



# A Review on Energy Conservation in Distribution System

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**Abstract:** India's energy sector is one of the most critical factors of an structure that affects India's profitable growth and thus is also one of the largest diligence in India. India is 5th largest electricity contributing capacity level and 6th major power buyer amounting for around 3.4 of global energy consumption. India's energy demand has grown at 3.6% over the once 30 times. The consumption of the energy is directly commensurable to the progress of force with ever growing population, enhancement in the living standard of the humanity and industrialization of the developing countries. Veritably lately smart grid technology can attribute important part in energy script. Smart grid refers to electric power system that enhances grid trustability and effectiveness by automatically responding to system disturbances. This paper discusses the new communication arrangement and plan intended to put together data.

**IndexTerms -Energy, Relay, LCD.**

## I. INTRODUCTION

Industrial power distribution networks experience an increase in power losses during the summer period. Due to the excessive use of air conditioning systems and motor drives, the electric load increases. Such an increase in this type of load is accompanied with low power factor (~ 78%) which leads to huge transfer of reactive power from the utility through the network. In power distribution networks, shunt capacitors are commonly used to compensate reactive power. The purpose of these devices is to minimize power and energy losses, maintain the best voltage regulation for load buses, and improve the security of power networks. The amount of compensation offered is very much linked to the placement of capacitors in the distribution network. This is essentially the determination of the location, size, number and type of capacitors to be placed in the system. A large variety of research work has been done on capacitor placement problem in the past. Due to demand and supply imbalance, transmission and distribution losses continue to increase. Consequently, grid frequency is reduced, and plant load factor decreases.

Fluctuation of electricity frequency is harmful to plant equipments. Peak demand strains power generation and utilization. sector in the country, including the power sector. To keep pace with the evolving energy challenges, the Government embarked upon a number of structural and operational changes to reform the power sector. The modifications mainly focused on bringing competition in different segments, setting up an independent regulatory commission, and establishing a proper funding mechanism. The Indian power sector has made remarkable progress since Independence. The total installed capacity has increased up from 1,362 MW in 1947 to more than 2,00,000 MW in 2012. The transmission network has grown from the isolated system concentrated around urban and industrial areas to the country wide National Grid. However, the demand of electricity has always exceeded the supply. The importance of electricity as a prime mover of growth is very well acknowledged and in order to boost the development of power system the Indian Government has participated intensely through creation of various corporations namely State Electricity Boards (SEB), National Thermal Power Corporation (NTPC), National Hydro Electric Power Corporation (NHPC) and Power Grid Corporation Limited (PGCL) etc. However, even after this, the country still faces shortages in terms of energy as well as peak demand to the tune of 10.9 and 13.8 % respectively. Here are some facts about the scenario of power sector in India.

The Indian power sector is one of the most diversified power sectors in the world. Sources for power generation range from commercial sources like coal, lignite, natural gas, oil, hydro and nuclear power to other viable nonconventional sources like wind, solar and agriculture and domestic waste. The demand for electricity in the country has been growing at a rapid rate and is expected to grow further in the years to come. In order to meet the increasing demand, a massive addition to the installed generating capacity in the country is required. Since its post independence structured growth, Indian power sector has made substantial progress both in terms of enhancing power generation and in making power available to a wide range of geographical boundaries. The installed generation capacity in the utility sector has increased to about 1,81,500 MW at the end of August 2011. The Indian power sector is largely coal based with the total installed capacity comprising of 99,503 MW (55 %) for coal based, 17,706 MW (10 %) for gas based, 1,200 MW for (1 %) diesel based, 38,206 MW (21 %) for hydro based, 4,780 MW (2 %) for nuclear based and 20,162 MW (11 %) from renewable energy sources. Development of renewable energy sources is being accorded special emphasis in view of their inherent advantages. The installed capacity from sustainable Sources has grown to 20,162 MW in June 2011 comprising 3,226 MW in state sector and 16,936 MW in private sector as presented in.

