

ENERGY

POWER MINISTRY

Indian government's Ministry of Power is empowered to supervise and assure adequate production of electricity, which can sustain infrastructure development, on top of propagation and delivery.

The power ministry got identity as a ministry, on 2 July 1992.

The sectionalised parts of ministry include: **Power ministry**, **Coal ministry** and **Ministry of Non-conventional Energy Sources**.

Ministry of Non-conventional Energy Sources was renamed as the "**Ministry of New and Renewable Energy**" (MNRE) in 2006. The ministry launched smart grid project in 2012.

COAL MINISTRY

The coal and lignite reserves including **explorations, production, distribution, supply, and even the pricing** are under the surveillance of The Ministry of Coal through the government's Coal India Limited and its subsidiaries along with Neyveli Lignite Corporation.

India's coal industry was predominantly driven by the private sector after Independence until the **Indira Gandhi government decided** to transfer all coal holdings to Coal India through the Coal Mines (Nationalisation) Act, 1973.

India's coal blocks are allocated on an **auction basis**. India is still not self-sufficient in coal production to fulfill basic need for power generation.

MINISTRY OF NEW AND RENEWABLE ENERGY (MNRE)

Department of Non-conventional Energy Sources (DNES) was established in 1982 and became the Ministry of Non-traditional Energy Sources in 1992.

The Ministry was re-christened as the Ministry of New and Renewable Energy (MNRE) in October 2006. Due to the fact that the concern related to country's energy security is growing, the role of new and renewable energy resources is assuming increasing significance recently.

INDIAN RENEWABLE ENERGY DEVELOPMENT AGENCY (IREDA)

India established Renewable Energy Development Agency (IREDA) in 1987 as a **public-sector non-banking company under MNRE** with the primary goal of **providing loans for new and renewable sources of energy**, thereby promoting project viability. Additionally, to **promote participation of new entrepreneurs**, IREDA has started entrepreneur development programme, providing training and assistance to new entrepreneurs in this field.

The major **objectives** of IREDA are:

- 1. Financial support** to certain projects and schemes related to energy and electricity production with the help of renewable and latest sources, enhancing efficiency of energy.
- 2. Betterment in efficiency** through periodical improvement systems, processes and resources, and subsequently assuring consumer satisfaction in addition to the share of IREDA in the sector of renewable energy through innovation.
- 3.**

The Petroleum and Natural Gas Regulatory Board Act, 2006

PNGRB was constituted in 2006. This Act provide Petroleum and Natural Gas Regulatory Board to **regulate the refining, processing, storage, transportation, distribution, marketing and sale of petroleum, petroleum products and natural gas** excluding production of crude oil and natural gas so as to protect the interests of

consumers and entities engaged in specified activities relating to petroleum, petroleum products and natural gas and to ensure uninterrupted and adequate supply of petroleum, petroleum products and natural gas in all parts of the country and to promote competitive markets and for matters connected therewith or incidental thereto. **This clearly indicates that it ensures a competitive market for gas.**

An appellate Tribunal established under section 110 of the Electricity Act, 2003 (36 of 2003) should be the Appellate Tribunal **for PGNRB.**

Govt. Scheme and Programme

URJA SANGAM 2015 / PAHAL

The Prime Minister, Shri Narendra Modi, urged well-to-do sections of the Indian society to **voluntarily give up LPG subsidy, for benefiting the poorer sections of society.**

During the inaugural address at global energy summit – ‘Urja Sangam 2015’ – in New Delhi. [L]

“**Give it up**” campaign was launched by the Prime Minister for voluntarily giving up LPG subsidy. **The Union Government targets to extend the reach of Piped Natural Gas (PNG) to 1 crore houses in the next five years.** [L]

On the occasion of the platinum jubilee of India’s independence, the Prime Minister called for enhancement of domestic production, which could **reduce the energy import load of the country by at least 10 percent till 2022**. He said that **PAHAL – the world’s largest cash subsidy transfer programme** in the world, enabling transfer of LPG subsidy directly into bank accounts had consequently led to the elimination of leakages, and curbing corruption. [L]

He also mentioned deregulation of diesel prices, ethanol, and ethanol-blended petrol in

order to assist sugarcane farmers, promotion of bio-diesel, and extension of the gas grid in eastern India, as some other major initiatives of the Government.

