

# **An Evaluation on Rising Economic Challenges in Power Generation on Electrification Networking**

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**Abstract:** Power age and dissemination is the two particular highlights of mechanical life which is for the most part rely on the idea of generation of vitality and usage of correspondence innovation, where control is the wellspring of motivation and inspiration to play out a work and exercises. In this way, it is the essential need forever. Be that as it may, for vitality no type of lifewould has ever risen. We as a whole know vitality for giving us light and solace yet in addition sustaining us by giving our coveted items to devour in our every day life. It spreads its arm in each part of human life, for example, foundation advancement, correspondence, Agriculture, Industry, Manufacturing, drug, Engineering, Information innovation, research, business and even item reusing for further usable and so on. Other than that it can assist us with cooling down amid summers and feel warm amid winter's season. It likewise encourages us to move between various places by the utilization of fuel, power. and so forth., Each and every organization, manufacturing plants needs to vitality to work different machines, engines through the supply of vitality by which an organization ready to deliver items, all autos require vitality to run; however even generally all different methods for transport require vitality. Clearly we have to know and additionally how control age and its conveyance framework how impacted on the zap to different part for a superior creation and advancement of business open doors for twenty five century. In this manner, the specialists were attempting to their dimension best to legitimized the said issue title taken by the Researchers in the accompanying method for their discoveries and perceptions.

**Keywords:** Net-Work System (NWS) Network- Application Technology (NWAT), Power Generation and distribution (PGAD) Power Supply System (PSS) Power Generation and Electrification (PGE)

## **1. Introduction**

Power Generation and its conveyance is a critical and important piece of modern life which encourages an extravagant life to people .The power age is the measure of power a generator delivers over an explicit timeframe. For instance, a generator with 1 megawatt (MW) limit that works at that limit reliably for one hour will deliver 1 uber Watt-hour (MWh) of power. On the off chance that the generator works at just a large portion of that limit with respect to 60 minutes, it will deliver 0.5 MWh of power. Numerous generators don't work at their full limit constantly. A generator's yield may differ as indicated by conditions at the power plant, fuel costs, and additionally trained by the electric power network administrator. Net age is the measure of gross power age a generator produces less the power used to work the power plant. These power utilizes incorporate fuel taking care of hardware, water siphons, burning and cooling air fans, contamination control gear, and other power needs. Before Michael Faraday had found his renowned law of electromagnetic enlistment, battery were the main wellspring of electric power. From that point onward, DC generator was created, yet it could deliver just a couple of hundred volts of electric power and normally this low voltage power couldn't transmitted effectively to a substantial separation. In the last 50% of eighteen

centuries, AC electric power age, transmission and conveyance came into the image. In an AC framework, it wound up conceivable to venture up voltage of electric capacity to want level for effective transmission to a long separation. After that 3-stage acceptance engine was created which was a lot easier in development. Age, Transmission and Distribution of AC control were a lot simpler than DC control; thus quick AC control framework turned into the most well known methods for electric power.

## 2. Literature Review

In the writing audit areas of the welcomed paper "An Evaluation on Rising Economic Challenges in Power Generation on Electrification Networking". The analysts were feeling very good in the word Impact of Power Generation on Electrification, in light of the fact that the word —Power Generation and Power Distribution —were utilized all the more freely in Indian Companies and Offices. In authority writing, it regularly incorporates tradable things, for example, steel, bond, manures and oil based commodities. The extension of local supply of these things in that setting must be defended as a component of an ideal creation reaction to adjust of installments issues, assessing different conceivable outcomes of growing generation of fares and other import substitutes of brilliant power, free of intrusions and voltage variances. Comparative up degree of value is applicable for other foundation benefits moreover. Development of Smart urban areas should accordingly be joined by a technique for foundation improvement which can take care of the expanded demand for framework administrations both regarding amount and quality. Does India's change program have such a methodology for foundation advancement? This paper examinations the way to deal with Power Generation and its logical dispersion are continues in a deliberate procedure of Net working for giving better jolt to the shoppers of different states, organizations, workplaces of around the nation and abroad.

