

## **ENERGY SECTOR IN INDIA**



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**OUR CORRPORATE SERVICES**

1. Arbitration –ADR
2. Family laws/Personal Laws settlement/wills & allied matters
3. Charitable Societies & Trust Laws
4. Labour Laws
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6. Insolvency Laws/BIFR
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## **INTRODUCTION**

Energy is derived from the Greek work 'energia' and is referred to as a scalar physical quantity that is a property of objects and systems which is conserved by nature. Energy is often defined as the ability to work.

Energy is an important building block in human development, and, as such, acts as a key factor in determining the economic development of all countries.

The International Energy Agency (IEA) forecasts that world primary energy demand between 2011 and 2030 will increase by 1.5% per year from just over 12,000 million tonnes of oil equivalent (Mtoe) to 16,800 Mtoe- an overall increase of 40%. Developing Asian countries are the main drivers of this growth, followed by Middle East.

India's substantial and sustained economic growth is placing enormous demand on its energy resources. The demand and supply imbalance in energy sources is pervasive requiring serious efforts by Government of India to augment energy supplies as India faces possible severe energy supply constraints.

Energy requirement in our country is increasing at a very rapid rate. While efforts are being made to improve availability of various energy sources, there is still a continuing gap between demand and supply of energy. Thus energy conservation has also emerged

as one of the major issues in recent years. Conservation and efficient utilization of energy resources play a vital role in narrowing the gap between demand and supply of energy. Improving energy efficiency is probably the most profitable thing that can be done in the short term.

### **MEANING OF 'ENERGY'**

Under Section 2(h) of the Energy Conservation Act 2001, Energy means any form of energy derived from fossil fuels, nuclear substances or materials, Hydro-electricity and includes electrical energy or electricity generated from renewable sources of energy or biomass connected to the grid.

Energy comes in different forms:

- heat (thermal),
- light (radiant),
- mechanical,
- electrical,
- chemical, and
- nuclear energy.

All forms of energy are stored in different ways, in the energy sources that we use every day. Energy sources are divided into two groups:

#### A. Primary Sources of Energy

1. Renewable Sources - (an energy source that can be replenished in a short period of time);

- Solar
- Wind

- Geothermal
- Biomass
- Hydro

2. Non Renewable Sources - (an energy source that we are using up and cannot recreate in a short period of time)

- Oil (Petroleum)
- Coal
- Natural Gas
- Nuclear Power

#### B. Secondary Sources of Energy

- Electricity
- Hydrogen

Renewable and nonrenewable energy sources can be used to produce secondary energy sources including electricity and hydrogen.

India's energy-mix comprises both non-renewable (coal, lignite, petroleum and natural gas) and renewable energy sources (wind, solar, small hydro, biomass, cogeneration bagasse etc.).

Information on reserves of non-renewable sources of energy like coal, lignite, petroleum, natural gas and the potential for generation of renewable energy sources is a pre-requisite for assessing the country's potential for meeting its future energy needs.

The major sources for commercial energy in India are coal, oil products, natural gas and electricity. Non-energy producing sectors derive energy from the resources available in primary form such as coal, crude oil, natural gas, hydro-power and nuclear power. Some

of the energy resources are converted into other (final) energy products that are used for purposes other than energy generation.

Coal is also used as a final product or intermediate for power generation. Similarly, natural gas is also used directly or as an intermediate in power generation. Many petroleum products, are used as a final product by the non-energy producing sectors and also used for power generation.

This indicates that the same energy source can be used in various forms at various stages of consumption.

### **RENEWABLE SOURCES OF ENERGY**

As per the publication 'Energy Statistics 2012, by the Central Statistics Office (CSO), Ministry of Statistics and Programme Implementation, in India, there is high potential for generation of renewable energy from various sources- wind, solar, biomass, small hydro and cogeneration bagasse. The total potential for renewable power generation in the country as on 31.03.11 is estimated at 89760 MW. This includes an estimated wind power potential of 49132 MW (55%), SHP (small-hydro power) potential of 15,385 MW (17%), Biomass power potential of 17,538 MW(20%) and 5000 MW (6%) from bagasse-based cogeneration in sugar mills. The geographic distribution of the estimated potential across States reveals that Gujarat has the highest share of about 14% (12,489 MW), followed by Karnataka with 12% share (11,071 MW) and Maharashtra with 11% share (9596 MW), mainly on account of wind power potential.

#### **Renewable Sources of Energy:**

Renewable energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly from the sun, or from heat generated deep within the

earth. It also includes electricity and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources, and biofuels and hydrogen derived from renewable resources. Each of these sources has unique characteristics which influence how and where they are used.

1. Wind Power – It is the conversion of wind energy into a useful form, such as electricity using wind turbines. Most wind power is generated in the form of electricity. Large scale wind farms are connected to electrical grids. Individual turbines can provide electricity to isolated locations. Wind energy is plentiful, renewable, widely distributed, clean and reduces greenhouse gas emissions when it displaces fossil-fuel-derived electricity.

Like old fashioned windmills, today's wind machines use blades to collect the wind's kinetic energy. Windmills work because they slow down the speed of the wind. The wind flows over the airfoil shaped blades causing lift, like the effect on airplane wings, causing them to turn. The blades are connected to a drive shaft that turns an electric generator to produce electricity.

2. Water Power – Water Power or Hydropower or hydraulic power is the force or energy of moving water. It may be captured for some useful purpose. Prior to the widespread availability of commercial electric power, hydropower was used for irrigation, and operation of various machines, such as watermills, textile machines, and sawmill.

3. Solar energy is the utilization of the radiant energy from the Sun. Solar power is used interchangeably with solar energy but refers more specifically to the conversion of sunlight into electricity by photovoltaics and concentrating solar thermal devices, or by one of several experimental technologies such as thermoelectric converters, solar chimneys and solar ponds.

4. Biofuel can be broadly defined as solid, liquid, or gas fuel derived from recently dead biological material, most commonly plants. This distinguishes it from fossil fuel, which is derived from long dead biological material. Biofuel can be theoretically produced from any (biological) carbon source. The most common by far is photosynthetic plants that capture solar energy. Many different plants and plant-derived materials are used for biofuel manufacture.

Biofuels are used globally and biofuel industries are expanding in Europe, Asia and the Americas. The most common use for biofuels is as liquid fuels for automotive transport. The use of renewable biofuels provides increased independence from petroleum and enhances energy security.

5. Geothermal energy is energy obtained by tapping the heat of the earth itself, usually from kilometers deep into the Earth's crust. It is expensive to build a power station but operating costs are low resulting in low energy costs for suitable sites. Ultimately, this energy derives from heat in the Earth's core.

6. Biomass refers to living and recently dead biological material that can be used as fuel or for industrial production. Most commonly, biomass refers to plant matter grown for use as biofuel, but it also includes plant or animal matter used for production of fibres, chemicals or heat. Biomass may also include biodegradable wastes that can be burnt as fuel. It excludes organic material which has been transformed by geological processes into substances such as coal or petroleum.

### **NON-RENEWABLE SOURCES OF ENERGY**

Non-renewable energy is energy taken from resources that will eventually dwindle becoming too expensive or too environmentally damaging to retrieve. Examples of non-renewable energy are coal, petroleum, diesel, natural gas (methane) etc.



