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An Analysis of Power Generation and Its Distribution System on the Practices of SCM in India: Emerging Challenges of Energy Crisis On The Basis Of Construction Technology

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Abstract

Power generation and power supply is the two distinct features of industrial life which is mostly depend upon the nature of construction Technology and its scientific management, but energy is the source of inspiration and motivation to perform any type of work and activities. Thus, it is the basic necessity for life. But for energy no form of life would have ever emerged. We all know energy for providing us light and comfort but also feeding us by providing our

desired products for consume in our daily life. It spreads its arm in every aspects of human life such as construction communication, Agriculture, industry, manufacturing, medicine, research, Business and even product recycling for further usable etc. besides that it can help us to cool down during summers and feel warm during winters. It also helps us to go from one place to another. Each and every company, factories needs to energy to operate various machines, motors through the supply of energy by which a company able to produce products, all automobiles need energy to run; but even otherwise all other means of transport need energy. But even though we use it every moment of our life and learn about it at school it often remains a riddle for many all through the life. Do you know whether energy is a gas, liquid or a solid? What is the origin of energy, how and when did it come about? We all talk about the energy crisis and the need to conserve it, but the textbooks say that energy is conserved in nature; it can neither be created nor destroyed. Isn't there a contradiction here? Obviously we need to know energy better. We basically have focused about the energy crisis in India whether it is a man make problem or not? The most of energy crisis are to be visible by the involvement of political leaders, why they indulged in it? What are their intension of involvement etc. are to be studied through the personal observations of the researchers by adopting various research techniques in order to reduce the cost of economic and solute the energy crisis in India as well as how power distribution system should be more stream lining through the practices of supply chain management system in India is the fundamental discussion in the aforementioned research title.

Keywords*: Energy Crisis (EC) Origin of Energy (OE) Power Generation (PG) Power Supply System (PSS) Power Generation and Power Distribution (PGAPD)*

I. Introduction

We have earlier discussed about the energy in abstract section, but first of all let us know what energy is? Energy is not a solid, liquid or an even a gas, but it can go from anywhere to anywhere. In fact it is everywhere. We cannot make energy rather energy made us possible. Doesn't it sound familiar? We often associate all these attributes with God. Then is energy the God? Energy is not God; it is a concept in science just like Time. A concept is an idea. Just like the concept of God helps us to explain many phenomena around us that we cannot otherwise explain and give us direction at the time of a crisis; the concept of energy has helped us to explain and correlate various apparently unrelated natural phenomena we experience and thus helps us understand them in a logically consistent manner. One can indeed derive an analogy between the various forms of energy: electricity, chemical nuclear, and the various Gods of Hindu religion: The Brahma, Vishnu, Maheswara, Durga etc. But, an analogy is only a comparison of certain similarities between things, which are otherwise unlike.

Unlike the various incarnations of God, we can witness inter conversions between various forms of energy. We all know light is a form of energy; how do we get light from the Sun, of course; or from an electric lamp. Now, from where does electricity come from, from a power station? How is electricity produced in a power station? If it is a hydroelectric power station, it is produced using the flow of water from a height, in a dam. Water falling down from a height can move the blades of a turbine that can in turn rotate the coils of wire of an electric generator. But, not all electricity comes from hydroelectric power stations. Some, power stations, known as thermal power stations, use coal or other fuels like natural gas, to heat water to produce steam at high pressure, which can also be used to turn the blades of a turbine. Another kind of power stations is known as nuclear power stations. In these power stations, the spontaneous fission of certain elements, like Uranium, to other elements provides energy to produce steam.

Most of us would have never visited a power station, so you might have never seen these transformations, but we can still witness them close to our home or within our home too. Most of us, often suffer power breakdowns. They have become rather common in our country. A power cut/breakdown can be very uncomfortable, so we often install alternative source of electricity in our home, like a portable generator or an inverter. How does a portable generator produce electricity? It produces electricity using petrol, diesel or kerosene. These fuels are used to run engines, similar to the automobile engines that can rotate coils of an electric generator just like in a power station. Have you ever seen a portable generator? No? Then you must have seen an inverter. Inverter supplies electricity stored in a lead acid battery, while the power supply from the power station is available certain chemical changes enable a lead acid battery to store electricity, which is made available during a power breakdown/cut to run our home appliances.

Now, let us return to our earlier discussion. We were discussing about the inter-conversions between various forms of energy and our analogy with God. Energy like God is one. So, the light that we get from an electric lamp is the same, regardless of the source of electricity. It does not matter whether the electric supply is from a hydroelectric power station, a thermal power station, a nuclear power station or from an inverter. Different forms of energy are converted into electric

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energy in these different sources of electricity. While it is the potential energy of water in a dam that is used to produce electricity in a hydroelectric station; it is the chemical energy in the fuels or in the lead acid battery that is converted into electrical energy in a thermal power station, a portable generator or an inverter. That is the unity in the diversity of all forms of energy.

Now, let us return to the question of energy crisis Vis a Vis the conservation of energy law. The energy crisis we often talk about is not about the shortage of energy. In fact there is more than enough energy around. The "energy crisis" is because we are unable to extract sufficient fuel from the earth to satisfy our needs; or because we are not producing enough electricity using the various fuels. This results in an energy crisis in spite of abundant energy around

II. Literature Review

In literature review, the researcher has followed the research methodology or Techniques as followed by the previous researchers, but in this invited research article we interested and more motivate for searching a new theorem with introducing the role of Supply Chain Management (SCM) on the practices on the Power supply and its distribution to the consumers and the industries in scientifically without any hindrances in supply .As you know, from the reliable sources we able to know India is the fourth largest energy user in world like china ,USA, Russia ,and India .we consume the energy from the source of Natural oil (7.7%),, crude oil (29.45%) ,Coal (54.5%), Nuclear Energy (1.26%) and the hydro electricity energy (5%) besides that we consume also bio energy , solar power etc.

In spite of the availed resources of energy, still India needs more energy because of its day- to-day requirements in industries. Henceforth, India has suffer energy crises due many relevant factor ,thus the researcher has trying to their level best to find out the problems of energy crisis with this survey and wanted to solute it by giving some suggestion and recommendations

III. Aim and objectives of the Research

- To provide the adequate and full voltage energy in to the power plants, industries, & The rural Areas as per the electricity Act section 6 of Central Government of India and the State government
- To supply the power to the rural people and house holder and ensure them to consume the electricity in an affordable cost.

