

# Wind, Solar and Renewable Energy Sources

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*Abstract—There is a current worldwide requirement for spotless and sustainable power sources. To proceed with it in a tranquil, feasible way, Nowadays human have been interested in the alternative source of resources which do not bear unsafe result to the nature and its creatures. Achieving answers for ecological issues that we face today requires long haul potential activities for feasible advancement. In such manner, sustainable power source assets seem, by all accounts, to be one of the most efficient and effective solutions. Petroleum derivatives are non-sustainable and require limited assets, which are lessening a result of high cost and earth harming recovery methods. In this way, the requirement for modest and possible assets is extraordinarily required. An efficient and more feasible alternative option is solar energy. Solar power can be extremely practical as alternatives to damaging carbon-intensive fuels. The usage and scope of renewable energy has been assuming increasing significance in today's time. Sustainable power source is vitality that is gathered from inexhaustible assets, which are normally renewed on a human timescale, for example, daylight, wind, rain, tides, waves, and geothermal heat. Renewable energy often provides energy in four important areas: electricity generation, air and water heating/cooling, transportation, and rural (off-grid) energy services. Of the alternative source of energy Wind Power assumes a noteworthy part. It has been discovered that out of the major sustainable power sources that are accessible on the earth, other than sunlight based and hydro-control, Wind is another immense potential vitality store. The paper focus on the fulfillment of the growing demand of energy associated with various kinds of need generated by domestic and industrial sector by various ministries working on it and their vision and target.*

**Keywords:** Sustainable power source, Renewable energy

## 1. INTRODUCTION

Wind Power from long ago has been harnessed by individual and using it in many purposes. It has been seen from prior circumstances recorded in history that Chinese individuals utilized wind power for water pumping application utilizing straightforward breeze plants, while Persians and Middle-East individuals utilized woven reed sails for pounding application. With around 300 clear and splendid days in a year, the discovered sun situated essentialness event on India's property region is around 5000 trillion kilowatt-hours (kWh) consistently (or 5 EWh/yr). The sun based imperativeness available in a year outperforms the possible imperativeness yield of all oil subsidiary essentialness holds in India. The step by step ordinary sun controlled power-plant age confine in

India is 0.20 kWh per m<sup>2</sup> of used land area. The form of energy that is harnessed from the power and heat of the sunrays is termed as solar power, it is renewable, and therefore a “green” source of energy. Photovoltaic cell is the most common device used to harness the solar energy. Just like wind power, solar power is a virtually unlimited and inexhaustible resource (unlike expendable fossil fuels).

## 2. SCENARIO OF SOLAR POWER IN INDIA

The fast developing industry in India is solar power. As of September, 2017 the nation's sun based framework had a total limit of 16.20 GW. Indian government extended its sun based plans in January 2015, targeting US\$100 billion in investment and 100 GW of solar capacity (including 40 GW from rooftop solar) by 2022. In January 2016, Indian Prime Minister and French President François Hollande established the framework stone for the central station of the International Solar Alliance (ISA) in Gwal Pahari, Gurugram. The ISA will concentrate on advancing and creating sun powered vitality and sunlight based items for nations lying completely or in part between the Tropic of Cancer and the Tropic of Capricorn.

### 2.1 Solar photovoltaic growth forecasts

In August 2016, the gauge for sun powered photovoltaic establishments was around 4.8 GW for the calendar year. Around 2.8 GW was introduced in the initial eight months of 2016, more than each of the 2015 sun oriented establishments.

### 2.2 Solar thermal power

The installed capacity of commercial solar thermal power plants (non storage type) in India is 225 MW with 25 MW in Gujarat, 50 MW in Andhra Pradesh and 150 MW in Rajasthan.<sup>[94][95]</sup> Solar thermal plants with thermal storage are emerging as cheaper (US 6.1 ¢/kWh or Rs 3.97/KWh) and clean load following power plants to supply electricity round the clock

**Figure 1**

Solar thermal power plant with a field of heliostats and a central solar power tower

### 2.3 Hybrid solar plants

Solar energy, produced mainly during the daytime in the non-monsoon period, complements wind which produce energy during the monsoon months in India. The location of the solar panels is in the space between the towers of wind-power plants. It also complements hydroelectricity, generated primarily during India's monsoon months

**Figure 2**

Hybrid plant in Leh, Jammu and Kashmir

### 2.4 Solar heating

In India the largest deployment of roof-top solar water heaters is in Bengaluru, producing an energy equivalent of 200 MW. It is India's first city to provide a rebate of ₹50 (78¢ US) on monthly electricity bills for residents using roof-top thermal systems, now in all new structures it is mandatory. Pune has also made solar water heaters mandatory in new buildings.

## 2.5 Rural electrification

India has sold or appropriated around 1.2 million sun oriented home-lighting system and 3.2 million sun based lamps, and has been positioned the finish Asian market for solar off-grid products.[113] Three thousand towns in Odisha were intended to be lit with sun based power by 2014.

