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Design and Analysis of Present Status and Potential of Solar Radiation Collector and Energy Alternatives in India

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Abstract: Renewable technologies are so fresh to minimalize energy sources and optimum use of these properties as ecological influence, produce minimum secondary waste and are sustainable, based on current and future economic and social needs of society. The ability of renewable resources to all energy needs of society set shown. Sun is the source of all energies. The primary forms of solar energy are heat and light. Sunlight and heat converted and absorbed by the environment in a variety of ways. various renewable systems are presented and addressed the issues of energy recovery, carbon dioxide reduction and energy storage. Pathways for renewable hydrogen production are shown and presented the implementation of hydrogen technologies in the energy infrastructure. The question is asked if money and energy are spent on carbon dioxide sequestration, or should be implemented instead of renewable resources.

Key words: Thermoelectricity · Thermoelectric converter · Solar radiation · Modelling

INTRODUCTION

Has interest in renewable energies depended on the perceived risks of using fossil fuels. During the energy crisis of the mid 1970s, the perceived risk of from conventional fossil fuels led to crash programs for the development of renewable energy sources and energy-saving measures, including higher fuel consumption and energy-efficient buildings and homes. These programs were as supply met again reduced demand. In the 1980s, the risks associated with the pollution inspired work to avoid or led to restoration of environmental damage from fossil fuel extraction, processing, transportation and fossil fuels and measures to clean (the catalyst is a product of this movement). the United States were related to handling of these risks on the analogy of a smoker, with the perceived risk of heart disease, but takes runs continue to smoke[1]. the risks associated with CO_2 emissions and global warming more recently have again spurred interest in renewable energy. However, we can not continue to burn fossil fuels and somehow sequester CO_2 produced efficiently enough to actually tackle global warming, such as the processes of concentration and buried, or the conversion of CO_2 itself energy intensive; according to the above analogy, there is no activity that can clean our lungs while we still smoke. Although CO_2 sequestration, where it is generated in the vicinity of depleted gas fields and aquifers or tertiary recovery is used, can be performed at low cost to transfer the building piping CO_2 sequestration order pages can be an expensive endeavor quickly. Pipeline cost of $ 1 million to reach $ 2 million per kilometer. The safety of CO_2 sequestration was not completely resolved. If a CO_2 sequestration reservoir interval and the CO_2 make it to the surface, it would effectively displace O_2 because CO_2 is heavier than air. So, if global warming issues require us to end our use of fossil fuels, there are in fact practical renewable alternatives? More generally, it is a sustainable energy system that a growing population with energy without destroying the environment in which it is used to provide power for the present without compromising the ability of future generations to meet their needs[2].

Renewable energy sources (RES) supply 14% of the total world energy demand. RES includes biomass, hydropower, geothermal, solar, wind and ocean energy [3]. These are the primary renewable, domestic and clean or inexhaustible energy resources. Large-scale hydropower supplies 20 percent of global power.

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Table 1: Main renewable energy sources and their usage form.

Energy source	Energy conversion and usage options
Hydropower	Power generation
Modern biomass	Heat and power generation, pyrolysis, gasification, digestion
Geothermal	Urban heating, power generation, hydrothermal, hot dry rock
Solar	Solar home system, solar dryers, solar cookers
Direct solar	Photovoltaic, thermal power generation, water heaters
Wind	Power generation, wind generators, windmills, water pumps
Wave	Numerous designs
Tidal	Barrage, tidal stream