- To generating energy within the next five years and projected to supply the rural people by innovating and renovation of the renewable source of energy i.e. hydro energy, wind Energy, solar energy, Atomic energy ,wind energy etc. and predicted to electrify more and more village people.
- Reliable to the village people for more electrification by centralizing and decentralizing the power supply system.
- Provide the energy in to the remote areas by electrifying the houses of Dalits, Adibasi's Tribal's etc. with a low cost.
- To more electrify and supply the electric power to the house holders, Govt. offices, enterprises etc. in time and supply the energy in stable.
- To expanded electrification in to more and more remote areas.
- Provide adequate Power of energy to the required areas when they meets emergency.
- To study the role and importance of construction technology in power generation with structure of Swiss Gates in water dam.
- Utilize more and more natural Resources of energy such as Solar Energy (Sun), Hydro energy (water turbine), Atomic Energy (Nuclear), Wind Energy (Fan) etc.

IV. Methodology

We the researcher has trying to our level best to justify the invited article **"An Analysis of Power Generation And its Distribution System on The Practices of Supply Chain Management In India: Emerging Challenges of Energy Crisis on the basis of Construction Technology "** in to an International standard of research work .where, we have followed the same methodology as followed by our previous researcher i.e. The method of data collection includes (i) The primary data and (ii) the secondary method of data collection, but we have more concentrate and focused both the method of data collection in order to complete the said article. In this article, we have taken a alternative hypothesis (Ho) in anticipation to the problem, if scientifically analysis of power generation and its distribution in timely to the door step of consumers on the practices of supply chain management (SCM) in India then the emerging crisis of energy has tremendously decreases, if the authorities of power supply companies not carefully operate and handle then the crisis of energy leads a bottle necked stage in India. Henceforth, we have taken the first variable as alternative (Ho) and the second variable as Null hypothesis. After carefully observation we have got the essence of research findings and on the basis of result we go for conclude this article.

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V. Energy Crisis and Nuclear Energy Requirement in India

1. The year 2005-06 is marked in the history of India – US relations as an important milestone in the mutual rediscovery of each other. It marks one of the most significant departures from long held relations. It is the biggest foreign policy challenge facing India after a gap of more than 30 years India and US agreed to resume cooperation in the field of nuclear energy. Until now, US viewed India as a nuclear weapon capable state as an outcaste, to be chastised for illegal possessor of nuclear weapons. India had been warned and advised repeatedly during the past and especially under President Clinton to roll back and terminate its nuclear programme.

2. On 18 Jul 2005, India and US agreed to re affirmed the multifaceted relationship, encompassing issues as diverse as terrorism, agriculture, health, commerce, energy, science and technology and defense, as visualized in the joint statement of the day between the PM of India and President of US at Washington. A joint statement issued said that the US would work with "friends and allies to adjust international regimes to enable full civil nuclear energy and trade with India". President Bush hailed India as a "responsible state", deserving the "same benefits and advantages as other such states". The signing of the US –India Framework Defense Agreement was the final prelude to the US bestowing de facto nuclear status to India.

VI. Power Automation & Distribution

The demand for electrical energy is ever increasing. Today over 21% (theft apart!!) of the total electrical energy generated in India is lost in transmission (4-6%) and distribution (15-18%). The electrical power deficit in the country is currently about 18%. Clearly, reduction in distribution losses can reduce this deficit significantly. It is possible to bring down the distribution losses to a 6-8 % level in India with the help of newer technological options (including information technology) in the electrical power distribution sector which will enable better monitoring and control.

VII. How do we have Power?

Electric power is normally generated at 11-25kV in a power station. To transmit over long distances, it is then stepped-up to 400kV, 220kV or 132kV as necessary. Power is carried through a transmission network of high voltage lines. Usually, these lines run into hundreds of

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kilometers and deliver the power into a common power pool called the grid. The grid is connected to load centre's (cities) through a sub-transmission network of normally 33kV (or sometimes 66kV) lines. These lines terminate into a 33kV (or 66kV) substation, where the voltage is stepped-down to 11kV for power distribution to load points through a distribution network of lines at 11kV and lower.

The power network, which generally concerns the common man, is the distribution network of 11kV lines or feeders downstream of the 33kV substation. Each 11kV feeder which emanates from the 33kV substation branches further into several subsidiary 11kV feeders to carry power close to the load points (localities, industrial areas, villages, etc.,). At these load points, a transformer further reduces the voltage from 11kV to 415V to provide the last-mile connection through 415V feeders (also called as Low Tension (LT) feeders) to individual customers, either at 240V (as single-phase supply) or at 415V (as three-phase supply). A feeder could be either an overhead line or an underground cable. In urban areas, owing to the density of customers, the length of an 11kV feeder is generally up to 3 km. On the other hand, in rural areas, the feeder length is much larger (up to 20 km). A 415V feeder should normally be restricted to about 0.5-1.0 km. unduly long feeder's lead to low voltage at the consumer end.

VIII. Bottlenecks in Ensuring Reliable Power

Lack of information at the base station (33kV sub-station) on the loading and health status of the 11kV/415V transformer and associated feeders is one primary cause of inefficient power distribution. Due to absence of monitoring, overloading occurs, which results in low voltage at the customer end and increases the risk of frequent breakdowns of transformers and feeders. In fact, the transformer breakdown rate in India is as high as around 20%, in contrast to less than 2% in some advanced countries.

In the absence of switches at different points in the distribution network, it is not possible to isolate certain loads for load shedding as and when required. The only option available in the present distribution network is the circuit breaker (one each for every main 11kV feeder) at the 33kV substation. However, these circuit breakers are actually provided as a means of protection to completely isolate the downstream network in the event of a fault. Using this as a tool for load management is not desirable, as it disconnects the power supply to a very large segment of consumers. Clearly, there is a need to put in place a system that can achieve a finer resolution in load management.