As per the publication 'Energy Statistics 2012, by the Central Statistics Office (CSO), Ministry of Statistics and Programme Implementation, India's reserves of non-renewable sources of energy like coal, lignite, petroleum, natural gas etc. is as follows:

### **Coal and Lignite**

India has a good reserve of coal and lignite. As on 31.03.11 the estimated reserves of coal was around 286 billion tones, an addition of 9 billion over the last year. Coal deposits are mainly confined to eastern and south central parts of the country. The states of Jharkhand, Orissa, Chhattisgarh, West Bengal, Andhra Pradesh, Maharashtra and Madhya Pradesh account for more than 99% of the total coal reserves in the country. The total estimated reserve of coal in India as on 31.03.10 was around 277 billion tonnes. There has been an increase of 3.1% in the estimated coal reserves during the year 2010-11 with Madhya Pradesh accounting for the maximum increase of 5 %.

The estimated reserve of lignite as on 31.03.11 was 41 billion tonnes, of which 80 % was in the southern State of Tamil Nadu. The increase in the estimated reserve of lignite during the year 2010-11 was 2.4%, Tamil Nadu accounting for the maximum increase of 2.7%.

Coal washing is an integral part of coal production. Raw coal coming from mines is washed to remove the ash contents to make them fit for feeding into boilers, particularly those of steel plants. Barring a few instances, a coal washery does not form part of a coal mine in India. Total installed capacity of washeries in the country increased from 126 Million tonne per year (MTY) during 2009-10 to 131 MTY during 2010-11. As on 31.03.11, a total of 52 washeries, both PSUs and Private, were operating in the country.

### **Petroleum and Natural gas**

The estimated reserves of crude oil and natural gas in India as on 31.03.2011 stood at 757 million tonnes (MT) and 1241 billion cubic meters (BCM), respectively. Geographical distribution of Crude oil indicates that the maximum reserves are in the Western Offshore (43%) followed by Assam (22%), whereas the maximum reserves of Natural Gas are in the Eastern Offshore (35%) followed by Western offshore (33%). There was an increase of estimated Crude Oil reserves by 33% in Andhra Pradesh followed by Tamil Nadu (8%). However there was a decrease of 2% in the estimated reserve of crude oil for the country as a whole during 2010-11. In case of Natural Gas, the increase in the estimated reserves over the last year was 8%. The maximum contribution to this increase has been from Cold Bed Methane (CBM) (145%), followed by Tamil Nadu (7%)

As on 31.03.11 there were a total of 20 refineries in the country, 17 in the Public Sector and 3 in the private sector.

Total installed crude oil refining capacity in the country at the end of March 2011 was 187 million tonnes per annum.

## **LEGISLATIVE FRAMEWORK AND ADMINISTRATION OF ENERGY SECTOR**

“Energy Laws” is a comprehensive term and would include the following:

- a. Laws governing Electricity
- b. Laws governing Energy Conservation
- c. Laws governing the Petroleum and Natural Gas sector including all fuels derived from petroleum sources
- d. Laws governing the Coal sector including all forms of coal
- e. Laws governing Nuclear Energy for electricity generation

A few of the legislations falling in different heads under energy laws are:

- The Electricity Act 2003
- Electricity Regulatory Commissions Act, 1998
- Energy Conservation Act, 2001
- The Petroleum Act, 1934
- The Petroleum and Natural Gas Regulatory Board Act 2006
- The Oilfields (Regulation and Development) Act, 1948
- The Petroleum Pipelines Act, 1962
- The Oil Industry Act, 1974
- Coal Mines (Conservation & Development) Act, 1974
- Mines & Minerals (Development & Regulation ) Act, 1957
- The Atomic Energy Act 1962
- Civil Liability for Nuclear Damage Act-2010

Different Ministries of the Government are involved with different aspects of Energy Law. E.g

1. The Ministry of Power - The Ministry of Power started functioning independently with effect from 2nd July, 1992. Earlier it was known as the Ministry of Energy sources. Electricity is a concurrent subject at Entry 38 in List III of the seventh Schedule of the Constitution of India. The Ministry of Power is primarily responsible for the development of electrical energy in the country. The Ministry of Power is responsible for the Administration of the Electricity Act, 2003, the Energy Conservation Act , 2001 and to undertake such amendments to these Acts,

as may be necessary from time to time, in conformity with the Government's policy objectives.

2. The Ministry of Petroleum & Natural Gas - is entrusted with the responsibility of exploration and production of oil and natural gas, their refining, distribution and marketing, import, export, and conservation of petroleum products and Liquefied Natural Gas.
3. The Ministry of New and Renewable Energy (MNRE) - is the nodal Ministry of the Government of India for all matters relating to new and renewable energy. The broad aim of the Ministry is to develop and deploy new and renewable energy for supplementing the energy requirements of the country.
4. The Ministry of Coal - The Ministry of Coal has the overall responsibility of determining policies and strategies in respect of exploration and development of coal and lignite reserves, sanctioning of important projects of high value and for deciding all related issues.
5. The Department of Atomic Energy - The Department of Atomic Energy (DAE) came into being on August 3, 1954 under the direct charge of the Prime Minister through a Presidential Order. According to the Resolution constituting the AEC, the Secretary to the Government of India in the Department of Atomic Energy is ex-officer Chairman of the Atomic Energy Commission. The Secretary to the Government of India in the Department of Atomic Energy is ex-officer Chairman of the Commission. DAE has been engaged in the development of nuclear power technology, applications of radiation technologies in the fields of agriculture, medicine, industry and basic research.

### **COAL AND COAL DERIVATIVES**

COAL is the most important and abundant fossil fuel in India. It accounts for 55% of the country's energy need. The country's industrial heritage was built upon indigenous coal.

Commercial primary energy consumption in India has grown by about 700% in the last four decades. The current per capita commercial primary energy consumption in India is about 350 kilograms of oil equivalent an year (kgoe/year) which is well below that of developed countries. Driven by the rising population, expanding economy and a quest for improved quality of life, energy usage in India is expected to rise around 450 kgoe/year in 2010. Considering the limited reserve potentiality of petroleum & natural gas, eco-conservation restriction on hydel project and geo-political perception of nuclear power, coal will continue to occupy centre-stage of India 's energy scenario.

With hard coal reserves around 246 billion tonnes, of which 92 billion tonnes are proven, Indian coal offers a unique ecofriendly fuel source to domestic energy market for the next century and beyond. Hard coal deposit spread over 27 major coalfields, are mainly confined to eastern and south central parts of the the country. The lignite reserves stand at a level around 36 billion tonnes, of which 90% occur in the southern State of Tamil Nadu.

Ministry of Coal has the overall responsibility of determining polices and strategies in respect of exploration and development of coal and lignite reserves, sanctioning of important projects of high value and for deciding all related issues. These key functions are exercised through its Central govt. public sector undertakings.

Ministry of coal has issued a strategic plan in February 2011 which seeks to enable the Coal Sector in the sustainable, efficient and economical exploitation of its coal resources. The strategic plan has discussed the issues and actions at length. The report has a detailed Strengths, Weaknesses Opportunities and Threats (SWOT) Analysis; and discussion on interdepartmental and cross-sectional issues, which gives a very good insight into dynamics of the coal sector in India.