### 2.5.1 Lamps and lighting

A total of 4,600,000 solar lanterns and 861,654 solar-powered home lights were installed by 2012. Generally it replaces kerosene lamps, they can be purchased for the cost of a few months' worth of kerosene with a small loan and 30- to 40-percent subsidy is offered by The Ministry of New and Renewable Energy of the cost of lanterns, home lights and small systems, twenty million sun based lamps are expected by 2022.

### 2.5.2. Agricultural support

Solar photovoltaic water-pumping systems are used for drinking water and irrigation. To dry harvests for storage solar driers are used.

## 2.6 Refrigeration and air conditioning

Thin-film solar cell panels show much better performance than crystalline silica solar panels in hot and dusty places like India; no partial shading effect and less deterioration in conversion efficiency with increased ambient temperature. These variables enhance the performance and reliability (fire safety) of thin-film boards.



### 2.6 Government contribution

Fifty-one sun powered radiation asset appraisal stations have been introduced crosswise over India by the Ministry of New and Renewable Energy (MNRE) to make a database of sun oriented vitality potential. Information is gathered and answered to the Center for Wind Energy Technology (C-WET) to make a sun powered map book. In June 2015, India started a ₹40 crore (US\$6.2 million) task to measure sun powered radiation with a spatial determination of 3 by 3 kilometers (1.9 mi × 1.9 mi). This sun radiation measuring system will give the premise to the Indian sun based radiation chart book. As indicated by National Institute of Wind Energy authorities, the Solar Radiation Resource Assessment wing

(121 ground stations) would gauge sun based radiation's three parameters—Global Horizontal Irradiance (GHI), Direct Normal Irradiance (DNI) and Diffuse Horizontal Irradiance (DHI)—to precisely quantify an area's sun oriented radiation.

The Indian government is advancing sun oriented vitality. It declared a portion of ₹1,000 crore (US\$160 million) for the Jawaharlal Nehru National Solar Mission and a spotless vitality support for the 2010-11 financial year, an expansion of ₹380 crore (US\$59 million) from the past spending plan. The monetary allowance supported private sun oriented organizations by diminishing the import obligation on solar panels by five percent. This is relied upon to lessen the cost of a rooftop solar-panel installation by 15 to 20 percent

### 3. WIND POWER IN INDIA

Wind power generation limit in India has fundamentally expanded lately. As of the finish of July 2017 the aggregate introduced wind power capacity was 32.56 GW. The advancement of wind energy in India started in 1986 with the primary breeze ranches being set up in seaside zones of Maharashtra (Ratnagiri), Gujarat (Okha) and Tamil Nadu (Tirunelveli) with 55 kW Vestas wind turbines. These exhibition ventures were bolstered by the Ministry of New and Renewable Energy (MNRE).

#### 3.1. OFFSHORE WIND POWER

Offshore wind Power alludes to the development of wind farms on the waterways to produce power by tackling the energy of wind. Offshore Wind Power's commitment to power is considerably more than the Onshore ones. Not at all like the normal use of the expression "Seaward" in marine industry, Offshore breeze control incorporates inshore water territories, for example, lakes, and protected waterfront ranges utilizing Traditional fixedbottom Wind Turbine advances and additionally in profound water regions utilizing Floating Wind Turbines. The possibility of Offshore Wind control came into minds cause it was watched that the breezes blowing over water bodies had more speed and were uniform than on lands. The potential vitality picked up is specifically corresponding to the 3D shape of the breeze speed. Accordingly a couple of miles for every hour in the speed can bring about essentially bigger measure of power. For example a turbine at a site with a normal breeze speed of 15 mph would deliver just about half more power than at a similar site with a similar turbine and with normal breeze velocities of 13mph.

### 4. GLOBAL COMPANIES IN OFFSHORE WIND MARKET

It has been founded that recently the Offshore Wind power market is in the midst of a boom, and high rate of Interest for vendors in the market is positively influencing the market growth at a CAGR of 17.5% from 2014 to 2019. The top ten global companies who are investing in offshore wind

power farming as an answer to a complete renewable technology worldwide are:

- Siemens
- Vestas
- Senvion
- GE Energy
- Areva
- Sinovel
- Clipper Windpower
- Doosan Heavy industries and Construction
- Gamesa Technology

It's been reported that these companies have been actively participating in the manufacturing of Offshore Wind farm materials as well as investing in its Research and Development Sector for newer technologies and also setting up farms around the world, thus contributing to a green future.

### 5. CONCLUSION

As the Ministry is actualizing a program on Information and Public Awareness utilizing Electronic Media, Print and Postal Media, Exhibitions and Outdoor Media like hoardings/stands/transport back boards, tune and dramatization and so on through DAVP, Doordarshan, All India Radio, Song and Drama Division, State Nodal Agencies, and so forth, to create mass familiarity with the non-customary vitality items and gadgets as far as their different advantages, outline highlights, items accessibility, and so on., and furthermore to scatter data on innovative advancements and special exercises occurring in the territory of non-ordinary vitality. Social and political interference may speed up the growth rate of renewable power generation. Local and central administrative authority should release more funds in renewable energy awareness program and subsidize solar panel and other appliances.

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