UJJWALA YOJANA

It was launched by the PM from Ballia on **1 May 2016**. The scheme ideated to **provide 8 crore cooking gas connections to Below Poverty Line families over the next three years (2016 – 2019)**. The scheme provides financial support for each LPG connection to the BPL household. The households will be identified in consultation with the state governments and UTs.

About Pradhan Mantri Ujjwala Yojana

1. Under the scheme, an adult woman member of a below poverty line family **identified through the Socio-Economic Caste Census (SECC)** is given a deposit-free LPG connection with **financial assistance of 1,600 per connection** by the Centre. [L]LPG is being supplied beyond commercial [L]considerations with the **Pradhan Mantri Ujjwala [L]Yojana initiated by the Ministry of Petroleum. [L]**
2. Eligible households will be identified in consultation with state governments and Union territories. **The scheme is being implemented by the Ministry of Petroleum and Natural Gas.** [L]

Some objectives of the scheme are: [L]

1. Empowering women and protecting their health. [L]
2. Reducing the serious health hazards associated with cooking based on fossil fuel. [L]
3. Reducing the number of deaths in India due to unclean cooking fuel. [L]
4. Preventing young children from significant number of acute respiratory illnesses caused due to indoor air pollution by burning the fossil fuel.

What makes LPG adoption necessary? [L]

1. A large section of Indians, especially women and girls, are exposed to severe **household air pollution (HAP)** from the use of solid fuels such as biomass, dung cakes and coal for cooking. A report from the **Ministry of Health & Family Welfare places HAP as the second leading risk factor contributing to India's disease burden.** [1 SEP]
2. According to the World Health Organisation, **solid fuel use is responsible for about 13% of all mortality and morbidity in India** (measured as Disability-Adjusted Life Years), and causes about 40% of all pulmonary disorders, nearly 30% of cataract incidences, and over 20% each [SEP] of ischemic heart disease, lung cancer and lower respiratory infection.

Kerala is now set to become the **first smoke-free State in the country with public sector oil companies eyeing 100% LPG penetration here.**

PRADHAN MANTRI URJA GANGA

GAIL (Gas Authority of India Limited) is a pioneer in city gas distribution in India. '**Petroleum Ministry**' launched a **INR 1750 crore city gas distribution project between Bhubaneshwar and Cuttack on March 2017**, making a big step towards linking of eastern India to the natural gas grid connection through **Jagdishpur-Haldia and Bokoro-Dhamra Natural Gas Pipeline (JHBDPL)**.

- The gas pipeline project aims to **provide piped cooking gas to residents of Varanasi** and later to millions of people in states like **Bihar, Jharkhand, West Bengal and Odisha**. The government estimates that around 5 lakh gas cylinders will be sent to rural areas annually.
- According to GAIL, with the Urja Ganga project, **20 lakh households will get PNG connections**. The project is said to be a major step towards collective growth and development of the Eastern region of India. GAIL has built a network of trunk pipelines covering the length of around 11,000 km. With Urja Ganga

project, this number will further increase by 2540 km.

Northeast gas pipeline grid project

- Five public sector oil and natural gas companies have signed the joint venture agreement to implement the Rs. 6000 crore gas pipeline grid project in Northeast.
- The five companies are **Indian Oil Corporation Limited (IOCL)**, **ONGC**, **GAIL**, **Oil India Limited** and **Numaligarh Refinery Limited (NRL)**.
- With the signing of the agreement the joint ventures company will develop, build, operate and maintain the natural gas pipeline grid.
- The proposed gas pipeline grid will connect Guwahati to the major Northeast cities and major load centres. [L][SEP]
- The project is being implemented under **Prime Minister Narendra Modi's ambitious Urja Ganga Gas Pipeline Project**. [L][SEP]
- Besides connecting all the state capitals in the region, the pipeline will also connect with the National Gas Grid through Barauni – Guwahati Gas Pipeline, which is being laid by GAIL. [L][SEP]
- From Guwahati, the pipeline will extend to Numaligarh, Dimapur, Kohima and Imphal in one direction; Shillong, Silchur, Aizwal and Agartala in the second direction and to Itanagar in the third direction. Gangtok will be connected from Siliguri from the gas pipeline of GAIL coming from Barauni to Guwahati. [L][SEP]