In the event of a fault on any feeder section downstream, the circuit breaker at the 33kV substation trips (opens). As a result, there is a blackout over a large section of the distribution network. If the faulty feeder segment could be precisely identified, it would be possible to

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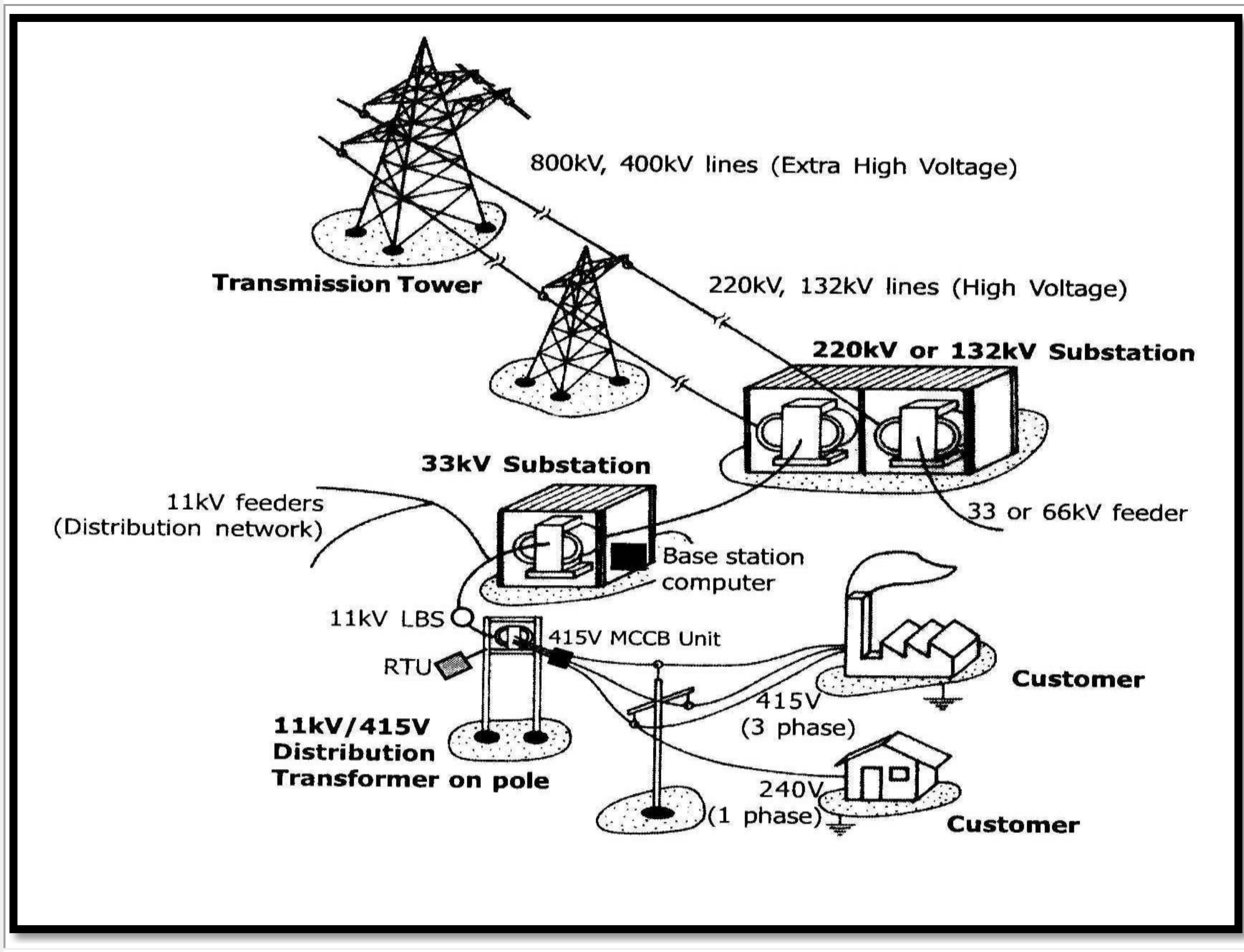
substantially reduce the blackout area, by re-routing the power to the healthy feeder segments through the operation of switches (of the same type as those for load management) placed at strategic locations in various feeder segments.



[Typical Power Transmission and Distribution Scenario by SCM with DA components]

IX. The Technology Development Mission

A Technology Development Mission on Communication, Networking and Intelligent Automation, was jointly taken up by IIT Kharagpur and IIT Kanpur. While the mission focus at

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IIT Kharagpur is to develop technology for industrial automation, IIT Kanpur embarked upon the development of an integrated technology for power distribution automation system.

In a distribution automation (DA) system, the various quantities (e.g., voltage, current, and switch status, temperature, and oil level) are recorded in the field at the distribution transformers and feeders, using a data acquisition device called Remote Terminal Units (RTU). These system quantities are transmitted on-line to the base station (33kV substation) through a variety of communication media. The media could be either wireless (e.g., radio, and pager) or wired (e.g., Dial-up telephone, RS-485 multi-drop, and Ethernet). The measured field data are processed at the base station for display of any operator selected system quantity through Graphic User Interface (GUI). In the event of a system quantity crossing a pre-defined threshold, an alarm is automatically generated for operator intervention. Any control action (for opening or closing of the switch or circuit breaker) is initiated by the operator and transmitted from the 33kV base station through the communication channel to the remote terminal unit associated with the corresponding switch or circuit breaker. The desired switching action then takes place and the action is acknowledged back to operator for information.

DA systems are being adopted by utilities in some developed countries in a phased manner, primarily for reliability evaluation in a field environment. In India too, a small beginning has been made by a few state utilities (Andhra Pradesh, Assam, Kerala and Rajasthan), which are confining themselves initially to the automation of 33kV substations. Electronics Research and Development Centre, Trivandrum, and Computer Maintenance Corporation, Hyderabad, are involved in these early experiments, the main objective being the development of know-how and a better understanding of the issues involved in implementing DA systems indigenously. The utility environment in India is far different from that in most of the developed countries, because of the existing social scenario. Hence, technological solutions available for DA in developed countries cannot be directly implanted in India. Also, the cost of importing a DA system technology is prohibitive.