## 3. Point and Objectives of Research for Energy Electrification

- Providing Sufficient power and jolt to every single important Consumer of different states so as to accomplish better generation and centered to accomplish GDP development rate of 8%
- Providing Reliable Power and Quality Power to the purchasers with least expense.
- Save Optimum Power cost of consumption
- Enhancing Commercial suitability of intensity industry.
- To make sufficient Strategies for a well power age and dissemination.
- Power Generation Strategy with spotlight on minimal effort age, enhancement limit usage, controlling the info cost, improvement of fuel blend, Technology up degree and use of Non Conventional vitality sources.
- Transmission Strategy with spotlight on improvement of National Grid including Interstate associations, Technology up degree and advancement of transmission cost.
- Distribution technique to accomplish Distribution Reforms with spotlight on System up degree, misfortune decrease, robbery control, buyer benefit Orientation, quality influence supply commercialization, Decentralized dispersed age and supply for country zones.
- Regulation Strategy went for securing Consumer interests and making the area economically reasonable.
- Financing Strategy to produce assets for required development of the power segment.
- Conservation Strategy to improve the usage of power with spotlight on Demand Side administration, Load the board and Technology up degree to give vitality productive hardware/devices.
- Communication Strategy for political agreement with media support to improve the overall population mindfulness so as to upgrading Rural charge

#### 4. Electric Power Generation

The AC control is produced in 3 stage framework as 3-stage AC electric power age is generally prudent. 3 stage AC generator is regularly known as the alternator. An alternator has adjusted three stage twisting on its stator and an electromagnetic field is turned inside the stator. Because of this framework, pivoting attractive field cuts the stator winding's channel and subsequently, power is actuated in the stator windings. From terminals of the stator three stage control is gotten. In an alternator, turning electromagnet is stimulated by the DC source. The rotor is driven by some outer means with the assistance of warm, Hydal, wind or different types of vitality. For instance, in warm power plant, the rotor of the alternator is pivoted by methods for a turbine shaft and the turbine is driven by methods for high temperature and weight steam. The steam is delivered in a kettle by consuming coal in the heater. As the stator winding is consummately adjusted, the three stage control created in an alternator is likewise adjusted that implies stage contrast between two conjugative stages is 120 degrees (electrical).

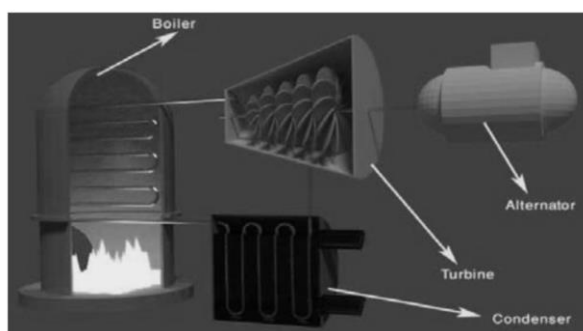
#### 5. Recurrence, Voltage and Interconnected System

If  $p$  is the quantity of shafts and  $N$  is the RPM of an alternator, recurrence of the produced voltage will be  $Np/120$ . In India the recurrence of produced control or essentially control recurrence is 50 Hz. In USA it is 60 Hz. In current power plants there are commonly in excess of one number of alternators keep running in parallel. Not just in a solitary Plant, may alternators, of different plants likewise be interconnected to run parallel. This plan enhances adaptability and proficiency of the power framework. At the point when the power stations of various areas are interconnected by methods for transmission lines, the aggregate system is alluded as a framework. In other word framework is a framework by which alternators of all power plants associated with that network keep running in parallel. On the off chance that any of the alternators winds up out of administration, still power can be nourished by different alternators without influencing accessibility of the framework. The same number of quantities of alternators are associated and keep running in parallel, the recurrence and voltage of the framework turns out to be much steady regardless of level of stacking present in the framework. The principle downside of the network framework is, the point at which an alternator is associated with the lattice, its recurrence, voltage and stage grouping must match with that of the matrix, and the way toward coordinating the said parameters of alternator with the matrix is certainly not a basic undertaking and the procedure is called synchronizing.

#### 6. Regular Source of Electric Power Generation

There are chiefly three traditional wellspring of electric power age, and they are warm Hydal, and atomic vitality and so forth.

(a) Thermal Power Generation In warm power plant coal or diesel is scorched to create adequate warmth. This warmth vitality is used to deliver high temperature and high weight steam in the evaporator.