RURAL ELECTRIFICATION [L]

As per 2011 census, nearly 80 percent population of the country stays in the rural areas, including 167.8 million families. The backbone of the rural economy is often seen in rural electrification. The four facets of rural electrification are: [L]

- Establishing of rural electrification infrastructure, thereby providing household connectivity. [L] [SEP]
- Desired power quality to be adequately supplied. [L] [SEP]
- Supplying electricity at reasonable tariff. [L] [SEP]
- Effective and efficient providing of environmentally friendly, clean and sustainable power. [L] [SEP]

Rural Electrification Policy 2005 [L] [SEP]

The key for accelerating rural development is seen in rural electrification and hence, provision of electricity is essential to cater for many requirements of life. As per the National Electricity Policy, supply of electricity to all areas including rural, as mandated in Section 6 of Electricity Act, marks the key development objective of the power sector. This National Policy for Rural Electrification has been prepared and framed up through an extensive consultative process undertaken by the Ministry of Power.

The Policy aims at / Goal

1. Provision of access to electricity to all households by the year 2009. [L] [SEP]
2. Quality and reliable power supply at reasonable rates. [L] [SEP]
3. Minimum lifeline consumption of 1 unit per household per day by 2012. [L] [SEP]

However, these targets are yet to be achieved. [L] [SEP] Based on the certificate issued by Gram Panchayat with certain properties, the REP has changed the definition of electrified villages. For rural electrification to be achieved in a sustainable way, a massive focus on creation on income generation activities has to be given to boost the rural economy. [L] [SEP]

Approach to Rural Electrification [L] [SEP]

- Grid connectivity is the normal way of electrification of villages. [L] [SEP]

- For villages with no possibility of grid connectivity, off-grid solutions based on standalone system may be taken up for electricity supply. [L][SEP]
- Decentralised distributed generation facilities, along with local distribution network, be it through conventional or non-conventional methods of electricity generation. [L][SEP]
- State government should, within six months, prepare and notify a Rural Electrification plant to achieve goal of providing access to all households. [L][SEP]
- Mapping and detailed electrification delivery mechanism should be deployed to rural electrification plan. [L][SEP]

Note: **Rural Electrification Corporation Limited (REC)**, a Government of India enterprise under Ministry of Power, is the nodal agency to implement Rural Electrification Programme. [L][SEP]

Rajiv Gandhi Grameen Vidyutikaran Yojna

RGGVY was launched by the central government on **4 April 2005**, for attaining the National Common Minimum Programme (NCMP) objective of providing access to electricity to all households in the country in 5 years. The scheme aimed at electrification of over 1 lakh un-electrified villages and providing electricity connection to 2.34 crore rural households approximately. The estimated cost was INR 51,000 crores. A village or hamlet with a population of 100 or more is eligible for this scheme. This scheme is being implemented mostly to provide benefits to households below poverty line (BPL) through a free connection but chargeable consumption of power. Under this scheme, central government provides 90 percent of grant and 10 percent as a loan, which is provided by REC (Rural Electrification Corporation) to all state governments. The REC is the main nodal working agency for this scheme.

Aim

- Electrifying every village as well as habitation, according to new guidelines.
- Proper electricity to every rural household. [L][SEP]
- To offer electricity connection to every BPL [L][SEP]family without charge. [L][SEP]

Conditions and Implementation Methodology [L][SEP]

- Main work is preparation of various district boards for proper execution. [L][SEP]
- Proper involvement of public sector. [L][SEP]
- Daily supply of 6–8 hours of proper electricity [L][SEP]in areas of RGGVY. [L][SEP]
- Outline electronic fund transfer directly to [L][SEP]contractor account. [L][SEP]

Deen Dayal Upadhyaya Gram Jyoti Yojna (DDUGJY) [L][SEP]

DDUGJY is a Government of India scheme designed to give continuous power supply to rural India as one of a key initiative of the Modi Government. [L][SEP]

This scheme will replace existing Rajiv Gandhi Grameen Vidyutikaran Yojna. This was launched on **25 July 2015 in Patna** by PM Modi. This is one of the major programmes of the **ministry of power** and will **facilitate 24 x 7 power supply**.

