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STUDY OF SOLAR ENERGY UTILISATION IN INDIA : A NEED OF TODAY

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Abstract

The researchers at MIT are making a transparent solar cell that could turn everyday products used in our day to day life such as windows in power generating devices—without altering how they look or their function today. The new solar cells absorb only infrared and ultraviolet light. Visible light passes through the cells unimpeded, so our eyes don't know they're there. Using simple room-temperature method, the researchers have deposited a coatings of the solar cells on various materials and have used them to run electronic displays using ambient light. They estimated that using coated windows in a skyscraper could provide more than a quarter of the building's energy needs without changing its look. They're now beginning to integrate their solar cells into consumer products, including mobile device displays and various parts of building.Other research groups have previously been working on making transparent solar cells, basically by using conventional opaque Photo Voltaic materials and either making them so thin they are translucent or "segmenting" them—a process of linking mounting pieces of a solar panel on a window with gaps for seeing out. But those approaches involve an inherent trade off between transparency and efficiency. When we start with opaque PV materials, we typically have to decrease the amount of active area to increase the transparency, So with existing PV technologies, it's difficult to optimize for efficiency and aesthetics at the same time. This technology is not going to save the planet by providing all the emissions-free energy for fulfilling it's needs. But it deems an attractive part of the solution. It can be added to things that are already being deployed, and it won't require devoting vast new areas to collecting solar energy. With this technology, those areas already exist in the surfaces all around us.

Index Terms: *Transparent Solar Panel, Photo Voltaic*

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1. INTRODUCTION

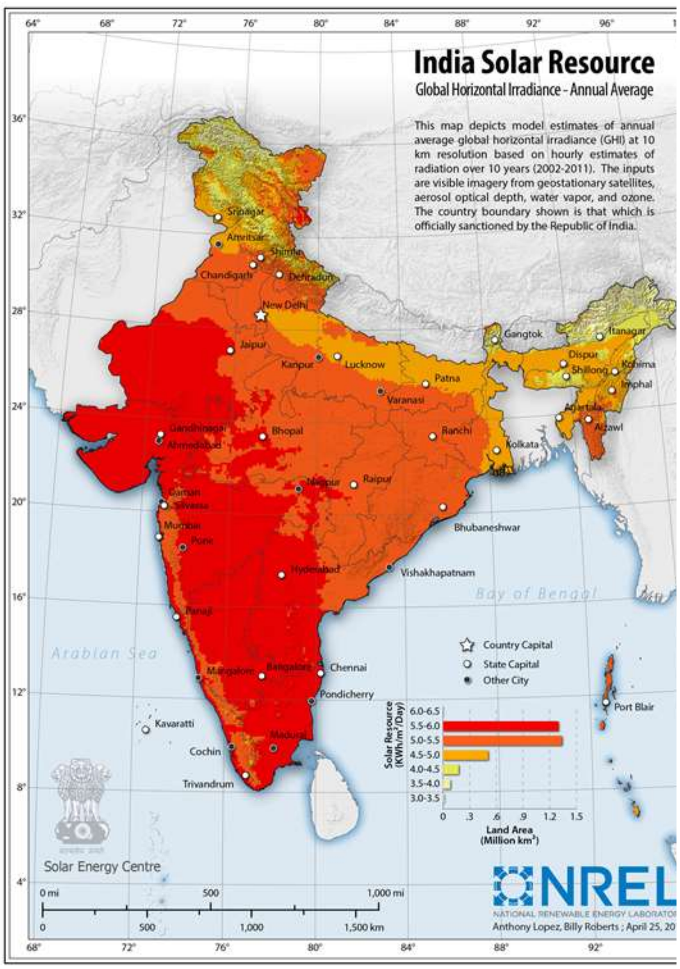
Solar power in India is one of the fastest developing industry. Country's solar panel installed capacity has reached upto 25.21 GW as of 31 December 2018. The Government of India had an initial target of 20 GW capacity for year 2022, which was achieved four years ahead of proposed schedule. In 2015 the target was raised upto 100 GW of solar capacity by 2022, targeting an investment of US$100 billion. India expanded its solar energy electricity 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. Rooftop solar power electricity generation accounts for 3.4 GW, of which 70% is industrial or commercial. In addition to its large-scale grid-connected solar PV initiative, India is developing off-grid solar power for fulfilling the local energy needs. Solar products have increasingly helped to meet rural needs; by the end of 2015 just under one million solar lanterns were sold in the country, reducing the need for kerosene. That year, 118,700 solar household lighting systems were installed and 46,655 solar street lighting installations were provided under a big national program just over 1.4 million solar cookers were distributed in India In January 2019, Indian Railways announced the plan to install 4 GW capacity along its all railway tracks.

