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PERCEPTION OF CUSTOMERS ON SOLAR POWER GENERATION w.r.t. E.G. DIST

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ABSTRACT

Energy is considered to be a prim agent in the generation of wealth and a significant factor in economic development. Limited fossil resources and environmental problems associated with them have emphasized the need for new sustainable energy supply options that use renewable energies. Solar thermal power generation systems also known as Solar Thermal Electricity generating systems are emerging as renewable energy technologies and can be developed as viable option for electricity generation in future.

Key Words: Energy, Solar Power, Fossil resources, Environmental Problems, Economical importance

I. INTRODUCTION

SOLAR POWER –A BACK DROP

The researcher felt that it is reasonable to present the technical aspect of solar power technology very briefly before going into the arising its growth. Hence, they technology aspect is presented here under:

SOLAR PV

Solar Energy ——>>> Electricity

Solar Cell - A solar cell is a semiconductor device that transforms sunlight into electricity. Semiconductor material is placed between two electrodes. When sunshine reaches the cell, free negatively charged electrons are discharged from the material, enabling conversion to electricity. This is the so-called photovoltaic effect. In theory, a solar cell made from one semiconductor material only can convert about 30 percent of the solar radiation energy it is exposed to into electricity. Commercial cells today, depending on technology, typically have an efficiency of 5 -12 percent for thin films and 13 – 21 percent for crystalline silicon based cells.

Efficiencies up to 25 percent have been reached by the use of laboratory processes. By using multiple solar cells, efficiencies above 35 percent have been achieved.

Solar Photovoltaics - Photovoltaics has been derived from the combination of two words, Photo means Light and Voltaic means electricity. It is a technology that converts light directly into electricity. Photovoltaic material, most commonly utilizing highly-purified silicon, converts sunlight directly into electricity.

The photovoltaic effect is the basic physical process through which a PV cell converts sunlight into electricity. Sunlight is composed of photons, or particles of solar energy. These photons contain various amounts of energy corresponding to the different wavelengths of the solar spectrum. When photons strike a PV cell, they may be reflected or absorbed, or they may pass right through. Only the absorbed photons generate electricity. When this happens, the energy of the photon is transferred to an electron in an atom of the cell (which is actually a semiconductor). With its newfound energy, the electron is able to escape from its normal position associated with that atom to become part of the current in an electrical circuit. By leaving this position, the electron causes a hole to form. Special electrical properties of the PV cell-a built-in electric field-provide the voltage needed to drive the current through an external load (such as a light bulb).

To induce the electric field within a PV cell, two separate semiconductors are sandwiched together. The p and n types of semiconductors correspond to positive and negative because of their abundance of holes or electrons (the extra electrons make an n type because an electron has a negative charge).Although both materials are electrically neutral, n-type silicon has excess electrons and p-type silicon has excess holes. Sandwiching these together creates a p/n junction at their interface, thereby creating an electric field. When the p-type and n-type semiconductors are sandwiched together, the excess electrons in the n-type material flow to the p-type, and the holes thereby vacated during this process flow to the n-type. (The concept of a hole moving is somewhat like looking at a bubble in a liquid. Although it's the liquid that is actually moving, it's easier to describe the motion of the bubble as it moves in the opposite direction.) Through this electron and whole flow, the two semiconductors act as a battery, creating an electric field at the surface where they meet (known as the junction). It's this field that causes the electrons to jump from the semiconductor out toward the surface and make them available for the electrical circuit. At this same time, the holes move in the opposite direction, toward the positive surface, where they await incoming electrons.

Solar energy isn't a new phenomenon. It has been utilized in one form or another for thousands of years. The history of solar energy goes back to the beginning of time. In fact, the first recorded use of solar energy of any kind was in the 7th century B.C. The earliest use of solar power entailed using glass and mirrors. By using a magnifying glass, the sun's rays could create an intense heat, and actually light a fire. As early as in the 3rd century, we read that the Romans and Greeks lit their torches for religious purposes using this technique. Using bronze shields to focus sunlight, the Greek scientist, Archimedes actually set wooden ships on fire belonging to the Roman Empire as early as 212 B.C. The famous Roman bathhouses of the first through the fourth centuries A.D. were solar heated, using large South facing windows to let the sun's warmth heat them. The Anasazi cliff dwellers in North America built their homes facing the South to capture the winter sun, thus providing heating.

II. HISTORY OF SOLAR POWER IN INDIA

India is densely populated and has high solar insolation, an ideal combination for using solar power in India. Considering, Global perspective, India is 5th largest contributor in wind energy sector. In the solar energy sector, some large projects have been proposed, and a 35,000 km2 area of the Thar Desert has been set aside for solar power projects, sufficient to generate 700 GW to 2,100 GW.