[Thermal power Generation of heat energy from coal /diesel]

This steam is then passed through the turbine blades and the turbine shaft rotates due to this steam pressure. The rotor of an alternator is mechanically coupled with the turbine shaft and hence it also rotates. This rotation produces electric power.

(b)Hydal Power Generation Here the water head is used to rotate the rotor shaft of an alternator. Water head can be naturally available or it can be created. In hilly region water head can be naturally available in the hill top natural lakes. In plain land, it can be created by constructing dams across suitable rivers. In comparing to a thermal power plant, Hydal plants are more eco-friendly as they are free from fuel combustion. Also the running cost of Hydal plant is much cheaper than that of thermal plants as there is no need of fuel to be burnt.

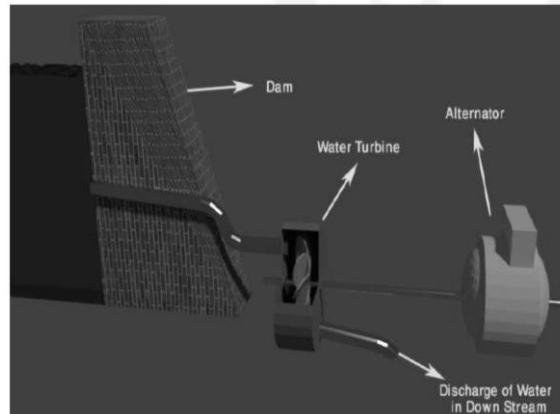


Figure 2: Hydal Power Energy form water

Albeit running expense of a Hydal control plant is very low, however beginning constructional cost of this plant is very high when contrasted with warm power plant. As in light of the fact that, there is colossal inclusion of cash in development of dams and other vital common structures. Water turbine by and large keeps running at a low speed, subsequently number of posts in the generator are higher to accomplish settled 50 Hz control Frequency. The quantity of post in a Hydal alternator might be up to at least 20.

(C) Nuclear Power Generation It is assessed that, the coal hold of our nation will be depleted inside next 40 years if the coal is kept on being devoured in present rate. The arrangement of this circumstance is an atomic power plant as thought. In an atomic power station, Uranium 235 is exposed to atomic parting. In splitting procedure, U 235 is shelled by a light emission. The crash of neutrons with the core of U 235 makes gigantic warmth vitality alongside different neutrons. These recently made neutrons are called parting neutrons which again hit by other U 235 atomic and make female horse warm vitality and other splitting neutrons. Amid splitting procedure the core of U 235 is partitioned into two sections. The parting procedure is commutative in nature. That is the reason, an atomic response is a chain response and subsequently it ought to be permitted to be happened in a controlled way. The conservatives and control bars are utilized to control this chain response.

