

# Potential of Solar Energy in Ahmednagar District, Maharashtra, India

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**Abstract** - India is blessed with an abundance of sunlight and Ahmednagar is one of the wildest rising metropolises in the state of Maharashtra. Ahmednagar is facing challenges of energy crises in especially rural areas of the districts. Energy demand of urban is nonstop increasing. However, resource expansion and growth in energy supply have failed to meet the ever-increasing demands exerted by the multiplying population, rapid urbanization and progressing economy. The potential of solar energy resources in the research area has good opportunity. This information generated in this study can help appropriately to assess the solar energy benefits only if beneficial efforts for urban developers to solve energy crises.

**Key Words:** Ahmednagar, Energy Resource, Solar energy, Sun, Renewable energy, Tata Power

## 1. INTRODUCTION

The energy of sun called solar energy can be used effectively. The earth receives energy continuously from the sun at the rate of about  $75,000 \times 10$  KWH of energy every day. Solar energy, a primary energy source, is non-polluting and inexhaustible. There are three methods to harness solar energy. Converting solar energy directly into electrical energy in solar power stations using photo cells or photovoltaic cells or silicon solar cell. Using photosynthetic and biological process for energy trapping. In the process of photosynthesis, green plants absorb solar energy and convert it into chemical energy, stored in the form of carbohydrate.

Converting solar energy in to thermal energy by suitable devices which may be subsequently converted into mechanical, chemical or electrical energy. Since solar energy is non-ending and its conversion to some other energy form is nonpolluting, attention should be paid for the maximum utilization of solar energy. Kelkar G.D. and Rathod V.R. (2018).

Sun, the oldest source of energy, enriching life with all the basic amenities required to sustain life on earth from thousands of decades. The solar energy developments in this booming technological and commercially vigorous world has rendered engineers and scientists to harness it with a wide range of applications (lighting, heating, cooling, rural electrification, and many industrial applications).

India being a tropical country is bestowed with ample solar energy with around 300 sunny days in a year. The total installed capacity of India as on March 31, 2016 is 298,060 MW in which solar along with other renewable

sources contributes 38,822 MW. The solar radiation of about 5,000 trillion kWh per year is incident over its land mass with average daily solar power potential of 0.25 kWh per m<sup>2</sup> of used land area with the commercially available. As on March 31, 2016, the total solar installed capacity of India is 6,762.85 MW. India expects to install an additional 10,000 MW by 2017 and a total of 100,000 MW by 2022. Renewable energy Akshay Uurja (2016).

The investigation region was selected for the present study for various reasons. First, the region has diversified the relief and amount of rainfall and soil types. Second, the arid region to the east, the irrigated region to the north, and the tribal population to the west are in the study region. Thirdly, the northern part has sugar cane cultivation in the investigation region and fourthly, the researcher belongs to this investigation region, which is why he is familiar with the investigation area. So, this will help him to generate the essential data of the field according to the unconventional energy resources.

### 1.1 STUDY AREA

Ahmednagar district is located partially in higher Godavari basin and partially in Bhima basin occupying in central west part in Maharashtra state. It extends from 180 10' to 200 00' north latitudes and 730 30' to 750 37' east longitudes (Fig-1). It is flanked by Igatpuri, Sinnar and Yeola talukas in Nashik district in north, Vajapur, Gangapur and Paithan talukas of Aurangabad district and Georai, Beed and Ashti talukas of Beed district in east, Bhum and Paranda talukas in Osmanabad district and Karmala takuka in Solapur district in south, Junnar, Shirur, Daund and Indapur talukas of Pune district and Murbad, Sahapur talukas of Thane district in west. (DSA) of Ahmednagar (2011).

This research is focused on non-conventional energy resources and its potential of energy resources in Ahmednagar district. As the era of industrialization was begin the energy demand has been rapidly increasing.