1.1 Solar Potential

About 300 sunny days in a year, the quantity of solar energy incidence on India's land area is about 5000 trillion kilowatt-hours (kWh) per year (or 5 EWh/yr). The available solar energy in one year exceeds the possible energy output of all of the fossil fuel energy reserves in India.In India,the daily average of solar-power-plant generation capacity is 0.20 kWh per m^2 of used land area which is equivalent to 1400–1800 peak (rated) capacity operating hours in a year with available, commercially-proven technology.

1.2Challenges And Opportunities

This map provides a solar resource maps and data for India. This maps and data were originally produced in 2012 for a period from 2002 to 2007. They were updated in 2014 extending a period to 2011. The latest update was released in February 2016 which includes the data from 2002 to 2014, and an incorporates enhanced aerosols information to improves the estimates of direct normal irradiance (DNI).



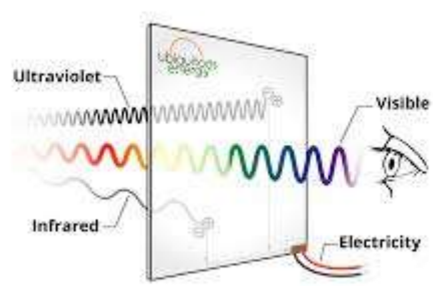
The land is scarce in India, and per-capita land availability is low. Dedication of land for the installation of solar arrays must compete with other needs. The amount of land required for utility-scale solar power plants is 1 km^2 (250 acres) for every 40–60 MW generated. It is use the water-surface area on canals, lakes, reservoirs, farm ponds and also the sea for large solar-power plants. These water bodies can provide water to a clean the solar panels. The Highways and railways may also avoid a cost of land nearer to load centres, minimising transmission-line cost by having solar plants about 10 meters above the roads or rail tracks. Solar power generated by road areas may also used for in-motion charging of electric vehicles, reducing fuel costs. Highways will avoid damage from rain and summer heat, increasing comfort for a commuters.

The architecture best suited to most of India would be set of rooftop power-generation systems connected with local grid. An infrastructure, which does not have the economy of scale of mass, utility-scale solar-panel deployment and needs a lower deployment price to attract individuals , family-sized households. Photovoltaics are projected to continue their cost reductions and becoming able to compete with fossil fuels.

Greenpeace recommend that India adopt policy of developing solar power as dominant component of its renewable energy mix, since it is identity as densely-populated country in tropical belt of the subcontinent has an ideal combination of high insolation and large potential consumer base. India could make renewable resources the backbone of its economy by 2030, reducing carbon emissions without compromising its economic-growth potential. A study suggested that 100 GW of solar power could be generated through the mix of utility-scale and rooftop solar, with the realizable potential for rooftop solar between 57 and 76 GW by 2024.

During the 2015-16 year NTPC, with 110 MW solar power installations, generated 160.8 million kWh at capacity utilisation of 16.64 percent (1,458 kWh per kW) which is more than 20 percent below the claimed norms of the solar-power industry.

It is considered prudent to encourage solar-plant installations up to the threshold (such as 7,000 MW) by offering incentives. Otherwise, substandard equipment with overrated nameplate capacity may tarnish the industry. The purchaser, transmission agency and financial institution should be require capacity utilisation and a long-term performance guarantees for equipment backed by insurance coverage in the event that original equipment manufacturer ceases to exist. Alarmed by the low quality of equipment, India issued draft quality guide lines in May 2017 followed by the solar plant equipment suppliers conforming to an Indian standards.