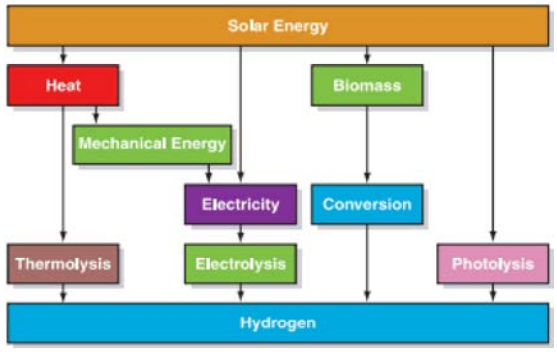

Fig. 1: Sustainable Paths to Hydrogen

Wind power in coastal and other windy is promising energy source. Main renewable energy sources and their use patterns are given in Table 1 Ress also be used as alternative energy sources. The proportion of Ress is expected (in 2100 30-80%) to increase very significantly. The global renewable energy scenario to 2040 Sustainable development requires methods and tools to measure and compare the environmental impact of human activities for various products[4]. Currently, the consumption of fossil fuels will dramatically increase along with improvements in quality of life, the industrialization of developing countries and the increase in the world population. It has been recognized for some time that this excessive consumption of fossil fuels not only leads to an increase in the rate of diminishing fossil fuel reserves, but it also has a significant adverse impact on the environment, leading to increased health risks and the risk of global climate change[5]. Changes the direction of environmental improvements are becoming more politically acceptable worldwide, especially in developed countries. Society is moving slowly towards the search for sustainable production, waste minimization, reduction of air pollution from vehicles, distributed power generation, conservation of native forests and reducing greenhouse gas emissions[6].

Increasing consumption of fossil fuels current energy meet demands alarm about the energy crisis has generated a resurgence of interest in the promotion of renewable alternatives for developing countries to meet growing energy needs. Excessive use of fossil fuels has global warming caused by carbon dioxide; therefore renewable promotion of clean energy is eager required.To monitor emissions of these greenhouse gases has reached an agreement with the overall pollution prevention goals, the goals of the Kyoto Protocol agreement. Attempted in this paper was made ??to find out the scope of the renewable energy gadgets, the energy demand and greenhouse gas reduction potential of meeting mainly carbon dioxide[7].

Literature Survey: The largest consumer of energy in the world (50% of total consumption) and would use any change in the global energy a change production and consumption of energy. Is it actually possible, all U.S. energy supply from renewable energy? the main renewable energy systems include photovoltaic (PV) (or solar cells), solar thermal (electrical and thermal), wind, biomass (plants and trees), hydropower, ocean and geothermal energy. Solar cells, perhaps the best known solar energy converter, directly convert the sun's energy flow, with no moving parts, whereas solar thermal systems produce heat and range from simple solar hot water heater, multi-megawatt power plant outside of Barstow, California. Wind energy is competitive renewable energy source for the next time costs. Produced by the warming of the Earth, Wind, as an energy resource is available throughout the United States and presents a dual-use technology[8]: The land can still be used agriculture, livestock and forestry. Biomass power ranges from the combustion of wood chips in power plants burning biogas from waste treatment plants for the production of methanol and ethanol, can be used fuels[9]. The ocean is the largest collector of solar energy earth and ocean thermal platforms have great potential for electricity generation. The ability of PV technology alone provide all the energy requirements. This calculation assumes a 10% solar electric system efficiency and the use of fixed flat plate collectors; Tracking to follow the sun would lower the desired range[10]. A square, 161 km (100 miles) would be on one side, while one year produce energy equivalent to that used. Although 25,921 km 2 (10,000 square miles) is a great area, less than onequarter the region, this country has, it is covered with roads and streets. When wind is added to the energy mix, this area for PV is reduced (in fact, the United States contains enough usable wind resources produce all the electricity used by the nation); If geothermal added, the PV sector is even

smaller and if the water force is added, the range is smaller again. The point is clear we can collect more than enough renewable energy to power our society. More important than the portion of the required amount of energy supply it is the way in which the current is generated. If we look at solar radiation data (how much sunshine per day), we see that the sun only shines in this area for an annual average of 6 hours/day (4). One of the major drawbacks of many forms of renewable energy is its periodicity, which I discuss in more detail below. A persistent belief is that renewable resources will require more energy in their manufacture than they produce in their lives; However, the actual calculations show a very rapid payback. for example, the energy payback for PV power systems was calculated from 3 to rich four years, depending on the type of PV panel (thin-film technology, or multi-crystalline silicon, respectively)[11]. This energy return time includes the energy costs of processing the semiconductor and installing a module, frame and support structure (5-8) and is expected to be reduced 1-2 years to improve production techniques. Wind energy has an even faster payback 3-4 months (9). During their lifetime, these technologies not only back pay (30 years for PV and 20 years for wind), the initial energy investment, but also the emissions produced from their own production. Renewable energy sources will play an important role in the play world's future. The energy resources are divided into three categories: fossil fuels, renewable resources and nuclear resources. Renewable energy sources are the resources that may produce power again and again, as solar energy, wind energy, biomass, geothermal, etc. and are also often called alternative energy sources. Renewable Energy Sources Meet domestic demand for energy have the potential to energy services with zero or almost zero emissions to supply of air pollutants and greenhouse gases. Renewable energy system development, it is possible that currently most important to solve tasks such as improving energy security and bio-fuel economy; Solving problems of local energy and water supply; increasing the standard of living and level of employment of the local population; sustainable development of remote areas in the desert and mountain areas; Implementation of the obligations of countries with regard to the implementation of international agreements on the protection of the environment[12]. Development and implementation of renewable energy projects in rural areas can create jobs and thereby minimize the migration towards urban areas. Harvesting of renewable energies in decentralized manner is one of the options, the rural and small scale to meet energy needs in a reliable, affordable and environmentally sustainabl.