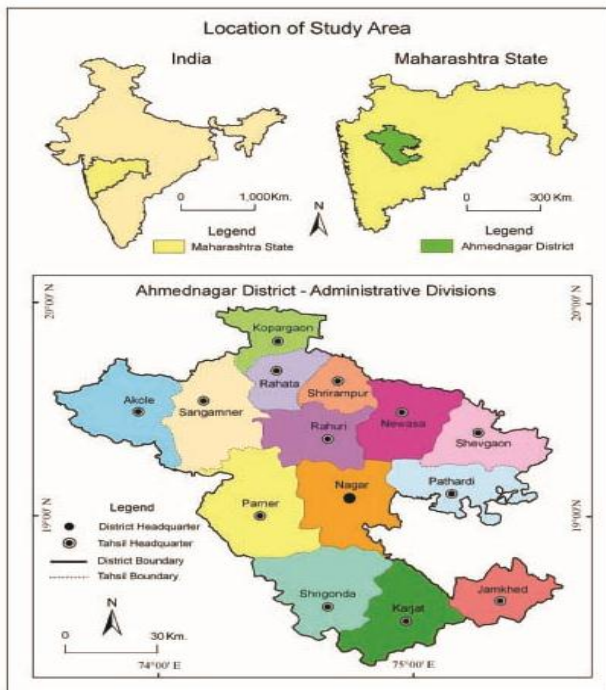


Fig-1: Showing location map of study area in Maharashtra

## 2. METHODOLOGY

I designed a questionnaire survey consisting of four parts dealing with: (1) the reasons why peoples choose to energy from waste; (2) the impact of people's use on the respondents' respective villages; and cities. The questionnaire was pre-tested in the English and revised for clarity. Questionnaires were distributed and collected by researcher included in the study area. Phone calls or personal visits were conducted on two separate occasions over the course of three months as follow-up for those who had not yet completed the questionnaire.

2.1 Primary Data: Principal data collection has been done in two major ways similarly as follows:

2.2 Written Surveys: This method provides immediate results; the involuntary nature of an in-person written survey makes this medium prone to response biases. This method is used to collect data from all sites of study area.

2.3 Secondary Data: The secondary data was collected from Gram Panchayat, Nager parishad & municipal cooperation's. Survey Questions A] Open-ended Questions: Open-ended survey questions allow respondents to answer in their own words. B] Closed-ended Questions: Closed-ended questions with ordered choices require the respondent to examine each possible response independent of the other choices.

## 3. RESULT AND DISCUSSION

According to the solar energy and their potential the consequences are characterized and discussed beneath systematically. The solar energy resource is one of the significant sources from nonconventional source of energy. Among these nonconventional sources, though the first solar energy is being harnessed in a big way in Ahmednagar district, Maharashtra, the other sources have not yet reached a stage of commercial exploitation. The major share of this comes from wind energy followed by solar based electricity generation on fuel pumps.

Tata Power is India's largest integrated power company with a growing international presence. The Company together with its subsidiaries and jointly controlled entities has an installed gross generation capacity of 10549 MW and a presence in all the segments of the power sector viz. Fuel Security and Logistics, Generation, Transmission, Distribution and Trading. It is also one of the largest renewable energy players in India with a clean energy portfolio of 3210 MW.

The energy of sun called solar energy can be used effectively. The earth receives energy continuously from the sun at the rate of about  $75,000 \times 10$  KWH of energy every day Green Plants have the capacity to trap the solar energy and they convert to solar energy into chemical form by a process called photo synthesis. Most part of solar energy is left unused. Just 0.1% of this could meet the total world energy requirements. Scientists have developed ways and means to trap solar energy artificially and convert into various forms like electrical, chemical and mechanical.

The solar radiation coming to the earth is called Insolation and it is in the form of electromagnetic waves. One square centimeter area on earth receives two calories of solar energy in one minute. It can be increased through artificial means to meet the energy requirement. Photo - chemical change involves changes due to heating effects of sun rays. e.g. during our child hood days, we might have played with leaves to burn papers by sun rays. Some chemical changes also can occur in objects that absorb solar energy. e.g. bright colour clothes fade away when put into strong sunlight continuously. Black surfaces absorb sunlight and thus get heated. Sun light also causes the synthesis of starch in green plants (Photosynthesis).