It draws its inspiration from the similar pioneering scheme implemented by the Government of Gujarat. This will enable to initiate much awaited reform in rural areas. It focuses on **feeder separations (rural household and agriculture)** and strengthening of sub-transmission and distribution infrastructure. It also includes **metering** at all levels on rural areas.

Particularly, there are two major components in DDUGJY, i.e., **providing power till 2019 to all** and **feeder separation**, which were not included in the RGGVY. The government has started undertaking different measures and also working in the direction of supplying power to the country's last standing mile. The target of the

Government is the completion of all electrification of villages by the year 2019.

Objectives

- Provide electrification to all villages.
- Feeder separation to ensure sufficient power to Farmer and regular supply to other consumer.
- Sub-transmission and distribution framework to be improved to enhance quality and reliability of the supply.
- Metering to reduce losses.

Benefits

- All villages and households shall be electrified. [L][SEP]
- Increased agriculture yield. [L][SEP]
- Business of small and household enterprise shall [L][SEP] grow resulting. [L][SEP]
- Improvement in health, Education, ATM [L][SEP] services. [L][SEP]
- Improvement in accessibility to radio, telephone, [L][SEP] mobile, etc. [L][SEP]
- Betterment in social security due to availability [L][SEP] of electricity. [L][SEP]
- Accessibility of electricity to schools, [L][SEP] panchayats, etc. [L][SEP]
- Rural areas shall get increased opportunities for comprehensive development.

SAUBHAGYA: Sahaj Bijli Har Ghar Yojana

Union Ministry of Power had launched Pradhan Mantri Sahaj Bijli Har Ghar Yojana on **25 September 2017** (Birth ceremony of Pt. Deen Dayal Upadhyaya). Its aim is to achieve **universal household electrification (to all rural and urban households)** in all parts of country by providing electricity connectivity. **These households will be identified under Socio-Economic and Caste Census (SECC) data 2011.**

Rural Electrification Corporation Limited (REC) is the nodal agency for operationalisation of SAUBHAGYA scheme throughout India. For this accelerated implementation, household survey will perform with the help of Mobile App. Public institutions/ Gram Panchayat in rural areas will be authorised to collect application

and documents. They will distribute and collect revenue in consultation with **Panchayat Raj Institutions (PRIs) and Urban Local Bodies (ULBs)**.

For **APL (Above poverty line) families**, INR 500 will be payable in 10 equal monthly installments but BPL cardholders will get free electricity connections.

In remote and inaccessible areas, solar power packs of 200 to 300 watts with battery will. It will also comprise of 5 LED lights, 1 DC fan, 1 DC power plug with all Repair and Maintenance (R and M) for next 5 years.

The total outlay of scheme is INR 16,320 crore while Gross Budgetary Support (GBS) is INR 12,320 crore. This is a central government scheme. The States and UTs are required to complete this work of complete household electrification by 31 December 2018. (**Note:** Some government sources inform that this yojana will take some more time)

This scheme will have many outcomes like to improve health services, education services, various economic activities and jobs, improved quality of life especially for women, every one can easily connect through radio, television, mobiles, etc., and also environmental up-gradation (due to complete replacement of kerosene for lighting purposes).

UJWAL DISCOM ASSURANCE YOJNA (UDAY)

UDAY is the **financial turnaround and revival package for power distribution companies of India (DISCOMs)** and more importantly offers a sustainable permanent solution to the problem. It is a path breaking reform for realising the Prime Minister's vision of affordable and accessible 24x7 power for all. It is another decisive step, further being the landmark strides made in the power sector over the past years. Financially stressed DISCOMs could not function adequately, because the legacy issues trapped the DISCOMs in a vicious cycle with operational loses being funded by debt. A rise of vibrant and efficient DISCOMs through a permanent resolution of past as well as potential future issues of the sector is assured by UDAY. The scheme

empowers DISCOMs to breakeven in the next 2–3 years by different initiatives.

Four Initiative of Scheme

- (i) Operational efficiencies of DISCOMs improved.
- (ii) Cost of power reduced.^[L]
[SEP]
- (iii) Reduction in interest cost of DISCOMs reduced.^[L]
[SEP]
- (iv) Financial disciplines on DISCOMs enforced, through alignment with state finances.

