basis;

(b) in calculating the net energy input to the plant,-

(i) convert the calorific values of all forms of energy sources into a single unit, namely, ton of oil equivalent using the conversion formulae specified in the Government of India, Ministry of Power notification number S.O.394(E), dated the 12th March, 2007;

(ii) consider all forms of energy that is, electricity, solid fuel, liquid fuel, gaseous fuel, or any other form of energy imported into the plant for consumption as energy for production of output;

(iii) not take into account energy consumed in the colony attached to the plant, temporary or major construction work, and for outside transportation system or energy consumed through renewable energy sources not connected to the grid;

(iv) take into account the energy exported out of the designated consumers' boundary;

(v) if any designated consumers' plant does not have disaggregated figures for energy consumed, consider the net energy consumed for calculation both in baseline year and in the target year:

Provided that the said designated consumer shall give adequate reasons that it was not feasible to make adjustment for energy consumed in the colony, temporary or major construction work:

Provided further that such designated consumer shall make necessary arrangements for disaggregation of data for energy consumption to ensure that actual energy consumed for production is considered in the next cycle;

(vi) where more than one product is produced, select the main product produced or an equivalent product worked out from the product mix as per standard practice prevalent in the concerned designated consumers sector:

Provided that where the production of the said main product is stopped, the designated consumer shall inform the necessary details in that regard to the Bureau and the concerned state designated agency;

(c) calculate the specific energy consumption for the baseline year as well as for the target year and normalise it by taking into account the capacity utilisation, mix of grid and captive electricity, and any other factor which affects energy consumption as specified in the Schedule;

(d) calculate the annual specific energy consumption in the baseline year by verifying the data in the previous three years, year-wise, using the data submitted by the designated consumers' under Rules 2007 and if verified, under Rules 2008;

(e) calculate the effect of capacity utilisation and other factors if any, on the specific energy consumption for the previous three years;

(f) calculate the specific energy consumption, production, capacity utilisation, in the baseline year by taking the average of the previous three years in the first cycle and for subsequent cycles, the provisions of rule 14shall apply;

(g) take into consideration the effect on capacity utilisation or the plant load factor or average energy consumption in the target year on account of any of the following factors, namely:-

(i) natural disaster; or

(ii) rioting or social unrest; or

(iii) major change in the Government policy including environmental standards; or

(iv) impact of market (shortage of raw material or sales) in any of the previous three years.

(2) The said technical committee shall prepare a report containing designated consumer-specific basis of methodology referred to in sub-rule 2 of rule 3, consultation with the designated consumers, and submit the said report to the Bureau.

(3) The Bureau shall examine the report submitted under sub-rule (2) and finalise its report containing its recommendation regarding the energy consumption norms and standards for each designated consumers' plant.

(4) The details regarding methodology used, formulae adopted, exceptions considered, principles adopted, for preparation of energy consumption norms and standards shall be as specified in the Schedule.

(5) The Bureau shall submit the report referred to in sub-rule (3) to the Central Government.

(6) The Central Government after considering the said report shall by notification,-

(a) establish and specify the energy consumption norms and standards for every designated consumers' plant under clause (g) of section 14;

(b) give direction to all designated consumers for compliance with the energy consumption norms and standards under clause (n) of section 14and inform the Bureau and all the State designated agencies.

5. Form, manner and time for preparation of scheme for implementation of efficient use of energy and its conservation.-(1) Every designated consumer, within three months of the issue of notification under sub-rule (6) of rule 4 shall submit a scheme to State designated agency with a copy to Bureau, which may include -

(a) action plan containing inter-alia, a brief description of identified energy saving measures to comply energy consumption norms and standards by the target year;

(b) the estimated cost of each identified energy saving measures;

(c) implementation plan to achieve energy consumption norms and standards through implementation of energy saving measures or through purchase of energy savings certificates.

6. Assessment of performance.-(1) Every designated consumer, within three months of the conclusion of the target year from the baseline year shall submit to the State designated agency, with a copy to the Bureau, the performance assessment document in Form 'A' covering the performance for the relevant cycle specifying the compliance with energy consumption norms and standards, duly verified together with certificate in Form 'B' given by the accredited energy auditor and accompanied by the following documents, namely:-

(a) copy of unique number of registration given to the designated consumer;

(b) proof of timely submission of reports in Form 1 under Rules 2007 for the previous three years;

(c) proof of timely submission of reports in Form 1, Form II and Form III under Rules 2008 along with copies thereof including the reports for the target year;

(d) details of energy savings measures implemented for compliance with the energy consumption norms and standards in Form II and Form III of Rules 2008, for each year, covering the relevant cycle enclosing therewith, a brief about the year-wise energy savings measures, details of investment made, photographs in support of measures implemented in each year, if feasible, and percentage improvement in energy savings achieved in every year following the baseline year until the target year;

(e) details of energy consumption norms and standards of the designated consumers in the baseline year, achievement made in every year following the baseline year and upto the target year together with the opinion of the accredited energy auditor on the achievement of energy consumption norms and standards, entitlement or requirement of energy savings certificates along with the details of calculation and correctness of entitlement or requirement duly certified by the accredited energy auditor;

(f) name and particulars of the energy manager, his date of appointment, details of duties performed including initiatives undertaken for improvement in energy conservation and energy efficiency.

(2) The designated consumer, within three months after the end of first or second year of the relevant cycle, may submit performance assessment document in Form 'A' to the State designated agency, with a copy to the Bureau, for issuance of proportionate energy savings certificates covering the performance for a period of not less than one year from the date of notification specifying the energy consumption norms and standards, duly verified together with certificate in Form 'B' given by accredited energy auditor along with the documents mentioned in sub-rule (1).

(3) The accredited energy auditor shall independently evaluate each activity undertaken by the designated consumer for compliance with the energy consumption norms and standards and entitlement or requirement of energy savings certificate, to ensure that they meet with the requirements of these rules.

(4) The accredited energy auditor, in order to assess the correctness of the information provided by the designated consumer regarding the compliance with energy consumption norms and standards shall-

(a) apply standard auditing techniques;

(b) follow the rules and regulation framed under the Act;

(c) integrate all aspects of verification, and certification functions;

(d) make independent technical review of the opinion and decision of the verification team;

(e) also take into consideration, a situation where a particular activity may or may not form part of the activities related to the compliance with the energy consumption norms and standards, and the procedure for the assessment shall include,-

(A) document review, involving-

(i) review of data and its source, and information to verify the correctness, credibility and interpretation of presented information;

(ii) cross checks between information provided in the audit report and, if comparable information is available from sources other than those used in the audit report, the information from those other sources and independent background investigation;

(B) follow up action, involving-

(i) site visits, interviews with personnel responsible in the designated consumers' plant;

(ii) cross-check of information provided by interviewed personnel to ensure that no relevant information has been omitted or, over or under valued;

(iii) review of the application of formulae and calculations, and reporting of the findings in the verification report.

(5) The accredited energy auditor shall report the results of his assessment in a verification report and the said report shall contain,-

(a) the summary of the verification process, results of assessment and his opinion along with the supporting documents;

(b) the details of verification activities carried out in order to arrive at the conclusion and opinion, including the details captured during the verification process and conclusion relating to compliance with energy consumption norms and standards, increase or decrease in specific energy consumption with reference to the specific energy consumption in the baseline year;

(c) the record of interaction, if any, between the accredited energy auditor and the designated consumer as well as any change made in his assessment because of the clarifications, if any, given by the designated consumer.

(6) If the accredited energy auditor records a positive opinion in his verification report, the Bureau shall consider that all the requirements with regard to the compliance with energy consumption norms and standards, entitlement about issue or liability to purchase energy savings certificate have been met.

(7) After submission of duly verified Form 'A' by designated consumer, state designated agency may convey its comments, if any, on Form 'A' to the Bureau within fifteen days of the last date of submission of Form 'A'.

7. Procedure for monitoring and verification.-(1) The designated consumer in consultation with the accredited energy auditor, shall put in place transparent, independent and credible monitoring and verification arrangements for energy consumption and production based on the Bureau of Energy Efficiency (Manner and Intervals of Time for Conduct of Energy Audit) Regulations, 2010 for compliance with the energy consumption norms and standard, and the said arrangements shall include,-

(a) preparation and maintenance of quarterly data reports by the designated consumers-

(i) on the performance of the plant and production processes;

(ii) on the internal field audits of plant and production processes for the purpose of identification of factors inhibiting improvements in energy efficiency and conservation, and taking of measures to reduce energy consumption and to improve energy efficiency.

(b) preparation and maintenance of yearly data reports by the designated consumers-

(i) on the performance of plant and production processes;

(ii) on the outcome of internal field audits of plant and production processes identifying factors inhibiting improvements in energy efficiency and its conservation, and taking of measures to reduce energy consumption and improve energy efficiency and measures taken to improve the efficiency of the production processes during each year;

(iii) regarding a year-wise report on production achieved, energy consumed, and specific energy consumption achieved, specific energy consumption reduction achieved, measures adopted for energy conservation and quantity of energy saved;

(c) preparation and maintenance of the end of the cycle data reports on production achieved, energy consumed, specific energy consumption achieved, specific energy consumption reduction achieved, measures adopted for energy conservation and quantity of energy saved.

(2) All the activities undertaken by the designated consumers under these rules shall be scrutinised by the accredited energy auditor for the purpose of preparation of verification report and the designated consumer shall furnish the full and complete data, provide necessary documents and other facilities required by the accredited

energy auditor for the purpose of performing the function of verification under these rules.

8. Check-verification.-(1) The Bureau may on its own, or on receipt of a complaint regarding any error or inconsistency or misrepresentation, within one year from the date of submission of the compliance report or within six months from the date of issue of energy savings certificates, whichever is later, shall initiate action for review of compliance report in accordance with the provision of sub-rule (2).