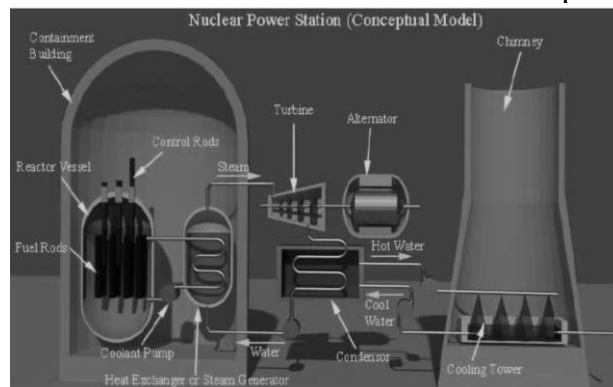


Figure 3: Nuclear energy from the nuclear sources



Conservatives are utilized to decrease the speed of neutrons and control bars are utilized to retain neutrons for keeping up, required number of neutrons for the procedure. Conservatives are made of substantial water or unadulterated carbon and control bars are made of cadmium or boron steel. The speed of the atomic response can be controlled by embeddings control bars up to a craving profound into the response chamber. By pushing down and pulling up the Control bars, the yield of the atomic producing plant is controlled. In spite of the fact that this procedure isn't manual, it is controlled by the programmed criticism control framework. The warmth created amid splitting is taken out from the reactor by methods for coolant comprising of fluid sodium or some vaporous liquids. The coolant is flowed between warmth exchanger and the reactor. It takes warm from the reactor and gives the warmth to the water in the warmth exchanger. Consequently the water in the warmth exchanger is changed over to high weight and high temperature steam. This steam at that point drives a turbine and depletes into a condenser where it is dense into dilute and cooled for re-nourishing to the radiator changes again by means of a feed water siphon. The fundamental preferred standpoint of atomic power plant is its base fuel utilization. It has been seen that for running a 1000 MW warm power plant, about  $6 \times 10^6$  kg of coal to be singed each day, while in an atomic power plant just 2.5 kg of Uranium to be devoured every day for getting same yield. In any case, the underlying speculation of atomic power plant is very high. It produces power without causing any air contamination, yet, it has dependably a shot of radiation peril due to spillage in reactor chamber. Another real weakness of this plant is its transfers, as on the grounds that its transfers are not free from radioactivity.

(d) Non Conventional Source of Electrical Power Generation Although the primary wellsprings of electric power age are warm, Hydal, and atomic power plants, yet at the same time there are numerous other non customary wellsprings of intensity accessible. These non traditional sources, similar to wind control, sun oriented power, MHD age, energy component, and so forth are turning into the promising elective hotspots for electric power age.

### **7. Distinction in the middle of Electricity Generation Capacity and Electricity Generation**

Limit is the most extreme electric yield a power generator can deliver under explicit Conditions. Nameplate limit is controlled by the generator's producer and demonstrates the greatest yield of power a generator can create without surpassing plan warm cutoff points. Net summer limit and net winter limit are normally controlled by an execution test and show the greatest power stack a generator can bolster at the purpose of interconnection with the power transmission and dissemination framework amid the separate season. There are two essential factors that effect or decide the distinction in limit among summer and winter months:

- The temperature of cooling water for warm power plants or the temperature of the encompassing air for ignition turbines
- The water stream and repository stockpiling qualities for hydropower plants.

### **8. Power Sector in India**

The power area in India is essentially administered by the Ministry of Power. There are three noteworthy mainstays of intensity segment these are Generation, Transmission, and Distribution. To the extent age is concerned it is predominantly isolated into three divisions these are Central Sector, State Sector, and Private Sector. The Central Sector or Public Sector Undertakings (PSUs) establish 29.78% (62826.63MW) of aggregate introduced limit i.e, 210951.72 MW (as on 31/12/2012) in India. Major PSUs associated with the age of power incorporate NHPC Ltd., NTPC Ltd., and Nuclear Power Corporation of India (NPCIL). Other than PSUs, a few state-level enterprises are there which represents about 41.10% of by and large age, for example, Jharkhand State Electricity Board (JSEB), Maharashtra State

Electricity Board (MSEB), Kerala State Electricity Board (KSEB), in Gujarat (MGVCL, PGVCL, DGVCL, UGVCL four dispersion Companies and one controlling body GUVNL, and one age organization GSEC), are likewise engaged with the age and intra-state dissemination of power The Indian government has set a driven focus to include roughly 78,000 MW of introduced age limit by 2012. The aggregate interest for Electricity in India is relied upon to cross 950,000 MW by 2030.

India is the 6th biggest as far as power age. About 65% of the power expended in India is created by warm power plants, 22% by hydroelectric power plants, and 3% by atomic power plants and rest by 10% from other interchange sources like sun oriented, wind; biomass and so forth 53.7% of India's business vitality request is met through the nation's huge coal holds. The nation has likewise put intensely lately on sustainable wellsprings of vitality, for example, wind vitality. As of March 2011, India's introduced breeze control age limit remained at around 12000 MW. Also, India has submitted gigantic measure of assets for the development of different atomic reactors which would create something like 30,000 MW. In July 2009, India disclosed a \$19 billion intend to create 20,000 MW of sun oriented power by 2020 under National Solar Mission. The per capita control utilization in India is 733.54KWh/yr, which is extremely negligible when contrasted with worldwide normal of 2340KWh/yr. Power misfortunes in India amid transmission and dispersion are to a great degree high, about 28.44 % ( 2008-09). India needs to hold over a pinnacle control setback of 13% somewhere in the range of 5pm and 11pm by decreasing misfortunes because of robbery and pilferage. Because of lack of power, control cuts are regular all through India and this has antagonistically affected the nation's monetary development. Burglary of power, basic in many parts of urban India, adds up to 1.5% of India's GDP. The state of utilities are bad either, total loss of 110 power utilities are evaluated as Rs 86,136 crore which is required to ascend to Rs 1, 16,089 crore by 2014-15. In spite of an eager country zap program, somewhere in the range of 400 million Indians lose power access amid power outages. While 84.9% of Indian towns have something like a power line, only 46 percent of country family units approach power. Power Generation and Electrification of India (Data Source CEA, as on 31/12/2015) Grand Total Installed Capacity is 210951.72 MW. The information underneath are in MW