When sunlight falls on some specific metals like sodium, potassium and lithium it activates the electrons inside it. The excited electrons after some time return to their original level after releasing the energy, it is called 'Photo Electric Effect'. All the above principles are used to convert solar energy into heat, chemical and electrical energy. Solar cooker, solar oven developed by Jodhpur's Central Arid Zone

Research Institute (CAZRI) space heating buildings during cold weather in USA signals at RS are examples of how solar energy can be used effectively.

To usage full solar radiation potential has need uncountable sale of solar equipment's in the research area in future. So, this will increase the awareness and popularity among the pupils in the research area. And eventually people will be automatically able to adopt for solar radiation. So, finally whole district will have the 99 - 100 % of potential for solar radiation in the Ahmednagar district area. As per as commercial level concern all most 10 out of 5 fuel pumps in the area has been using solar panels for generation of electricity on pump stations. As per as domestic or home level concern the small solar lantern has huge sell. As about the 10-15 solar lanterns has been sealed per day having coast of 600/- rupees each. So, monthly sell of about 300 to 400 lanterns in one month. Kelkar Gautam, Rathod V. R., (2016).

Discussing to Kelkar Gautam, Rathod V. R., (2017) shows the increasing awareness among the peoples in the investigation area during the research period of five years. There is also sale of solar inviter in the study area but its coast affects the sale of it. Since its shorelines 5000 minima to 50,000 maximum rupees for each part. So, it makes problematic to acquisition to the pupils in the investigation part. So, it needs the governmental subsidy or it need finical assistance to upsurge the sale in upcoming. To use full solar radiation potential has need countless sale in the research area in future. The last five years data of solar radiation as shown underneath in chart part.

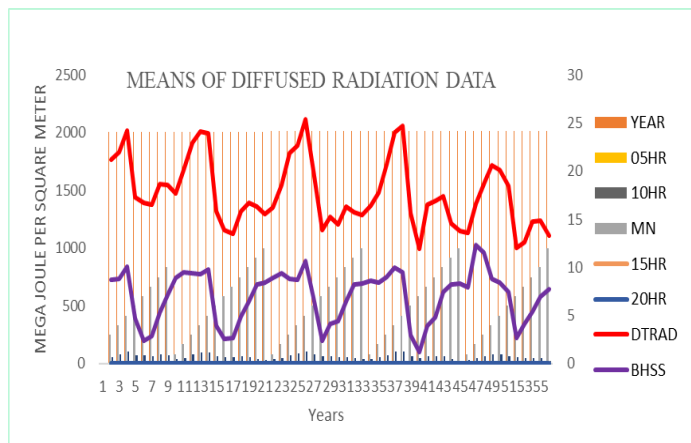


Fig- 2: Showing potential of solar radiation in Ahmednagar during a research period of five years

Solar energy from the sun emits about  $3.8 \times 10^{26}$  W of power in all the directions. Available of this around  $1.7 \times 10^{17}$  W is received by earth. The average solar radiation outside the earth's atmosphere is  $1.35 \text{ kW/m}^2$  varying from  $1.43 \text{ kW/m}^2$  (in January) to  $1.33 \text{ kW/m}^2$  (in July). In India, the annual solar radiation is about  $5 \text{ kWh/m}^2$  per day; with about 2300-3200 sunshine hours per year. Solar energy can

be exploited for meeting the ever-increasing requirement of energy in our country.

Solar cookers, solar heaters, solar desalination plants, solar photovoltaic electric power, generators and solar pump sets are being used even in remote villages. The basically this four organizations develop solar energy system. i.e. Department of Non - conventional energy sources (DNES), Rural Electrification Corporation, Indian Institutes of Technology and Department of Metallurgy of Pune Engineering College.

#### 4. CONCLUSIONS

There is a huge potential of solar radiation in Ahmednagar District. To usage full solar radiation potential has need uncountable sale of solar equipment's in the research area in coming. So, this will increase the awareness and popularity among the pupils in the research area. And eventually people will be automatically able to adopt for solar radiation.

So, finally whole district will have the 99 - 100 % of potential for solar radiation in the Ahmednagar district area. Solar cookers, solar heaters, solar desalination plants, solar photovoltaic electric power, generators and solar pump sets are being used even in remote villages. Solar energy can be exploited for meeting the ever-increasing requirement of energy in our country.

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