UDAY is a shining example of the utilisation of the best principles of cooperative and competitive federalism is being demonstrated by UDAY and has been evolved through discussion at highest levels with multiple states.

Features

State shall take over 75 percent of Discom debt on 30 September 2015. 50 percent Discom debt shall be taken over in 2015–16 and 25 percent in 2016–17.^[L]
[SEP]

**States accepting UDAY and performing as per it will be given additional funding through Deen Dayal Upadhyaya Gram Jyoti Yojna, Integrated Power Development Scheme (IPDS) and [L]Power Sector Development Fund (PSDF).^[L]
[SEP]**

This scheme was announced by Minister of Power in November, 2015.^[L]
[SEP]

**Scheme is under optional basis for states^[L]to joins, however 11 states have joined this scheme. First state to join this scheme was Jharkhand and recently 4 other states have joined too, thereby making the total of 15 states to have joined the scheme.
[L]
[SEP]**

UNNAT JYOTI BY AFFORDABLE LEDS FOR ALL (UJALA)

The Union Government has also initiated the nationwide programme for **Home and**

Street LED-based Lighting, so as to conserve energy through the reduction of energy consumption. Subsequently, **Energy Efficiency Services Ltd.**, an Government organisation, has launched the scheme for distribution of LED bulbs under **Domestic Efficient Lighting Programme (DELP)** in the year March 2015. There after, in the year **March 2016**, this scheme got a fresh face and name termed as ‘UJALA’.

The scheme’s main objective is the **promotion of efficient lighting, awareness enhancing on the usage of the equipment, which efficiently reduces bills and aid in the environment preservation**. Under this scheme, there is distribution of LED bulbs in a phased manner from the year March 2015. At present, the DELP scheme is continuing in the country’s nine states – Uttrakhand, Himachal Pradesh, Andhra Pradesh, Jharkhand and Karnataka. Till 28 June 2016, there is distribution of around 123 million LED bulbs, which is being equivalent to energy saving of approximately 43 million kilowatts hour per day and further shunning away of peak demand of 3205 megawatts.

Under the scheme, 20W LED tube lights and BEE 5-star rated energy efficient fans are also distributed to the consumers. The 20W LED tube lights are 50% more energy efficient than conventional 40W tube lights and are available for Rs. 220/- per tube, as against the market price of Rs. 400-600. The energy efficient fans under the UJALA scheme come with a BEE 5 Star rating. These ceiling fans are rated 30% more energy efficient than conventional fans and are priced at Rs. 1200/- per fan.

Objectives

The main objective is to promote efficient lighting, enhance awareness on using efficient equipment which reduce electricity bills and help preserve environment.

Overall targets

UJALA LED bulbs

- Overall target of number of LED lights to be replaced in 3 years - 770 million
- Expected annual energy savings - 105 bn KWh
- Expected reduction of peak load - 20,000 MW
- Annual estimated greenhouse gas emission reductions - 79 million tonnes of CO₂

Implementation agencies

The Electricity Distribution Company and **Energy Efficiency Services Limited (EESL)** a public sector body of Government of India are implementing the programme.

Eligibility of acquiring LED bulbs

Every grid-connected consumer having a metered connection from their respective Electricity Distribution Company can get the LED bulbs at about 40% of the market price under the UJALA Scheme. Consumers also have the option of paying for the LEDs in equated monthly instalments.

States implemented

The UJALA is under implementation across the country. To know the cities covered and the status of LED bulb distribution, [click here](#).

Procuring LED bulbs

The bulbs will be distributed through special counters set up at designated places in the city. These will not be available at any other location including shops etc. There will be phase wise distribution. The location of counters is made available through the awareness drive (leaflets, posters, advertisements etc) to inform the consumers.

Documents to be submitted to get LED bulbs

- Photo copy of the latest electricity bill
- A copy of photo ID proof
- A copy of residential proof (The address on the residential proof must match the address on the electricity bill.)
- Cash advance in case of on-bill financing (balance amount recovered from the electricity bill) or full amount in case of upfront payment for each LED. In case of upfront payment, address proof is not mandatory.