With about 300 clear, sunny days in a year, India's theoretical solar power reception, on only its land area, is about 5000 Petawatt-hours per year (PWh/yr) (i.e. 5000 trillion kWh / yr or about 600 TW). The daily average solar energy incident over India varies from 4 to 7 kWh/m2 with about 1500–2000 sunshine hours per year (depending upon location), which is far more than current total energy consumption. Assuming the efficiency of PV modules were as low as 10%, this would still be a thousand times greater than the domestic electricity demand projected for 2015.

According to a 2011 report by BRIDGE TO INDIA and GTM Research, India is facing a perfect storm of factors that will drive solar photovoltaic (PV) adoption at a "furious pace over the next five years and beyond".

The falling prices of PV panels, mostly from China but also from the U.S., has coincided with the growing cost of grid power in India. Government support and ample solar resources have also helped to increase solar adoption. India, "as a growing economy with a surging middle class, is now facing a severe electricity deficit that often runs between 10 and 13% of daily need.

III. OBJECTIVES OF THE STUDY

The following objectives have been formulated for the study:

1. To know the socio-economic conditions of the respondents in the selected locations in the district.
2. To study the economics of solar power generation and customers' perception on solar power in select location in the district.
3. To identify the problems in the utilization of solar energy from the point of producers of panels, sellers of panels and the power generation and to make appropriate suggestions for improvement of solar power in India.

Keeping the above objectives of the study in mind, an exhaustive study of perception of solar power producers cum users have been undertaken in East Godavari District of Andhra Pradesh. The present study is based on the data collected from Primary and Secondary sources. A questionnaire has been prepared with different questions to examine the socio-economic status and perceptions about solar power producers cum users and dealers. For the purpose of administering the questionnaire, a sample of 250 respondents has been selected based on simple random sampling method. The secondary data has been collected from the records and annual reports of Central Electricity Authority, New Delhi, research articles, periodicals, magazines. The data has been analyzed with the help of appropriate statistical techniques like simple average method.

Sources of Data:

Data and information is collected from both primary and secondary sources:

Primary Source: For collecting data and information from the producers cum users of electricity a questionnaire was prepared with 20 questions on different aspects relating to solar energy panels purchase, installation, usage of the panels and the problems relating to the usage of the panels.

Secondary Source: Data and information are collected from various reports of Central Electricity Authority and other related Departments Annual reports, Books, Journals and from reading news papers like Economic Times, Business Line, Financial Express etc.,

IV. REVIEW OF LITERATURE

An attempt is made in this chapter to review the existing studies on Solar Power Energy and its impact on Indian Economy. The studies of government, international organizations and research organizations with reference to Indian context were examined. Some countries failed in implementing the solar power energy. But in Indian economy on Solar Power is successfully. The intention in taking up review of literature is to identify the research gaps.

Mohibullah, Sagar Bhardwaj, and Shashank K Garg (2014)[1] studied the most essential need of human beings is electricity form household to industrial work. In this modern era, it is the need of each family in remote and rural areas. They analyzed the power supply using abundant solar, wind and biogas as a hybrid energy in west of Uttar Pradesh. These areas include nearby rural parts of Harduaganj, Aligarh, Hathras, Sasni, Saatha, Baraithi. These are the flat areas of Uttar Pradesh where population density is 200 persons per square kilometer. Solar, wind, biogas energy present in abundance can be made to sustainable use and a reliable hybrid system can be designed. To enlighten these huts in dark nights and to provide them electricity for household hybrid wind-solar energy-biogas may be a boon for this area.

Yog Raj Sood, RajnishShrivastava, and Naveen Kurmar Sharma (2014)[2] concluded that Indian electricity demand is expected to increase considerably during the next decade at the same time environmental pollution is also increasing with the development of conventional energy source. This article presents the detailed power scenario and trends of current Indian power sector with availability, demand and shortage of power status. Renewable and nuclear power must play a crucial role for reform power sector as well as carbon free electricity generation in India. Renewable energy source especially solar energy is the only option with a large technical potential, and must be included in the decarburization strategy for Indian power sector with reduced demand growth. So power planning will play an important role in the successful power reform. The electricity market is undergoing a tremendous transformation not only in India but throughout the world as it moves towards a more competitive environment.

[1]Mohibullah, SagarBhardwaj, and Shashank K Garg (2014), "Rural Electrification by Effective Mini Hybrid PV Solar, Wind and Biogas Energy System for Rural and Remote Areas of Uttar Pradesh", International Journal of Computer Science and Electronics Engineering, Volume 2, Issue 4, p.178-181.