## II. RESEARCH METHODOLOGY

A top-down, unidirectional approach is the mode of operation of electric power structures. Call for and supply are saved balanced by means of a constrained range of big strength plant life. Working an electric powered energy machine requires a completely high-quality stability. Risky renewable power sources and electro-mobility are new challenges to this stability and speak to for classy control techniques. Using the load as an additional degree of freedom isn't always entirely new however low priced worldwide verbal exchange infrastructure and embedded structures make it now quite easy to add a certain part of "clever" to the loads. Intake is steadily growing each yr notwithstanding stepped forward efficiency of electric gadgets. Even as technology won't be lots of a trouble, it's far the grid potential that makes many concerned humans worry. The transport of electricity increases questions, specially in the case of new and formidable projects like DeserTec (expansive sun strength stations in Northern Africa to deliver Europe) and big offshore wind parks. The grids may soon face their limits, and shrewd call for facet control (DSM) is one manner to stretch those limits a bit in addition. DSM also promotes Manuscript acquired February 27, 2011; revised can also 05, 2011; regularly occurring may additionally 18, 2011. Date of booklet June 27, 2011; date of modern-day model August 10, 2011. Paper no. TII-eleven-080. P. Palensky is with the Austrian Institute of era, power department, 1210 Vienna, Austria (electronic mail: palensky@ieee.Org). D. Dietrich is with the Vienna university of era, 1040 Vienna, Austria (electronic mail: dietrich@ict.Tuwien.Ac.At). Coloration versions of 1 or more of the figures in this paper are to be had on line at <http://ieeexplore.Ieee.Org>. Virtual object Identifier 10.1109/TII.2011.2158841 classes of DSM. Disbursed technology: with a purpose to avoid lengthy-distance transport, domestically generated energy could be ate up via neighborhood loads, at once while it's far available. DSM's most important benefit is that it's miles less pricey to intelligently have an impact on a load, than to construct a new energy plant or set up a few electric powered garage tool. DSM consists of the whole lot that is completed at the call for facet of an strength device, starting from changing antique incandescent mild bulbs to compact fluorescent lights (CFLs) as much as installing an advanced dynamic load control device. At the same time as DSM changed into "utility driven" within the past, it'd pass a piece closer to a "consumer pushed" activity in the close to future. The lower edge of the DSM spectrum is strength efficiency measures. They consist of all everlasting modifications on equipment (e.G., replacing an inefficient ventilation system with a higher one) or improvements on the physical houses of the system (e.G., making an investment within the constructing shell with the aid of adding additional insulation). Such measures bring about immediately and permanent strength and emissions savings and are therefore the maximum welcome approach. Occasionally seen as a separate category of DSM, energy Conservation will be seen as a part of electricity performance on this paper. EC specializes in customers and behavioral changes to achieve more green strength utilization [1].

Energy is the primary and the most widely wide-spread measures of all sorts of paintings through human being and nature. Electric energy is proved to be a super power in all kinds of energy available in nature. Energy is the prime mover of monetary increase and is essential to the sustenance of a current economic system. Future financial growth crucially depends on the lengthy-time period availability of energy from resources which are low-cost, accessible and environmentally pleasant. Strength is prime thing for national economic improvement. India ranks 6th in the world in overall power consumption and needs to accelerate the development of the sector to satisfy its increase aspirations. In keeping with capita electricity is use in India is a whole lot beneath as compared to many countries. Fossil fuels like coal, oil that has taken years to form is at the verge of depleting soon. In closing 200 years we've ate up 60% of all resources. For sustainable improvement we need to adopt electricity efficiency measures. These days 85% of number one power resources come from non-renewable and fossil assets. Those reserves growing intake and will exist for future generations. Power survey carried out with the aid of Ministry of electricity in 1992 reveled that there is requirement of development in strength generation efficiency, development in electricity transportation (transmission & distribution systems) and improving the overall performance efficiency of use stop apparatus. Look at of 'strength techniques for future' evolved things - efficient use of strength, energy conservation and use of Renewable power. Energy conservation emerges out to be the first and least price choice. Electricity conservation approach reduction in increase of electricity intake and is measured in bodily phrases.

Energy conservation is the practice of lowering the quantity of strength used while attaining a similar outcome of stop use. (This exercise might also bring about boom of financial capital, environmental price, country wide safety, personal protection and human consolation.) strength conservation additionally approach reduction or removal of useless energy used and wasted. Electric system is a internet paintings wherein energy is generated the usage of non-renewable resources by conventional approach and then transmitted over longer distances at excessive voltage levels to load centers wherein it's miles used for various power conversion manner. Cease user region are identified as 3 essential regions -power generating station, Transmission & Distribution systems, and electricity consumers. Customers are similarly labeled as home, To generate 1MW electricity era cost is Rs 4.5 to 5.25 crores and T& D fee is Rs.2 crores . However cost of saved strength is Rs.1Crores/Mw. The critical word is time period to set a electricity plant is 5 years; to installation transmission line 1 year and to plot energy conservation is best 1 month. We have much less possibility for EC in producing vicinity however we can improve the overall performance efficiency of turbines through optimization of load, optimum distribution of load among special devices, periodical upkeep and also growing the ability by adopting superior technology the use of renewable energy assets [2].