MATERIALS AND METHODS

Solar energy is a very important energy source because of its Benefits. There are many remote areas of the world where electricity is not available, but the sunlight is abundant, so that the Use of solar energy to produce electricity in these areas is everything is possible. Power system Solar thermal power generation is a Apparatus, the solar radiation for the generation of electric energy by the solar conversion used; basically collection Solar energy is converted by the use of one species into electric energy Heat to electricity conversion device. The main component of any solar system is the Solar Collector. Solar collectors are special kind of heat exchangers, solar energy transformed into internal energy of the the transport. A historical introduction to the use of Solar energy has been a description of the various types of collectors such as flat plates - followed attempted, Compound Parabolic, Vacuum tubes, parabolic trough, Fresnel lens, reflector and collector of heliostat field. Production cost of electricity by Solar energy is much higher than that of the conventional power plant. As as for the carbon-based solar plant published nearly zero-carbon[13].

Electrical energy is the pivot of all development efforts in both the developed and the developing countries, because conventional energy sources are finite and fast depleting. In the last decades, energy issues becoming more and more important and affect the optimal use of resources, the environmental impact of the emission of pollutants and the consumption of conventional energy resources. Direct conversion of solar energy to generate electricity is conventionally performed with photovoltaic cells, the use of photovoltaics makes (PV) effect. PV effect depends equal to or more than the band gap of the PV materials of interaction of photons with energy. Some losses due to the band gap limitations are avoided by cascading different semiconductor bandgaps. PV modules generate electricity directly from

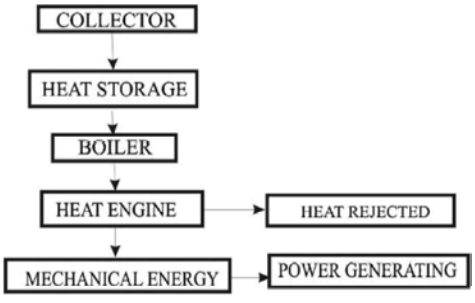

Fig. 2: Schematic representation of a solar conversion system.

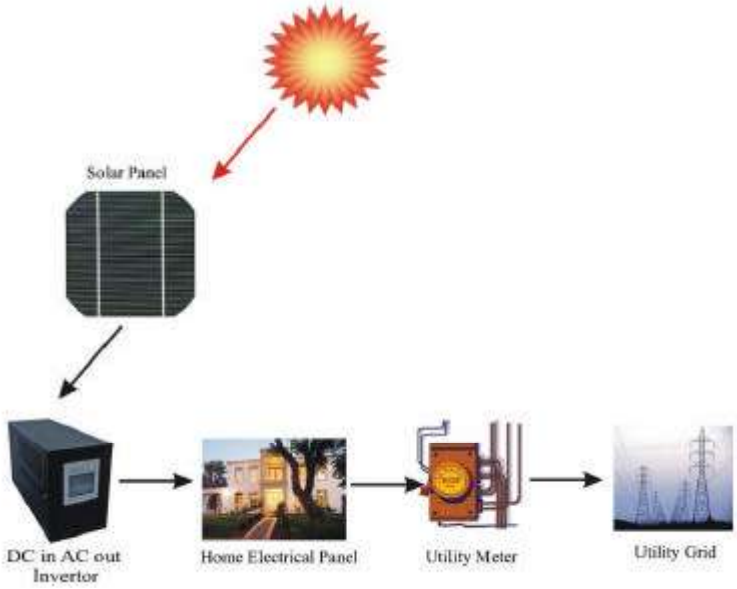

Fig. 3: Grid connected photovoltaic system.

light without emissions, noise and vibrations. Sunlight is free, but energy generation costs is extremely high, although the prices start to drop. Solar energy has low energy density: PV modules require a large surface area for small amounts of energy. The main component in grid-connected PV systems is the inverter, DC power convert it from PV into alternating current generated in accordance with the voltage and current quality requirements of use gird, as shown. Silicon solar cells are perhaps the simplest and most widely used for space and terrestrial applications[14].