[2]Yog Raj Sood, RajnishShrivastava, and Naveen Kurmar Sharma (2014), "Assessment of Restructured Indian Power Sector: Availability, Demand and Shortage", International Conference on Power Systems, Energy, Environment, p.118-122.

Amit K. Bhandari and Chinmoy Jana (2010)[3] studied that the Solar Photovoltaic (SPV) based systems have been widely accepted technology for rural electrification in developing countries. The standalone SPV home lighting system has increasingly been popular among rural households, while SPV mini-grid supply system is being promoted for rural electrification schemes. This study uses data from household survey to explore the impact of household characteristics on the preference for electrical energy from SPV systems. Econometric evidence shows heterogeneity in behavioural pattern for these two SPV systems. The flexibility in use and cost of systems might explain this difference. Household characteristics such as monthly household income, household size, occupational status of household head, number of room and type of house significantly influence household's decision for SPV standalone home lighting systems.

Ajay Sharma, Anand Singh and Manish Khemariya (2013)[4] analyzed that introducing a new Design Idea Of Optimized PV-Solar and Wind Hybrid Energy System, Mobile Base Station Over Conventional Diesel Generator for a particular site in village Himalaya (Bhanpur) . The aim of this paper to generate electricity and transferring it mobile tower with extra electricity begging transfer to village. For this particular hybrid system, we are taking the meteorological data of Solar Insolation and hourly wind speed, for village Himalaya (Bhanpur) and through the study of pattern of load consumption of mobile base station and we have designed a model for optimization of the hybrid energy system using HOMER software. The hybrid energy system is a combination of wind, solar, diesel generation and batteries. Hybrid Optimization Model for Electric Renewable (HOMER) software is used for the analysis of sizing and sensitivity, performed in order to obtain the most feasible configuration of a hybrid renewable energy system.

D. Azofra , E. Martínez , E. Jiménez, J. Blanco a J.C. Saenz-Díez (2014)[5] intended to analyze the influence of biomass, solar–thermal and small hydraulic power respectively (isolated from the rest of the special regime) on the final electricity prices of the Spanish Pool and the cost of electricity tariffs. Thus, their influence is compared resulting that the economic impact that they have on the system is uneven. For that analysis, artificial intelligence techniques are used to create a descriptive model of the Pool, by means of an ex-post analysis. Algorithms of different typologies are also analyzed. Finally, tree models based on algorithm M5P are applied. The main conclusion is that biomass and small hydraulic power have reduced the energy prices of the Pool at 1.48 and 1.45€ /MW h, generating an overall saving for the system of€ 50.7 and 200.6 million, and for the average domestic consumer of€ 0.12 and 3.01 respectively in 2012. Regarding solar–thermal power, it has

[3]Amit K. BhandariandChinmoy Jana (2010), "A Comparative Evaluation of Household Preferences for Solar Photovoltaic Standalone and Mini-grid System: An Empirical Study in a Costal Village of Indian Sundarban", Renewable Energy 35, p.2835e2838.

[4]Ajay Sharma, Anand Singh and Manish Khemariya (2013), "Homer Optimization Based Solar PV; Wind Energy and Diesel Generator Based Hybrid System", International Journal of Soft Computing and Engineering ,Volume-3, Issue-1, p.199-204.

[5] D. Azofra , E. Martínez , E. Jiménez , J. Blanco a J.C. Saenz-Díez (2014)., "Comparison of the Influence of Biomass, Solar–Thermal and Small Hydraulic Power on the Spanish Electricity Prices by Means of Artificial Intelligence Techniques Applied", Energy 121, pp. 28–37.

reduced the energy prices of the Pool at 1.05€ /MW h, generating an overall cost overrun for the system of€ 648.2 million, and for the average domestic consumer of€ 12.39.

N.B. Desaia, S. Bandyopadhyaya, J.K. Nayaka, R. Banerjeea, S.B. Kedarea (2014)[6], studied that a grid-connected solar thermal power plant, with a gross capacity of 1 MWe at direct normal irradiance (DNI) of600 W/m2, has been designed and is being commissioned at Gurgaon near New Delhi in India. The unique feature of the plant is the integration of two different solar fields (parabolic trough collectors and linear Fresnel reflectors) without a fossil fuel backup. The hot oil (Therminol VP1) from parabolic trough collectors and saturated steam from linear fresnel reflectors are integrated to produce superheated steam at 350°C, 42 bar to run a turbine-generator to produce electricity. They give outlines the salient features of this package and presents simulation studies of the power plant under the climatic conditions of New Delhi. A detailed performance model of the actual plant is created in the simulator using its libraries. Diurnal Simulation of the plant has been done to see the daily variations of the collector heat gain and plant power output. The plant will produce about 1365 MWh of annual energy at a capacity factor of 15.6%; the annual DNI at New Delhi being 1273 kWh/m2-year. These results can be used to plan the operation and device the appropriate control strategy of the power plant. The simulation results will be validated with actual plant data, after commissioning.