## **PETROLEUM AND NATURAL GAS**

The Ministry of Petroleum & Natural Gas is the nodal ministry responsible for activities relating to exploration and production of oil and natural gas (including import of Liquefied Natural Gas (LNG)), refining, distribution & marketing, import, export and conservation of petroleum products. Various Public Sector Undertakings and other organizations are under the administrative control of the Ministry of Petroleum & Natural Gas.

India has to heavily depend on the import of oil and also LNG. Therefore, this sector is affected by the global development in the industry. India depends on imports to meet more than 75% of its hydrocarbon energy requirements. Hydrocarbons are organic compounds made of two elements carbon and hydrogen and are chief components of petroleum and natural gas.

Crude Oil production has been at the level of 33 Million Metric Tonnes (MMT) for some years now. During the year 2010-11 production of petroleum products from crude oil was 196 MMT. During the financial year 2010-11, import of crude oil has been 163 MMT valued at Rs. 4559 billion, against that during 2009-10 at 159 MMT valued at Rs. 3754 billion.

In view of India's increasing demand of energy needs, a number of programmes had been proposed to be taken up during the 12<sup>th</sup> Five Year Plan to help bridge the shortfall in availability of oil and gas in the country. There would be acceleration the exploration activities in the non-producing areas of the Indian sedimentary basins. Key technologies would be inducted to improve existing techniques activities.

New Exploration Licensing Policy (NELP) was conceptualised by the Government of India, during 1997-98 to provide an equal platform to both Public and Private sector companies in exploration and production of hydrocarbons with Directorate General of Hydrocarbons (DGH) as a nodal agency for its implementation. It was introduced to boost the production of oil and natural gas and providing level playing field for both public and private players. The New Exploration Licensing Policy (NELP) provides an international class fiscal and contract framework for Exploration and Production of Hydrocarbons. In the first eight rounds of NELP spanning 2000- 2010, Production

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Sharing Contracts (PSCs) for 235 exploration blocks have been signed. Under NELP, 90 oil and gas discoveries have been made by private/joint venture (JV) companies in 26 blocks. In the Ninth round of NELP (NELP-IX), 34 exploration blocks were on offer.

Shale gas has been recognized as an important new source of Energy in India. The Directorate General of Hydrocarbons (DGH) under the Ministry of Petroleum and Natural Gas, has initiated steps to identify prospective areas for Shale Gas exploration and acquisition of additional geo-scientific data, formulation of policy for Shale Gas exploration and exploitation.

In the refinery sector, it is proposed to lay greater emphasis on cleaner fuels and improve profitability of the refineries while meeting the environment and market demand.

In association with major national industrial associations, Petroleum Conservation Research Association (PCRA) has initiated steps to approach the Small and Medium Industrial clusters where energy consumption is substantial and a large scope for its optimization exists. Through interaction, the areas where Research & Development interventions are sought by the Industrial clusters are finalized and then necessary action initiated for required R &D and its implementation.

To encourage production of bio-diesel in the country, the Ministry of Petroleum and Natural Gas has announced a Bio-diesel Purchase Policy, in October, 2005, which became effective from 1.1.2006. Under this scheme Oil Marketing Companies will purchase bio-diesel for blending with High Speed Diesel (HSD) to the extent of 5% at identified purchase centres across the country. The bio-diesel industry is still at nascent stage of growth and blending has not been set in motion so far.

### **ATOMIC ENERGY**

The Atomic Energy Commission (AEC), reporting directly to the Prime Minister, is the apex body of the Government of India for atomic energy. AEC has executive and

financial powers and has powers of the Government of India within the limits of approved budget provision. AEC provides direction on policies related to atomic energy. The members of AEC include, among others, some eminent scientists & technocrats, secretaries of different ministries and seniormost officials from the office of the Prime Minister.

Development and implementation of AEC directions in nuclear power, related nuclear fuel cycle activities and research & development activities is carried out by various units of Department of Atomic Energy (DAE).

DAE organization is divided into four major sectors, viz. research & development sector, industrial sector, public sector undertakings and services & support sector. The DAE also provides for the interaction needed between the production and R&D units. As integrated group of different units, DAE comprises of five research centres, three industrial organizations, five public sector undertakings and three service organizations. It has under its aegis two boards for promoting and funding extra-mural research in nuclear and allied fields, mathematics, and a national institute (deemed university). It also supports seven institutes engaged in research in basic sciences, astronomy, astrophysics, cancer research and education.

Atomic Energy Regulatory Board (AERB) is the national regulatory body having powers to frame safety policies, lay down safety standards & requirements and powers to monitor & enforce safety provisions in nuclear and radiation installations and practices. AERB reports to the Atomic Energy Commission. A bill on constitution of an independent National Regulatory Authority is currently under consideration of the Government of India.

Nuclear power has a very important role to play in India's future energy. Nuclear power is economically competitive and therefore can provide large base load generation, while contributing significantly to de carbonization of the power sector, being devoid of greenhouse gas emissions, with life cycle emissions comparable with hydro and wind power.



India has signed Civil nuclear cooperation agreements with many countries, including, USA, Russia, France, UK, South Korea, Namibia, Mongolia, Canada and others.

### **NEW AND RENEWABLE ENERGY**

The role of new and renewable energy has been assuming increasing significance in recent times with the growing concern for the country's energy security.

The Ministry of New and Renewable Energy (MNRE) is the nodal Ministry of the Government of India at the Federal level for all matters relating to new and renewable energy. The Ministry has been facilitating the implementation of broad spectrum programmes including harnessing renewable power, renewable energy to rural areas for lighting, cooking and motive power, use of renewable energy in urban, industrial and commercial applications and development of alternate fuels and applications. In addition, it supports research, design and development of new and renewable energy technologies, products and services.

MNRE is broadly organized into eight Groups dealing with 'Bio-Energy, Research & Development and TIFAD(Technology Information Forecasting, Assessment and Databank ), Solar Energy', and Remote Village Electrification', Biomass and Wind Power', 'Energy for Urban, Industrial & Commercial Applications', 'Small Hydro and Information & Public Awareness', 'Hydrogen Energy' and 'Administration and Coordination'. In addition, the Ministry has an Integrated Finance Division, which is functioning under the Special Secretary and Financial Adviser. The Ministry is classified as a Scientific Ministry.

Extension programmes of the Ministry are largely implemented through the State Renewable Energy Development Agencies. These agencies, in turn, mobilize participation of the State level machinery, local institutions, Non- Governmental Organizations (NGOs) and village level organizations for implementation of these programmes.

The MNRE has set up a Solar Energy Centre near Delhi with the state-of-art facilities for testing of solar thermal and solar photovoltaic materials, devices and systems. A Centre for Wind Energy Technology has been set up in Chennai for providing technical support to the Ministry in the implementation of its wind energy programmes. Research and Development programmes are sponsored in research institutions, national laboratories and in industries, both public and private sectors. For market development and financing of renewable energy projects, a separate financing institution called the Indian Renewable Energy Development Agency (IREDA) has been set up as a public sector undertaking. IREDA provides institutional finance exclusively in the field of renewables and energy efficiency.

Renewable energy sources contribute over 30% in India's primary energy supply. Renewable energy programme is guided by a strategic plan developed by the Ministry of New and Renewable Energy for 2011 – 2017.