The PV system is a promising source of electricity generation for the energy and resource reduction of CO_2 emissions, even if current technologies are applied. The development of the efficiency of solar cells amount of material used in the solar cell and the system design for maximum use of recycled material is to reduce energy consumption and greenhouse gas emissions. Net annual CO_2 emission mitigation potential of 1.8 kWp solar photovoltaic pump with an average insolation of 5.5 kWh m-2 is about 2085 kg of diesel pumps and operated 1860 kg of gasoline-powered pumps. The CO_2 emissions mitigation potential in the case of diesel substitution higher compared to gasoline substitution. This is mainly due to the low efficiency of the fuel economy of the diesel engine pumps[15].

Solar Radiation Resource Assessment: Resource assessment is the first and essential exercise for solar energy project evaluation. The intensity of the incident radiation on the earth's surface Suns varies depending on the daily movement of the sun and is controlled by the orientation of the surface of the earth with respect to sun; which is defined by different angles between the ground reference and the surface under the sun. The intensity of solar radiation at each location varies throughout the year due to the change in the solar inclination angle (d), solar hour angle (ä) and geographical angle as width (?) and length and other microclimatic conditions such as wind, dust, etc. The solar radiation on a surface can be enhanced by the positioning of the collector in accordance with the position of the sun is called tracking. Since the solar power plants must therefore higher operating temperatures only concentrating collectors (parabolic trough, dish, heliostats, flat and compound Fresnel mirror, etc.) are used. These collectors are either stationary with fixed alignment or tracking type that follow or track the sun. The stationary panels (d flat plat collectors, evacuated tube collectors and PV modules stationary, etc.) obtained global radiation; while the concentration of solar collectors concentrate only direct radiation onto the receiver / absorber and thus their performance estimation is done in only account for direct radiation (ie solar radiation not scattered by dust or water droplets and remains unidirectional) component of the incident solar radiation[16]. The parabolic trough collectors and collectors CLFR line with a focus on solar collectors and include single axis tracking (Hoshi *et al*., 2005) and thus the direct solar radiation increases by 30-40% by the case of a horizontal surface (Kalogirou, 2004).

Similarly, the heliostats of the Power Tower and satellite dishes are comprised point focus and work under two axis tracking state and thus maximum possible direct sunlight receives (ie DNI) at each site. The two-axis tracking can improve the direct solar radiation on a surface of 60-70%, depending on the situation. In India, the Indian Meteorological Department (IMD), the solar radiation and other climatic parameters on different places around the country but the measuring stations record only measures global and diffuse solar radiation on horizontal surfaces. Therefore, the direct solar radiation on track surfaces is based on the values of global and diffuse solar radiation on horizontal surfaces with the mathematical equations of the Sun-Earth angles. In the present study, the data of global and diffuse solar radiation have been taken by Mani (1980), the measurement is based on 15-20 years by IMD and comparable to typical meteorological year (TMY) weather data files. Fifty representative bodies that have all climates India for solar radiation resource assessment identified in the present study[17]. The solar radiation availability at these locations. The geography in terms of length, width and height above sea level is also shown in the same table. The annual direct solar radiation on horizontal surface from the difference between estimated global and diffuse radiation on horizontal surface. (Retscreen.net www) has been carried out the direct solar radiation on single-and two-axis tracking using computer software RETScreen International. These monthly global and diffuse solar radiation values were in RETScreen estimate the direct solar radiation has been processed and their quantum on tracking surfaces[18]. In order to check the reliability of similar RETScreen data obtained values of direct solar radiation were obtained for a few sites with METEO database. A computer program to estimate with TRNSYS software, direct solar radiation values developed over tracking surfaces with TMY data files from METEO database for a few locations. It is observed that TMY2 files METEO database consists hourly values, which is maintained by TRNSYS to obtain annual values of direct sunlight for tracking surfaces. A good match (R7% deviation) has been obtained between the values obtained from direct sunlight RETScreen (IMD) data and TRNSYS (with METEO data) models [19]. The impact of the departure on technical and financial performance of the projects could be integrated in the sensitivity analysis. The annual global radiation varies from 1651 kWh / m 2 for the location of Dibrugarh in Assam to 2350 kWh / m^2 for the location of Jaisalmer in Rajasthan. the year diffuse solar radiation as high as 999 kWh / m2 obtained for Kodaikanal in Tamil Nadu during Jaisalmer it reaches minimum as 466 kWh / m^2. Estimates of annual direct solar radiation availability on Width of location, single-axis tracking and two-axis tracking. The direct annual solar radiation on horizontal surface for Jaisalmer scored as maximum 1,884 kWh / m^2 while it as minimal as received 676 kWh / m^2 of selected locations[20].

