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Review of electricity generation from solar energy and future scope

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ABSTRACT
The Solar Energy is produced by the Sunlight is a non-vanishing renewable source of energy which is free from ecofriendly. Every hour enough sunlight energy reaches the earth to meet the world's energy demand for a whole year. In today's generation we needed Electricity every hour. This Solar Energy is generated by as per applications like industrial, commercial, and residential. It cans easily energy drawn from direct sunlight. So it is very efficiency & free environment pollution for surrounding. In this article, we have reviewed about the Solar Energy from Sunlight and discussed about their future trends and aspects. The article also tries to discussed working, solar panel types; emphasize the various applications and methods to promote the benefits of solar energy.

Keywords: Renewable energy, Solar panel, Photovoltaic cell, Modelling of PV Panel, Current energy policies future of solar energy

I. INTRODUCTION

Nowadays, due to the decreasing amount of renewable energy resources, the last ten years become more important for per watt cost of solar energy device. It is definitely set to become economical in the coming years and growing as better technology in terms of both cost and applications. Everyday earth receives sunlight above (1366W approx.) This is an unlimited source of energy which is available at no cost. The major benefit of solar energy over other conventional power generators is that the sunlight can be directly converted into solar energy with the use of smallest photovoltaic (PV) solar cells. There have been a large amount of research activities to combine the Sun's energy process by developing solar cells/panels/module with high converting form. the most advantages of solar energy is that it is free reachable to common people and available in large quantities of supply compared to that of the price of various fossil fuels and oils in the past ten years. Moreover, solar energy requires considerably lower manpower expenses over conventional energy production technology.

The total annual solar radiation falling on the earth is more than 7500 times the world's total annual primary energy consumption of 450 EJ. The annual solar radiation reaching the earth's surface, approximately 3,400,000 EJ, is an order of magnitude greater than all the estimated (discovered and undiscovered) non-renewable energy resources, including fossil fuels and nuclear. However, 80% of the present worldwide energy use is based on fossil fuels. Most parts of India receive 4–7 kWh of solar radiation per square meter per day with 250–300 sunny days in a year. The highest annual radiation energy is received in Western Rajasthan while the NorthEastern region of the country receives the lowest annual radiation. India has a good level of solar radiation, receiving the solar energyequivalent of more than 5000 trillion kWh/yr. Depending on the location, the daily incidence ranges from 4 to 7 kWh/m2 , with the hours of sunshine ranging from 2300 to 3200 per year.

The MNRE, working in conjunction with the Indian Renewable Energy Development Agency (IREDA) to promote the utilization of all forms of solar power as well as to increase the share of renewable energy in the Indian market. This promotion is being achieved through R&D, demonstration projects, government subsidy programs, and also private sector projects.

SOLAR ENERGY

Amount of energy in the form of heat and radiations called solar energy. Shown in Fig.1. It is radiant light and heat from sun that is natural source of energy using a range of ever changing and developing of technology such as solar thermal energy, solar architecture, solar heating, molten salt power plant and artificial photosynthesis. The large magnitude of solar power available makes highly appealing source of electricity. 30% (approx.) solar radiation is back to

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space while the rest is absorbed by materials. It has two types: positive charge and negative charge .This cell technology are used to design solar cells with low cost as well as high conversion efficiency. When the cell absorbed photons from sunlight, electrons are knocked free from silicon atoms and are drawn off by a grid of metal conductors, pressure a flow of electric direct current.

Working of solar energy

Solar Cell (Photovoltaic Cell) The cells converted solar radiation directly into electricity. It consist various kinds of semiconductor ocean, clouds and land masses.PV cells Convert Sunlight to Direct Current (DC) electricity. Charge Controller work as control the power from solar panel which reverse back to solar panel get cause of panel damage. Battery System act as storage of electric power is used when sunlight not available (i.e. night).From this system connected to inverter for convert Direct Current (DC) into Alternating Current (AC).