X. The Mission Activities at IIT Kanpur

IIT Kanpur has embarked on an effort to develop indigenous technology for an integrated power distribution automation system in collaboration with four industry partners (Secure Meters Limited, Udaipur; Indian Telephone Industries, Raebareli; Data Pro Electronics Private Limited, Pune; and Danke Switchgears, Vadodara). This effort includes development of

(a) Communication and networking technology using wired and wireless media,

(b) Micro-controller based remote terminal unit (RTU),

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(c) Remotely operable switch for 11kV and 415V feeders,

(d) Application Specific Integrated Circuit (ASIC) for electrical instrumentation,

(e) DA software to enable remote monitoring, alarm generation and remote control, and

(f) Distribution network simulator (a scaled down model of a real-life distribution network) to provide a test bed for a comprehensive testing of the developed technology, components and software. Some of the developments noted above are being implemented in the IIT Kanpur distribution network as a pilot level installation for field reliability evaluation.

XI. Salient Contributions

The technology development mission at the Institute has made the following contributions:

XII. Communication and Networking Technology

This enables distributed data acquisition, monitoring and control system functions. Unlike traditional communication solutions, the approach here is to have a core communication controller in the base station that can support diverse choices of communication media (dial-up, RS485, Ethernet, and radio). This open approach facilitates cost effective implementation. The base station communication controller has cross-platform portability, supports functions for communications network management, and permits LAN, Internet, and Intranet connectivity through Ethernet. All command communication functions are invoked through GUI of automation software. Data transfer from/to RTUs supports industry standard data links.

XIII. Remote Terminal Unit

The micro-controller based pole-top RTU has 32 analog and 16 digital channels, and affords RS232 full duplex asynchronous communication. The acquired data (voltage and current) is processed for RMS and power factor calculations. Some design goals focus at low cost, flexibility and expandability, modularity at signal conditioning level, and communication interface.

XIV. Remotely Operable Switch

A load break switch (LBS) for 11kV operation and a moulded case circuit breaker (MCCB) unit for 415V operation have been developed and tested as per available specifications. The three-pole 11kV LBS opens in 80 milliseconds at the rated current of 80 A. While this switch is primarily meant for breaking load current, it can sustain 16 kA of fault current for one second and can also close on fault. The remote operation is through a three-phase induction motor coupled with gear mechanism. The 415V MCCB unit, on the other hand, has an isolator on the incoming circuit and two MCCBs for two outgoing feeders. Flexibility exists to choose the MCCB of appropriate rating corresponding to the rated feeder current. The remote operation is through solenoid-plunger arrangement.

XV. Application Specific Integrated Circuit (ASIC)

XVI. The Energy Crisis and Climate Change (The ultimate Solution)

The future global economy is likely to consume ever more energy, especially with the rising energy demand of developing countries such as China and India. At the same time, the tremendous risk of its Management. According to John Browne the term 'energy crisis' is used quite loosely so it pays to be clear about what's under discussion. Broadly speaking the term poses three distinct questions:

XVII. Will We Run out of Energy?

We rely on coal, oil and gas (the fossil fuels) for over 80% of our current energy needs – a situation which shows little sign of changing over the medium-term without drastic policy changes. On top of this energy demand is expected to grow by almost half over the next two decades. Understandably this is causing some fear that our energy resources are starting to run out, with devastating consequences for the global economy and global quality of life.

The potential for crisis if we run out of energy is very real but there is still time before that occurs. In the past two decades proven gas reserves have increased by 70% and proven oil reserves by 40%. At expected rates of demand growth we have enough for thirty years supply. Moreover, better technology means that new oil and gas fields are being discovered all the time while enhanced recovery techniques are opening up a potentially huge array of unconventional sources, including tar sands, shale gas and ultra-deepwater. Ultimately, the near-unlimited supply potential of renewable energy sources should ensure that the world does not fall short of its energy needs.

XVIII. How secure is our access to energy?

The security of global energy supplies continues to be problematic. Today, oil and gas reserves are in the hands of a small group of nations, several of which are considered political unstable or have testy relationships with large consuming countries. Eighty per cent of the world's proven oil reserves are located in just three regions: Africa; Russia and the Caspian Basin; and the Persian Gulf. And more than half of the world's remaining proven gas reserves exist in just three countries: Russia, Iran, and Qatar.

Concerns over energy security prompt policymakers to seek independence from foreign sources of energy. In Europe, new coal-fired power stations are back on the political agenda, partly because Russia is no longer seen as a reliable supplier of gas. In the US, home-grown biofuels have been promoted by successive administrations as an alternative to Middle Eastern oil imports, despite being more expensive. These reactions are a natural consequence. The more governments can extract themselves from the dependence on foreign energy resources, the more secure they feel.

XIX. How Does Climate Change Affect The Energy We Use?

Emissions of carbon dioxide into the Earth's atmosphere – primarily as a result of burning fossil fuels for energy – are thought to be the cause of rising global temperatures. The scientific evidence to support this assertion has become increasingly compelling in recent years, suggesting a need for urgent and concerted action by all nations to prevent ecological degradation on a massive scale.

For the first time in history we face an energy crisis not because we might run out of energy, but because we are using it in the wrong way. Up to now the energy industry was judged by two metrics: its contribution to energy security and the cost of energy delivered to the consumer. To this we must now add a third: its success in reducing the emission of greenhouse gases, chiefly carbon dioxide, into the atmosphere.

Fortunately, finding solutions to these differing energy crises demands a broadly similar response:

Solution: 1.

Reduce growing energy demand through improved energy efficiency and conservation.

The first step to reducing global emissions is to arrest the growth in energy demand with an aim to eventually setting it on a downward trend. The key for continued economic progress is to learn how to create more wealth with less energy. This has additional benefits in improving energy security, preserving precious natural resources and saving money for businesses and the ordinary consumer.

However, unlocking the potential savings from improved energy efficiency will be very difficult without government coordination to change consumer behaviour. This will involve stricter product regulations as well as public education programmes to encourage people to think differently about energy. Governments should also address the issue of financing, providing cheap loans to households and small businesses with which they can carry out the necessary improvement works.

Solution: 2

Research, develop and deploy a broad range of energy sources, both domestic and international, to work with properly functioning global markets to help meet future energy demands.