Hundreds on electric powered energy networks encompass two components: lively strength (measured in kilowatts) and reactive electricity (measured in kilovars). Lively power needs to be supplied with the aid of electricity vegetation, whereas reactive power may be furnished by using either power vegetation or shunt var reimbursement which include shunt capacitors financial institution. It's far a well-known fact that shunt electricity capacitors are the most cost-efficient source to fulfill the reactive energy requirements of inductive masses and transmission lines operating at a lagging energy factor.

Whilst reactive strength is furnished only by strength plants, every gadget components (i.E., generators, transformers, transmission lines and distribution feeders, transfer-equipment, and protecting equipments) needs to be improved in length as a consequence. Capacitors can mitigate these conditions by way of decreasing the reactive electricity call for all of the way back to the generators 4 . Line currents are reduced from capacitors places all the way back to the technology device. As a end result, losses and loadings are reduced in distributions feeders, substation transformers, and transmission traces. Relying upon the uncorrected energy factor of the system, the installation of shunt capacitors can increase generator and substation functionality of additional load at the least 30 percentage, and can increase person circuit functionality, from the voltage regulation factor of view, about 30 to one hundred percentage. Moreover, the present day discount in transformer and distribution equipment and features

reduces the load on those kilovolt ampere-constrained apparatus. In wellknown, the financial advantages force capacitor banks to be set up on the primary distribution community in preference to at the secondary. EDSA strength drift application 6 has been used to calculate the entire community electricity losses. Power drift solution has been received the usage of Newton-Rap son approach.

The energy float with shunt capacitors is proven in From it could be determined that the electricity component has been advanced to zero.9478. The kvar rating of the shunt capacitors were determined to enhance the electricity element at each feeder to 95% lagging. The main goal of this observe is to design an electricity saving scheme for an commercial distribution community in A.P.. This could be finished via lowering the community losses and improving the main electric powered load operation to a better performance stage. The designed scheme is involved with enhancing the energy issue of the distribution network with the aid of including shunt capacitors to the community at superior length and vicinity. Load glide modeling is used to simplify the network and to calculate the network losses and the voltage profile. The network model parameters are accumulated via area measurements and then carried out in electric Distribution software evaluation (EDSA) application 6 . After that, the EDSA modeling is established with the aid of evaluating load flow results with energy float subject measurements. The size of the capacitor (VAR reimbursement) is decided and is demonstrated the use of EDSA software program. The designed VAR compensation device will reduce the overall network losses [3].

### III. SYSTEM METHODOLOGY

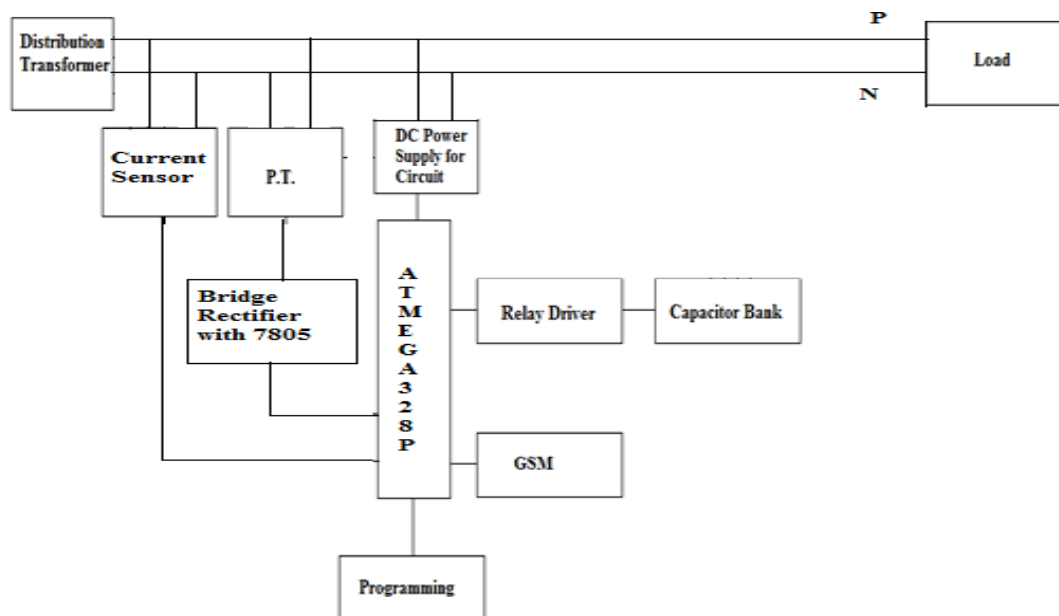


Fig 1: Block Diagram

#### 3.1 RELAYS

A circuit used to switch on and off a light bulb or every other load linked to most important deliver. It really works at the precept of electromagnetic operation in which magnetic area is created to operate the lever to manipulate the float of cutting-edge in precise direction to turn on/off the burden. Right here the load given is led to specify the on/off situations of relay.