(2) The Bureau shall initiate action in accordance with the following procedure, namely-

(a) a notice shall be issued to the designated consumer as well as to the accredited energy auditor who had submitted the verification report with a copy to relevant state designated agency, to provide comments in reply to the said notice within ten working days from the date of receipt of aforesaid notice;

(b) the comments furnished by the designated consumer and accredited energy auditor shall clearly state that-

(i) they stand by the compliance report and verification report submitted by them and submit a confirmation report giving point wise replies with necessary documents in response to the said notice; or

(ii) they accept the errors or inconsistencies or misrepresentation pointed out in the aforesaid notice and shall give detailed explanations in respect of each point in the notice and work out the impact of such errors or inconsistencies or misrepresentation on the submitted compliance report;

(c) within ten working days from the date of the receipt of the comments referred to in clause (b),Bureau shall after taking into consideration the said comments, decide to undertake or not to undertake review and the Bureau shall record the reasons in writing for its decision;

(d) where the Bureau, in consultation with state designated agency, decides to undertake review,

(i) it shall appoint an accredited energy auditor, who has not performed the verification functions with respect to the concerned designated consumer, to conduct the check-verification;

(ii) on a complaint, the said check-verification shall be carried out at the cost of the complainant;

(e) where the Bureau decides not to undertake the said review, the designated consumer, his accredited energy auditor, and the complainant shall be informed in that regard in writing.

(3) The check-verification process shall involve assessment to ensure that, –

(a) the activities relating to the compliance with energy consumption norms and standards have been performed and the issue or purchase of energy savings certificate are in accordance with the provisions of these rules;

(b) the monitoring and verification process are in accordance with the provisions of rule 6;

(c) the details of the data and the activities referred to in rule 7 are evaluated and conclusion made that errors, omissions or misrepresentations or aggregation thereof in the said data do not affect the energy consumption norms and standards achieved by the activities and issue or purchase of energy savings certificates by more than the threshold limit specified in the Schedule.

(4) The said accredited energy auditor shall assess and verify that the activities performed by the designated consumer for compliance with the energy consumption norms and standards are in accordance with these rules, and the assessment and check-verification process shall involve–

(a) a review of the documents as well as the on-site assessment referred to in rule 6to verify that the activities performed to comply with the energy consumption norms and standards are in accordance with these rules and in case the aforesaid accredited energy auditor decides that it was not possible or appropriate to make a site visit, then he shall record reasons in writing in this regard;

(b) a review of both quantitative and qualitative information on the energy consumption norms and standards, the quantitative information comprising of the reported data in 'Form A', and the qualitative information comprising of information on internal management controls, calculation procedures, procedures for transfer of data, frequency of energy consumption norms and standards achieved every year following the baseline year until the target year, reports and review of internal field audit of calculations or data transfers;

(c) a review of previous verification reports;

(d) a review of any other information and documents relevant to or having a bearing on the activities performed under these rules;

(e) are view of the monitoring and verification process referred to in rule 7.

(5) The designated consumer shall furnish full and complete data, provide necessary documents and other facilities required by the accredited energy auditor for the purpose of performing the function of check-verification under these rules.

(6) The accredited energy auditor in-charge of check-verification function shall report the results of his assessment in a check-verification report and the said report shall contain,-

(a) the summary of the verification process, results of his assessment and his opinion along with the supporting documents;

(b) the details of check-verification activities carried out in order to arrive at the conclusion and opinion including the details captured during the verification process and conclusion relating to compliance with energy consumptions norms and standards, increase or decrease in specific energy consumption with reference to the specific energy consumption in the baseline year, entitlement about the issue or liability to purchase energy savings certificate.

(7) If the accredited energy auditor records in his check-verification report, a positive opinion, it shall be concluded that all the requirements with regard to the compliance with energy consumption norms and standards and the issue or purchase of energy savings certificates have been met.

(8) If the accredited energy auditor records in his check-verification report, a negative opinion, the effect of such opinion on the energy consumption norms and standards, issue or purchase of energy savings certificate, the liability of the accredited energy auditor in giving the verification report and amount of the unfair gain gained by the designated consumer as a result of such verification report shall be calculated by the accredited energy auditor conducting the check-verification.

(9) The accredited energy auditor in-charge of check-verification shall submit his report with due certification in Form 'C' to the Bureau and the concerned State Designated Agency.

(10) Where the verification report given by the accredited energy auditor secures an unfair or undue gain due to the deficiencies or inconsistencies or errors or misrepresentation by the designated consumer, the quantum of such gain shall be calculated having regard to the following factors, namely:-

(a) the value of the amount payable by such designated consumer shall be as worked out in the verification report plus twenty-five per cent. of such value because of unfair practice used by the said designated consumer for obtaining unfair advantage;

(b) the amount of metric ton of oil equivalent of energy specified because of unfair gain identified due to check-verification;

(c) cost of check-verification.

(11) The State designated agency may furnish its comments on the report within ten days from the receipt of the report from the said accredited energy auditor and in

case no comments are received from the concerned state designed agency, it shall be presumed that they have no comments to offer in the matter.

(12) The Bureau after the expiry of ten days referred to in sub-rule (11), shall issue show cause notice to the designated consumer as well as to his accredited energy auditor specifying the deficiencies or inconsistencies or errors or misrepresentation noticed against the designated consumer and his accredited energy auditor.

(13) The designated consumer as well as his accredited energy auditor shall submit their replies to the said show cause notice within a period of fifteen working days to the officer of the Bureau who has issued that show cause notice.

(14) The Bureau after examining the said replies to the show cause notice referred to in sub-rule (13), shall forward the report to the concerned State designated agency specifying the following details for the purpose of initiating the penalty proceedings, namely:-

(a) the number of energy savings certificates wrongfully obtained by the designated consumer on the basis of verification report found to be wrong and false on check-verification;

(b) the number of energy savings certificates which the designated consumer was liable to purchase for non-compliance with the energy consumption norms and standards as found in the check-verification report;

(c) details of the misrepresentation, if any and the unfair gain due to such misrepresentation;

(d) the cost of check- verification.

(15) The State designated agency within two months from the date of the receipt of the report referred to in sub-rule (9) shall initiate-

(a) action to recover from the designated consumer the loss to the Central Government by way of unfair gain to the designated consumer;

(b) penalty proceedings against the persons mentioned in the said report, under intimation to the Bureau;

(c) register complaint for such fraudulent unfair gain if designated consumer does not pay penalty and loss to the exchequer in the specified time mentioned in the penalty proceedings.

(16) Where the check-verification has been initiated on the basis of a complaint received by the Bureau, the cost of check-verification shall be borne by the complainant, in case it was found on check-verification that the designated consumer has submitted correct information in Form 'A'.

(17) Where the check-verification has been initiated on the basis of a complaint received by the Bureau, the cost thereof shall be borne by the designated consumerin case it was found on check-verification that the designated consumer has submitted false and incorrect information in Form 'A'.

9. Procedure regarding compliance with energy consumption norms and standards and issue of energy savings certificate.-(1) A firm registered under the Indian Partnership Act, 1932 (9 of 1932) or a company incorporated under the Companies Act, 1956 (1 of 1956) or any other legal entity competent to sue or to be sued or enter into contracts shall be entitled to undertake verification and check-verification regarding compliance with the energy consumption norms and standards and issue or purchase of energy savings certificate if it,-

(a) has at least one accredited energy auditor whose name is included in the list of the accredited energy auditors maintained by the Bureau under regulation 7 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010;

(b) has at least three energy auditors;

(c) has adequate expertise of field studies including observations, probing skills, collection and generation of data, depth of technical knowledge and analytical abilities for undertaking verification and check-verification;

(d) has a minimum turnover of ten lakhs rupees per annum in at least one of the previous three years or in case of a newly formed organisation, a net worth of ten lakhs rupees.

(2) The Bureau shall invite applications from the firms, companies and other legal entities to undertake the work of verification and check-verification for the purpose of preparing a panel of such firms, companies and other legal entities.

(3) The applications referred to in sub-rule (2) shall be accompanied by a certificate of registration or in corporation as the case may be.

(4) The applications so received shall be scrutinised in accordance with the provisions of sub-rule(1) and a panel of eligible applicants shall be prepared which shall be displayed on the web site of the Bureau, that is, www.bee-india.nic.in.

(5) The selected applicants shall be issued a certificate of empanelment in support their selection to undertake the function of verification and check-verification as accredited energy auditor.

(6) A unique identification number shall be issued to the accredited energy auditors referred to in sub-rule (5).

10. Obligations of accredited energy auditor.- (1) For the work of verification or check verification, the accredited energy auditor shall constitute a team comprising of a team head and other members including experts:

Provided that a person who was in the employment of a designated consumer within the previous four years, shall not be eligible to perform the work of verification or check-verification for such designated consumer;

Provided further that any person or firm or company or other legal entity, who was involved in undertaking energy audit in any of the designated consumer within the previous four years, shall not be eligible to perform the work of verification or check-verification for such designated consumer.

(2) The accredited energy auditor shall ensure that persons selected as team head and team members must be independent, impartial and free of potential conflict of interest in relation to activities likely to be assigned to them for verification or check-verification.

(3) The accredited energy auditor shall have formal contractual conditions to ensure that each team member of verification and check-verification teams and technical experts act in an impartial and independent manner and free of potential conflict of interest.

(4) The accredited energy auditor shall ensure that the team head, team members and experts prior to accepting the assignment inform him about any known, existing, former or envisaged link to the activities likely to be undertaken by them regarding verification and check verification.

(5) The accredited energy auditor must have documented system for determining the technical or financial competence needed to carry out the functions of verification and check -verification and in determining the capability of the persons referred to in sub-rule (2), the accredited energy auditor shall consider and record among other things the following aspects, namely:-

(a) complexity of the activities likely to be undertaken;

(b) risks associated with each project activity;

(c) technological and regulatory aspects;

(d) size and location of the designated consumer;

(e) type and amount of field work necessary for the verification or check-verification.