In case of faulty bulbs/LED bulb fuses

LED bulbs have very long life (> 15 years if used of 4-5 hours every day) and are not likely to fuse. However, if the LED bulb stops working due to a technical defect, EESL will be providing free of cost warranty for all technical faults for three years. And the replacements shall be done through designated retail stores that will be communicated after the distribution ends. During the distribution, replacements can be done through any of the DELP distribution counters that would be operating within the city. Any EESL LED bulb can be replaced with any other company's EESL LED bulb.

Registering complaints

Maximum no. of bulbs owned by a household

Through the UJALA scheme consumers can avail from a minimum of 2 to a maximum of 10 LED bulbs, depending on the region. Studies indicate that a domestic household on an average has 5-6 lighting points.

How the model works

- Energy Efficiency Services Limited (EESL) distributes LED bulbs to households at 40 % of market price
- Total upfront investment and risk coverage borne by EESL
- DISCOM pays EESL from actual energy savings over 5 years
- No subsidy required from government
- No impact on electricity tariffs

“NELP” AND “HELP”

“NELP” (*New Exploration Licensing Policy*)

National Exploration License Policy in 1997 became effective in February 1999.

Salient Features of New Exploration Licensing Policy (NELP)

The main features of NELP are:

- [L][SEP]Private participation for intensive exploration of Indian basins.[SEP]
- Provide scopes and opportunity for opening up of acreages in ultra-deep water and frontier areas.
- To introduce new generation and state-of-the-art technology in exploration and exploitation.
- Equal distribution of playing field to all participating companies. [SEP]
- Transparency in bid evaluation system.

Current System and Problems with NELP [L][SEP]

It is at present the policy regime for exploration and production of oil and gas, as in existence for 18 years. The current system and various problems associated with it are as follows: [L][SEP]

1. Separate policies for different hydrocarbons:

At present, there are separate policies and licenses for different hydrocarbons, such as conventional oil and gas, coal-bed methane, shale oil and gas and gas hydrates. In practice, the present framework leads to inefficiencies in exploiting natural resources.

2. Profit sharing revenue model and delays:

The present regime is based on the principle of “profit sharing” and Production Sharing Contracts (PSCs) are awarded under NELP. According to this, if a contractor discovers oil or gas, he is expected to share the profit as per the percentage given in his bid with the government. On the other hand, only royalties and cesses are paid to the government if no profit is made. [L][SEP]

3. Exploration confined only to some areas: [SEP]Exploration currently is confined to blocks, [SEP]which the Government has put on tender. [SEP]

4. Unfair pricing: The producer price of gas is currently fixed by the government. This has led to loss of revenue, considerable litigation, [SEP]disputes and arbitrations. [SEP]

5. Unfair royalty charges under some cases: While [SEP]fixing royalties, the current system does not provide efficient distinction between shallow water fields with lower costs and risks and deep/ultra deep-water fields with higher risks and costs. [SEP]

HELP (Hydrocarbon Exploration and Licensing Policy)

Hydrocarbon Exploration and Licensing Policy is a policy adopted by Government of India in March 2016 indicating new contractual and fiscal modal for award of hydrocarbon acreage towards exploration and production.

HELP replaces present policy regime for E and P of oil and gas, known as **New Exploration licensing policy (NELP)**, which has been in existence for 18 years. HELP aims to provide for an uniform licensing system and to provide single licensing covering all hydrocarbons like oil, gas, coal-bed methane, etc.

Features-

HELP has 4 main aspects [SEP]

- **Uniform license:** Uniform license for exploration and production of all forms of hydrocarbon. [SEP]
- **Open Acreages:** Gives option to a hydrocarbon company to select exploration blocks throughout the year without waiting for government bid. [SEP]
- **Revenue Sharing Model:** There will be no concern for the government regarding the cost incurred and will gain a share of gross revenue from sale of oil, gas etc. [SEP]

- Marketing and Pricing Freedom for crude oil and natural gas produce has been granted, subject to ceiling price limit, for new gas production from deep water. Provides pricing and marketing freedom to gas production from existing discoveries. Ceiling is calculated once in six months.

Significance of HELP

It paves way for the modernisation of the oil and gas exploration policy. It is expected to boost new exploration activities for oil, gas and other hydrocarbons and reduce import dependence. It can enhance the employment opportunities, especially in the petroleum sector. It has potential to bring in substantial investment in to this sector. Disputes, corruption, administrative delays, administrative discretion, arbitrations and litigation will reduce and result in growth.

