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A REVIEW ON BUILDING INTEGRATED PHOTOVOLTAICS FOR SUSTAINABLE ENVIRONMENT

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ABSTRACT- As India is moving towards industrial and urban development, the need for energy is growing with time. The conventional energy resources cannot fulfill these demands forever since they provide a certain finite energy demands. In such case the solar energy can be considered as a potential source. The geographical location of India being close to the equator, the solar energy is available in abundance. Capturing the solar energy and converting into electrical will prove to be an efficient way to utilize the solar potential for fulfilling the growing demand for energy. Photo Voltaic Solar Panels located on terraces or open grounds are commonly used as solar capturing devices in India. The Building Integrated Photovoltaic panels (BIPV) is a step further which can also be used as outer envelope in buildings. This paper reviews the feasibility and suitability of the BIPV system to Indian construction industry and its future.

Keywords—BIPV, Solar, Photovoltaic, construction, electricity.

I. INTRODUCTION

The continuous growing need for energy is creating a stress on current energy resources. This stress has pushed everyone across the globe to explore other resources for generating energy. The existing resources are limited and do not increase with time as does the demand for energy. In this exploration, the solar energy can be looked upon as a potential resource. India is a tropical country. It receives abundant radiation compared to many other areas on earth. Solar energy is a renewable energy that will never run out of nature and will be available for forever.To utilize the solar energy efficiently; capturing the energy becomes the most important task in this process. The initial initiative to utilize solar energy began with solar eater heating systems which utilized solar energy to heat water. Very few solar panels are utilized to generate electricity. The solar panels utilize the concept of Photovoltaic for electricity generation.

II.LITERATURE REVIEW

For more than 35 weeks, there is clear sunshine in Egypt; hence it has potential to utilize the solar energy to its full efficiency. The BAPV system is more suitable than BIPV system for the market and socio-economic conditions in Egypt [1].

The solar collecting plates in Photovoltaic panels are installed with a certain angle for maximum efficiency. But throughout the year, with the change in earth's location with respect to sun, the efficiency of collecting solar energy decreases. If double axis PV panels are provided, then it will become possible to achieve the same efficiency throughout the year [2].

The BIPV if installed in commercial buildings can supply power to the same building during daytime since it is not used at night hours. Losses due to transmission and distribution can be avoided in such cases. For Mediterranean climates, the best tilt angle of BIPV panels is 30 degrees [3].

Along with BIPV, the BIPVT (Building Integrated Photovoltaics-Thermal) system is also gaining equal importance. The choice to use BIPV or BIPV-T depends upon the design provided by the architects and the climatic conditions where it is to be provided [4].

II.SOLAR ENERGY

Incident Solar Energy on India

India receives abundant solar energy. For almost 42 weeks in a year, the sky is clear for solar energy. For almost 80% time of the year, India receives solar energy.

The solar energy incident on India is 5000 Kwh/day. On a daily basis, the energy obtained is 10 to 13 Kwh/day.

Solar Radiation

Solar radiation is transmitted to earth in the form of waves. These waves are electromagnetic waves having wavelengths from 0.03 nm to 14000nm.Photovoltaic cells

use wavelengths that have values between 300 to 800 nanometers. This is the range of wavelength of visual light. Sunlight also contains ultraviolet light and infrared light which are wastage for Photovoltaic cells.

Advantages of Solar Energy

a. It is a renewable energy source, which means it is unlimited.

b. It helps to minimize the use of non-renewable energy resources like fossil fuels..

c. No money is to be paid for obtaining incident solar energy. Only initial and operational cost is necessary. Sound pollution is completely absent.

d. No poisonous gases are released thus reducing the danger of global warming.

e. Health issues are eradicated.

f. It does not need any external energy source or fuel intake to operate.

III PHOTOVOLTAICS

Photovoltaic effect

The phenomenon by which electricity is generated in a material after it is exposed to light; especially sunlight is called photovoltaic effect.

Photovoltaic Devices

A photovoltaic device is a device that applies the photovoltaic panel to generate electricity. The photovoltaic panels use semiconductor materials for conversion of solar energy to electric energy.

IV. TYPES OF PV

a.Grid Connected BIPV

A power grid is a network of cables that carry electricity from the power stations to end users. In this type of BIPV, a long collection series of BIPV panels is connected to the grid. Between the grid and BIPV panels, an inverter is placed which converts the DC current produced by BIPV panels into AC current.

b. Building Integrated Photovoltaics (BIPV)

BIPV are photovoltaic panels that can be integrated in the envelope of a building as the outer periphery. The photovoltaic panels can be used as walls, facades and roofing materials. These Photovoltaic panels will generate electricity and provide to the building itself for use.

V.NEED FOR BIPV

Conventional energy resources are limited and non-renewable which means they cannot be renewed. They also create pollution as a byproduct of their energy generation process.

Non-conventional energy resources like solar energy, tidal energy abundant and should be utilized optimally. Considering the need to reduce pollution, it is important to use clean energy resources that can generate energy without harming the environment.

Growth in construction sector has raised the demand for energy requirements. It therefore becomes a stress on the current energy resources.

VI. ADVANTAGES OF BIPV SYSTEM

1. BIPV system can be integrated along with the building envelope rather than installing as separate solar panels on rooftops.
2. BIPV panels can be customized in any desired architectural dimensions and specifications.
3. They can generate electricity and make the building self-sufficient in terms of energy demand. The on location generation of electricity helps in preventing transmission losses.
4. BIPV improve architectural aesthetics of buildings and helps in beautifying them
5. It also protects from sunlight and acts as soundproof envelope for buildings.

VII .WHERE CAN BE BIPV INSTALLED

1. Outer walls of buildings
2. Facades
3. Railings
4. Sloping Roofs

VIII.CONCLUSION

BIPV systems are a hopeful concept towards the optimal utilization of naturally available solar energy as a resource. BIPV systems can use the incident solar energy in for generating electricity which can be readily use for domestic ,commercial and industrial applications reducing the load on present non-renewable resources. The governing authorities can play an important role in initiating the practice of BIPV systems.

VI. FUTURE SCOPE

The Government authorities can initiate the use of BIPV systems. by making provision for newly build residential, commercial and industrial complexes. Better approach for optimum utilization will be the use of BIPV systems in smart city initiatives taken by the Government in Indian cities.

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