(6) The accredited energy auditor shall have documented system for preparing the plan for verification or check-verification functions and the said plan shall contain

all the tasks required to be carried out in each type of activity, in terms of man days in respect of designated consumers for the purpose of verification and check -verification.

(7) The names of the verification or check-verification team members and their bio-data shall be provided by the accredited energyauditor to the concerned designated consumer in advance.

(8) The verification or check-verification team shall be provided by the accredited energy auditor with the concerned working documents indicating their full responsibilities with intimation to the concerned designated consumer.

(9) The accredited energy auditor shall have documented procedure-

(i) to integrate all aspects of verification or check-verification functions;

(ii) for dealing with the situations in which an activity undertaken for the purpose of compliance with the energy consumption norms and standards or issue of energy savings certificate shall not be acceptable as an activity for the said purposes.

(10) The accredited energy auditor shall conduct independent review of the opinion of verification or check-verification team and shall form an independent opinion and give necessary directions to the said team if required.

(11) In preparing the verification and check-verification reports, the accredited energy auditor shall ensure transparency, independence and safeguard against conflict of interest.

(12) The accredited energy auditor shall ensure the confidentiality of all information and data obtained or created during the verification or check verification report.

(13) In assessing the compliance with the energy consumption norms and standards and issue of energy savings certificates, the accredited energy auditor shall follow the provisions of the Act, rules and regulations made thereunder.

(14) After completion of the check-verification, the accredited energy auditor shall submit the check-verification report, together with the certificate in Form-'C', to the Bureau.

11. Recommendation for issue of energy savings certificates.- (1) The Bureau on satisfying itself about the correctness of verification report, and check-verification report, wherever sought by it, send its recommendation under clause (aa) of sub-section (2) of section 13 to the Central Government, based on the claim raised by the designated consumer in Form 'A', within ten working days from the last date of submission of said Form 'A' by the concerned state designated agency, for issuance of energy savings certificates under section 14A and the recommendation shall specify.-

(a) the exact number of energy savings certificates to be issued to the designated consumer and the entitlement for such energy savings certificates after determining by the following formula:

(i) for thermal power plant sector:

number of energy savings certificates =

(heat rate notified for the target year
– heat rate as acheived in the target year)
× production in the baseline year in million kwh/10

(ii) for other sectors:

number of energy savings certificates =

(specific energy consumption notified for the target year
– specific energy cosnumption as acheived in the target year)
× production in the baseline year

(b) the identity of the concerned designated consumers;

(c) the certification that all the requirements for issue of energy savings certificates have been complied with, by the designated consumer and his entitlement has been certified in the verification report by the accredited energy auditor.

(2) The designated consumer may seek issue of energy savings certificates in proportion of its performance achieved during the first or second or target year with respect to compliance with the energy consumption norms and standardsand the Bureau on satisfying itself about the correctness of verification report, and check-verification report, wherever sought by it, send its recommendation under clause (aa) of sub-section (2) of section 13 to the Central Government, based on the claim made by the designated consumer in Form 'A', for issue of energy saving certificates not exceeding eighty percent. of the entitlement in a year other than the target year under section 14A.

(3) The total amount of energy savings certificates recommended under sub rule (2) shall be adjusted against the entitlement on conclusion of the target year as per the following formulae:-

(A) for thermal power plant sector:

(i) energy savings certificate to be issued after year 1 =
{[heat rate in the baseline year – (heat rate in the baseline year –
heat rate notified for the target year) ÷ 3] –
heat rate achieved in year 1} × 80% ×
production in million kwh in the baseline year/10;

(ii) adjusted heat rate after year 1 =
heat rate notified for target year –
(energy savings certificates issued in year 1 ÷
productionin million kwh in the baseline year) × 10;

(iii) energy savings certificate to be issued after year 2 =
{[heat rate in the baseline year – (heat rate in the baseline year –
heat rate adjusted after year1) × 2 ÷ 3] –
heat rate achieved in year 2} × 80% ×
production in million unit in the baseline year/10;

(iv) adjusted heat rate after year 2 =
heat rate adjusted after year 1 –
(energy savings certificates issued in year 2 ÷
production in million in the baseline year) × 10

(v) energy savings certificate to be issued in the target year =
{[heat rate in the baseline year – (heat rate in the baseline year –
heat rate adjusted after year 2)] –
heat rate achieved in the target year} ×
production in million kWh in the baseline year/10;

(vi) total number of energy savings certificates issued in the cycle =
energy savings certificates issued in year 1 +
energy savings certificates issued in year 2 +
energy savings certificates issued in target year.

(B) for other sectors:

(i) energy savings certificate to be issued after year 1 =
{[specific energy consumption in the baseline year –
(specific energy consumption in the baseline year –
specific energy consumption notified for the target year) ÷ 3] –
specific energy consumption achieved in year 1} × 80% ×
production in the baseline year;

(ii) adjusted specific energy consumption after year 1 =
specific energy consumption notified for target year –
(energy savings certificates issued in year 1 ÷
production in the baseline year);

(iii) energy savings certificate to be issued after year 2 =
{[specific energy consumption in the baseline year –
(specific energy consumption in the baseline year –
specific energy consumption adjusted after year1) × 2 ÷ 3] –
specific energy consumption achieved in year 2} × 80% ×
production in the baseline year;

(iv) adjusted specific energy consumption after year 2 =
specific energy consumption adjusted after year 1 –
(energy savings certificates issued in year 2 ÷
production in the baseline year)

(v) energy savings certificate to be issued in the target year =
{[specific energy consumption in the baseline year –
(specific energy consumption in the baseline year –
specific energy consumption adjusted after year 2)] –
specific energy consumption achieved in the target year} ×
production in the baseline year;

(vi) total number of energy savings certificates issued in the cycle =
energy savings certificates issued in year 1 +
energy savings certificates issued in year 2 +
energy savings certificates issued in target year.

12. Procedure for issue of energy savings certificate.-(1) The Central Government, on the receipt of recommendation from the Bureau under rule 10, shall on satisfying itself in this regard, issue energy savings certificates of required value to the concerned designated consumer with in fifteen working days from the date of receipt of such recommendation from the Bureau.

(2) The energy savings certificate shall be issued in electronic form.

(3) The value of one energy savings certificates shall be equal to one metric ton of oil equivalent of energy consumed.

(4) The designated consumer who has been issued energy savings certificates may sell them through the power exchange.

(5) The designated consumer who has been issued the energy savings certificates during the current cycle may use them for the purpose of banking until the next compliance cycle.

(6) The energy savings certificates issued in a cycle period shall remain valid till the completion of the compliance period of the next cycle.

(7) The energy savings certificates purchased by a designated consumer for the purpose of compliance with the energy consumption norms and standards shall after their submission to the Bureau stand expired.

13. Compliance of energy consumption norms and standards.- (1) The designated consumer for the purpose of achieving the compliance with the energy consumption norms and standards during the target year, in the relevant cycle shall take the following action and after completing the said action, furnish the status of compliance to the concerned state

designated agency with a copy to the Bureau in Form 'D'by the end of five months from the last date of submission of Form 'A'-

(a) by implementation of energy conservation and energy efficiency improvement measures or;

(b) where the measures implemented in terms of clause (a) are found inadequate for achieving compliance with the energy consumption norms and standards, the designated consumer shall purchase the energy savings certificates equivalent in full satisfaction of the shortfall in the energy consumption norms and standards worked out in terms of metric ton of oil equivalent.

14. Establishment of new baseline for next cycle.- The energy consumption norms and standards achieved by the designated consumer on the completion of the target year, as mentioned in the compliance report in Form-'D' shall be the baseline for establishment of new plant specific energy consumption norms and standards for designated consumers for the next cycle.

15. Obligations of the designated consumers.-The designated consumers shall,-

(a) for assessment of their performance for compliance with the energy consumption norms and standards, get the work of verification done through accredited energy auditors;

(b) take all measures including implementation of energy efficiency projects recommended by the accredited energy auditor and good practices prevalent or in use in the concerned industrial sector so as to achieve the optimum use of energy in their plant ;

(c) furnish the full and complete data, provide necessary documents and other facilities required by the accredited energy auditor for the purpose of performing the function of verification and check-verification.

16. Specification of value of energy.-(1) The value of per metric ton of oil equivalent of energy consumed shall be determined by applying the following formula, namely:-

$P = Wc \times Pc + Wo \times Po + Wg \times Pg + We \times Pe$

Where-

P = price of one metric ton of oil equivalent(1toe);

Pc = average price of delivered coal;

Po = price of fuel oil as declared by Indian Oil Corporation Limited;

Pg = price of gas as declared by Gas Authority of India Limited;

Pe = average price of one unit of electricity for industrial sector in the States of Chattisgarh, Gujarat, Maharashtra, Madhya Pradesh and Tamil Nadu as specified by the respective State Electricity Regulatory Commission;

all prices shall be as on 1st April of the year for which value of energy is being specified.

Weightage of coal (Wc) =

$$\frac{\text{(amount of coal consumed across all designated consumers in the baseline year (in toe))}}{\text{(total energy consumption across all designated consumers in the baseline year (in toe))}};$$

Weightage of oil (Wo) =

$$\frac{\text{(amount of oil consumed across all designated consumers in the baseline year (in toe))}}{\text{(total energy consumption across all designated consumers in the baseline year (in toe))}};$$

Weightage of electricity (We) =

$$\frac{\text{(amount of electricity consumed across all designated consumers in the baseline year (in toe))/(total energy consumption across all designated consumers in the baseline year(in toe))}}{};$$

(2) The value of per metric ton of oil equivalent of energy consumed for the purpose of these rules shall be rupees 10154 for the year 2011-12.

(3) The value of per metric ton of oil equivalent of energy consumed shall be reviewed every year for the purpose of sub-rule (2).