Modeling of solar energy

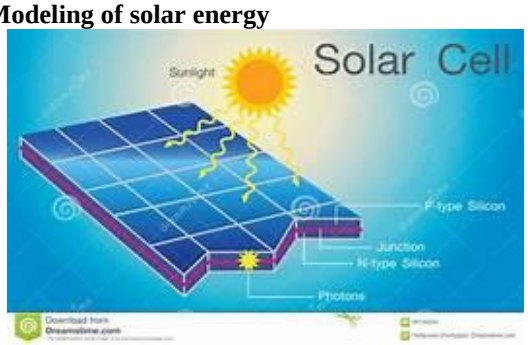
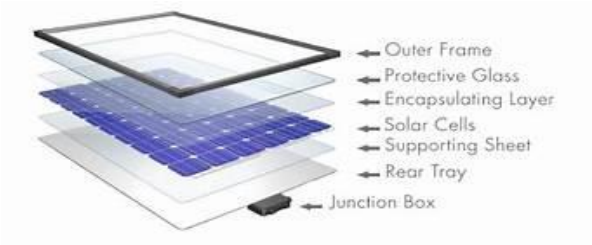


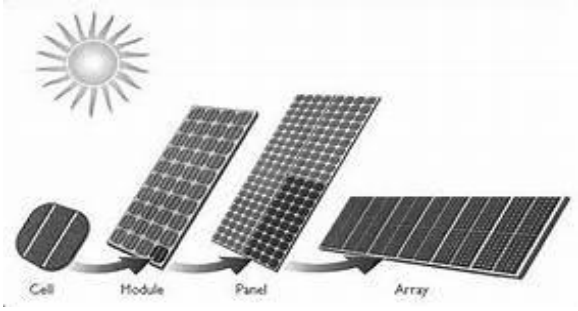
Figure 1 Internal of Reaction of Solar energy

A. Photovoltaic Module A PV module consists of solar cell circuits sealed in an environmentally protective laminate and are the fundament building blocks of PV system. Generally sizes from 60W to 170W. Usually a number of PV modules are arranged in series and parallel to meet the energy requirement.

B. Photovoltaic Panel It includes one or more PV modules assembled as a pre-wind, field instable unit. In this panel PV cell is series connections. Solar panels are made up of individual PV cells connected together.



C. Photovoltaic Array It is contain of several amount of PV cells in series and parallel connections. Series connections are responsible for increasing the voltage of the module whereas the parallel connection is responsible for increasing the current in the array. It generates maximum 180W in full sunshine. Large the total surface area of the array, more solar electricity it will produce.



Current status of solar energy

Solar power in India is a fast developing industry. The country's solar installed capacity reached 31.696 GW as of 31 October 2019. India has the lowest capital cost per MW globally to install the solar power plants.

The Indian government had an initial target of 20 GW capacity for 2022, which was achieved four years ahead of schedule. In 2015 the target was raised to 100 GW of solar capacity (including 40 GW from rooftop solar) by 2022, targeting an investment of US$100 billion India has established nearly 42 solar parks to make land available to the promoters of solar plants

India expanded its solar-generation capacity 8 times from 2,650 MW on 26 May 2014 to over 20 GW as on 31 January 2018. The country added 3 GW of solar capacity in 2015–2016, 5 GW in 2016–2017 and over 10 GW in 2017–2018, with the average current price of solar electricity dropping to 18% below the average price of its coal-fired counterpart.By the end of September 2019, India has installed more than 82,580 MW of renewable energy capacity with around 31,150 MW of capacity under various stages of installation.

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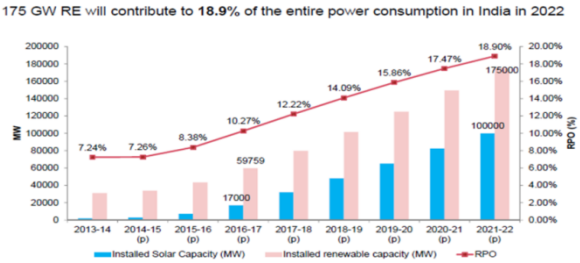
Future scope of solar energy

India, with its booming economy and humongous population of over 1 billion, has always faced shortage of energy. Even though the country is among the largest producers of electricity in the world, it is hardly ever able to meet the electricity requirements of its ever-so-rapidly increasing population. At present, almost 53% of India's energy requirements are met with coal; going by the predictions, the coal reserves of the country will not last beyond 2050. [coal power plant]. It is common knowledge that over 72% of the population of this third world country still resides in villages, with only about half of its rural population getting access to electricity. It is high time India moved to renewable ways to feed its population its fair-share of electricity.



Current energy policies

The ultimate objective of the renewable energy policy framework is to significantly increase the share of renewable energy source in India's energy mix [20]. These energy policies are set by government.

