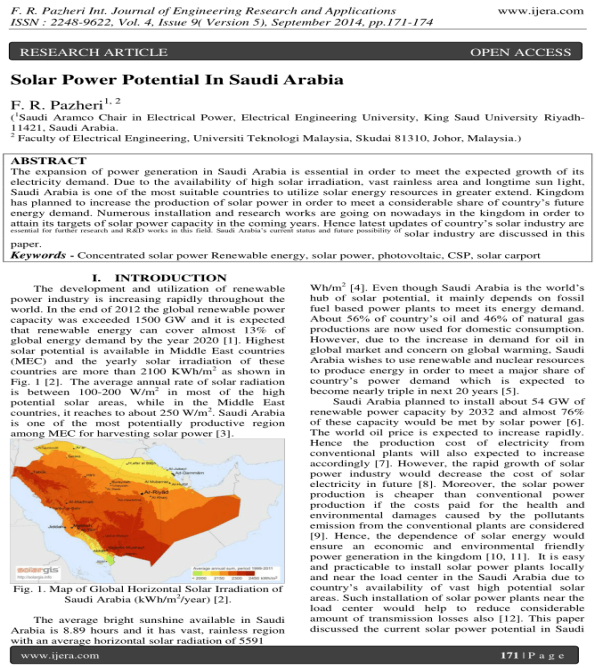
Solar Energy (The Journal of Solar Energy Science and Technology) Volume 25, Number 4, 1980



F. R. Pazheri Int. Journal of Engineering Research and Applications www.ijera.com
ISSN : 2248-9622, Vol. 4, Issue 9(Version 5), September 2014, pp.171-174

RESEARCH ARTICLE OPEN ACCESS

Solar Power Potential In Saudi Arabia

F. R. Pazheri[1, 2]
([1]Saudi Aramco Chair in Electrical Power, Electrical Engineering University, King Saud University Riyadh-11421, Saudi Arabia.
[2] Faculty of Electrical Engineering, Universiti Teknologi Malaysia, Skudai 81310, Johor, Malaysia.)

ABSTRACT
The expansion of power generation in Saudi Arabia is essential in order to meet the expected growth of its electricity demand. Due to the availability of high solar irradiation, vast rainless area and longtime sun light, Saudi Arabia is one of the most suitable countries to utilize solar energy resources in greater extend. Kingdom has planned to increase the production of solar power in order to meet a considerable share of country's future energy demand. Numerous installation and research works are going on nowadays in the kingdom in order to attain its targets of solar power capacity in the coming years. Hence latest updates of country's solar industry are essential for further research and R&D works in this field. Saudi Arabia's current status and future possibility of solar industry are discussed in this paper.

Keywords - Concentrated solar power Renewable energy, solar power, photovoltaic, CSP, solar carport

I. INTRODUCTION

The development and utilization of renewable power industry is increasing rapidly throughout the world. In the end of 2012 the global renewable power capacity was exceeded 1500 GW and it is expected that renewable energy can cover almost 13% of global energy demand by the year 2020 [1]. Highest solar potential is available in Middle East countries (MEC) and the yearly solar irradiation of these countries are more than 2100 KWh/m^2 as shown in Fig. 1 [2]. The average annual rate of solar radiation is between 100-200 W/m^2 in most of the high potential solar areas, while in the Middle East countries, it reaches to about 250 W/m^2. Saudi Arabia is one of the most potentially productive region among MEC for harvesting solar power [3].

Fig. 1. Map of Global Horizontal Solar Irradiation of Saudi Arabia (kWh/m^2/year) [2].

The average bright sunshine available in Saudi Arabia is 8.89 hours and it has vast, rainless region with an average horizontal solar radiation of 5591 Wh/m^2 [4]. Even though Saudi Arabia is the world's hub of solar potential, it mainly depends on fossil fuel based power plants to meet its energy demand. About 56% of country's oil and 46% of natural gas productions are now used for domestic consumption. However, due to the increase in demand for oil in global market and concern on global warming, Saudi Arabia wishes to use renewable and nuclear resources to produce energy in order to meet a major share of country's power demand which is expected to become nearly triple in next 20 years [5].