FORM – A

(See rule 5)

PERFORMANCE ASSESSMENT DOCUMENT

(To be filled by designated consumer)

1.	Name of designated consumer		
2.	Registration number		
3.	Sector		
4.	Sub-sector		
5.	Accredited energy auditor		
	Name		
	Registration number		
6.	List of documents submitted		
a.	Baseline data (three years)	Submitted/Not submitted	Date of submission
b.	Form I () Specify the year in the bracket	Submitted/Not submitted	Date of submission
c.	Form I ( ) Specify the year in the bracket	Submitted/Not submitted	Date of submission
d.	Form I ( ) Specify the year in the bracket	Submitted/Not submitted	Date of submission
e.	Form II	Submitted/Not submitted	Date of submission
f.	Form III	Submitted/Not submitted	Date of submission

7.	Target			
	Year	Notified target specific energy consumption for the cycle	Energy savings certificates issued	Revised target specific energy consumption for the cycle
		toe/ton of product or Net Kcal/kWh	Nos	toe/ton of product or Net Kcal/ kWh
a.	Mention the year ( )		-	
b.	Mention the year ( )			
c.	Mention the year ( )			

8.	Specific energy consumption		
a.	Specific energy consumption (baseline)		toe/ton or Net kcal/ kWh
b.	Production (baseline)		ton or Million kWh
c.	Revised target SEC (from 7.b)		toe/ton or Net kcal/ kWh
d.	Target after normalisation, if any		toe/ton or Net kcal/ kWh
e.	Achieved specific energy consumption		toe/ton or Net kcal/ kWh
f.	Energy savings certificates		nos

9.	Energy Efficiency Project implemented during current cycle					
	Project	Year of Implementation	Annual Energy consumption (before)	Annual Energy consumption (after)	Energy tariff	Investment
a.						
b.						
c.						
d.						
e.						
f.						

Note 1: Form A may be filled in accordance with the following guidelines, namely:-

GUIDELINES

1. Name of designated consumer: As per notification under clause (g) of section 14.
2. Registration No: As provided at the time of registration for this portal
3. Sector:
    - Aluminium
    - Cement
    - Chlor Alkali
    - Fertilizer
    - Iron and Steel
    - Pulp and Paper
    - Textile
    - Thermal Power Plant

4. Sub Sector:

Sector	Basis for Sub-sector	Sub-Sector
Thermal Power Plant	Fuel Based	Coal, Gas, Oil
Cement	Process Based	Dry, Wet
Iron and Steel	Operation Based	Integrated, Sponge Iron
Fertilizer	Feedstock Based	Natural Gas, Naptha
Aluminum	Product Based	Refinery, Smelter
Pulp and Paper	Raw Material Based	Wood, Agro, Recycled Fibre
Textile	Operation Based	Spinning, Processing, Composite, Fiber yarn
Chlor-Alkali	Technology Based	Membrane cell, Mercury

5. Name of accredited energy auditor: As selected by designated consumer from list of accredited energy auditor empanelled by Bureau of Energy Efficiency.

6. List of documents submitted:

   (a) Baseline data (three years): Submitted to Bureau of Energy Efficiency for Target Calculations

   (b) Form I mention the year ( ): As per filing, attach acknowledgement of submission i.e. after completion of 1st year after notification

   (c) Form I mention the year ( ): As per filing, attach acknowledgement of submission i.e. after completion of 2nd year after notification

   (d) Form I mention the year ( ): As per filing, attach acknowledgement of submission i.e. after completion of target year

   (e) Form II: As per filing, attach acknowledgement of submission

   (f) Form III: As per filing, attach acknowledgement of submission

7. Target: Enter target as notified by Government of India under clause (g)of section 11 (target specific energy consumption). Enter energy savings certificates, if any, issued in last three years). Adjusted target calculated as per formulae mentioned in rules.

8. Specific energy consumption (SEC)

   (a) Specific Energy Consumption (Baseline): As notified by Government of India as aforesaid.

(b) Production (Baseline): As notified by Government of India as aforesaid.

(c) Revised target specific energy consumption (from 7.b): if any (in metric ton of oil equivalent /unit production), or as notified by Government of India or enter 8.a

(d) Target after normalisation, if any: as notified by Government of India as aforesaid (in metric ton of oil equivalent /unit production) and calculated as specified in the schedule, else enter 8.c

(e) Achieved specific energy consumption: Achieved specific energy consumption in the year of submission of Form 'A'

(f) energy savings certificates: calculate as per formulae provided in the rule 10.

9. Project implemented during current cycle: Energy efficiency projects implemented by designated consumers during last three years. Attach photograph of energy savings projects implemented.

Undertaking

I/We undertake that the information supplied in this Performance Assessment Document is accurate to the best of my knowledge and if any of the information supplied is found to be incorrect and such information result into loss to the Central Government or State Government or any of the authority under them or any other person affected, I/we undertake to indemnify such loss.

I /We agree to extend necessary assistance in case of any enquiry to be made in the matter.

Signature
Name
Designation
For and behalf of
Name of the Firm/Company/Organisation
SEAL of the Firm /Company/Organisation

FORM B

(See rule 5)

CERTIFICATE OF VERIFICATION

I/We _____the accredited energy auditor, have undertaken a thorough independent evaluation of the activities undertaken by M/s. _____ , a designated consumer for compliance with the energy consumption norms and standards specified under the Government of India Ministry of Power notification number_____, dated the _____during the target year compared to the baseline year and consequent entitlement or requirement of energy savings certificates and certify that-

(a) the verification of the data collection in relation to energy consumed and specific energy consumption per unit of production in the baseline year and in the target year in Form 1under Rules 2007 or Rules 2008, has been carried out diligently and truthfully;

(b) the verification of the identified energy efficiency measures, and the progress of their implementation given in Form II and Form III under Rules 2008 has been carried out diligently and truthfully;

(c) the verification of the compliance with energy consumption norms and standards during the target year has been carried out diligently and truthfully;

(d) the verification of the total amount of energy saved, year-wise, after the baseline year and until target year or otherwise and request made by the designated consumer, the entitlement of _____ (Nos) energy savings certificate (s) required to be issued or purchased by him have been carried out diligently and truthfully;

(e) all reasonable professional skill ,care, and diligence have been taken in verifying the various verification activities, findings and conclusions, documents, reports, preparing the documents including the performance assessment document in Form 'A' and verification report and the contents thereof are a true representation of the facts.

Signature:

Name of accredited energy auditor for verification

Designation:

SEAL

FORM C

(See rule 7)

Certificate of Check – Verification

I/We _____the accredited energy auditor, have undertaken a thorough independent evaluation of the activities undertaken by M/s. _____,a designated consumer for compliance to the energy consumption norms and standards specified under the Government of India, Ministry of Power notification numbers _____, dated the _____during the target year compared to the baseline year and consequent entitlement or requirement of energy savings certificates, mentioned in the Performance Assessment Document in Form 'A' and compliance of energy consumption norms and standard document in Form 'D' and certify that-

(a) the check-verification of the data collection in relation to energy consumed and specific energy consumption per unit of production in the baseline year and in the target year in Form 1under Rules 2007 or Rules 2008, has been carried out diligently and truthfully;

(b) thecheck-verification of the identified energy efficiency measures, and the progress of their implementation given in Form II and Form III under Rules 2008 has been carried out diligently and truthfully;

(c) thecheck-verification of the compliance with energy consumption norms and standards during the target year has been carried out diligently and truthfully;

(d) the check-verification of the total amount of energy saved, year-wise, after the baseline year and until target year or otherwise and request made by the designated consumer, the entitlement of _____ (Nos) energy savings certificate (s) required to be issued or purchased by him have been carried out diligently and truthfully;

(e) all reasonable professional skill, care, and diligence have been taken in check-verifying the various verification activities, findings and conclusions, documents, reports, preparing the documents including the information given in the Performance Assessment Document in Form 'A' and verification report submitted by the accredited energy auditor appointed by the designated consumer …… for verification and the contents thereof are a true representation of the facts.

Signature:

Name of accredited energy auditor for check-verification

Designation:

SEAL

FORM D

(See rule 12)

COMPLIANCE OF ENERGY CONSUMPTION NORMS AND STANDARD DOCUMENT

(To be filled in by designated consumer)

1.	Name of designated consumer		
2.	Registration number		
3.	Sector		
4.	Sub-sector		
5.	List of documents submitted		
a.	Performance Assessment Document (Form 'A')	Submitted/Not Submitted	Date of Submission
6.	Compliance		
a.	Energy Savings Certificates		Issued/Recommended for purchase
b.	Energy Savings Certificates submitted for compliance		If recommended for purchase
c.	Balance Energy Savings Certificates		Nos

Note 1: Form D may be filled in accordance with the following guidelines:-

GUIDELINES

1. Name of designated consumer: As per notification from Government of India (GoI) under clause (g) of section 14

2. Registration number: As per E-filing

3. Sector:

- Aluminium
- Cement
- Chlor Alkali
- Fertilizer
- Iron and Steel
- Pulp and Paper
- Textile
- Thermal Power Plant

4. Sub Sector:

Sector	Basis for Sub-sector	Sub-Sector
Thermal Power plant	Fuel Based	Coal, Gas, Oil
Cement	Process Based	Dry, Wet
Iron and Steel	Operation Based	Integrated, Sponge Iron
Fertilizer	Feedstock Based	Natural Gas, Naptha
Aluminum	Product Based	Refinery, Smelter
Pulp and Paper	Raw Material Based	Wood, Agro, RCF
Textile	Operation Based	Spinning, Processing, Composite, Fiber yarn
Chlor-Alkali	Technology Based	Membrane cell, Mercury

5. List of Documents submitted:

(a) Performance assessment document: Submitted to Bureau of Energy Efficiency for issue of energy savings certificates.

