



MODERN TECHNOLOGY IN SOLAR ENERGY GENERATION

¹.Dr. John Paul Pulipati, ²P.Anil Kumar, ³B.Manjula, ⁴P.Venkatapathi,

¹Principal, principal@mrce.in, Malla Reddy College of Engineering

²Assistant Professor, Dept. of ECE, Malla Reddy College of Engineering

³Assistant Professor, Dept. of ECE, Malla Reddy College of Engineering

⁴Assistant Professor, Dept. of ECE, Malla Reddy College of Engineering

Abstract— energy is playing a pivotal role in compensating the electrical energy as there is short fall in this energy due to more demand and decline trends of conventional source of energies exhaustion of fuels like coal, petroleum, natural gases and constant of environmental and climatic changes to cope up this photovoltaic installation is being done in an electrical system to compensate and enhance the energy. an photovoltaic installation in an electrical system is made from the assembly of various photovoltaic units that uses solar energy to produce the electricity in a cheaper way from sun power. Till now the use and scope of solar energy is limited and has not reached up to masses Moreover the efficiency of the system is also low due to which the output is not sufficient as compared to input as in some installed case of solar panel it has been observed that efficiency is not more than 27%. To make it versatile and more useful for the masses newer trends and innovations will help. These have discussed in this paper.

Keywords: Solar panels, Efficiency, Namadd, renewable energy resources, distributed generation.

I. INTRODUCTION

Now-a-days distributed generation (DG) is not a new concept. Without this the rectification of energy crises is not possible [1]. In most of the countries the electrical power demand is more than the electrical power generated. On the other hand there is a serious decline in the availability of natural resources, fuels, coal and gases etc. The generation of hydropower plant also varies due to variation in inflow of water from catchment

area. When the capacity of hydropower plant decreases the power shortage arises. The solar power plant may be installed in such a fashion that these may work in unison for example when draught is more showering of sun is more. In this way shortage of power will be compensated by the energy governed by the solar power plant. Moreover this installation is to be done in such a way that solar panel will cover the rivers or reservoir reducing the evaporation which enhances the capacity of dam. On the other hand the solar panel covering this area will generate electrical power which will then enhance the power generation of the system. Moreover by using some newer technologies this power generated may be integrated with the power grid to enhance the capacity of grid.

The development and uses of solar energy at large scale is not only a reasonable method of energy resource utilization in the future but also an effective frame to improve energy resource crises economically. There is different solar resource in different area, seasons, and weather conditions and soon because of so many influencing factors [2]. As this kind of renewable energy is available in abundance in nature. The research and application of solar energy will be used to deal with alternative energy [3]–[4]. The advantages of renewable energy sources are enormous as they are free from gas emissions from few conventional energy resources which have impact on the global warming. If this generation of solar energy expedited rigorously can meet the most of the energy demand of the world. Use of Renewable energy will prove as a panacea for solving the climatic and environmental

problems as every sector of society is keen to solve these problems on the health ground problems. Currently, renewable energy sources install 15 percent to 20 percent of the world's total energy demand [5]. The solar energy is considered as the most promising and important renewable. It is envisaged that solar energy power plants would

meet all human needs and would eventually replace the conventional power plants[6].

II. TYPES OF DISTRIBUTED GENERATION

There are different types of distributed generation according to the constructional and technical points of view as shown in Figure (1)[1].