The Strategic Plan Initiatives have been formulated to address the following issues:

- i) Pursue initiatives that fit national strengths;
- ii) Overcome weaknesses with new knowledge and capabilities;
- iii) Identify actions that can leverage India's strength to reduce vulnerabilities to external threats; and
- iv) Establish a defensive plan to prevent internal weaknesses from making it perceptible to external threats.

The Strategic Plan Initiatives are expected to lead to:

- i) Cost reduction for incubating technologies with high future potential;
- ii) Opening market channels and introducing new business models;
- iii) Continuing improvements in regulatory and policy initiatives;
- iv) Developing and deploying appropriate financial instruments

- v) Developing framework for monitoring and verification of projects;
- vi) Promoting schemes; and
- vii) Promoting human resource development.

MNRE has focused on rural applications through following activities:

1. National Biogas and Manure Management Programme (NBMMP) – NBMMP caters to setting up of family type biogas plants for meeting cooking energy needs in rural areas along with making available enriched biofertilizer.
2. “Biogas based Distributed/Grid Power Generation Programme” (BGPG) – The scheme was started from 2005-06 with a view to promote biogas power generation
3. The remote village electrification programme is being implemented by use of renewable energy technologies for electrification of remote villages including small hydro, biomass and solar energy.
4. Village Energy Security Test projects were taken up by the Gram Panchayats since the 10th Plan.

Other Initiatives:

1. Renewable Energy Certificates - In January 2010, the Central Electricity Regulatory Commission issued a notification on 'Terms and Conditions for recognition and issuance of Renewable Energy Certificate (REC) for Renewable Energy Generation'.
2. The Special Area Demonstration Project Scheme of the Ministry has been introduced with the objective of demonstrating application of various renewable energy systems in a project mode at places of national and international importance including world heritage sites, heritage monuments, religious locations and places of public interest to create

greater awareness of renewable energy sources and to supplement the energy requirements at such locations.

3. A programme on tidal energy has been implemented to develop and harness about 8,000 to 9,000 MW of estimated tidal energy potential for power generation.

4. A broad based programme on research, development and demonstration of battery operated vehicles/hybrid electric vehicles/plug hybrid electric vehicles is being implemented to get a feed back on the performance of battery operated vehicles under operating conditions.

### **ELECTRICITY**

Electricity is a concurrent subject in the Constitution of India. The Ministry of Power is the nodal central ministry responsible for development of power sector in India.

The main items of work dealt with by the Ministry of Power are:

- General Policy in the electric power sector and issues relating to energy policy and coordination thereof.
- All matters relating to hydro-electric power (except small/mini/micro hydel projects of and below 25 MW capacity) and thermal power and transmission & distribution system network;
- Research, development and technical assistance relating to hydro-electric and thermal power, transmission system network and distribution systems in the States/UTs;
- Administration of the Electricity Act, 2003, the Energy Conservation Act, 2001, the Damodar Valley Corporation Act, 1948 and Bhakra Beas Management Board as provided in the Punjab - Reorganisation Act, 1966.
- All matters relating to Central Electricity Authority, Central Electricity Board and Central Electricity Regulatory Commission;

- Rural Electrification; Power schemes and issues relating to power supply/ development schemes/programmes/ decentralized and distributed generation in the States and Union Territories;
- All matters concerning energy conservation

**Central Electricity Authority (CEA)**

CEA is a Statutory Body constituted under the Electricity Act 2003. The office of the CEA is an "Attached Office" of the Ministry of Power. The CEA is responsible for the technical coordination and supervision of programmes and is also entrusted with a number of statutory functions.

The functions and duties of the Authority are delineated under section 73 of the Electricity Act 2003. Besides, CEA has to discharge various other functions as well under sections 3, 8, 4, 5, 55 and 177 of the Act.

As per section 73 of the Electricity Act, 2003, the Central Electricity Authority shall perform such functions and duties as the Central Government may prescribe or direct, and in particular to -

- a) advise the Central Government on the matters relating to the national electricity policy, formulate short-term and perspective plans for development of the electricity system and coordinate the activities of the planning agencies for the optimal utilization of resources to sub serve the interests of the national economy and to provide reliable and affordable electricity to all consumers;
- b) specify the technical standards for construction of electrical plants, electric lines and connectivity to the grid;
- c) specify the safety requirements for construction, operation and maintenance of electrical plants and electric lines;

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- d) specify the Grid Standards for operation and maintenance of transmission lines;
- e) specify the conditions for installation of meters for transmission and supply of electricity;
- f) promote and assist in the timely completion of schemes and projects for improving and augmenting the electricity system;
- g) promote measures for advancing the skills of persons engaged in electricity industry;
- h) advise Central Government on any matter on which its advice is sought or make recommendation to that Government on any matter if, in the opinion of the Authority, the recommendation would help in improving the generation, transmission, trading, distribution and utilization of electricity;
- i) collect and record the data concerning the generation, transmission, trading, distribution and utilization of electricity and carry out studies relating to cost, efficiency, competitiveness and such like matters;
- j) make public from time to time the information secured under this Act, and provide for the publication of reports and investigations;
- k) promote research in matters affecting the generation, transmission, distribution and trading of electricity;
- l) carry out, or cause to be carried out, any investigation for the purpose of generating or transmitting or distributing electricity;
- m) advise any State Government, licensees or the generating companies on such matters which shall enable them to operate and maintain the electricity system under their ownership or control in an improved manner and where necessary, in coordination with any other Government, licensee or the generating company owning or having the control of another electricity system;
- n) advise the Appropriate Government and the Appropriate Commission on all technical matters relating to generation, transmission and distribution of electricity; and

o) discharge such other functions as may be provided under this Act.

### **The Electricity Act 2003**

With the objective of reforming the Power Sector, the Electricity Act, 2003 (No. 36 of 2003) has been enacted and the provisions of this Act have been brought into force with effect from 10th June, 2003.

Electricity Act, 2003 provides an enabling framework for accelerated and more efficient development of the power sector. The Act seeks to encourage competition with appropriate regulatory intervention. Competition is expected to yield efficiency gains and in turn result in availability of quality supply of electricity to consumers at competitive rates.

The Act has been enacted to consolidate the laws relating to generation, transmission, distribution, trading and use of electricity and generally for taking measures conducive to development of electricity industry, promoting competition therein, protecting interest of consumers and supply of electricity to all areas, rationalisation of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and environmentally benign policies, constitution of Central Electricity Authority, Regulatory Commissions and establishment of Appellate Tribunal and for matters connected therewith or incidental thereto.

Electricity Act, 2003 is divided into XVIII Parts viz.

PART I Preliminary

PART II National Electricity Policy and Plan

PART III Generation Of Electricity

PART IV Licensing

PART V Transmission Of Electricity

PART VI Distribution Of Electricity

PART VII Tariff

PART VIII Works

PART – IX Central Electricity Authority

PART – X Regulatory Commissions

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**The National Electricity Policy**

Section 3 (1) of the Electricity Act 2003 requires the Central Government to formulate, inter alia, the National Electricity Policy in consultation with Central Electricity Authority (CEA) and State Governments

Vide Resolution No. 23/40/2004-R&R (Vol.II) dated 12<sup>th</sup> February, 2005 the Central Government notified the National Electricity Policy.

The National Electricity Policy aims at laying guidelines for accelerated development of



the power sector, providing supply of electricity to all areas and protecting interests of consumers and other stakeholders keeping in view availability of energy resources, technology available to exploit these resources, economics of generation using different resources, and energy security issues.