Gains for the E and P (Exploration & Production) companies

HELP provides more pricing freedom to the companies. Although, the revenue sharing model will enhance the investment recovery period for these companies, the prospect of less government intervention is an incentive.

SMARTGRID

It is an electrical grid using information and communication technology to collect data and act on information regarding the behaviour of suppliers and consumers in an automated fashion. Hence, Smart Grid is a generic label for the application of computer, intelligence and networking abilities to the existing electricity distribution system.

The grid offers smarter digital technology, allowing two-way communication between the utility and its customers and the sensing along the transmission line. The Smart Grid will consist of controls, computers, automation, and new technologies and equipment working together, just like they are in the Internet. However, the difference

is that, these technologies will work with the electrical grid to generate digital responses to our rapidly changing electric demand.

The smart grid will deploy technologies like state estimation that can improve detection of fault and allow self-healing of the network without requiring the technicians to intervene. The reliable supply of electricity, and reduced vulnerability to natural disasters or attacks, assured by these grids, will be quite advantageous.

Reasons for Smart Grid

- Reduce carbon foot-prints. [L]
- Self-healing. [SEP]
- Improve distribution management and decision support software. [L]
- Automated control for distribution. [SEP]
- Increased efficiency. [L]
- Sensing and measurement technologies. [L] The smart grid allows for systematic communication between suppliers (their energy price) and consumers (their willingness-to-pay). It permits both the suppliers and the consumers to be more flexible and sophisticated in their operational strategies. [SEP]

Advantages

1. Transmission of electricity will become more efficient. [L]
2. Electricity can be restored quickly after power disturbances. [L]
3. Reduction in operations and management costs for utilities, which ultimately lowers power costs for consumers. [L]
4. Reduced peak demand; consequently lowering electricity rates. [L]
5. Integration of large-scale renewable energy systems can be increased. [L]
6. Better integration of customer-owner power generation systems, which includes renewable energy systems along with improved security. [L]

NET METERING

Net Metering (or net energy metering - NEM) allows consumers who generate some or all of their own electricity to use that electricity any time, instead of when it is generated.

This is particularly important with wind and solar, which is non-dispatchable. Monthly net metering allows consumers to use solar power generated during the day and night or wind from a windy day later in the month.

Net metering is an enabling policy designed to faster private investment in renewable energy.

History of Net Metering: Net Metering originated in the United States, where small wind turbines and solar panels were connected to the electrical grid and consumers wanted to be able to use the electricity generated at a different time or date from when it was generated. Minnesota is commonly cited as passing the first Net Metering law, in 1983.

Impact of Net Metering in India: Many Indian states have started implementation of Net Metering. States like Tamil Nadu, Karnataka and Andhra Pradesh have started implementation of Net Metering and the respective state electricity boards have announced the policy in 2014.

Controversy of Net Metering: Net Metering is controversial, as it affects different interest on the grid.

BUREAU OF ENERGY EFFICIENCY STAR LABEL

The Government of India has set up Bureau of Energy Efficiency (BEE) on 1st March 2002 under the provision of the Energy Conservation Act, 2001. The mission of Bureau of Energy Efficiency is to assist in developing policies and strategies with a

thrust on self-regulation and market principles with the primary objective of reducing energy intensity of the Indian economy within the overall framework of the Energy Conservation Act, 2001. This will be achieved with active participation of all stakeholders, resulting into accelerated and sustained adoption of energy efficiency in all sectors.

Bureau of Energy Efficiency Star Label is the Standards and Labeling Programme to provide the consumer satisfaction at different levels about the energy and cost saving potential of various types of equipment (marketed, household and other equipments).

It is currently invoked for various equipments/ appliances like Computer, Direct Cool Refrigerator, Stationary Type Water Heater, Submersible Pump Set, Frost Free Refrigerator, Room Air Conditioner, Ceiling Fan, Open well Submersible Pump Set, Diesel Engine, Driven Mono set pumps. For Agricultural Purposes, Diesel Generator Set Distribution Transformer, Domestic Gas Stove, Monoset Pump, Solid State Inverter, Office Automation Products, Led Lamps, Inverter AC, Colour Television, and General Purpose Industrial Motor.