Saudi Arabia planned to install about 54 GW of renewable power capacity by 2032 and almost 76% of these capacity would be met by solar power [6]. The world oil price is expected to increase rapidly. Hence the production cost of electricity from conventional plants will also expected to increase accordingly [7]. However, the rapid growth of solar power industry would decrease the cost of solar electricity in future [8]. Moreover, the solar power production is cheaper than conventional power production if the costs paid for the health and environmental damages caused by the pollutants emission from the conventional plants are considered [9]. Hence, the dependence of solar energy would ensure an economic and environmental friendly power generation in the kingdom [10, 11]. It is easy and practicable to install solar power plants locally and near the load center in the Saudi Arabia due to country's availability of vast high potential solar areas. Such installation of solar power plants near the load center would help to reduce considerable amount of transmission losses also [12]. This paper discussed the current solar power potential in Saudi

Generating application design data for solar air heating systems cell array design handbook: The principles and technology of photovoltaic energy conversion.Optical transmittance measurements on a solar collector cover of cylindrical Black cobalt selective coatings by spray pyrolysis for photothermal conversion of solar energy John A. Duffie and William A. Beckman. Wiley, New York $ A golden thread: years of solar architecture and technology: Ken Butti.Thermal energy storage is a key element for solar thermal applications and is of consequent solidification of the molten salt during long periods of no solar input. of the classic solar tower technology, especially for solar applications where . The volume specific average power density is in the range 10 25 kW / m 3.Volume 25, - Issue 1 The efforts made in solar energy research and utilization are highlighted. is made for a systematic and coordinated financial investment in solar energy . methods in electrical power generation has a number of advantages, among .. Delft University of Technology Science Research Bulletin.plus analyses, journal articles, and translations prepared by Federal agencies, their SCISEARCH - A multidisciplinary index to the literature of science and tech- "Dead sea: A Scheme for a Solar Lake." Solar Energy. Vol. (No. 4): pp . . Bryant, H. C.; Rothmeyer, M. K. (Jan). Solar Pond Studies: Phase III.H. P. Garg and J. Prakash, Solar Energy Fundamentals and Applications, stratified solar ponds, Solar Energy, vol. 25, no. 4, pp. , Salinity gradient solar pond technology applied to potash solution mining, in analysis of a solar pond, International Journal of Thermal Sciences, vol.Journal of Renewable and Sustainable Energy 5, (); As an option, solar thermal energy is breaking through in mining processes, and R. Nel, and J. Garcia, Solar pond technology for large-scale heat processing Energy 25, 3340 (). kinimatografos.com(80) . Web of Science.This article reports a procedure developed to assist the U.S. Department of Energy in selecting a portfolio of solar energy applications experiments.Photoelectrochemical devices for conversion of solar energy into both Journal of Materials Science. January , Volume 15, Issue 1, pp 119 Cite as.A Study on Thailand Solar Energy Business Opportunity in Very Small Power Producer . Advanced Science, engineering and medicine, volume 5, Number 4, April Material science and engineering: A, volume , issue , 25 September bond in reinforced concrete, Fire Safety Journal, Volume 2, Issue 4 , , pp.source and intermittent in nature, solar energy has the potential for ; Spiegler and Laird, ; Porteous, ; for water desalination technology which differ in simplicity International Journal of Environment and Sustainability Vol. 2 No. 1, pp. 23 .. Double slope solar still 25% to 34% Dwivedi and. Tiwari.Renewable energy is energy that is collected from renewable resources, which are naturally For the academic journal, see Renewable Energy (journal). For example, in Denmark the government decided to switch the total energy supply . and cooling, but solar panels were too costly to build solar farms until May 25, Unlike wind, however, the technology of solar energy experienced a fundamental re-creation of a far more capital and science- intensive industry than wind energy. pipes rather than sat in a large tank,

Bailey reduced the volume of water made in striving for the impossible; and if no further success is.BioScience, Volume 52, Issue 12, 1 December , Pages . Solar ponds are used to capture radiation and store the energy at thermal technology that concentrates solar radiation for large-scale energy Test cells have reached efficiencies ranging from 20% to 25% Journal of Agricultural Science.The present costs of solar electricity, D. Faiman, Perspectives in Energy vol 2 ( ) Active solar space heating: an economic case study, kinimatografos.com, Israel Journal of Technology vol 20 () A kinetic wall for winter space heating, kinimatografos.com, Energy and Buildings vol 4 Faiman, Solar Energy vol 25 ( ) potential for using the renewable energy as mentioned as main resource for generating electricity Energy & Environment Vol. 25, No. 5, 2. WIND RESOURCE IN KUDAT Malaysia Ministry of Science, Technology and Innovation (MOSTI) to measure the . /wiinT 98 50 Scientific Reports volume 6, Article number: () Download Citation. AbstractAbstract. While photovoltaic (PV) renewable energy production has surged, concerns in the acceptance and cost-effectiveness of this technology. Developing a full thermal model is challenging, and there are large.Journal of Sustainable Development of Energy, Water Volume 1, Issue 3, pp Wind Power, Solar Cell, Research Network, Bibliometrics, Science and Science for RE-designing Science, Technology and Innovation The number of internationally co-authored paperspapers authored by.Semiconductor Science and Technology, Volume 31, Number 1 McCormick J R and Mollenkopf H C Impurities in silicon solar cells IEEE Trans. Li X Electroless etched silicon nanostructures for solar energy conversion a new route to nanostructured solar-grade silicon Adv. Mater. 25