Table

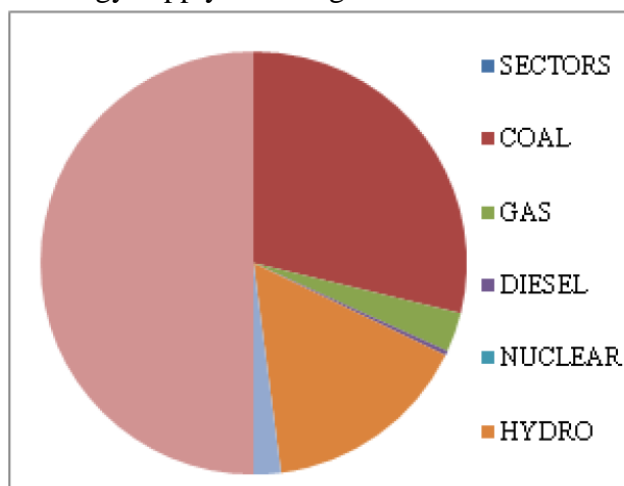
| Sectors        | Coal             | Gas             | Diesel         | Nuclear        | Hydro           | Res             | Total            | Percentage (%) |
|----------------|------------------|-----------------|----------------|----------------|-----------------|-----------------|------------------|----------------|
| State Sector   | 49933.00         | 5215.32         | 602.61         | 0.00           | 27395.00        | 3569.92         | 86715.85         | 41.10%         |
| Central Sector | 41995.00         | 6702.23         | 0.00           | 4780.00        | 9349.40         | 0.00            | 62826.63         | 29.78%         |
| Private Sector | 28945.38         | 6985.50         | 597.14         | 0.00           | 2595.00         | 22286.22        | 61409.24         | 29.11%         |
| <b>Total</b>   | <b>120873.38</b> | <b>18903.05</b> | <b>1199.75</b> | <b>4780.00</b> | <b>39339.40</b> | <b>25856.14</b> | <b>210951.72</b> |                |
| Percentage (%) | 57.29%           | 08.96%          | 0.57%          | 2.27%          | 18.65%          | 12.26%          |                  | 100.00%        |

- Captive Generating limit associated with the Grid (MW) = 34444.12
- The province of Maharashtra is the biggest maker of warm power in the nation.
- India was one of the spearheading nations in building up hydro-electric power plants. The power plant at Darjeeling and Shimsha (Shivanasamudra) was built up in 1898 and 1902 separately and is one of the first in Asia.
- R.E.S. Incorporates :- Ship – 2900 MW , Wind – 12000 MW, B.P. and B.G. – 2313.33 MW, U&I and Solar – 114.74 MW (SHP – Small Hydro Power, B.P. – Biomass Power, B.G.- Biomass Gasifier, U&I – Urban and Industrial Waste)