The National Electricity Policy aims at achieving the following objectives:

- Access to Electricity - Available for all households in next five years
- Availability of Power - Demand to be fully met by 2012. Energy and peaking shortages to be overcome and adequate spinning reserve to be available.
- Supply of Reliable and Quality Power of specified standards in an efficient manner and at reasonable rates.
- Per capita availability of electricity to be increased to over 1000 units by 2012.
- Minimum lifeline consumption of 1 unit/household/day as a merit good by year 2012.
- Financial Turnaround and Commercial Viability of Electricity Sector.
- Protection of consumers' interests.

### **Appellate Tribunal for Electricity**

The Appellate Tribunal for Electricity (APTEL) has been set up under the Electricity Act 2003 by Government of India (Ministry of Power) w.e.f. 7th April, 2004, to hear appeals against the orders of the Adjudicating Officer or the appropriate Commission under the Act. The Tribunal also has Original Jurisdiction to hear petitions under Section 121 of the Act. APTEL is headed by the Chairperson, who has been given the terms of a sitting judge of the Supreme Court. There are three other Members of the Tribunal, one Judicial and two Technical Members, who have been given terms of a sitting judge of the Delhi High Court. Every Bench constituted by the Chairperson shall include at least one Judicial Member and one Technical Member. The Headquarters of APTEL is New Delhi.

## **ENERGY CONSERVATION**

Energy conservation facilitates the replacement of non-renewable resources with renewable energy. It is often the most economical solution to energy shortages, and is a more environmentally benign alternative to increased energy production. It is the quickest, cheapest and most practical method of overcoming energy shortage. Energy conservation has emerged as one of the major issues in recent years.

Energy Conservation Act in 2001 and establishment of the Bureau of Energy Efficiency, (BEE) under Ministry of Power, Government of India, on 1st March 2002 paved way for institutionalization of energy conservation efforts in the country. BEE has initiated a number of energy efficiency initiatives through a range of measures, including the launch of Energy Conservation Building Code for large, new commercial buildings; the launch of energy labeling scheme for appliances; the initiation of process for the development of energy consumption norms for industrial sub sectors and an annual examination to certify energy auditors and energy managers.

The Energy Conservation (Amendment) Act, 2010', notified on 25.08.2010 further strengthened the provisions for energy efficiency in buildings, appliances and equipments and set a mechanism for incentives and penalties to energy intensive industries in lieu of complying with energy performance targets. With this amendment, there will be one Appellate Tribunal both for the Electricity Act as well as the Energy Conservation Act.

### **The Energy Conservation Act 2001**

Energy efficiency/conservation measures can reduce peak and average demand. One unit saved avoids 2.5 to 3 times of fresh capacity addition. Investment in energy efficiency/energy conservation is highly cost effective. It also avoids investment in fuel, mining, transportation etc.

Considering the vast potential of energy savings and benefits of energy efficiency, the Government of India enacted the Energy Conservation Act, 2001 (52 of 2001).

It was enacted in October 2001 but became effective from 1<sup>st</sup> March, 2002.

The Act provides for the legal framework, institutional arrangement and a regulatory mechanism at the Central and State level to embark upon energy efficiency drive in the country.

### **Framework of the Act**

The Energy Conservation Act, 2001 is An Act to provide for efficient use of energy and its conservation and for matters connected therewith or incidental thereto.

The Act is divided into 10 chapters, comprising of 62 sections and one Schedule.

Chapter I: Preliminary

Chapter II: Bureau of Energy Efficiency

Chapter III: Transfer of assets, liabilities etc. of Energy Management Centre to Bureau

Chapter IV: Powers and functions of Bureau

Chapter V: Power of Central Government to facilitate and enforce efficient use of energy and its conservation

Chapter VI: Power of State Government to facilitate and enforce efficient use of energy and its conservation

Chapter VII: Finance, Accounts and Audit of Bureau

Chapter VIII: Penalties and Adjudication

Chapter IX: Appellate Tribunal for Energy Conservation

Chapter X : Miscellaneous

The Schedule : List of Energy Intensive Industries and other establishments specified as designated consumers.

However, the Central government has, vide its notification dated 12<sup>th</sup> March,2007 in exercise of the powers conferred by the clauses (e) and (f) of section 14 of the Energy Conservation Act,2001, in consultation with the Bureau of Energy Efficiency, altered the List of Energy Intensive Industries and other establishments specified in the Schedule to the said Act.

### **Salient features of the Energy Conservation Act 2001**

The Act empowers the Central Government and, in some instances, State Governments to:

- specify energy consumption standards for notified equipment and appliances;
- direct mandatory display of label on notified equipment and appliances;
- prohibit manufacture, sale, purchase and import of notified equipment and appliances not conforming to energy consumption standards;
- notify energy intensive industries, other establishments, and commercial buildings as designated consumers;
- establish and prescribe energy consumption norms and standards for designated consumers;
- prescribe energy conservation building codes for efficient use of energy and its conservation in new commercial buildings having a connected load of 500 kW or a contract demand of 600 kVA and above;
- direct designated consumers to -
  - o designate or appoint certified energy manager in charge of activities for efficient use of energy and its conservation;

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- o get an energy audit conducted by an accredited energy auditor in the specified manner and interval of time;
- o furnish information with regard to energy consumed and action taken on the recommendation of the accredited energy auditor to the designed agency;
- o comply with energy consumption norms and standards;
- o prepare and implement schemes for efficient use of energy and its conservation if the prescribed energy consumption norms and standards are not fulfilled;
  - get energy audit of the building conducted by an accredited energy auditor in this specified manner and intervals of time;

State Governments may –

- o amend the energy conservation building codes prepared by the Central Government to suit regional and local climatic conditions;
- o direct every owners or occupier of a new commercial building or building complex being a designated consumer to comply with the provisions of energy conservation building codes;
- o direct, if considered necessary for efficient use of energy and its conservation, any designated consumer to get energy audit conducted by an accredited energy auditor in such manner and at such intervals of time as may be specified;

**Energy intensive Industries**

The Schedule to the Energy Conservation Act, 2001 gives the List of Energy Intensive Industries and other establishments specified as designated consumers.

However, the Central government has, vide its notification dated 12<sup>th</sup> March,2007 in exercise of the powers conferred by the clauses (e) and (f) of section 14 of the Energy

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Conservation Act,2001, in consultation with the Bureau of Energy Efficiency, altered the List of Energy Intensive Industries and other establishments specified in the Schedule to the said Act.