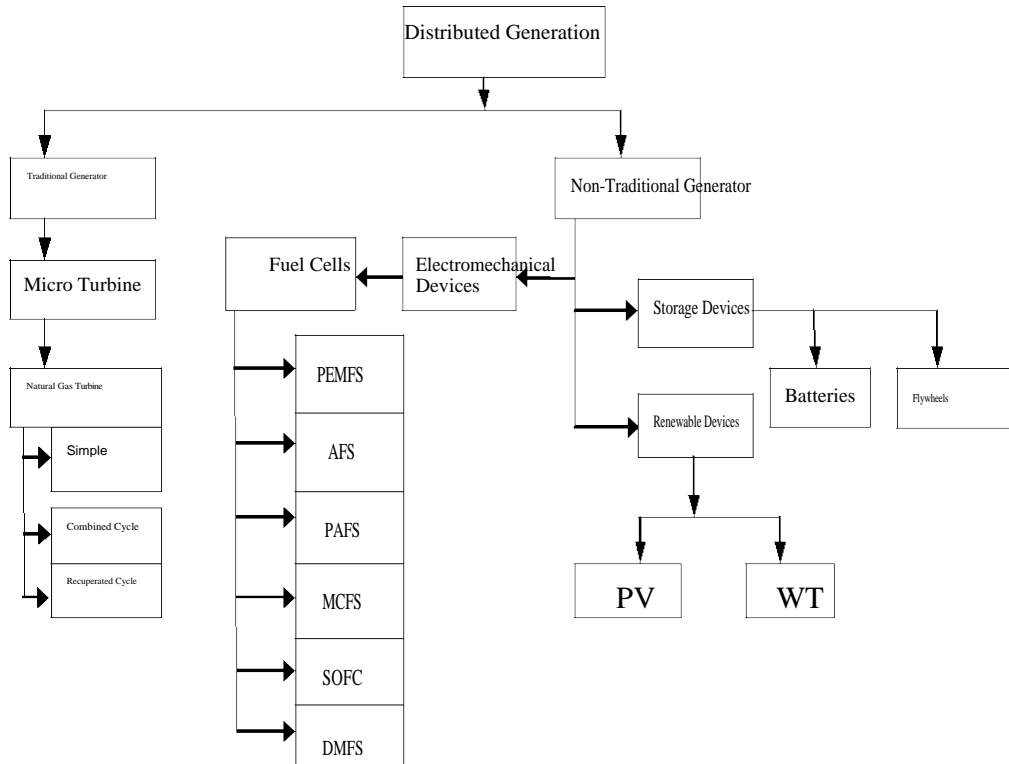


Figure 1 Types of Distributed Generation

III. THE PRINCIPLE OF ENERGY STORAGE

The circulation medium was heated by synchronous tracking and non-tracking solar collector and injected into the heat exchanger which was set in concrete pile with the help of circulation pump. After heat exchanging between the heat exchanger and concrete pile, circulation medium was pumped to synchronous tracking solar collector, so formed circulations. And then, the solar energy which was gathered by synchronous tracking and non-tracking solar collector was stored constantly in the underground concrete energy storage pile [7]. The circulating principle is shown in Figure(2). The solar panels are used to generate steam which drives the steam turbines coupled with alternator as per figure(3).

IV. SOLAR ENERGY POLICIES OF INDIA

The Government of India has increased its focus on developing alternative resources of energies especially Solar Energy under the policies related to energy development. The solar energy is available in abundance and almost free of cost as it is available from nature.

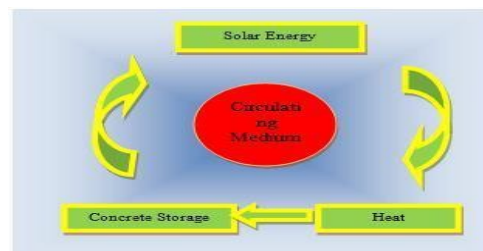


Figure 2 the circulating principle of solar energy

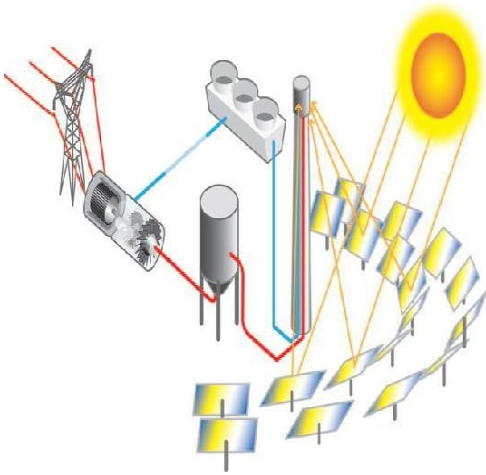


Figure 3 System of Power generation from solar energy most growing markets and expected to be second largest energy contributor in energy market in the world by 2035. Due to limited domestic fossil fuels reserve, the India has strong planning to expand the renewable energy sources for power sector.

1. To supply the electricity to all the areas included the rural areas as mandated in section 6 of electricity act. Both the Central and State Government will jointly installed to achieve this objective at the earliest. Rural Electrification will be done for securing electricity access to the entire household in rural sector. Most of this requirement will be fulfilled by use of renewable energy sources.

2. Reliable rural electrification would be done either through conventional or non conventional methods of electricity whichever is more suitable and economical. Non conventional sources of energy especially Solar can be utilized even where Grid connectivity exists[8]

3. Particular attention is to be given to Dalit Bastis, Tribal areas and other weaker section of the society the other newer resources.

4. Rural Electricity Corporation of India (REC) is the nodal agency at central govt. Level to implement these programs of electrification in rural areas. The REC will install all the goals set up by the National Common Minimum Programme ensuring timely implementation[9].