ENERGY CHALLENGES IN INDIA

Approximately a quarter of the India's population does not have any access to electricity. It has been recognised that energy poverty is the reason behind

the slow economic development. Thus, access to energy for its entire population has been among top priorities of Indian policy makers. Energy security has a prime spot in government policy making. Earlier, weightage was given to electricity shortage and disappointed energy needs. Still, the high dependency rate on imported energy sources, such as oil, natural gas and coal, brought the subject into light. In India, energy security can be broadly described as: supplying lifeline energy to all of our people, regardless of their capacity in paying as well as meeting its effectual demands for secure and suitable energy and satisfying its different requirement at reasonable prices all times with a set level of confidence with fair consideration to reasonably

expected shocks and disruptions.

Even though the government took up the policy to diversify fuel, the main importance was given to the maximum utilisation of what is available in India (Thorium, Hydrocarbons, etc.). Dr. APJ Abdul Kalam, the then president, announced a plan to realise zero dependence and move to renewable energy sources.

Challenges in India

1. India's primary challenge is to maintain a steady economic growth. A well-developed energy sector is prime for its high functioning and financially sound economy. This will want an enhanced move towards an energy sector on the basis of market economy. The two prime challenges in the country's energy sector are:

Shortage of electricity as a result of energy [L]shortages across different fuel sectors which, in turn, hampers economic and social development. [L]

The low domestic production pushes it to a position of deficit and hence requiring import of energy resources. [L]

Enhancing Energy Security: The main reason behind the dependency on the imports of energy sources is the high demand of the developing economy, which results in crises due to low domestic production. [L]

This dependency questions our policies of a future energy security, which is the most important challenge to the Indian Ministry of Power.

2. Ensuring Energy Distributions and Supply:

In the country's power sector, the coal and natural gas shortages, are important issues for power generation in India's power sector. The key causes for unsatisfactory supply of coal

Flat domestic coal production due to delayed cases of mining. Slow acquisition of land as well as stern clearance in environment. [L]

Controlled coal import because of inadequate import infrastructures and also due to the high difference in price. [L] [SEP]

3. Challenges of Energy Project Infrastructure:

Inadequate equipment and services in the power sector along with facilities that contain these equipment are a major disappointment. [L] [SEP]

4. Rural Electrification:

Electrification of rural India is the key to achieve high economic growth as well as employment, which would ultimately result in low poverty. There are huge number of rural areas that are still not privileged to have electricity. [L] [SEP]

5. Development of Renewable Energy Sources:

Following challenges are major obstacles in our way to energy security:

- a. Solar lanterns can be used for lighting in [L] place of kerosene as a fuel, being a cleaner [L] and brighter substitute. [L]
- b. Biomass technology, though is abundantly [L] present in the country, India has unfortunately failed to manage in achieving the installations scale with regard to its potential. [L]
- c. India's rank is fifth in the world in terms of hydropower potential. However, the potential developed so far is even less than 25 percent. [L]
- d. Geothermal technology can power geothermal plants for application of projects small-scale intensity. However, its application is faintly used so far. [L]

6. Making Use of Nuclear Power:

Despite consistent efforts, commitments and advances, India's nuclear power capacity

remains small. The current generation capacity of nuclear power is 4.8 gigawatts and with this, India ranks thirteenth in the world, accounting to world's 12 percent nuclear capacity. All this is linked to the country's long separation from the nuclear global energy regime and its focus on the nuclear programmes, which are thorium- based. India's energy challenges can greatly be addressed by adequate and efficient application of nuclear energy.

The present challenges in the development and the utilisation of renewable sources of energy and nuclear energy have to be well tapped, so as to enhance India's chances of being energy sufficient and greatly solve the serious energy shortage. This, in turn, would also limit the country's growing import pressure and produce feasible business opportunities.

7. Striving towards sustainable Development:

One of India's top priorities is boosting the energy sector. There is close connection between energy security and economic growth and poverty alleviation. The biggest challenge is seen to acquire adequate economic growth with no harm to the environment, and supporting conservation of environment.

Balanced energy mix, which means adequate balance between application of all non-renewable energy sources and an increasing renewable energy share, will enable the country to achieve multiple objectives like sustainable development challenges, meeting food, water and fuel basic needs for an increasing population, etc.