The list now includes the following, namely:

1. Thermal Power Stations-30,000 metric tonne of oil equivalent (MTOE) per year and above
2. Fertilizer-30,000 metric tonne of oil equivalent (MTOE) per year and above
3. Cement-30,000 metric tonne of oil equivalent (MTOE) per year and above
4. Iron and Steel-30,000 metric tonne of oil equivalent (MTOE) per year and above
5. Chlor-Alkali-12,000 metric tonne of oil equivalent (MTOE) per year and above
6. Aluminium-7,500 metric tonne of oil equivalent (MTOE) per year and above

7. Railways—

- (a) the electric traction Sub-section (TSS) in each Zonal Railway having maximum energy consumption as per the table given below:—

TABLE

Railway Zone	List of TSS
Central Railway	Wardha
Eastern Railway	Titagarh
East Central Railway	Koderma
East Coast Railway	Simhachalam North
Northern Railway	Narela
North Central Railway	Mathura
Southern Railway	Avadi
South Central Railway	Krishna Canal
South Eastern Railway	Balichak
South Western Railway	Bangarapet
South East Central Railway	Bilaspur
Western Railway	Makarpur
West Central Railway	Bina

- (b) the diesel loco shed in each Zonal Railway as per table given below:—

TABLE

Railway Zone	Loco Shed
(1)	(2)
Central Railway	Kalyan
Eastern Railway	Undal
East Central Railway	Patratu
East Coast Railway	Vishakhapatnam

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(1)	(2)
Northern Railway	Ludhiana
North Central Railway	Jhansi
North Eastern Railway	Gonda
Northeast Frontier Railway	New Guwahati
North Western Railway	Abu Raod
Southern Railway	Erode
South Central Railway	Kazipeth
South Eastern Railway	Kharagpur
South East Central Railway	Rajpur
South Western Railway	Hubli
Western Railway	Vatva
West Central Railway	New Katni Jn.

(c) all six production units i.e. Integral Coach Factory (ICF), Rail Coach Factory (RCF), Chittaranjan Locomotive Works (CLW), Diesel Locomotive Works (DLW), Diesel Component Works (DCW) and Rail Wheel Factory (RWF);

(d) workshops on Indian Railways having total annual energy consumption of 30,000 MTOE or more.

8. Textile-3,000 metric tonne of oil equivalent (MTOE) per year and above

9. Pulp and Paper-30,000 metric tonne of oil equivalent (MTOE) per year and above

NOTES:



**Note : 1** The energy conversion value given in the table below shall be used for working out annual energy consumption in terms of metric tonne of oil equivalent.

**TABLE**

1kwh	860 kilocalories (kcal)
1 kg. Coal/Coke	Gross Calorific Value as per supplier's( coal company's) latest certificate
1 kg. Charcoal	6,900 kcal or as per supplier's latest certificate
1 kg. Furnace Oil/ Residual Fuel Oil/Low Sulphur Heavy Stock- NAPHTHA	10,050 kcal (density=0.9337 kg/ litre) or as per supplier's latest certificate
1 kg. High Speed Diesel	11,840 kcal (density=0.8263 kg/ litre) or as per supplier's latest certificate
1 kg. Petrol	11,200 kcal (density=0.7087 kg/ litre) or as per supplier's latest certificate
1 kg. Kerosene	11,110 kcal (density of SKO=0.7782 kg/ litre) or as per supplier's latest certificate
1 kg. Liquefied Petroleum Gas	12,500 kcal or as per supplier's latest certificate

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1 M <sup>3</sup> Natural Gas	8,000-10,500 kcal (Actual calorific value as per supplier's latest certificate will be considered.) In case of non-issue of certification by the supplier, average of the range 8000-10,500 kcal/M <sup>3</sup> will be considered).
Other Fuels or waste material or by product used as a Fuel	Gross Calorific value as per the certificate from a National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited laboratory or Central Government laboratory or State Government laboratory or Government approved laboratory provided the fuel sampling for assessing the calorific value has also been carried out by the concerned laboratory.

For the purpose of this table,—(i) 1 kg. of Oil Equivalent: 10,000 kcal

- (ii) 1 Metric Tonne of Oil Equivalent (MTOE):  
10 × 10<sup>6</sup> kcal
- (iii) In case of coal, petroleum products and other fuels, in absence of the supplier's certificate (due to its non-issue by the supplier), the gross calorific value of the above fuels will be considered as per the Test Certificate from a National Accreditation Board for Testing and Calibration Laboratories (NABL) Accredited Laboratory or Central Government Laboratory or State Government Laboratory or Government recognized Laboratory provided the fuel sampling for assessing the calorific value has also been carried out by the concerned Laboratory.

**Note : 2** For the purpose of declaring energy intensive industry or any other establishment specified in the Schedule to the Act, the limit of annual energy consumption in terms of metric tonne of oil equivalent shall be reviewed every three years with effect from the date of publication of this notification.

**Note : 3** The provisions mentioned in this Schedule shall not be applicable to the Ministry or the Department of the Central Government dealing with Defence, Atomic Energy, Space, Internal Security or Undertakings or Boards or Institutions under the control of such Ministries or Departments.

### **Establishment of Bureau of Energy Efficiency**

The Bureau of Energy Efficiency (BEE) is a statutory Body under the Ministry of Power, Government of India established under the provisions of the Energy Conservation Act, 2001. Under the provisions of the Act, Bureau of Energy Efficiency has been established with effect from 1<sup>st</sup> March, 2002.

The Bureau would be responsible for spearheading the improvement of energy efficiency of the economy through various regulatory and promotional instruments. The BEE has published specifications of several electrical equipments and appliances on energy efficiency.

The Bureau shall be a body corporate having perpetual succession and a common seal, with power subject to the provisions of this Act, to acquire, hold and dispose of property, both movable and immovable, and to contract, and shall, by the said name, sue or be sued.

The head office of the Bureau shall be at Delhi. The Bureau may establish offices at other places in India.

### **Objectives of the BEE**

The mission of the Bureau of Energy Efficiency is to develop policy and strategies with a thrust on self-regulation and market principles, within the overall framework of the Energy Conservation Act, 2001 with the primary objective of reducing energy intensity of the Indian economy.

This will be achieved with active participation of all stake holders, resulting in accelerated and sustained adoption of energy efficiency in all sectors of the economy.

The primary objective of BEE is to reduce energy intensity in the Indian economy through adoption of result oriented approach. The broad objectives of the BEE are:

- to assume leadership and provide policy framework and direction to national energy efficiency and conservation efforts and programmes;
- to coordinate policies and programmes on efficient use of energy and its conservation with the involvement of stakeholders;
- to establish systems and procedures to measure, monitor and verify energy efficiency results in individual sectors as well as at national level;

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- to leverage multi-lateral, bi-lateral and private sector support in implementation of the Energy Conservation Act and programmes for efficient use of energy and its conservation;
- to demonstrate energy efficiency delivery mechanisms, through private-public partnership,
- to plan, manage and implement energy conservation programmes as envisaged in the Energy Conservation Act.

**Management of the BEE**

The Director-General is the chief executive officer of the Bureau of Energy Efficiency.

The general superintendence, direction and management of the affairs of BEE is vested in the Governing Council which shall consist of not less than 20 but not exceeding 26 members, to be appointed by the Central Government.

The Governing Council is headed by Union Minister of Power and consists of Secretaries of various line Ministries, heads of various technical agencies under the Ministries, members representing industry, equipment and appliance manufacturers, architects, and consumers, and members from each of the five power regions representing the states of the region.

The Director – General of the Bureau is the ex-officio member-secretary of the Governing Council.

BEE has been given a corpus fund of Rs. 50 Crore for setting up of the Central Energy Conservation Fund for meeting the expenses relating to the salaries, allowances and other remuneration of the officers and employees of the Bureau and to meet the expenses of the Bureau in discharge of its functions as well as on objects and for purposes authorized by the Act. It has also been authorised to collect appropriate fees in discharge of functions

assigned to it and raise funds from other sources. Bee may become self-sufficient in a period of 5-7 years.