5. Responsibility of operation and maintenance & cost recovery could be discharged through appropriate arrangement with Panchayats, Local

Authorities, BDO, and NGO etc[10].

6. This Great task of Rural Electrification requires cooperative efforts of all agencies like Govt. Of India, State Government and community education cell in rural areas.

7. The Electricity act 2003 has provision of restructuring the electricity industry which unbundled the vertically integrated electricity supply in each state. Now generation, transmission and distribution companies have been formed by the Regulatory Commission of state electricity board. Regulatory Commission will also specify the minimum percentage of electricity that each distribution utility must get from renewable energy sources[11].

V. NEWER METHODS WHICH WILL ENHANCE THE USE OF SOLAR ENERGIES

Day by day new trends and innovations are being developed throughout the world in R&D centers, auto mobile sectors and domestic use in institutions, hostels to reduce the energy wastage and to generate the power by solar devices. Many of them are explained given below:

1. Solar cells of higher efficiency have been developed having conversion efficiency more than 37% as compared to the previous solar cells having efficiency of 27 % made of two materials. Tata power is going to install the solar panels having 35% efficiency [12]. In These cells three photo absorption layers are stacked together. This has been developed by stacking Indium, Gallium and arsenide as the bottom layers. These cells have capability of absorbing the light from various wavelengths available in sunlight and convert into electrical energy. Through optimal process the active area has been increased. This breakthrough in technology has been done by new energy and industrial technology development organization.

1. The conversion efficiency of solar panels/plates is increased by newer devices of cleaning these panels. The device makes use of automated "dry-sweep" to push dust and dirt away from the surface of these devices. In south Arabian language the device is known as nsta which is very rugged and have

low maintenance cost. The device is powered by the lithium ion batteries. These batteries are charged by the array itself and have high efficiency. The device has moving parts. It is very interesting that this act like a robotic arm and automated work with scheduling. The device can jump the obstacle between the panels [13].

2. Throughout the world research and development is done to procure more and more energy from various devices and technologies. Under this concept Japan developed a fabric which is known as a solar cell fabric capable of harnessing the energy from sunlight while you are moving by wearing this fabric made cloth. This fabric is made from wafer thin solar cells woven in a stylish way. The electricity generated will be capable to charge the mobile and other portable electronic gadgets. The thread used will be stronger and which increases the life or durability of the fabric cloth. The same idea can be embedded/used in the blind makers and certain type of curtain will also generate power, when sun rays on these. Various companies developing this type of fabric in association with solar cell maker. This will help the men to recharge these small gadgets while in sun [14].

3. A new trend of solar panel roofs have come in which most of the buildings the roof is covered with solar panel. In some advanced countries like china the roof of the max. Of the homes is made of solar panel by using aluminum or strong alloy to support the weight of panels. In remote area where grid supply is not viable these panels generate power for themselves and supply electricity to the neighbours also who cannot afford the cost of installation. This will help nearby masses and community in that region where distribution of power is not feasible by other ways & transmission may not be possible due to heavy expenditure.

4. In some countries in urban area some hobbyist of solar energy generate electrical power this system for sufficient for their requirement and surplus generated power is supplied to the grid empowering the national grid. The solar panel should be installed on the vehicles where it is possible so that charging of batteries and other devices in the vehicle may be done with the help of solar energy. Whenever the

solar rays fall on the panel this will improve the electrical efficiency of the vehicles. This type of experimentation and uses are already being done in Japan and in other advanced countries where conversion technologies from solar to electrical are being used frequently and sufficiently. In India also solar panels have been installed in metro railway service.

5. As we are aware of that electrical power demand is increasing and viewing the climatic concerns it is desired that renewable energy sources especially solar may be integrated to the utility grid. By using better flexibility in integration through power electronics. Harmonics can be reduced and the reactive power can be balanced.

6. In these days most of the power industries switch over side by side starting manufacturing of the solar inverters of high capacity. These may be utilized to get emergent power if not continues at remote locations where there is no grid supply.

7. CSP systems technology is used for power generation in the system large, flat, sunlight mirrors known as heliostats receive sun light at the top of the tower. A fluid for heat transfer is used to generation the steam which is used for production of electrical power. In some countries the capacity of these plant as high as up to 200 MW. These power tower are very popular in these days because of solar to electrical conversion efficiency is high [15].

VI. DISTRIBUTED SOLAR ENERGY GENERATION

In [16] the authors has explained the use of Distributed solar photovoltaic (PV) systems is producing electricity on site, so reducing the requirement to build new transmission line and also avoiding line losses.