We need to look at both the short-term and long-term. In the short-term we can push existing technologies to help reduce carbon emissions. Fortunately we already have many technologies at our disposal: from wind, wave, solar and biomass for heat and power, to liquid biofuels, biogas and electric motors for transport. In the long-term, evolutionary technologies need to be further developed and research into revolutionary ones pursued.

A crucially important technology will be carbon capture and storage (CCS) which allows for the continued use of fossil fuels in the future energy mix. Coal is widely used to generate electricity in many of the world's largest economies (especially the USA, China and India) and without CCS technology there is little chance that their energy demands can be met whilst at the same time reducing greenhouse gas emissions.

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Solution: 3

The so-called 'developed countries' along with large developing countries such as China, India, Russia and Brazil, should agree and adopt a common position on climate change, focused on reducing greenhouse gas emissions through an effective cross-border market and technology transfer mechanism.
Put simply, we cannot hope to avoid the dangerous consequences of climate change unless global emissions are halved from current levels by 2050. At current rates of population growth and with current technologies this will be impossible without a global agreement to limit and disperse the negative consequences. Developed countries must shoulder the initial burden with an agreement for immediate emissions cuts. In return, the largest developing countries must agree to cut their own emissions in the future, but only after having achieved some recognizable level of economic development.

All countries must agree to, and participate in, a carbon market framework with the aim of reducing emissions where it is most efficient and least costly. Whatever its design, the carbon market must create and defend a long-term price for carbon which is stable enough for businesses to factor it in to their forward planning. Where the flow of finance through the carbon market is insufficient to make the necessary reductions in emissions, additional funds should be made available. These should be used to allow non-OECD countries to develop alternative energy sources and help their citizens adapt to global warming. The OECD nations should seek to create a $100bn fund for this purpose.

XX. Power Generation Systems in India

One really good reason why any business should consider investing in *solar power in India* is the significant SAVINGS on electricity costs realized for a long time as a result of deploying solar PV systems on site. To understand *what is solar power*; we need to lay out some obvious facts supporting the above statement and get them out of the way

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Basic Facts about Solar Power Generation :(Figure: 2)

- Commercial and industrial solar power generation for businesses is more common and affordable than ever before and they can be adapted to fit anyone's specific needs. Think techno-commercial viability
- They make use of infinite source of energy - the sun; best of all sunlight is free.
- Solar power in India is one of the most accessible forms of energy available. Throughout most locations in India the average solar radiation is great for solar power generation.
- Solar power generation systems, which are also called photovoltaic or PV systems, are pollution-free, reliable and have an expected life of about 25 years.
- Your solar power generation is really free after a short payback while others continue to pay heavily for coal and gas generated power.

With this out of the way, enjoy the rest of the article on what is solar power?

XXI. Application of the Solar Power Generation Process:

Solar power in India is becoming common across regions, industries and commercial institutions. There are two basic types of systems that generate solar power in India. Simple descriptions and accompanying diagrams visualizing these two types of systems are displayed below. Ones that

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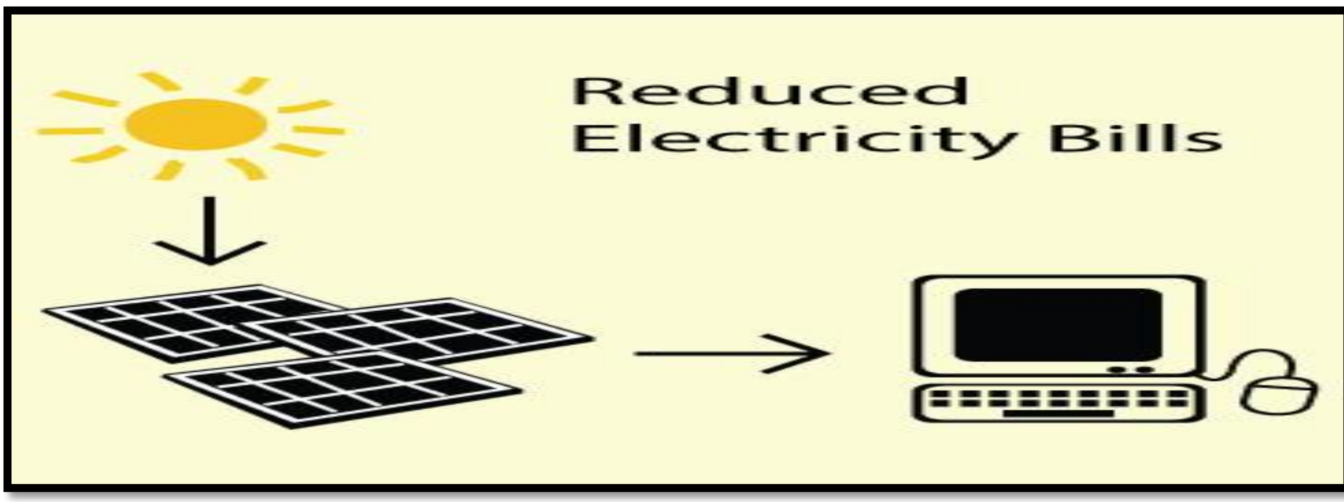
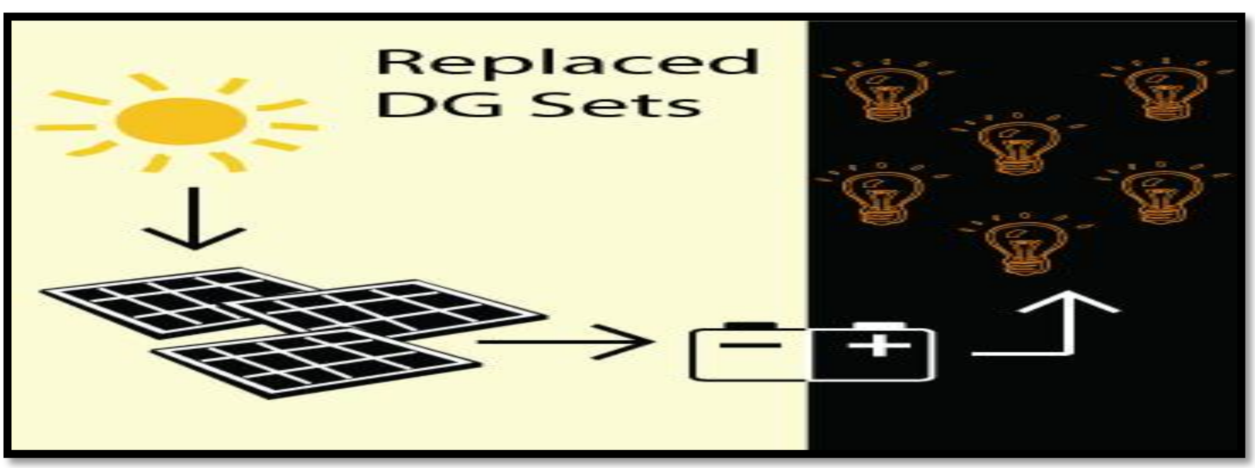
provide electricity while the sun is shining .These solar power generation systems generate electricity when it is used the most during the day time and provides it for institutional operations. Another type of system stores that energy in specially configured deep-cycle battery banks for use when the sun is not shining used to eliminating the need for expensive diesel power generation. Consequently *solar power in India* is replacing diesel power faster than ever.