2.TRANSPARENT SOLAR PANEL

The thickest layer is the glass and plastic or other transparent substrate being a coated; the multiple layers of PV coating are toward the right. The core of coating are the two active layers the absorptive semiconductor materials that get excited by the sunlight and interact, creating a electric field that causes the current to flow. Sandwiching those layers are electrodes that connect to external circuit that carries current out of the device. Both electrodes must be transparent and not the usual reflective metal a layer on the back of the cell can added to reflect sunlight of selected wavelengths, sending back for a second to pass through the active layers. The anti-reflective coatings can be used on both outside surfaces to reduce reflections because any light that reflects potentially as much as 10% of the total does not go through the device. Use a combination of molecular engineering, optical design, and device optimization a holistic approach to designing the transparent device.

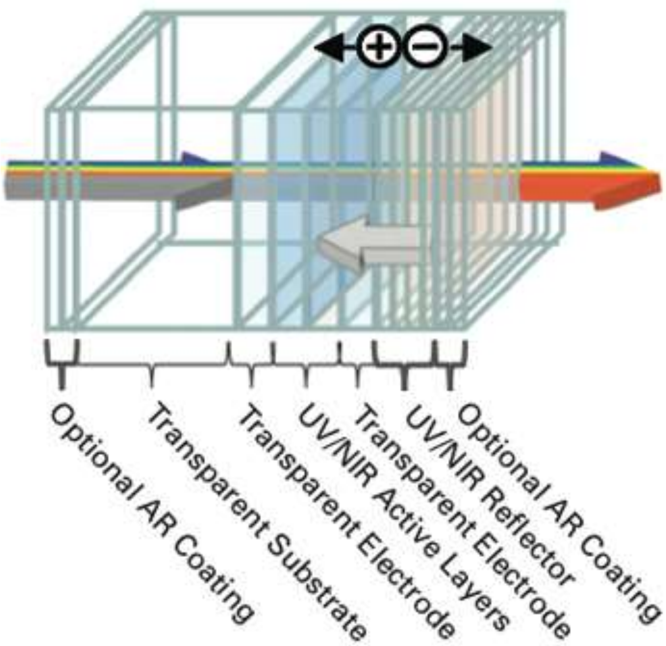


Fig-1:Sample transparent photovoltaic device

This diagram shows important components of transparent photovoltaic (PV) device, which transmit a visible light while capturing ultraviolet (UV) and near-infrared (NIR) lights. The PV coating of series of thin layers at right is deposited on the piece of glass, plastic, or other transparent substrate. At the core of the coating are the active layers, which absorb the UV and NIR light and cause current to flow via the two transparent electrodes through the external circuit. The reflector send UV and NIR light back into a active layers, while anti-reflective (AR) coatings on the outside surfaces maximize incoming light by the reducing reflections.

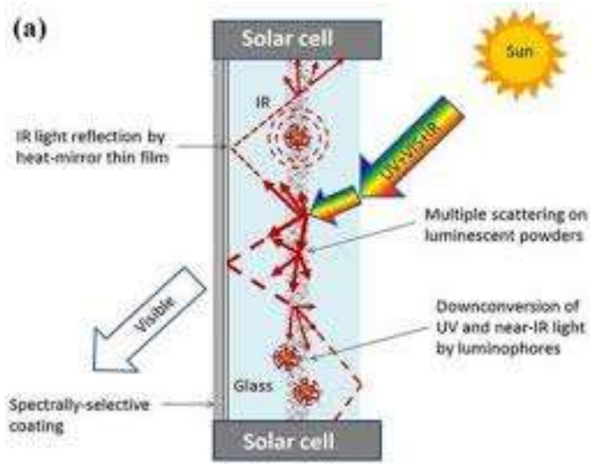


Fig-2: Working of transparent solar panel

3. CONCLUSION

As we know that fossil fuel won't last long so we need to switch renewable energy such as solar energy which is available abundance in India.The concept transparent solar panel might make revolution solar power industry

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