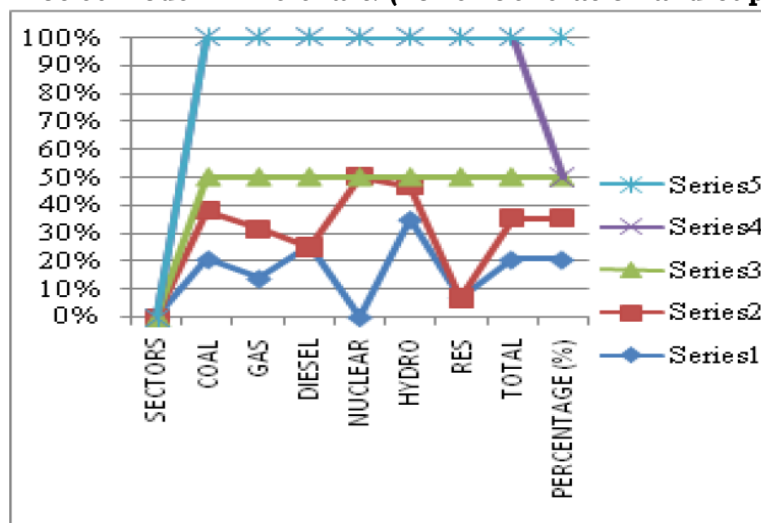
### 9. Theory Testing

In this Section , the specialists are endeavoring to analyzing the legitimacy of the acquired outcome in connection with the above said taken factors of watched theory (H0) i.e Increase of Power Generation through different assets and Maximization of zap of zones through the Power dissemination framework (Expected speculation (He). From the said perception, we

the specialist saw that expansion of Power age through assets will effect to upgrading the circulation procedure of Energy supply for charge.



**Semiotics Model in Pie chart: (Power Generation and Supply)**



### 10. Power Transmission

A power transmission link worked by BEST in Mumbai, India Transmission of power is characterized as mass exchange of control over a long separation at high voltage, for the most part of 132kV or more. In India mass transmission has expanded from 3,708 ckm in 1950 to more than 166000ckm, out of which 75556ckm is transmitted by Power Grid Corporation of India (as on 30 Sep. 2010). The whole nation has been partitioned into five districts for transmission frameworks, in particular, Northern Region, North Eastern Region, Eastern Region, Southern Region and Western Region. The Interconnected transmission framework inside every area is additionally called the local network. The transmission framework arranging in the nation, before, had customarily been connected to age extends as a feature of the clearing framework. Capacity of the power framework to securely withstand a possibility without age rescheduling or stack shedding was the fundamental criteria for arranging the transmission framework. Be that as it may, because of different reasons, for example, spatial advancement of load in the system, non-Commissioning of load focus producing units initially arranged and deficiency in receptive remuneration, certain pockets in the power framework couldn't securely work even under ordinary conditions. This had required calling it quits of age and working at a lower stack age balance previously. Transmission Planning has along these lines moved far from the before age clearing framework intending to incorporate framework arranging. While the dominating innovation for power transmission

and dissemination has been Alternating Current (AC) innovation, High Voltage Direct Current (HVDC) innovation has likewise been utilized for interconnection of every single territorial framework the nation over and for mass transmission of control over long separations. Certain arrangements in the Electricity Act 2003, for example, open access to the transmission and conveyance organize, acknowledgment of intensity exchanging as an unmistakable action, the liberal meaning of a hostage creating plant and arrangement for supply in provincial zones are required to present and support rivalry in the power area. It is normal that all the above measures on the age, transmission and circulation front would result in development of a hearty power framework in the nation.



Figure 6: Power Distribution for Electrification

The aggregate introduced creating limit in the nation is 210951.72MW, and the aggregate number of purchasers is more than 146 million. Aside from a broad transmission framework organize at 500kV HVDC, 400kV, 220kV, 132kV and 66kV which has created to transmit the power from producing station to the matrix substations, a tremendous system of sub transmission in circulation framework has additionally come up for use of the power by a definitive customers. Be that as it may, because of absence of sufficient speculation on transmission and circulation (T&D) works, the T&D misfortunes have been reliably on higher side, and came to the dimension of 28.44% in the year 2008-09. The decrease of these misfortunes was fundamental to convey financial reasonability to the State Utilities As the T&D deficit was not ready to catch every one of the misfortunes in the net work, idea of Aggregate Technical and Commercial (AT&C) shortfall was presented. AT&C misfortune catches specialized and in addition business misfortunes in the system and is a genuine pointer of aggregate misfortunes in the framework. High specialized misfortunes in the framework are basically because of deficient speculations throughout the years for framework enhancement works, which has brought about impromptu augmentations of the dispersion lines, over-burdening of the framework components like transformers and conductors, and absence of sufficient responsive influence bolster. The business misfortunes are for the most part because of low metering effectiveness, burglary and pilferages. This might be wiped out by enhancing metering effectiveness, legitimate vitality bookkeeping and reviewing and enhanced charging and accumulation productivity.