[A **diagrammatic model of power generation system through Solar System] (Figure: 3)**



Power generation model – figure-3



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Both these *solar power generation* systems consist of solar modules or solar panels mounted on structures connected in series and parallel. These panels of convert energy from sunlight into DC electrical power whenever sufficient solar radiation is available.

"Solar power in India makes absolute sense. Even the average solar radiation in India is great for power generation from PV systems.

XXII. What is Solar Power Process?

In order to achieve a higher system voltage, modules are installed in a row arrangement, called a string. This has the advantages of faster and cleaner installations, higher plant efficiency and better usage of smaller cross section cables. Carefully optimized numbers of strings are connected in parallel by cables to form an array configuration typically associated with *solar power in India*.

Outputs from such arrays are typically connected in parallel in the combiner box. Combiner boxes from a quality system provider typically hosts a number of disconnect and other safety devices making it a protection firewall of sorts for your system.

This combiner box output is fed to the Maximum Power Point Tracking (MPPT) algorithm based solar inverter. Solar inverters form the heart of any **Solar power generation system** High efficiency solar inverters convert the solar power system's direct-current (DC) power to single phase or three phase alternating-current (AC) power used by most applications. In battery based systems solar inverters also ensure that the batteries do not get overcharged or undercharged. Also hybrid capabilities in quality solar inverters allows the system to smartly draw and use power from the grid whenever enough solar PV generated power or battery bank power is not available giving you a "Zero Downtime" system.

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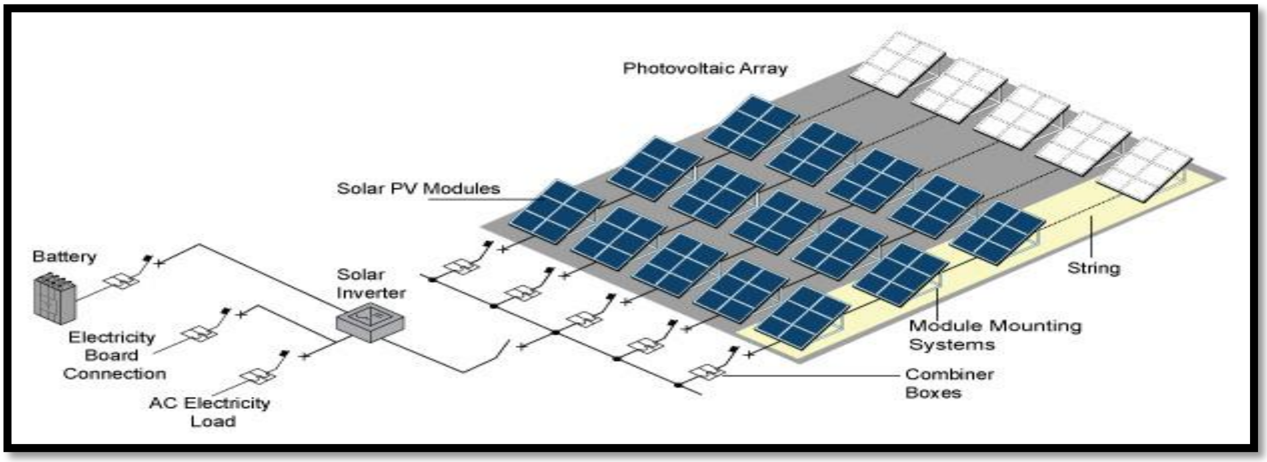

A Model of "Zero Down Time System" (figure-4)

XXIII. Components for Solar Power in India

Despite differences in details **solar power generation** systems should have these specific components

- Solar PV Modules or Solar PV Panels
- Module Mounting Systems
- Combiner Boxes
- Solar Inverters
- Solar Batteries (Optional)

Before that envy-inducing, money saving **solar power generation** system can be deployed one must have a basic grasp on exactly what is solar power and the system components used in *solar* **power in India**. Each component has a unique and important role in the whole system.

The free E book is a Must-have Consumer Guide to **Solar Power Generation** Systems. It introduces the major components used for ***solar power in India*** and their relationship to each other. It's a top resource for decision makers considering deploying *solar power* generation systems for their businesses. Download for free now

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XXIV. Problem of Energy Crisis:

Everywhere now-a-days the energy crisis are visible such as it occurs due to power failure and cut in power hot summer, lack of continuous power supply, low voltage etc. inconsistency in time of energy supply etc. Henceforth, many economical crisis are comes to picture in the 21st century i.e.

- Climate change and global warming
- Deforestation
- Hike of Carbon dioxide in air.
- Instability of rain ,Drought ,famine
- Earthquake, Tsunami etc.
- A system of cross-subsidization
- The residential building sector
- Shortages of fuel
- Poor pipeline connectivity and infrastructure
- Shortage of Gas
- Lack of sufficient Hydroelectric power projects

- Theft of power
- Lack of clean and reliable energy sources
- Lack of power plants and thermal plants
- Average transmission, distribution and consumer-level losses

XXV. Climate Change how effect and affect The Energy Crisis:

Emissions of carbon dioxide into the Earth's atmosphere – primarily as a result of burning fossil fuels for energy – are thought to be the cause of rising global temperatures. The scientific evidence to support this assertion has become increasingly compelling in recent years, suggesting a need for urgent and concerted action by all nations to prevent ecological degradation on a massive scale.