National Electricity Policy, 2005 :-The National Electricity Policy aims at achieving the following objectives; access to electricity, availability of power demand (to be fully met by 2012), energy and peaking shortages to be overcome and spinning reserve to be available, supply of reliable and quality power of specified standards in an efficient manner and at reasonable rates, per capita availability of electricity to be increased to over 1000 units by 2012, financial turn around and commercial viability of electricity sector and protection of consumers' interests.

The Electricity Act 2003 :- The Electricity Act contains the following provisions pertaining to non-conventional energy sources. Under Sections 3(1) and 3(2), it has been stated that the Central Government shall, from time to time, prepare and publish the National Electricity Policy and Tariff Policy, in consultation with the state governments and authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or material, hydro and renewable sources of energy. Section 4 states that the Central Government shall, after consultation with the state governments, prepare and notify a national policy, permitting stand-alone systems for rural areas. Section 61, 61(h) and 61(i) state that the appropriate commission shall, subject to the provision of this Act, specify the terms and conditions for the determination of tariff, and in doing so, shall be guided by the following, namely, the promotion of cogeneration and generation of electricity from renewable sources of energy; and the National Electricity Policy and Tariff Policy. Section 86(1) and 86(1)(e) state that the state commissions shall discharge the following functions, namely, promote cogeneration and generation of electricity from renewable sources of energy by providing, suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution license.

Tariff Policy, 2006:- The Tariff Policy announced in January 2006 has the following provisions:

1. Pursuant to provisions of section 86 (1) (e) of the Act, the Appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs.
2. It will take som`e time before non-conventional technologies can compete with conventional sources in terms of cost of electricity. Therefore, procurement by distribution companies shall be done at preferential tariffs determined by the Appropriate Commission.
3. Such procurement by Distribution Licensees for future requirements shall be done, as far as possible, through competitive bidding process under Section 63 of the Act within suppliers offering energy from same type of nonconventional sources.
4. The Central Commission should lay down guidelines within three months for pricing non-firm power, especially from nonconventional sources, to be followed in cases where such procurement is not through competitive bidding.

National Rural Electrification Policies, 2006

1. Goals include provision of access to electricity to all households by the year 2009, quality and reliable power supply at reasonable rates, and

minimum lifeline consumption of 1 unit/household/day as a merit good by year 2012.
2. For villages/habitations where grid connectivity would not be feasible or not cost effective, off-grid solutions based on standalone systems may be taken up for supply of electricity.
3. State government should, within 6 months, prepare and notify a rural electrification plan, which should map and detail the electrification delivery mechanism.
4. The Gram Panchayat shall certify and confirm the electrified status of the village as on 31st March each year.

Integrated Energy Policy Report (Planning Commission) 2006:- Suggest a path to meet energy needs of the country in an integrated manner up to 2031–2032. It recommended special focus on renewable energy development.

MERITS OF SOLAR ENERGY

It is save up to 20% of energy costs. It can use in Remote Locations. Easy Installation (i.e. does not required any wires, cords etc.).Rooftop which means no new space is needed & every domestic or commercials user can generate their own electricity. It is widely available of sunlight with free of cost, eco-friendly, renewable resource. It has no moving parts and not required any additional fuel, other than sunlight, to produce power. No need of water and fuel.

DEMITS OF SOLAR ENERGY

No generation of energy, when the sun is not shining. Initial cost is high. More area needed for large amount power. For alternating Current (AC) application required of inverter and also storage at night. Production PV systems single silicon crystals is technically challenging, energy, time consuming.

APPLICATIONS OF SOLAR ENERGY

It is used in many applications including electricity, evaporation, heating water, Heating and cooling of buildings, cooking of food, water pumping etc.

II. CONCLUSION

The sun is a powerful source that can help our planet by giving us clean, reusable energy to power our world. The use of this energy is free, does not create pollution, and if used wisely can help us become less dependent on other more costly and damaging forms of power. After participating in this Web Quest I hope you are able to see the benefits of this valuable resource and help change the future for energy use.

Most of the people are aware about non-renewable energy resources. Solar energy has become increase more popular due to their economic benefits. By on Battery Backup, Solar Energy can even provide Electricity 24x7, even on cloudy days and at night. This also used with inter-grid System with Continuously Power supply. It has more benefits compared to other forms of energy like fossils fuels and petroleum deposits. It is an alternative which is promise and consistent to meet the high energy demand. Research on solar cell and solar energy is promise has a future worldwide.

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