Distributed generation also offers significant benefit to the consumers while providing resiliency to an electric grid that is based on the traditional and centralized model. These systems are used in applications ranging from small commercial to residential and for industrial use. Though this market is still primarily driven by government incentives, distributed solar PV will continue its steady march in future. Due to reduced market

activity in Italy and Germany, global distributed solar photovoltaic market contracted slightly in 2012,

However, growth in the United States, China, Japan, and other countries continued, driven by solar PV module

price reductions, the growth of third-party financing models, and feed-in tariffs. Navigant Research forecasts that, from 2013 to 2018, 220 GW of distributed solar PV will be installed worldwide, representing \$540.3 billion in revenue.

VII. CONCLUSION

Due to decline availability of natural's fuels and viewing environmental changes causes due to conventional method of generation, the use of solar energy is becoming popular and urgency of the day. This will create healthy environment for the human beings which are suffering from the various hazards due to pollution from the installed contents. Moreover the power generation due to hydro power plant is not also regular due to irregular flow of water from the catchment area. So it is concluded that solar power plant may be installed in such a way so these may work in unison with hydro and other methods of generation to enhance the clean and green energy.

REFERENCES

[1] WEI-Khattam and M.M.A Salama, "Distributed generation technologies, definitions and benefits", *Electric Power Systems Research*, vol. 71, Issue 2, p.p., 119–128, October 2004.

[2] Mingzhi Zhao, Zhizhang Li and Mingjun Yu, "Data acquisition and analyzing of solar energy resource", *Information and Automation (ICIA)*, Harbin, p.p., 2205-2208, 20-23 June 2010.

[3] Zhao Qingbo, Shan Baoguo, Situation and Outlook of Energy Demand in the World, *Energy of China*, 2002(02):34- 36.

[4] Zehner and Ozzie, "Green Illusions", Lincoln and London: University of Nebraska Press. Pp., 331–42, 2012

[5] G.M.Shafiullah, A.M.T. Oo, D.Jarvis, B.M.S.Ali, P.Wolfs, "Prospect of Solar Energy in Australia", *Electrical and Computer Engineering (ICECE)*, 2010 International Conference, Dhaka p.p., 350 – 353, 18-20 Dec. 2010.

[6] S. Rao and B.B.Parulekar, "Energy Technology Non-Conventional, Renewable &

Conventional", Khanna Publication, 3rd, 2012.

[7]

Yan Zhao, Dajun Zhao, Yirong Yao, Xin Fang, Shousheng Li, "Development of Solar Energy Underground Seasonal Storage Device and Its Parameters Measuring System", *Information Engineering (ICIE)*, 2010 WASE International Conference, Beidaihe, Hebei, p.p., 231 – 234, 14-15 Aug. 2010.

[8] G.D.Kamalapur and R.Y.Udaykumar, "Rural Electrification in the Changing Paradigm of Power Sector Reforms in India", *International Journal of Electrical and Computer Engineering*, p.p., 147-154, vol. 2, No. 2, April 2012.

[9] N. Sasidhar, "Electricity online trading in India", *Rural Electricity Corporation of India*, 2012.

[10] Giuseppe Buglione, Guido Cervigni, Eileen Fumagalli, Elena Fumagalli and Clara Poletti, "Integrating European Electricity Markets", *Center for Research on energy and environmental economics policy*, Report 2, Oct. 2009.

[11] Madhu Khanna, Kusum Mundra, Aman Ullah, "Parametric and Semi-Parametric Estimation of the Effect of Firm Attributes on Efficiency: Electricity Generating Industry in India", *Journal of International Trade and Economic Development*. Pp. 419–436. vol. 8, No. 4, Sept. 2011.

[12] Electronics for You, "Most efficient Solar Cell", *Technology news*, January, 2013.

[13] George Eitelhube, "Seed Fund Winners - NOMADD: The No-water Mechanical Automated Dusting Device", *King Abdullah University of Science and Technology (KAUST)*, energy and sustainability are primary research drivers, 2012.

[14] John Badding, "Flexible Silicon Solar-Cell Fabrications May Soon Become Possible", *Journal Advanced Materials*, Penn State University, 6 December 2012.

[15] Dolf Gielen, "Concentrating Solar Power technology", *Energy Technology Systems Analysis Programme*, International Renewable Energy Agency, January 2013.

[16] G. D. Rai, "Non-Conventional Energy Sources", Khanna Publication, 4th edition, 2012.