### **Powers and Functions of BEE**

The functions of BEE can be classified as regulatory functions being recommendatory body to the Central Government in implementing the provisions of the Energy Conservation Act and facilitation, market development and market transformation functions such as:

- arrange and organize training of personnel and specialists in the techniques for efficient use of energy and its conservation;
- develop testing and certification procedures and promote testing facilities;
- strengthen consultancy services;
- create awareness and disseminate information;
- promote research and development;
- formulate and facilitate implementation of pilot projects and demonstration projects;
- promote use of energy efficient processes, equipment, devices and systems;
- take steps to encourage preferential treatment for use of energy efficient equipment or appliances;
- promote innovative financing of energy efficiency projects;
- give financial assistance to institutions for promoting efficient use of energy and its conservation;
- prepare educational curriculum on efficient use of energy and its conservation and
- implement international co-operation programmes relating to efficient use of energy and its conservation.

Powers and Functions of the BEE are enlisted in Section 13 of the Act as follows:

(1) The Bureau shall, effectively co-ordinate with designated consumers, designated agencies and other agencies, recognise and utilise the existing resources and infrastructure, in performing the functions assigned to it by or under this Act

(2) The Bureau may perform such functions and exercise such powers as may be assigned to it by or under this Act and in particular, such functions and powers include the function and power to -

(a) recommend to the Central Government the norms for processes and energy consumption standards required to be notified under clause (a) of section 14 ;

(b) recommend to the Central Government the particulars required to be displayed on label on equipment or on appliances and manner of their display under clause (d) of section 14;

(c) recommend to the Central Government for notifying any user or class of users of energy as a designated consumer under clause (e) of section 14;

(d) take suitable steps to prescribe guidelines for energy conservation building codes under clause (p) of section 14;

(e) take all measures necessary to create awareness and disseminate information for efficient use of energy and its conservation;

(f) arrange and organize training of personnel and specialists in the techniques for efficient use of energy and its conservation;

(g) strengthen consultancy services in the field of energy conservation;

(h) promote research and development in the field of energy conservation;

(i) develop testing and certification procedure and promote testing facilities for certification and testing for energy consumption of equipment and appliances;

(j) formulate and facilitate implementation of pilot projects and demonstration projects for promotion of efficient use of energy and its conservation;

(k) promote use of energy efficient processes, equipment, devices and systems;

(l) promote innovative financing of energy efficiency projects;

- (m) give financial assistance to institutions for promoting efficient use of energy and its conservation;
- (n) levy fee, as may be determined by regulations, for services provided for promoting efficient use of energy and its conservation;
- (o) maintain a list of accredited energy auditors as may be specified by regulations;
- (p) specify, by regulations, qualifications for the accredited energy auditors;
- (q) specify, by regulations, the manner and intervals of time in which the energy audit shall be conducted ;
- (r) specify, by regulations, certification procedures for energy managers to be designated or appointed by designated consumers;
- (s) prepare educational curriculum on efficient use of energy and its conservation for educational institutions, boards, universities or autonomous bodies and coordinate with them for inclusion of such curriculum in their syllabus;
- (t) implement international co-operation programmes relating to efficient use of energy and its conservation as may be assigned to it by the Central Government;
- (u) perform such other functions as may be prescribed.

### **The Energy Conservation Building Codes (ECBC)**

The BEE launched the Energy Conservation Building Code (ECBC) on 27<sup>th</sup> May 2007 in New Delhi.

This code addresses the design of new, large commercial buildings to optimize the building's energy demand. Commercial buildings are one of the fastest growing sectors of the Indian economy, reflecting the increasing share of the services sector in the economy.

Nearly one hundred buildings are already following the Code, and compliance with it has also been incorporated into the Environmental Impact Assessment requirements



The Energy Conservation Building Codes under the Act are aimed at achieving total energy efficiency in buildings and establishments.

The new buildings are required to be designed and built with energy efficiency consideration right from the initial stages itself. The development of energy conservation building codes is necessary for this purpose. The codes would be applicable to commercial buildings constructed after the relevant rules are notified under the Energy Conservation Act. The Bureau would constitute Committee of Experts for preparation of Energy Conservation Building Codes for different climatic zones.

ECBC norms will be implemented on a voluntary basis initially and then made mandatory.

Aim of ECBC:

The ECBC aims at increasing awareness about efficient use of energy and its conservation in new commercial buildings with a connected load of 500kW or contract demand of 600KVA.

ECBC incorporates energy efficiency factors at the design stage itself to reduce the long term operating energy costs of the buildings.

What does ECBC do?:

ECBC defines the norms of energy requirement per sq. metre of area and takes into consideration the climatic region of the country, where the building is located. Norms have been developed to cater to 5 different climate zones in India- Composite; Hot and Dry; Warm and Humid; Moderate; and Cold.

What is Included in ECBC:

The Government has introduced Energy Conservation Codes for commercial buildings.

ECBC details the parameters of various building materials to be used in walls, windows, glass, ceilings and floors to minimize heat gain and thus the cooling cost.

ECBC also covers Lighting, Heating, Ventilation, Air-Conditioning, Electrical Distribution, Water Heating and Pumping Systems.

Savings

If the nearly 21.50 million sq mtrs of commercial space constructed in India every year conforms to ECBC norms, energy consumption can be cut down by 30-40%, which will result in a saving of approx. Rs.1000 crores in capital investment in a 250MW power plant plus 1.7 billion units of electricity annually every year.

Revised ECBC:

BEE has come out with the revised edition of ECBC incorporating the comments received from stakeholders and organizations. This code is intended for new commercial buildings having a connected load of more than 500 kW and has initially been launched on voluntary basis. In order to ensure administration of ECBC implementation in a uniform and consistent manner all over the country, the BEE has set up an ECBC Programme Committee (EPC) by pooling in the expertise of all stake holders, including State Designated Agencies, Industry etc. This committee facilitates the development of ECBC compliant building design, credible implementation of a few demonstration projects in the public sector, making arrangements for evaluation of the progress and outcomes by creating appropriate institutional mechanism.

With a view to build adequate technical capacity and develop building procedures and tools to effectively implement ECBC - a panel of 37 ECBC expert architects has been

shortlisted. The shortlisted Architects would act as resource persons and are the Brand Ambassadors for the ECBC. These expert architects support the implementation of ECBC by providing services to architects who are designing ECBC compliant buildings.

### **Designated Consumers (DCs)**

Under Section 2(g) of the Energy Conservation Act,2001 “designated consumer” means any consumer specified under clause (e) of section 14 of the Act.

Section 14(e) says - The Central Government may, by notification, in consultation with the Bureau, specify, having regard to the intensity or quantity of energy consumed and the amount of investment required for switching over to energy efficient equipments and capacity or industry to invest in it and availability of the energy efficient machinery and equipment required by the industry, any user or class of users of energy as a designated consumer for the purposes of this Act.

The Schedule to the Act provides a list of the Designated Consumers. These DCs have to :

1. Appoint/Designate Energy Managers
2. Get Energy Audit conducted by Accredited Energy Auditors
3. Implement Techno-Economic Viable Recommendations
4. Comply with norms of specific energy consumption fixed
5. Submit Report on Steps Taken

### **Labeling Programme for Appliances**

An energy labeling programme for appliances was launched in 2006, and comparative starbased labeling has been introduced for fluorescent tubelights, air conditioners, and distribution transformers.