#### 3.2 ATMEGA 328

The excessive-overall performance % electricity 8bit AVR RISC-based totally microcontroller combines 32KB ISP flash memory with read-at the same time as-write competencies, 1024B EEPROM, 2KB SRAM, 23 general reason I/O traces, 32 trendy cause running registers, three flexible timer/counters with examine modes, inner and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, a 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF applications), programmable watchdog timer with inner oscillator, and five software selectable power saving modes. The tool operates between 1.8-five.5 volts.

#### 3.3 POWER SUPPLY

An embedded circuit called a regulated electricity deliver adjustments unregulated AC (Alternating modern) into a constant DC. A rectifier is used to transform the AC supply into DC. Its motive is to offer a circuit or tool that must be operated within specific energy supply parameters with a solid voltage (or, less regularly, modern).

### 3.4 TRANSFORMER

A device that transfers electric energy from one alternating-current circuit to one or more different circuits, both growing (stepping up) or reducing (stepping down) the voltage. Transformers are employed for broadly varying purposes; e.g., to reduce the voltage of conventional power circuits to operate low-voltage devices, such as doorbells and toy electric powered trains, and to elevate the voltage from electric turbines in order that electric power may be transmitted over long distances.

### 3.5 RECTIFIER

One of the vital assets of DC supply are Batteries. But the use of batteries in sensitive electronic circuits isn't always a very good concept as batteries sooner or later drain out and lose their capacity through the years. 7805 is a three terminal linear voltage regulator IC with a set output voltage of 5V which is beneficial in a extensive range of applications. Presently, the 7805 Voltage Regulator IC is manufactured with the aid of Texas units, ON Semiconductor, STMicroelectronics, Diodes integrated, Infineon technology, and so on.

### 3.6 RELAY DRIVE

The circuit used for riding a relay may be termed as a relay motive force circuit and it could be designed the use of various incorporated circuits. These relays are needed to be driven for activating or to turn ON. So, relays require a few motive force circuitry to turn ON or OFF (based at the requirement). The relay motive force circuit can be found out the usage of one-of-a-kind incorporated circuits together with ULN2003, CS1107, MAX4896, FAN3240, A2550, and so on. Right here, in this text let us discuss approximately relay driver circuit the usage of ULN2003. Before discussing in detail about a relay motive force circuit, allow us to understand about IC ULN2003.

### 3.7 CAPACITORS

A capacitor is a device that shops electric energy in an electric powered discipline by means of virtue of gathering electric charges on two close surfaces insulated from every other. It's far a passive digital factor with terminals. The impact of a capacitor is called capacitance. At the same time as some capacitance exists among any electric conductors in proximity in a circuit, a capacitor is a part designed to add capacitance to a circuit. The capacitor changed into in the beginning known as the condenser a term still encountered in a few compound names, such as the condenser microphone.

### 3.8 GSM MODULE

A GSM modem or GSM module is a tool that uses GSM cellular smartphone technology to offer a wi-fi records link to a community. GSM modems are used in cellular phones and different system that communicates with cellular smartphone networks. They use SIMs to perceive their tool to the community.

### 3.9 PCB MODULE

A broadcast circuit board (PCB; additionally printed wiring board or PWB) is a medium used in electrical and digital engineering to attach electronic additives to one another in a controlled way. It takes the shape of a laminated sandwich structure of conductive and insulating layers: each of the conductive layers is designed with an paintings sample of lines, planes and other functions (just like wires on a flat floor) etched from one or more sheet layers of copper laminated onto and/or among sheet layers of a non-conductive substrate.

## V CONCLUSION

In this paper, gift and future energy situation in India is discussed. India's developing economy has compelled the U.S. To increase mounted power capacity to 2 hundred GW this 12 months. Despite this increase in supply, the U.S. Remains facing important demanding situations in imparting energy get admission to to all of the families and also enhancing reliability and fine of electricity deliver. Its strength systems are struggling to overcome power shortages and poor power excellent. The primary constraint in reaching the target is scarcity of capital resources. Shortages are exacerbated by way of inefficiencies in strength generation, distribution and cease-use systems. There may be a right away want for trade in making plans strategies from the traditional technique of increasing generation to satisfy in disciplined consumption to want, useful resource and conservation based method for monetary and environmental blessings.

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