V. ANALYSIS OF OPINIONS OF HOUSEHOLD RESPONDENTS

Awareness about the possible use of sunlight for energy needs:

A renewable resource is a resource which can be used repeatedly because it is replaced naturally. Examples are: oxygen, fresh water, solar energy, timber, and biomass. Renewable resources may include goods or commodities such as wood, paper and leather, because their sources are renewable. Gasoline, coal, natural gas, diesel, plastics and other things that come from fossil fuels are not renewable. They take millions of years to be made, and cannot be renewed in our lifetime or even a nation's lifetime (they are called fossil fuels because they are as old as fossils). Ways have been developed to make biodegradable plastic and biodiesel and other fuels from renewable resources such as corn, sugar cane, soya beans and canola.

Solar energy is the technology used to harness the Sun's energy and make it useable. Today, the technology produces less than one tenth of one percent of global energy demand. Every hour the sun beams on to Earth more than enough energy to satisfy global energy needs for an entire year. Solar energy is the technology used to harness the sun's energy and make it useable. Hence, the awareness about the possible use of sunlight for energy needs, Awareness about the Availability Of Solar Energy Technology, Source of Information about the Availability of Solar Power Generator, Source of Information for contacting the dealer, Desire of sample solar power producers to have uninterrupted power, Type of Solar Energy Technology installed in Sample Power Generators Houses, Their intention to use solar power for other uses, to know the day wise use of power by

[6] N.B. Desaia, S. Bandyopadhyaya, J.K. Nayaka, R. Banerjeea, S.B. Kedarea (2014)., 2013 ISES Solar World Congress Simulation of 1MWe Solar Thermal Power Plant Energy Procedia 57, pp.507 – 516.

sample Solar Power users, Availability of credit from the supplier, Satisfaction on the service of the dealer that supplied panels, Overall Satisfaction of solar power producers are examined in this research. On the basis of above analysis the following suggestions were offered.

VI. SUGGESTIONS

1. Protection of environment is the responsibility of every human being. "770 million dreams but one planet", so we should think of earth. Whenever people start using solar, the polution may come down.
2. The world is going to be face shortage of fossile fuels, there is an urgency, to think of alternatives. Solar energy can replace this shoratage. So, governments should create awareness among rural community.
3. In our country there is some Lacking in electricity infrastructure, particularly in rural parts of Indian. India's grid system is considerably under-developed, with major sections of its populace still surviving off-grid. As of 2004 there are about 80,000 unelectrified villages in the country out of these villages, 18,000 could not be electrified through extension of the conventional grid. So, it is suggested to focus on these issues to make India a developed country.
4. India's power sector is one of the most diversified in the world; along with conventional sources such as coal, lignite, natural gas, oil, hydro and nuclear power the other viable non-conventional sources such as wind, solar, and agricultural and domestic waste. Electricity may meet the increasing demand for electricity in the country; massive addition to the installed generating capacity is required.
5. India has a vast supply of renewable energy resources, and it has one of the largest programs in the world for deploying renewable energy products and systems. India is now moving towards development so, it is suggested to make it part in "MAKE IN INDIA".
6. India is currently experiencing strong economic growth, while at the same time attempting to extend modern power services to millions but still some are living in poverty. Expanding electrical capacity is need of the hour so, while giving permissions for commercial buildings, like fire permission, installation of solar panels to generate power also should be made.
7. The geographical location of the country stands to its benefit for generating solar energy. So, India may become self sustain in generating natural power, the reason is that it is a tropical country and it receives solar radiation throughout the year, which amounts to 3,000 hours of sunshine.
8. It is suggest that in India Inculcating solar energy concept is very easy, why because 33% of the respondents are graduates or post-graduates. Even in rural India also there are many people who have qualified SSC; it is suggested to make it solar energy as revolution like Swatcha Bharath.
9. A journey towards solar energy need tied more on policy support rather than on the prices of fossil fuels, any uncertainty in policies for the sector can prove to be troublesome for the sector. This can range from policies related to land allocation, government clearances, and electricity rates.
10. To make solary energy generation in considerable manner; one should focus on various problems that the industry is facing. It is suggested that the quality of the panels may encourgare people from trail run to fulltime

production of solar enery. This is also suggested to make solar power generation as employment. It can create many employment opportunities to people like India.

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