6. Compliance

(a) Energy savings certificates: Enter +ve value if energy savings certificates issued to designated consumer or enter -ve value in case recommended for purchase of energy savings certificates

(b) Energy savings certificates submitted for compliance: If designated consumer is recommended for purchase of energy savings certificates, then enter value of energy savings certificates submitted by designated consumer for compliance of energy consumption norms and standards- saving target of designated consumer.

(c) Balance energy savings certificates:- Numbers of energy savings certificates balance. If balance is ZERO than DC is in accordance for compliance of energy saving target and if balance is -ve than DC will be recommended for penalty.

Undertaking

I/We undertake that the information supplied in compliance with energy consumption and standard documents in this Form 'D' is accurate to the best of my/our knowledge and if any of the information supplied is found to be incorrect and such information result into loss to the Central Government or State Government or any of the authority under them or any other person affected, I/we undertake to indemnify such loss.

I/we agree to extend necessary assistance in case of any enquiry is made in the matter.

Signature
Name
Designation
For and behalf of
Name of the Firm/Company/Organisation
SEAL of the Firm/Company/Organisation

SCHEDULE

[See rules 2, 4 and 7]

1. Determination of baseline specific energy consumption.-

1.1 Specific energy consumption (See rule 2(l))

(a) The specific energy consumption (SEC) gives the indication of efficient utilisation of different sources of energy in a plant operational boundary to produce one unit of product, which is defined as the ratio of total energy input to plant boundary and the quantity of products produced and specific energy consumption of an industry shall be calculated based on Gate-to-Gate concept with the following formula:-

$$\text{Specific Energy Consumption} = \frac{\text{Net energy input into the designated consumers' boundary}}{\text{Total quantity of output exported from the designated consumers' boundary}}$$

and expressed in terms of the metric ton of oil equivalent (toe)/per unit of product;

Note: value to be rounded to three decimal places.

Table 1: Definition of product to calculate specific energy consumption

Sector	Main product	Unit
Cement	Cement	ton
Fertilizer	Urea	ton
Iron and Steel (Integrated)	Crude Steel	ton
Iron and Steel (Sponge Iron)	Sponge Iron	ton
Aluminium (Refinery)	Alumina	ton
Aluminium (Smelter)	Molten Aluminium	ton
Aluminium (Integrated)	Molten Aluminium	ton
Pulp and Paper (Pulping)	Pulp	ton
Pulp and Paper (Only Paper Making)	Paper	ton
Pulp and Paper (Pulp and Paper)	Paper	ton
Textile (Spinning)	Yarn	Kg

Sector	Main product	Unit
Textile (Composite)	Yarn/Fabric	kg
Textile (Fibre)	Fibre	kg
Textile (Processing)	Fabric	kg
Chlor-Alkali	Equivalent Caustic Soda	ton
Power Plant	Electricity	Million kWh

1.2 Gate-to-Gate designated consumer boundary(sector-specific)

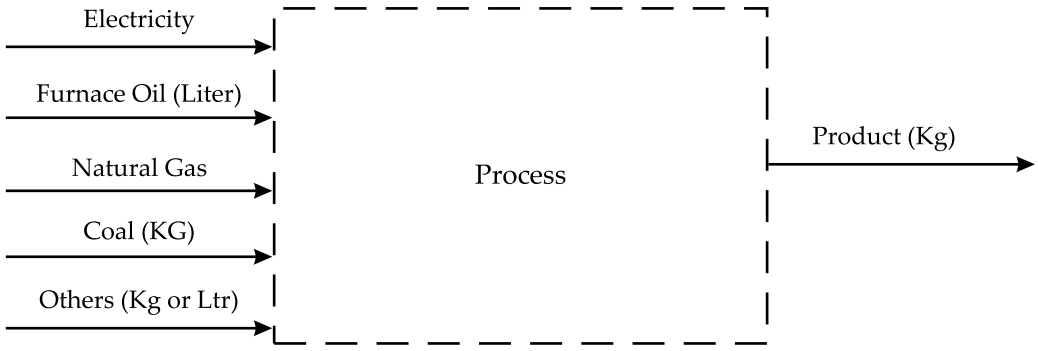
(a) As the specific energy consumption (SEC) is calculated on a Gate-to-Gate concept, the plant boundary shall be selected in such a manner that the total energy input and the above product defined in Table 1,is be fully captured and the entire designated consumers'plant. The colony, residential complex and transportation system, mining operations in case of Iron and Steel, Aluminum and Cement sectors are not part of designated consumers 'boundary.

(b) Once the designated consumers' boundary has been fixed, the same boundary shall be considered for entire cycle, and any change in the said boundary such as capacity expansion, merger of two plants, division of operation etc. shall be duly intimated to the Bureau of Energy Efficiency.

(c) The following designated consumers' boundaries will be considered in the first cycle:-

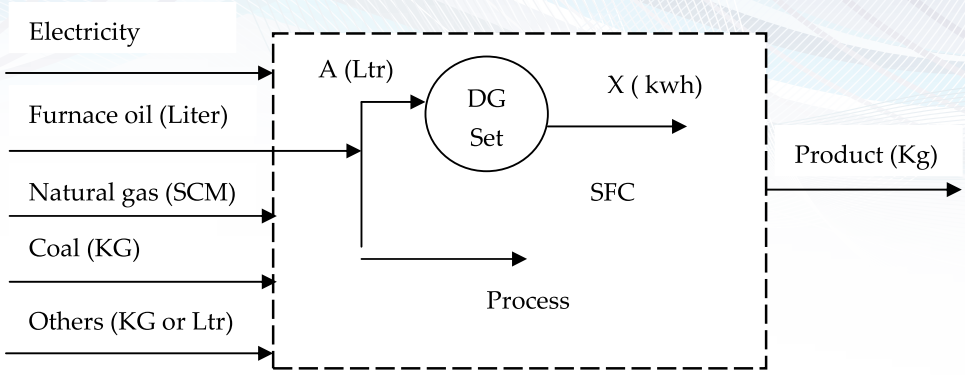
Case-I: All energy purchased and consumed:-

- Electricity is purchased from the grid



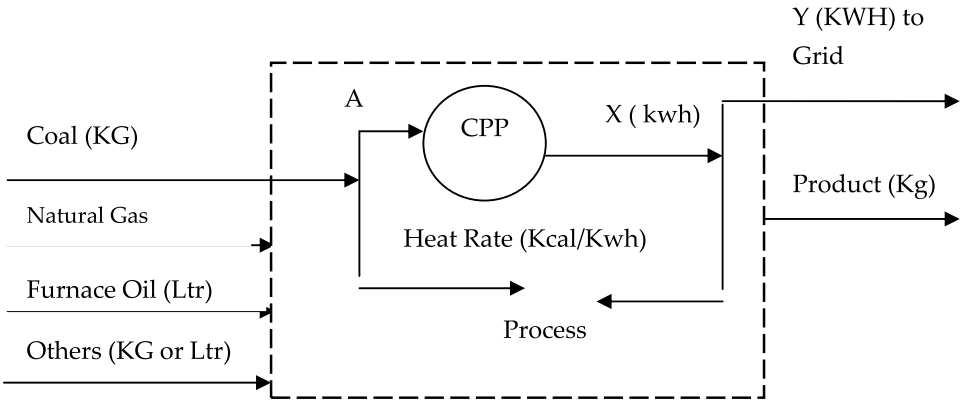
Case-II: Electricity partially generated by diesel generating(DG) set ,other energy purchased and consumed:-

- Electricity is purchased from the grid and generated by DG set



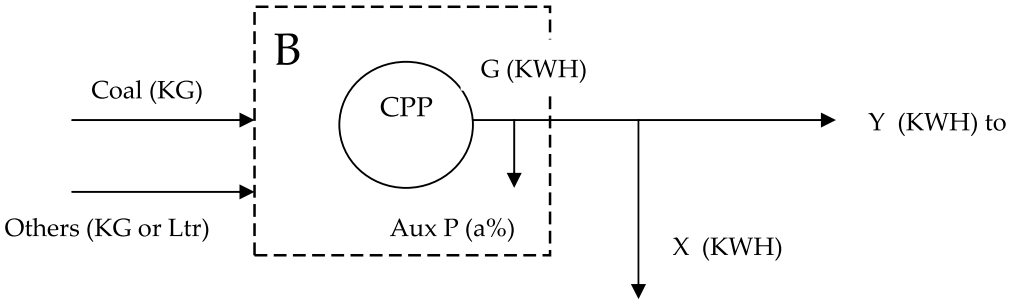
Case -III: Electricity generated by captive power plant and other energy purchased and consumed, electricity partially sold to grid:-

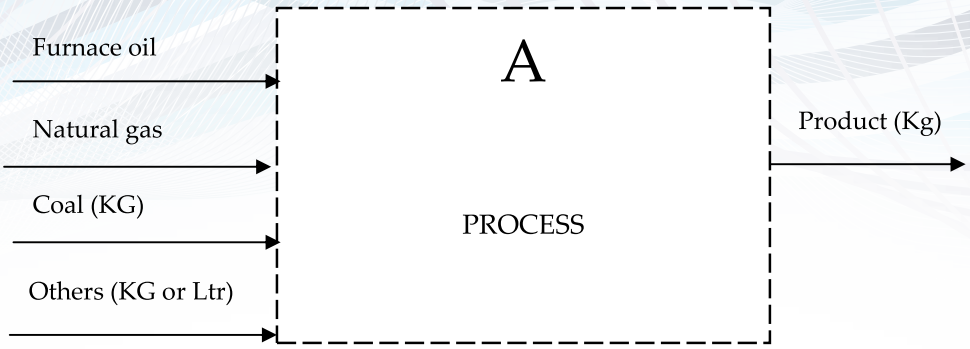
- Electricity is generated by coal based captive power plant, partially sold to grid-



Case -IV: Electricity generated by captive power plant(CPP), other energy purchased and consumed, electricity partially sold to grid from captive power plant:-