Settling of responsibility of the faculty/feeder chiefs may help extensively in decrease of AT&C misfortune. With the activity of the Government of India and of the States, the Accelerated Power Development and Reform Program (APDRP) was propelled in 2001. APDRP intended to overhaul the dispersion framework, limit transmission and circulation misfortunes, enhance metering and dole out duty regarding the acknowledgment of client charges — has not possessed the capacity to cut down misfortunes to 15% before the finish of 2007, as initially focused in 2000-01. The APDRP program is being rebuilt by the



Government of India, with the goal that the coveted dimension of 15% AT&C misfortune could be accomplished before the finish of eleventh plan.(estimated plan cost – Rs50000 crore). The fundamental goal of the program was to bring Aggregate Technical and Commercial (AT&C) misfortunes underneath 15% in five years in urban and in high-thickness zones. The program, alongside different activities of the Government of India and of the States, has prompted decrease in the general AT&C misfortune from 38.86% in 2001-02 to 28.44% in 2008-09. RGGVY, which had an objective of giving power to 125,000 towns and associating 23 million beneath destitution line family units the nation over by 31 March, has likewise been vacillating. The Government of India has an aspiring mission of POWER FOR ALL BY 2012. This mission would necessitate that the introduced age limit ought to be no less than 200,000 MW by 2012 from the present dimension of 167278.36MW. Power necessity will twofold by 2020 to 400,000MW.

The administration had before intended to include 78,000 MW of intensity limit before the finish of the eleventh Plan, which the Planning Commission had downsized to 62,000 MW. This may now be additionally shortened to 58,000 MW (as on Dec' 2010). 10.2 Subsidies Several state governments in India give power at sponsored rates or even allowed to a few segments .i.e kutir jyoti, Yojana , Gramiya Seva and so forth. This incorporates for use in farming and for utilization by in reverse classes. The sponsorships are predominantly as cross-appropriation, with alternate clients, for example, enterprises and private purchasers paying the shortage caused by the financed charges gathered. Such measures have brought about a significant number of the state power board ending up monetarily frail.

### **11. Research Findings**

In the welcomed research article, we have done broad research work by taking number of field think about, perception from the plant site visit, gathering information's from different diaries, article's, periodicals, and distributed and unpublished sources so as to finish the said assignment. At long last, we got the accompanying characters and expectation that by these little woks the educators, specialists, academicians, future youthful scholarly buds and so on will be profited a tad so as to improving their future research work.

- Power (Energy) isn't just the wellspring of motivation yet in addition it is an inspirational factor or source to create merchandise/items and giving administrations to the people groups something by using it, the fantasies of building Smart urban areas can be satisfied.
- By delivering increasingly vitality a nation ends up self free in vitality of his own utilization in task of industry, office control plant and so on the keen urban communities of India are looks at more most astute without flinching of world.
- Due to adequate Power (vitality) creation a nation turns out to be increasingly and the nation can deal to other nation who needs it, by which a nation's financial improvement in as it were. • By building Smart urban communities, we are never winds up keen, until and except if we are not demonstrates our intelligence in all parts of present day life. For example, knowledge, advancement, financial, way of life and so forth • Power (Energy) ought to be utilized according to prerequisite of the keen urban areas, industry, residential and official utilization .regarding be recollect the trademark —Save Energy Save Nation l.by the manner in which we are turns out to be more shrewd.
- Emphasize increasingly to devour sun powered vitality, Bio-Energy, hydro – vitality rather than power plant vitality in keen urban communities. With the goal that it is anything but difficult to keep up an eco-balance atmosphere in world.

### 13. Conclusion

Taking everything into account, we the analyst continues an eye gets end by getting number of research discoveries and its suggestions. Here, we concede that Power (vitality) is the wellspring of motivation and inspiration to begin each sort of creation and activity of different works, for example, fabricating, transporting, the executives and power supply. So as to meet the prerequisite of shoppers and clients it is possible that they might be household or industrialize purchasers. In any case, vitality itself originates from two particular assets, for example, characteristic assets (Solar, wind, tidal and so forth.) and counterfeit assets (Thermal ,Nuclear .Bio plant etc).Thus we may emphatically suggest assuming increasingly regular wellspring of vitality will be utilized in various ordinary and conversational type of vitality then the vitality emergency will be diminished and monetarily will be profited.

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