For the first time in history we face an energy crisis not because we might run out of energy, but because we are using it in the wrong way. Up to now the energy industry was judged by two metrics: its contribution to energy security and the cost of energy delivered to the consumer. To this we must now add a third: its success in reducing the emission of greenhouse gases, chiefly carbon dioxide, into the atmosphere.

Fortunately, finding solutions to these differing energy crises demands a broadly similar response:

XXVI. The Economic Solution of Energy Crisis:

Problem Solution:

Solution 1

Reduce growing energy demand through improved energy efficiency and conservation.

The first step to reducing global emissions is to arrest the growth in energy demand with an aim to eventually setting it on a downward trend. The key for continued economic progress is to learn how to create more wealth with less energy. This has additional benefits in improving energy security, preserving precious natural resources and saving money for businesses and the ordinary consumer.

However, unlocking the potential savings from improved energy efficiency will be very difficult without government coordination to change consumer behaviour. This will involve stricter product regulations as well as public education programmes to encourage people to think differently about energy. Governments should also address the issue of financing, providing cheap loans to households and small businesses with which they can carry out the necessary improvement works.

Solution 2

Research, develop and deploy a broad range of energy sources, both domestic and international, to work with properly functioning global markets to help meet future energy demands.

We need to look at both the short-term and long-term. In the short-term we can push existing technologies to help reduce carbon emissions. Fortunately we already have many technologies at our disposal: from wind, wave, solar and biomass for heat and power, to liquid biofuels, biogas and electric motors for transport. In the long-term, evolutionary technologies need to be further developed and research into revolutionary ones pursued.

A crucially important technology will be carbon capture and storage (CCS) which allows for the continued use of fossil fuels in the future energy mix. Coal is widely used to generate electricity in many of the world's largest economies (especially the USA, China and India) and without CCS technology there is little chance that their energy demands can be met whilst at the same time reducing greenhouse gas emissions.

Solution 3

The so-called 'developed countries' along with large developing countries such as China, India, Russia and Brazil, should agree and adopt a common position on climate change, focused on reducing greenhouse gas emissions through an effective cross-border market and technology transfer mechanism. Put simply, we cannot hope to avoid the dangerous consequences of climate change unless global emissions are halved from current levels by 2050. At current rates of population growth and with current technologies this will be impossible without a global agreement to limit and disperse the negative consequences. Developed countries must shoulder the initial burden with an agreement for immediate emissions cuts. In return, the largest developing countries must agree to cut their own emissions in the future, but only after having achieved some recognizable level of economic development.

All countries must agree to, and participate in, a carbon market framework with the aim of reducing emissions where it is most efficient and least costly. Whatever its design, the carbon market must create and defend a long-term price for carbon which is stable enough for businesses to factor it in to their forward planning. Where the flow of finance through the carbon market is insufficient to make the necessary reductions in emissions, additional funds should be made available. These should be used to allow non-OECD countries to develop alternative energy sources and help their citizens adapt to global warming. The OECD nations should seek to create a $100bn fund for this purpose.

XXVII. Role and importance of Power Supply System through SCM

SCM plays an important role among others. With our international presence, we can improve efficiency and create visibility across your supply Demand for energy is increasing everywhere, from one end of the world to the other. There's an emphasis on the environment, sustainability, security, and energy efficiency. Safety is also a primary concern. Energy companies are

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responsible for keeping up with ever-changing regulations, all while exploring new technologies and maintaining current operations.

When you work with Excel, we take care of your supply chain so you can keep up with the rapid pace of change in the global energy marketplace. With our industry expertise and proven background as a logistics leader, we make your operations more efficient and provide the guidance to improve the utilization of your equipment, facilities, and resources. Our supply chain assessment solution improves plant congestion, productivity, and inventory accuracy, and material tracking, chain.

We already support many of the largest energy companies on every continent. Find out exactly how we can help you, and why Excel is the best choice for logistics solutions across all sectors of the global energy industry.

XXVIII. Research Findings

In the invited research article, we have done extensive research work by taking number of field study, observation from the plant site visit, and other published and unpublished sources in order to complete the said task and finally we got the essence ,which are present for the future reference of young intellectual buds professors ,researchers , academicians etc. i.e.

- Energy is not only the source of inspiration but also it is a motivational factor or source to produce something by utilizing it.
- By producing more and more energy a country becomes self independent in energy of his own consumption in operation of industry, office power plant etc.
- Due to sufficient energy production a country can sale to other country who needs it, by which a country’s economic development in to a great extent.
- Crisis is not a crisis if it is not indulged political penetration and pressure. So, don’t involve and coloured by whistling politics.
- Energy should be used as per requirement of the industry, domestic and official consumption.

In connection with be remembering the slogan “Save Energy Save Nation”.

Emphasize more and more to consume solar energy, Bio-Energy, hydro –energy instead of power plant energy, so that it is easy to maintain an eco-equilibrium climate in world.

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XXIX. Role of Supply Chain Management in Energy crisis

With most of India's reactors being developed indigenously for many years, the country developed its own nuclear supply chain. However, if increased importation of technology occurs, we are likely to see increased purchases of nuclear components, products and services from outside of India. At the same time, the country has set a policy of localization as a requirement of doing business. AREVA and Westinghouse have agreed to localize their content as an incentive for their reactors to be built in India. Is India poised to become a global exporter of nuclear technology and equipment? The general consensus is that the country's own demands will probably consume more resources than its industry will be able to supply.

According to Jonathan Hinze, Senior Vice President of Ux Consulting, a firm which tracks worldwide nuclear development and provides forecasting, export of India's nuclear equipment may occur on a case-by-case basis. There could be selected products such as Larsen & Toubro's steam generators or other components that could compete in the global market. However, he believes India will not sell into the global market to the same degree as China. Hinze states that "India will likely be lagging behind China in its track record and global acceptance of its quality assurance standards."