The Figure below shows labels for refrigerators and Fluorescent Lamps.



The labels provide information about the energy consumption of an appliance, and thus enable consumers to make informed decisions. Almost all fluorescent tubelights sold in India, and about two-thirds of the refrigerators and air conditioners, are now covered by the labeling programme.

### **Star Rating Programme for Office Buildings**

In order to create a market pull for Energy Efficiency activities in the commercial buildings, the Bureau of Energy Efficiency has now developed a Star Rating Programme for office buildings which is based on actual performance of the building, in terms of specific energy usage (in kWh/ sq m/year). This Programme would rate office buildings on a 1-5 star scale, with 5-star labeled buildings being the most energy efficient. Till date, 136 buildings have been found eligible for the award of label.

**Energy Managers and Energy Auditors**

Under the EC Act, 2001 it is mandatory for the designated consumers to get energy audit conducted by an “accredited energy auditor” (under clause 14(h) and 14(i)) and to designate or appoint an energy manager (under clause 14(1)).

The BEE is empowered to specify the regulations and mechanism to meet the above objective. It has been decided that prescribed qualification for energy manager will be the passing of certification examination to be arranged by the Bureau. Also, regular accreditation is proposed to be given to energy audit firms having a pool of certified energy auditors.

BEE has retained the National Productivity Council (NPC) as the National Certifying Agency on the advise of the Governing Council of the BEE, for conducting the National Certification Examination for Energy Managers and Energy Auditors under the aegis of BEE.

National Level Certification Examination has to be passed to qualify as a Certified Energy Manager and Certified Energy Auditor, to be appointed or designated by the designated consumers under the Energy Conservation Act. The country has now 8013 Certified Energy Managers, out of which 5726 are also qualified as Certified Energy Auditors, from the 10 examinations conducted during the years 2004 to 2010.

**Energy Audits of Large Industrial Consumers:**

Energy audit studies conducted in several office buildings, hotels and hospitals in India indicate energy saving potential of 20-30%. The potential is largely untapped, partly due to lack of an effective delivery mechanism for energy efficiency.

Government buildings by themselves, constitute a very large target market. The Government of India is committed to set an example by implementing the provisions of the Energy Conservation Act in all its establishments as a first initiative.

To begin with, the Bureau has begun conduct of energy audit in the Rashtrapathi Bhawan, Parliament House, South Block, North Block, Shram Shakti Bhawan, AIIMS, Safdarjung Hospital, Delhi Airport, Sanchar Bhawan, and RailBhawan. Energy audit in the Rashtrapati Bhawan PMO, S S Bhawan, Sanchar Bhawan & Rail Bhawan has been completed

In March 2007, the conduct of energy audits was made mandatory in large energy-consuming units in nine industrial sectors. These units, notified as “designated consumers” are also required to employ “certified energy managers”, and report energy consumption and energy conservation data annually.

### **INDIAN ENERGY EXCHANGE**

<http://www.iexindia.com/>

Indian Energy Exchange Limited (IEX) is India’s first-ever, nationwide, automated, and online electricity trading platform. It has been conceived to catalyse the modernisation of electricity trade in the country by ushering in a transparent and neutral market through a technology-enabled electronic trading platform.

CENTRAL ELECTRICITY REGULATORY COMMISSION (CERC) accorded approval on 9th June 2008, to IEX to commence its operations. IEX is a demutualised exchange that will enable efficient price discovery and price risk management in the electricity market.

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On 6th February 2007, the CERC issued guidelines for grant of permission to set up power exchanges in India. Financial Technologies (India) Ltd responded by proposing then tentatively named 'Indian Power Exchange Ltd' and applied for permission to set it up and operate it within the parameters defined by CERC and other relevant authorities. Based on the oral hearing on July 10, the CERC accorded its approval vide its order dated 31st August, 2007. IEX thus moved from the conceptual level to firmer grounds. On 9th June 2008 CERC accorded approval to IEX to commence its operations and 27th June 2008 marked its presence in the history of Indian Power Sector as Indian Energy Exchange Ltd (IEX), India's first-ever power exchange.

Regulator of IEX:

CENTRAL ELECTRICITY REGULATORY COMMISSION (CERC)

Promoters of IEX:

IEX is promoted by Financial Technologies (India) Ltd, and PTC India Ltd.

Financial Technologies (India):

Financial Technologies has a 90% share of the electronic exchange and online brokerage solutions market in India. The company's solutions power six exchanges and 750 out of the 800-odd brokerage houses operating over 1,40,000 trading terminals on a daily basis. IEX will be the seventh exchange to be powered by Financial Technologies.

PTC India:

A public-private partnership initiated by the government of India, whose primary focus is to develop a commercially vibrant power market in the country. It has pioneered power trading in India and is presently the leading power trading company with a market share of 44% (2006-2007)

Stakeholders in IEX:

There are a number of key stakeholders in IEX:

1. Infrastructure Development Finance Company (IDFC):

A private sector enterprise formed by a consortium of public and private investors, IDFC is a specialised financial intermediary for infrastructure. It provides financial assistance to projects in power, roads, ports, and telecommunications.

2. Adani Enterprises:

Part of the Adani group of companies, Adani Enterprises is active in the power trading business across the country. It is implementing mega thermal power projects at various locations in India. It aims to enter into power transmission in a big way.

3. Reliance Energy:

India's largest integrated private sector power utility company, Reliance Energy is into generation, transmission, distribution, and trading of power. It is also an investor in infrastructure projects including the prestigious Mumbai metro rail project and various road projects of the National Highways Authority of India.

4. Lanco Infratech:

With more than two decades of experience in power generation, power trading, construction and EPC, infrastructure and property development, Lanco Infratech's expertise in power encompasses conventional as well as non-conventional sources of energy such as gas, coal, biomass, hydro, and wind. It is also one of the top three power trading companies in the country.



5. Rural Electrification Corporation (REC):

A wholly public sector enterprise, REC's main objective is to finance and promote electrification projects in villages all over India. It provides financial assistance to state electricity boards, state government departments, and rural electricity cooperatives for rural electrification projects.

6. Tata Power Company:

Pioneers of electricity generation in India, Tata Power is the country's largest private sector power utility. It has successfully served customers in Mumbai for over 90 years and has now spread its operations across the nation. Tata Power has generation units in Mumbai, Delhi, Jojobera, Jharkhand, and Karnataka.

Technology Support to IEX:

OMX Technology, Sweden, the technology provider to the world's leading power exchange, NORDPOOL, has joined hands with Financial Technologies (India) Ltd to provide technology support to Indian Energy Exchange (IEX).

OMX is a leading expert in the exchange industry. It owns exchanges in the Nordic and Baltic regions, and develops and provides technology and services to companies in the securities industry around the globe. In power trading, OMX is a pioneer, with four power exchanges in Europe currently using its technology.

**USEFUL WEBSITES**

Ministry of Power

<http://www.powermin.nic.in/>

Bureau of Energy Efficiency

<http://www.beeindia.in/>

Ministry of Petroleum and Natural Gas

<http://petroleum.nic.in/>

Ministry of Coal

<http://www.coal.nic.in/>

Ministry of New and Renewable Energy

[www.mnre.gov.in/](http://www.mnre.gov.in/)

Department of Atomic Energy

[www.dae.gov.in/](http://www.dae.gov.in/)