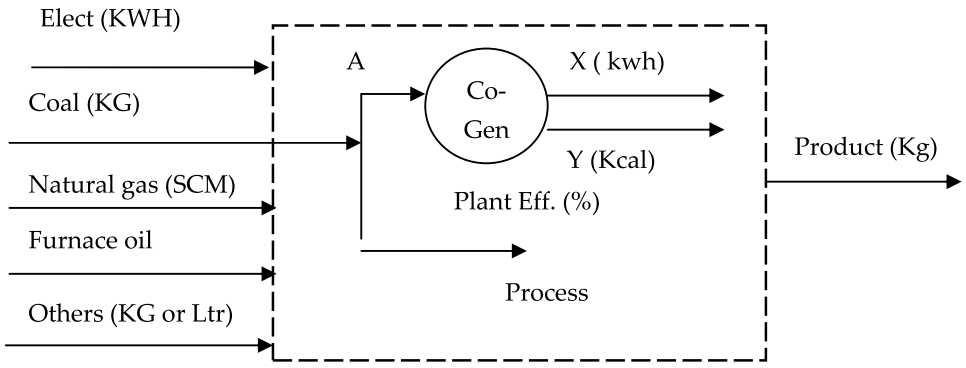
- Electricity is generated by coal based captive power plant, partially sold to grid and captive power plant is in separate boundary-



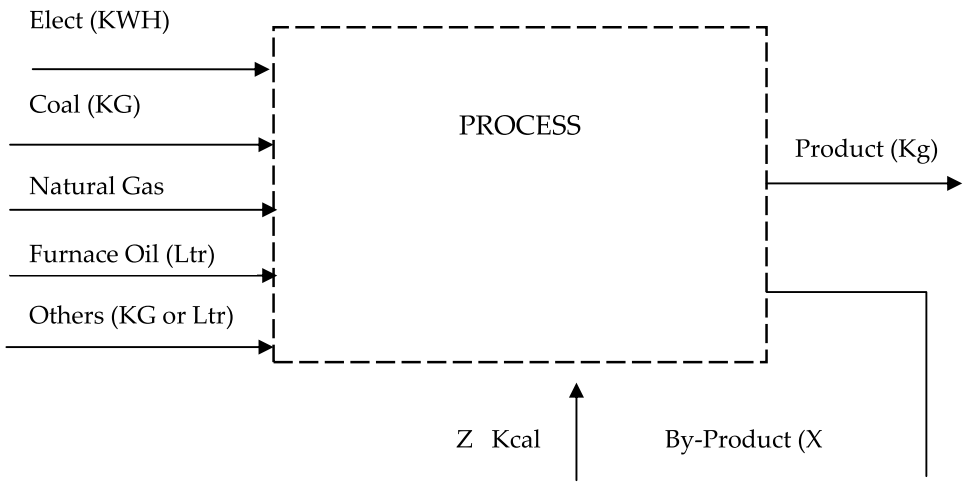


Case -V: Energy purchased and consumed, electricity and heat partially generated through co-generation plant

- Electricity and heat are generated by co-generation Plant-



CASE -VI: Energy purchased and consumed, heat energy partially met by waste or by-product of the process-



1.3 Methodology for calculating baseline specific energy consumption.-

(a) During the first cycle designated consumer having more than five years life, data for the previous three years, namely, 2007-08, 2008-09, 2009-10 shall be considered provided the capacity utilization is uniform. Normalisation, in a suitable statistical approach, shall be done in case of abnormality in capacity utilisation in any of the aforesaid three year (s).

(b) During the first cycle designated consumer having more than five years life and less than three years data has been reported, the same shall be considered provided the capacity utilisation is uniform and if the capacity utilisation is abnormally low in any of the aforesaid three year(s), the same shall not be considered.

(c) During the first cycle, designated consumer having less than five years life and less than three years data has been reported, the available year's data shall be considered provided the capacity utilisation is uniform. If the capacity utilisation is abnormally low in any of the year(s), the same shall not be considered.

(d) During the first cycle, in case of new designated consumer, the data shall be considered for those years where the capacity utilisation is greater than seventy percent. (70%) and if only one year data is reported, the same shall be considered irrespective of the capacity utilisation.

(e) In the next cycle, baseline specific energy consumption shall be calculated in accordance with the provisions of rule 14.

(e) Few additional sector specific information like process technology, process flow, raw material, product mix etc. shall also be collected.

(f) All forms of energy shall be converted into a single form i.e. metric ton of oil equivalent (toe) by the use of standard engineering conversion formula and the following general guiding principle shall be used in this regard:-

(i) The reported gross calorific value (GCV) of fuels by the designated consumer shall be considered for estimating the equivalent thermal energy.

(ii) If gross calorific value (GCV) is not reported, then the values mentioned in the Government of India, Ministry of Power, notification number S.O 394(E), dated the 12th March, 2007 shall be considered. Any other information as required shall be taken from standard industrial practice.

(iii) The equivalent thermal energy of the electricity supplied to the grid shall be deducted from the total energy input to the designated consumers' boundary. The following expression shall be used:-

Equivalent thermal energy (kcal) =Electricity supplied to grid(kWh) x national average heat rate in kcal/kWh in the baseline year.

National average heat rate in year 2009-10 was 2717 kcal/kWh.

(iv) Total energy input to the designated consumers' boundary shall be estimated with the following expression:-

$$\text{Energy input (toe)} = \frac{\text{Fuel consumed quantity (kg) x gross calorific value (kCal/kg)}}{10^{7}}$$

(v) Once the total energy input to the designated consumers' boundary is estimated, the specific energy consumption shall be calculated by dividing the product quantity.

1.4 Procedure for normalisation of specific energy consumption.-

(a) Variable factors as described in rule 4 may affect the energy consumption and 'Normalisation Factors' shall be considered in those cases. Capacity utilisation is one of the most important parameters to have a normalisation factor. The reported specific energy consumption (SEC) shall be normalised after incorporating the normalisation factor.

Normalized specific energy consumption = f (Reported SEC, normalization factors).

(b) The specific energy consumption shall be normalised, during baseline and target periods, based on statistical procedures.

(c) The normalisation procedure is proposed to be applied if the capacity utilisation or Plant Load Factor (PLF) has a deviation of more than thirty percent. It shall be applied only if capacity utilisation has deviated due to uncontrollable factors described in rule 4, and duly declared by the designated consumer with authentic proof or self certifications.

(d) The normalisation shall be doneby performing a statistical analysis of the specific energy consumption and production data by-

(i) plotting the production versus energy consumption curves;

(ii) performing statistical analysis to represent the relationship between the production and energy consumption;

(iii) extrapolating the above relationship to generate capacity utilisation versus energy consumption and capacity utilisation versus specific energy consumption data for a suitable range of capacity utilisation values;

(iv) the average capacity utilisation shall be used to identify the corresponding specific energy consumption value;

(v) the normalised specific energy consumption shall be the value as computed in the previous step;

(e) The "capacity utilisation" referred to in clauses (c) to (d) shall be replaced by "Plant Load Factor" in case of designated consumers in the thermal power plant sector;

(f) The above calculation determines the normalised specific energy consumption for the designated consumers.

2. Thermal power plant sector.-

2.1 The designated consumersfor the thermal power plant sector shall be grouped based on the fuel used and they are as under:-

2.2 The energy consumption norms and standards for power stations shall be specified in terms of specific percentage of their present deviation of net operating heat rate,based on the average of previous three years, namely, 2007-8,2008-9,2009-10 for the first cycle ,and for cycles thereafter in accordance with the provision of rule 14from the net design heat rate. The power stations shall be grouped into various bands according to their present deviations, of operating heat rate from design heat rate and for power stations with higher deviations the energy consumption norms and standards shall be established at lower level and shall be grouped taking into account percentage deviation as under:-

Deviation in net station heat rate from design net heat rate	Reduction target for percentage deviation in the net station heat rate
Upto five per cent	Ten per cent (10%)
More than five per cent and upto ten percent	Seventeen per cent (17%)
More than ten per cent and upto twenty percent	Twenty-one per cent (21%)
More than twenty per cent.	Twenty-four per cent (24%).

2.5 Correction factor considered for effect on heat rate due to coal quality:

(a) Average "ash", moisture, and gross calorific value for the previous three years in case of baseline for first cycle and as per rule 14 for consequent cycles and

specified year in case of target year,shall be taken into account for the baseline year andcorrection factor shall be worked out based on the following boiler efficiency formula:-

$$\text{Boiler Efficiency} = 92.5 - \frac{[50 * A + 630\ (M + 9\ H)]}{G.C.V}$$

Where:

A = Ash percentage in coal

M = Moisture percentage in coal

H = Hydrogen percentage in coal

G.C.V = Gross calorific value in kcal/kg

Station heat rate (Kcal/kWh) = Turbine heat rate/Boiler efficiency

(b) The permissible error shall be ±0.05% in terms of toe for the purpose of determining entitlement of energy savings certificates.