Tests on Exposed Receiver Elements: In the tower central receiver solar thermal plants (CTRSTPP), the solar radiation is arranged to reflect a series of large mirrors called heliostats and concentrated on a receiver at the top of a support tower. A working fluid flowing through the receiver absorbs concentrated radiation and transfers heat to the ground level, where it is used for generating mechanical power through a power cycle as the thermodynamic Rankine or Brayton cycle[21]. Each heliostat onto a central receiver center has reflective surface area of 50-150 m2, Mirrors installed on a common foundation. The heliostats track the sun on two axes (from east to west and up and down)[22]. There are different classifications of the receiver based on the constructional configuration and the heat transfer medium. The geometric configuration or can be external cavity type. in a receptor cavity, the radiation reflected from the heliostats passes through the opening in a box like structure before impinging on the heat transfer surface. External receivers may be designed with tube panels FlatPlate or cylindrical. This is the typical solution adopted for surround heliostat fields [85]. In volumetric receivers, air acts as a gaseous fluid operating typically 373-1073 K. In 1986 under the initiative of SOTEL and DLR, the study of a 30 MWe plant for Jordan began. The solar thermal power plant is one of the promising options to replace the rising demand of conventional energy renewable energy. The cost per kW of solar energy is higher and the overall system efficiency is lower. Growing global energy demand and prices of fossil fuels and encourage developed developing countries to shrink their energy use and exploit renewable energy sources. In addition, environmental problems caused by the massive consumption of fossil fuels (eg, global warming), are also major concerns that require countries to consider on reducing CO_2 emissions. The developed models are applied to calculate the monthly average diffuse radiation Bangalore, Kolkata, Nagpur, New Delhi and Pune. The diffuse component of the global radiation is correlated with another climate parameters viz. hours of sunshine, temperature and relative humidity by adjusting the first and second order equations. The emphasis has been made on the different combinations of meteorological parameters and the increasing power of variables. In

addition, the correlation developed performance is evaluated by comparing with the existing model of Iqbal. Statistical analysis shows that prediction errors are lower for the proposed formulas than Iqbal. Therefore, we conclude that the seven correlations suggested equations are generalized for India and are able to estimate the monthly average daily diffuse irradiance on a horizontal surface for any site in India. Discussions revealed that the models promise to give good results. In the present communication, a thorough review of the literature on the stage of solar thermal power plants and technologies for up-to-date worldwide is presented. The results of studies of technical and economic feasibility of researchers reported shortly for further reference. It is noted that solar thermal power plants have emerged from the experimental stage to commercial applications. Case studies of solar thermal power plants 50 MW typical weather conditions in India in places like Jodhpur and Delhi is highlighted with the help of the techno-economic model. Different solar concentrating technologies (parabolic trough, parabolic dish and central tower) for solar thermal power plants are compared economically. It's been found that the concentrator plant power output Solar parabolic dish Stirling generate electricity at a lower unit cost than the other two solar technologies considering 30 years life expectancy and the rate of interest of 10% of the investment[23].

CONCLUSION

A preliminary assessment of the techno-economic evaluation of CSP technologies in several Indian locations has been made in this study. To the financial feasibility of CSP technologies in Indian conditions analyze two projects, namely PS-10 (based on power tower technology) were taken as reference cases for this study. these two systems were simulated at several Indian locations The unit cost of electricity generated by these two system sat Rajas than and Gujarat states is lower than the price of electricity under the feed in tariff policy of MNRE justify the firm financial feasibility of these systems. With the internalization secondary benefit of emissions trading under clean development mechanism of the Protocol, the use of CSP plants is financially feasible in most locations in three states as fact. Rajasthan, Gujarat and Madhya Pradesh. It may be noted that the sites with an annual direct solar radiation blessed more than 1800 kWh/m^2 are best for recommended installation of CSP systems. Internalization of CDM benefits, the amounts of financial performance indicators to further improve CSP plants and the use of these systems is economically feasible for the sites thus reducing the possibility for large dissemination of CSP plants in these locations.

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