State wise per electricity Consumption in India for 2009-2011.
[Table: 1]

States / UTs	kWh
Haryana	1222.21
Himachal Pradesh	1379.99
Jammu & Kashmir	952.02
Punjab	1526.86

Rajasthan	**736.20**
Uttar Pradesh	**348.37**
Uttarakhand	**1112.29**
Chandigarh	**1340.00**
Delhi	**1651.26**
Sub-Total (NR)	**695.11**
Gujarat	**1615.24**
Madhya Pradesh	**602.07**
Chhattisgarh	**1546.94**
Maharashtra	**1028.22**
Goa	**2263.63**
Daman & Diu	**7118.23**
D & N Haveli	**11863.64**
Sub-Total (WR)	**1116.92**
Andhra Pradesh	**966.99**
Karnataka	**903.24**
Kerala	**525.25**
Tamil Nadu	**1131.58**
Pondicherry	**1743.37**
Lakshadweep	**418.14**
Sub-Total	**938.88**
Bihar	**122.11**

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Jharkhand	**880.43**
Orissa	**874.26**
West Bengal	**550.16**
A & N Islands	**493.98**
Sikkim	**850.00**
Sub-Total (ER)	**481.36**
Assam	**204.80**
Manipur	**240.22**
Meghalaya	**675.19**
Nagaland	**218.03**
Tripura	**335.47**
Arunachal Pradesh	**470.00**
Mizoram	**376.99**
Sub-Total (NER)	**257.98**
Total(All India)	**778.71**

XXX. Electricity Consumption in India

The consumption of electricity in India is quite larger than its production, hence resulting in common power outage.

The country's Annual electricity generation capacity has increased in last 20 years by about 120 GW, from about 66 GW in 1991[43] to over 100 GW in 2001,[44] to over 185 GW in 2011.India's Power Finance Corporation Limited projects that current and approved electricity capacity addition projects in India are expected to add about 100 GW of installed capacity

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between 2012 and 2017. This growth makes India one the fastest growing markets for electricity infrastructure equipment.

India's installed capacity growth rates are still less than those achieved by China, and short of capacity needed to ensure universal availability of electricity throughout India by 2017.

State-owned and privately owned companies are significant players in India's electricity sector, with the private sector growing at a faster rate. India's central government and state governments jointly regulate electricity sector in India.

As on august 2011 power Supply in India [Table: 2]

State	Per capita Consumption(kWh)
Goa	2004.77
Pondicherry	1864.5
Punjab	1663.01
Gujarat	1558.58
Haryana	1491.37
Delhi	1447.72
Chandigarh	1238.51
Tamil Nadu	1210.81
Himachal Pradesh	1144.94
Andhra Pradesh	1013.74
Jammu & Kashmir	968.47

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State	Per capita Consumption(kWh)
Rajasthan	811.12
Uttar Pradesh	386.93
Uttarakhand	930.41
Madhya Pradesh	618.1
Maharashtra	1054.1
Karnataka	873.05
Kerala	536.78
Lakshadweep	428.81
Bihar	117.48
Jharkhand	750.46
Orissa	837.55
West Bengal	515.08
Andaman and Nicobar Islands	506.13
Sikkim	845.4
Assam	209.2
Manipur	207.15

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State	Per capita Consumption(kWh)
Meghalaya	613.36
Nagaland	242.39
Tripura	223.78
Arunachal Pradesh	503.27
Mizoram	429.31

Item	Value	Date reported	Reference
Total installed capacity (GW)	201.64	April 2012	
Available base load supply (MU)	837374	May 2011	
Available peak load supply (GW)	118.7	May 2011	
Demand base load (MU)	933741	May 2011	
Demand peak load (GW)	136.2	May 2011	

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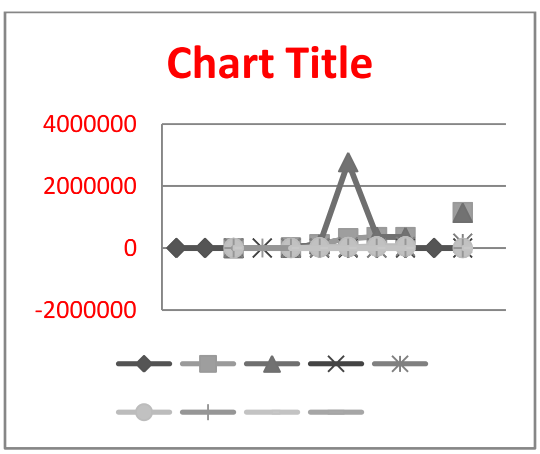
All India (Projected) Power Supply Position in the Year of 2015-2016

Energy **Peak power**

Region	Requirements	Availability (MU)	Surplus (+) Deficit (-)	Demand (MW)	Supply (MW)	Sur Plus (+) Deficit (-)	Remarks
Northern Eastern	15,703	13,934	-113%	2650	2544	-6.0%	Deficit of Power
Eastern	124,610	127,066	2.0%	16507	19358	-4.6%	"
Southern	313,246	277,0979	-113%	43630	35011	-19.8%	"
Western	353,068	364,826	+33%	48.479	50254	-3.7%	"
Northern	355,794	354,540	-0.4%	54329	54137	--0.4%	"
All India Requirement							
Grand Total	1,162,423	1,138,346	-2.1%	156,862	152.754	-2.6%	"

Graph 1: Represents the Peak power supply in MW



In this graph, OY Axis has represents the Energy power in Mega watt (MW) consumption of various states of India during the year 2015-2016 ,where OX represents the peak of energy supply in Mega Unit (MU) in the year 2015-2016.

XXXI. Conclusion

In conclusion, we the researcher draws an eye catching conclusion by getting number of research findings and its recommendations. Here we admit that energy is the source of inspiration and motivation to start each & every type of production and action of various works such as manufacturing, transporting, management and power supply etc. in order to meet the requirement of consumers and customer's .Whether they may be domestic or industrialize consumers. But energy itself comes from two distinct resources such as natural resources (Solar, wind, tidal etc.) and artificial resources (Thermal, Nuclear.Bio plant etc).Thus we may recommend ate if more and more natural source of energy shall be used by the people in different conventional & conversational form of energy then the energy crisis will be reduced and economically will be benefited.

Acknowledgement

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