3. Cement sector.-

3.1 For establishment of energy consumption norms and standards for designated consumers in the cement sector, the designated consumers shall be grouped based on similar major output or product with the available data to arrive at a logical and acceptable spread of specific energy consumption among the designated consumers which shall be grouped as under:-

Portland Pozzolana Cement Plant (PPC)	Ordinary Portland Cement (OPC)	Portland Slag Cement Plant (OPC)	White Cement Plants	Wet Cement Plants	Clinker Grinding Plants	Clinkerization Plants

Normalization Factors

3.2 Equivalentmajor grade of cement production.-The various product mixes shall be converted in to equivalent major grade of cement product by the designated consumer by using the following formulae:-

(i) Conversion of Ordinary Portland Cement (OPC) production equivalent to major product

$$\textit{Equivalent major product} = \frac{\textit{OPC produced (Lakh ton)} \times \textit{Conversion factor of OPC}}{\textit{Conversion factor of major product}}$$

[Lakh ton]

(ii) Conversion of Portland Pozzolana (PPC) production equivalent to major product

$$\textit{Equivalent major product} = \frac{\textit{PPC produced (Lakh ton)} \times \textit{Conversion factor of PPC}}{\textit{Conversion factor of major product}}$$

[Lakh ton]

(iii) Conversion of Portland Slag Cement (PSC) or any other variety of cement production equivalent to major product

$$\textit{Equivalent major product} = \frac{\textit{PSC or any other variety cement produced (Lakh ton)} \times \textit{Conversion factor of PSC or any other variety cement}}{\textit{Conversion factor of major product}}$$

[Lakh ton]

(iv) Conversion of total exported clinker to major product

$$\textit{Equivalent major product} = \frac{\textit{Total exported clinker (Lakh ton)}}{\textit{Conversion factor of major product}}$$

[Lakh ton]

Where: Total exported clinker = [Clinker exported to other plants + clinker exported to clinker stock over and above the opening stock]

(v) Conversion of total imported clinker to major product

$$\textit{Equivalent major product} = \frac{\textit{Total imported clinker (Lakh ton)}}{\textit{Conversion factor of major product}}$$

[Lakh ton]

Where: Total Imported clinker = [Clinker Imported from other plants + clinker

Imported from clinker stock, equivalent to the quantity by which the clinker opening stock gets reduced]

(vi) Total equivalent major product of cement

It can be arrived at by summing up all the different grades of cements equivalent to major product calculated above:

Total Equivalent major product of Cement = a(i) + a(ii) + a(iii) + a(iv)

[Lakh ton]

Note: S.No. a(v) is already accounted in major product

3.3 Calculation for Gate to Gate specific energy consumption (SEC)

(i) Total thermal energy consumption

Total thermal energy consumption is to be calculated as:-

Total thermal energy consumption = [Fuel consumed (Lakh ton) × Gross calorific value of respected fuel (kcal/kg) × 100]
[Million kcal]

(ii) Total electrical energy consumption

Total electrical energy consumption is to be calculated as:-

Total electrical energy consumption = [{(Total electricity purchased from grid (Lakh kWh) × 860(kcal/kWh) – electricity exported to grid (Lakh kWh) × 2717 (kcal/kWh)}/10]
[Million kcal]

Where: - 2717 kcal/kWh is national average heat rate.

(iii) Notional/ Normalisation energy for imported electricity from grid

Notional energy for imported electricity = [Imported electricity (lakh kWh) × (3208 – 860) (kcal/kWh)] /10
[Million kcal]

Where: - 3208 kcal/kWh is weighted average heat rate of all designated consumers in cement sector.

(iv) Notional/Normalisation energy Required for grinding of exported clinker

It is calculated by using following formula:

Notional energy required = {Total exported clinker to major product (Lakh ton) × Electrical SEC of cement grinding (kWh/ton of cement) × Weighted average heat rate (kcal/kWh)}/10
[Million kcal]

Where: -Weighted average heat rate (kcal/kWh) = [{Imported electricity (Lakh kWh) × 3208 (kcal/kWh)} + {diesel generation (lakh kWh) × diesel generator heat rate (kcal/kWh)} + {Captive power plant generation (lakh kWh) × Captive power plant heat rate (kcal/kWh)}]/[Imported electricity (Lakh kWh) + diesel generation (Lakh kWh) + Captive power plant generation (Lakh kWh)]

(v) Notional/Normalisation energy required for clinkerisation of imported clinker

It is calculated by using following formula:

Notional energy required = [Total clinker imported (Lakh ton) × {Thermal SEC of clinkerization kcal/kg clinker) × 1000 + electrical SEC of clinkerization (kWh/ton of clinker) × Weighted average heat rate (kcal/kWh)}/10] [Million kcal]

(vi) Gate to Gate (GtG) energy consumption

GtG energy consumption = b(i) + b(ii) + b(iii) + b(iv) + b(v) [Million kcal]

(vii) Gate to Gate (GtG) specific energy consumption

$$GtG\ GEC = \frac{GtG\ energy\ consumption\ (Million\ kCal)}{Total\ equivalent\ major\ product\ of\ cement\ (Lakh\ ton) \times 100}$$

[kcal/kg of equivalent cement]

3.4 The permissible error shall be ±0.05% in terms of toe for the purpose of determining entitlement of energy savings certificates.

4 Aluminum sector.

4.1 For establishment of energy consumption norms and standards for designated consumers in the Aluminum sector, the designated consumers shall be grouped based on similar major output or product with the available data to arrive at a logical and acceptable spread of specific energy consumption among the designated consumers which shall be grouped as under:-

4.2 The permissible error shall be ±0.05% in terms of toe for the purpose of determining entitlement of energy savings certificates.

5 Iron and Steel sector.-

5.1 For Establishment of Energy consumption norms and standards in the Iron and Steel sector, the Designated consumers are grouped based on similar characteristics with the available data to arrive at a logical and acceptable spread of specific Energy consumption among the designated consumers which may be grouped as under:-

5.2 The entire sector can be sub divided in the following 8 sub-sector as detailed below:

5.3 Integrated Steel Plant

A) Integrated Steel Plant:- The energy indices of the major integrated steel plants captured from the annual reports and reported during the baseline audits have been taken for the below calculations. The Gate to Gate Specific Energy Consumption may be calculated as follows-

Gate to Gate Specific Energy Consumption (SEC) = Energy index of the plant Submitted to Ministry of Steel (kcal/tone of crude steel).

As regards the total energy consumed in plant for these major integrated steel plants, the following formula can be given-

Total Energy Consumed in Plant

Total Energy Consumption (Mkcal) = [Total Thermal Energy (Mkcal) + {Purchased Electricity from Grid (MkWh) *860 kcal/kWh} – {Exported Electricity to grid (MkWh) * Captive Power Plant Heat Rate kcal/kWh}].

Where, Total Thermal Energy (Mkcal) = [Fuel Quantity used (tonne) *Gross Calorific Value of Fuel (kcal/kg)]/1000

5.4 Sponge Iron

B) Sponge Iron:- for this sub sector only those plants are considered which are standalone sponge Iron plants with no downstream products. The gate to gate SEC may be given as follows:

Gate to Gate Specific (Mkcal/ tonne) = Total Energy Consumption (Mkcal)/ Production of Sponge

Energy Consumption Iron (tonne)

5.5 Sponge Iron with Steel Melting Shop

C) Sponge Iron with Steel Melting Shop:- for this sub sector those plants are considered which are sponge Iron plants with SMS (Steel Melting Shop). The gate to gate SEC may be given as follows:

In this Group first we convert sponge iron to Steel melting shop and again equivalent Steel Melting Shop to sponge iron as follows-

Specific Energy Consumption of Coal for sponge Iron = Tonne of Coal Consumption/Tonne of sponge iron Electrical Specific Energy Consumption for sponge Iron = kWH/Tonne of Sponge Iron.

Thermal Specific Energy Consumption

for Sponge Iron = {(Tonne/Tonne* Gross Calorific Value of Coal)+(kWH/Tonne)* CPP Heat Rate kcal/kWh)}

Electrical Specific Energy Consumption for Steel Melting Shop = kWH/Tonne of Steel Melting Shop.

Steel Melting Shop Equivalent to

Sponge Iron Production = [{(kWH/Tonne)*CPPHeat Rate}*production of Steel melting shop] / (Total Specific Energy Consumption of Sponge Iron)

Total Equivalent Sponge Iron

Production (Tonne) = Production of Sponge Iron (Tonne) + Steel Melting Shop production equivalent to sponge iron (Tonne)

(Gate to Gate SEC) Gate to Gate Specific Energy

Consumption (Mkcal/Tonne) = Total Energy consumed (Mkcal)/Total Equivalent Sponge Iron Production (Tonne)

5.6 Sponge Iron with Steel Melting shops and other

D) Sponge Iron with Steel Melting Shop and others:- for this sub sector those plants are considered which are sponge Iron plants with SMS (Steel Melting Shop) and other products like Ferro Manganese, Silicon Magnanese, Pig Iron etc. . The gate to gate SEC may be given as follows:

In this subsector first we convert equivalent Steel melting shop to Sponge Iron and thereafter equivalent Ferro Alloy is converted to sponge Iron by given formulae.

Equivalent Ferro Alloy Manganese

to Sponge Iron = [{Electrical SEC of Ferro Manganese(kWH/Tonne)*Heat Rate}*Production of Ferro Alloy Ferro Manganese}/(Total Specific Energy Consumption of Sponge Iron)

Equivalent Ferro Alloy

Sponge Iron Manganese to Sponge Iron = [{Electrical SEC of Sponge iron Manganese(kWH/Tonne)*Heat Rate}*production of Ferro Alloy Sponge iron Manganese}/(Total Specific Energy Consumption of Sponge Iron)

(Pig Iron to Sponge Iron) Equivalent Pig Iron to

Sponge Iron = [{Electrical SEC of Pig Iron (kWH/Tonne)* CPP Heat Rate}* production of Ferro Alloy Pig Iron}/(Total Specific Energy Consumption of Sponge Iron)

(Total Sponge Iron) Total Equivalent Sponge

Iron Production = Total energy Sponge Iron +Ferro Manganese to Sponge Iron + Sponge Iron Manganese to Sponge Iron + Pig Iron to Sponge Iron

G to G SEC, Gate to Gate Specific Energy

Consumption = Total Energy consumed/Total Equivalent Sponge Iron Production

5.7 Ferro Alloy

E) Ferro Alloy:-

In this Group we have converted all products as regards equivalent to Ferro alloy (Sponge iron Manganese) by given formula-

Equivalent Ferro Alloy Manganese to Ferro Alloy Sponge iron

Manganese = (Electrical SEC of Ferro Manganese * Production of Ferro Manganese)/ Electrical SEC of Sponge iron Manganese)

Equivalent Ferro alloy Sponge iron Manganese

to Ferro Alloy Sponge iron Manganese = (Electrical SEC of Sponge iron Manganese * Production of Sponge iron Manganese)/ Electrical SEC of Sponge iron Manganese)

Equivalent Ferro Chrome to Ferro Alloy Sponge iron

Manganese = (Electrical SEC of Ferro Chrome * Production of Ferro Chrome)/ Electrical SEC of Sponge iron Manganese)

Equivalent Pig Iron to Ferro Alloy Sponge iron

Manganese = (Electrical SEC of Pig Iron * Production of Pig Iron)/ Electrical SEC of Sponge iron Manganese)

Total Equivalent Ferro Alloy

Sponge iron Manganese Production = (Ferro Manganese to Ferro sponge iron Manganese) + (Fe Sponge iron Manganese equivalent to Ferro Sponge iron Manganese) + (Ferro Chrome equivalent to Ferro Sponge iron Manganese) + (Pig Iron to Ferro Sponge iron Manganese)

Gate to Gate Specific Energy Consumption = Total Energy consumption (Mkcal))/Total Equivalent Ferro Alloy Sponge iron Manganese Production

5.8 Ferro Chrome

F) Ferro Chrome:- The Gate to Gate SEC for this subsector is given as follows-

Gate to Gate Specific Energy Consumption

of Ferro Chrome = Total Energy Consumption (Mkcal)/Total Ferro Chrome Production (Tonne).

5.9 Mini Blast Furnace

G) Mini Blast Furnace:- The G to G SEC for this subsector is given as follows-

Gate to Gate Specific Energy Consumption

of Mini Blast Furnace = Total Energy Consumption (Mkcal)/Total Production (Tonne).

5.10 Steel Processing Unit

H) Steel Processing Units:- This subsector contributes towards the many such steel processing plants like rerolling, wiredrawing, cold rolling, hot rolling etc.

The Gate to Gate SEC for this subsector is given as follows-

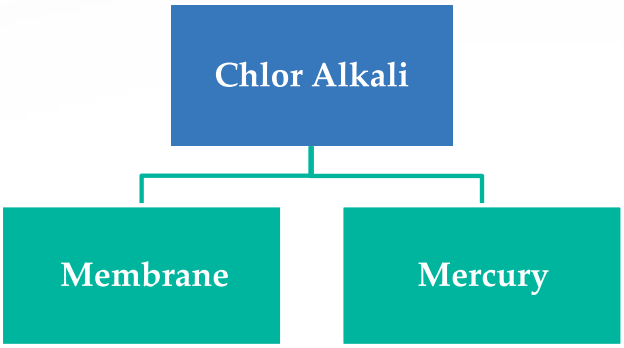
Gate to Gate Specific Energy Consumption

of Steel Processing Unit = Total Energy Consumption (Mkcal)/Total Production of Steel Processing Unit (Tonne).

5.11 The permissible error shall be ±0.05% in terms of toe for the purpose of determining entitlement of energy savings certificates

6 Chlor-Alkali sector.-

6.1 For establishment of energy consumption norms and standards in the Chlor-Alkali sector, the designated consumers shall be grouped based on similar characteristics with the available data to arrive at a logical and acceptable spread of specific energy consumption among the designated consumers which may be grouped as under:-



6.3 Correction factors developed for variability:

(a) Product mix

Caustic Soda	1.0 of Equivalent Caustic Soda
Liquefied Chlorine (T)	0.0615 of Equivalent Caustic Soda
Compressed Hydrogen (Lac NM^3)	13.889 of Equivalent Caustic Soda
Solid Flakes (T)	0.219 of Equivalent Caustic Soda

(b) Membrane and Electrode Life

60 kWh/tonne per year is added into specific energy consumption in the baseline year for each plant. For example:

Addition of 60 kWh per year: 60 kWh × 860 kCal (In case of Non CPP plants) × 3 years/10000000 MTOE/tonne

Addition of 60 kWh per year: 60 kWh × 2717kCal (In case of CPP plants) × 3 years/10000000 MTOE/tonne

6.4 The permissible error shall be ±0.05% in terms of toe for the purpose of determining entitlement of energy savings certificates

7 Pulp and Paper sector.-

7.1 For establishment of energy consumption norms and standards in the Pulp and Paper sector, the designated consumers shall be grouped based on similar characteristics

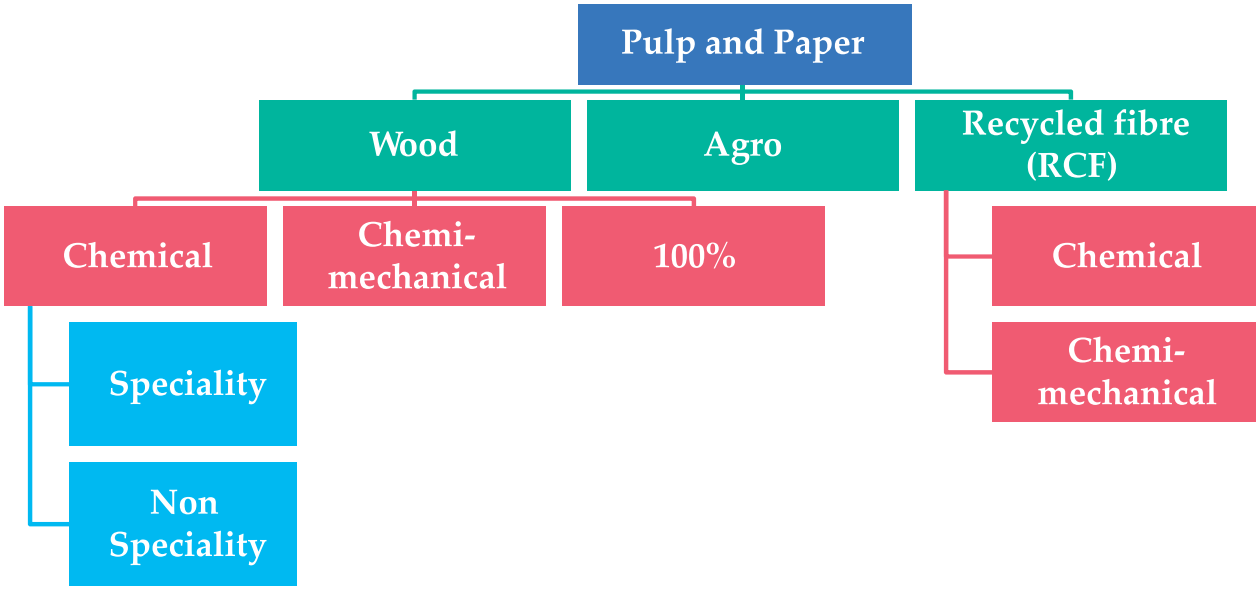
with the available data to arrive at a logical and acceptable spread of specific energy consumption among the designated consumers and the following guidelines shall be applied to group the designated consumers based on similarity in input raw material and product output on the basis of availability of consistent data:-

(i) The input raw materials are Wood, Agro and Recycled Fibre (RCF);

(ii) The process outputs are of Chemical Pulping, Chemi-mechanical Pulping and 100% market pulping

(iii) The product output of specialty paper, non-specialty paper and newsprint.

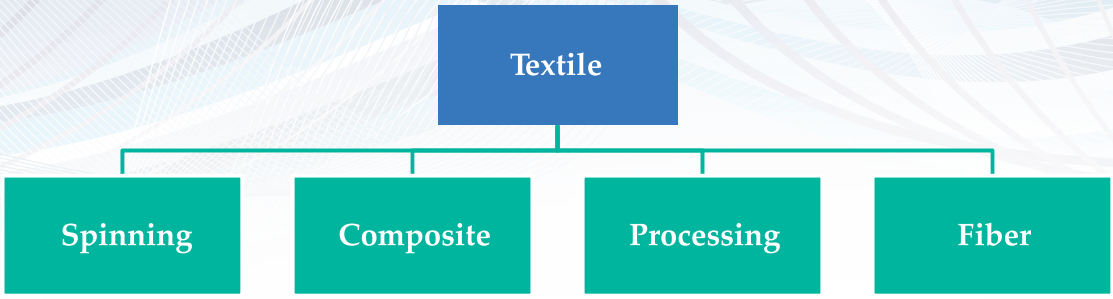
7.2 The groups made for Pulp and Paper sector under are:-



7.3 The permissible error shall be ±0.05% in terms of toe for the purpose of determining entitlement of energy savings certificates.

8 Textile sector.-

8.1 For establishment of energy consumption norms and standards in the Textile sector, the designated consumers shall be based on similar characteristics with the available data to arrive at a logical and acceptable spread of specific energy consumption among the designated and the group made are as under:-



8.2 The designated consumers whose production is measured in meters of cloth, the average grams per square meter (GSM) as 125 and average width as 44 inches shall be assumed for weight calculations.

8.3 The permissible error shall be ±0.05% in terms of toe for the purpose of determining entitlement of energy savings certificates.

9 Fertilizer sector.-

9.1 In Fertilizer Sector, for manufacturing of Urea fertilizer, out of total energy consumed at designated consumer plant boundary, stoichiometric energy of 2.53 Gcal/MT Urea is contained in urea product and goes out as such. Thus, the net energy utilized in urea manufacture is total energy input at designated consumers' boundary reduced by 2.53 Gcal/MT Urea. The figure is worked out by considering heat energy of ammonia as 4.46 Gcal/MT Ammonia and specific consumption 0.567 MT of Ammonia/MT Urea.

9.2 The permissible error shall be ±0.05% in terms of toe for the purpose of determining entitlement of energy saving certificates.

[F. No. 10/6/2008-EC]
JYOTI ARORA, Jt. Secy.

(Note: For all practical and legal purposes, the English Version of the concerned notified Rule in the Gazette of India will be considered as final)