

USAGE OF SOLAR ENERGY AND ITS STATUS IN MALAYSIA

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ABSTRACT

Solar energy is radiant energy that is produced by the sun and every day sun radiates, or sends out an enormous amount of energy. The sun radiates more energy in one second than people have used since beginning of time. There are lot of technology are used now a days to harness the energy from the sun as solar thermal energy, ocean thermal energy conversion, solar ponds, solar tower and photovoltaic systems. Green campaign is one of the hot topics among the Malaysian. The main objective of green campaign is to create awareness among the public to protect our environment. In Malaysia there are a lot of organization organizing green campaign such as Environmental Protection Society Malaysia (EPSM), Malaysia Environment NGOs (MENGO) and Treat Every Environment Special Sdn. Bhd. (TRESS). Price of solar energy is very reasonable and very depending upon the amount of energy you need and the size of the panels required. The payback time for solar water heating now makes solar energy financially viable for the majority of domestic applications.

Keywords: Solar energy; Malaysia; Thermal.

1. INTRODUCTION

World primary energy demand is projected in the reference scenario to expand by almost 60% from 2002 to 2030, an average annual increase of 1.7% per year. Demand will reach 16.5 billion tons of oil equivalents (toe) compared to 10.3 billion toe in 2002. The projected rate of growth is, nevertheless, slower than over the past three decades, when demand grew by 2% per year. On the other hand, fossil fuels will continue to dominate global energy use. They will account for around 85% of the increase in world primary demand over 2002–2030. And their share in total demand will increase slightly, from 80% in 2002 to 82% in 2030.

The share of renewable energy sources will remain flat, at around 14%, while that of nuclear power will drop from 7% to 5% (Bilen *et al.*, 2008).

Mounting up the negative effects of fossil fuel combustion on the environment in addition to limited stock have forced many countries to inquire into and change to environmentally friendly alternatives that are renewable energy to sustain the increasing energy demand. In this situation, availability of cheap and abundant energy with minimum environmental and ecological hazards associated with its production and use is one of the important factors for desired improvement in the quality of life of the people living especially in developing world. The growing scarcity of fossil fuels has raised global interest in the harnessing of solar energy (Hasnain *et al.*, 1998).

Solar power is a type of energy with great future potential-even though at presents it covers merely a minor portion of global energy demands (0.05% of the total primary energy supply); at the moment PV power generates less than 1% of total electricity supply. This is due to solar power still being considered the most expensive type of renewable energies. However, in remote regions of the earth it may very well constitute today's best solution for a decentralized energy supply (EREC, 2005; ECTIF, 2006).

2. USAGE OF SOLAR ENERGY

To be put to work solar energy must be converted into more useful forms of energy. Solar technology is expanding rapidly into areas other than traditional applications (solar water heating, space heating and to cook and dry food); however, it is important to be aware of this progress. Solar energy can be used in many different ways. Among them few are discussed here.

2.1 Solar Thermal Energy

It is the technology for harnessing solar energy for thermal energy (heat). One of the simplest and economical ways to utilize solar energy is through solar thermal systems. This proven and economical technology has been around for decades for hot water, pool and space heating applications. Greece was one of the pioneers in Europe for the last decades with approximately one million installed solar flat plate collectors saving energy by using the inexhaustible

solar potential. Also in Cyprus such systems find a wide implementation, as 92% of the households and 53% of the hotels have solar water heating systems. According to a study of the European Union the island of Cyprus is a pioneer in the field of solar thermal applications with approximately 1 m² of installed collector area per capita (Paschalides, 2008). Figure 1 show the various ways of collecting solar power from the sun light.

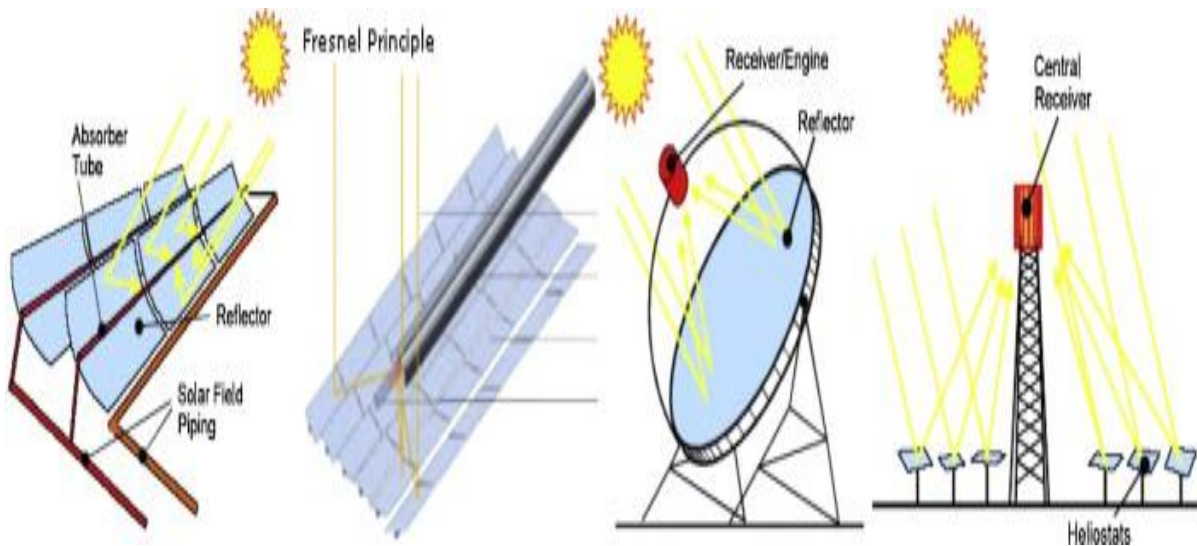


Fig. 1 Solar thermal technologies for the production of power (from left to right: parabolic trough, Fresnel collector, solar dish, solar chimney, solar tower)

2.2 Solar Ponds

The working principle of solar ponds is based on the capture of solar radiation in a salt solution. A solar pond is a pond filled with water that consists of three different layers of salt concentration solution. The bottom water layer is a concentrated (saturated) salt solution; the middle layer has a salt concentration gradient with decreasing salt concentration upwards. The top layer is fresh water. The bottom of the pond is a black solar ray absorbing foil surface. There are some advantages and disadvantages of using such solar ponds or lakes as collector. As there are not many natural salt lakes on earth, widespread use is not possible. Also, most natural ponds, e.g., the solar lake at Sinai do not have a heat sink such as a cold-water OTEC pipe nearby, instead only the atmosphere could be used as coolant for the condenser. As advantage, however, there are no digging costs to create the lake

shape. Also, no foil is needed at the top surface to contain water; hence material costs and foil welding issues are absent. Finally, a natural solar lake is part of nature already, so environmental impacts are no issue in this sense

2.3 Ocean Thermal Energy Conversion

OTEC plants (are in fact solar energy plants, because they exist of a solar heat collecting surface (the upper layer of the ocean), thermal storage (the upper layer of the ocean) and a thermal power cycle that runs on a temperature difference. The heat sink, or coolant, consists of the lower, colder layers of the ocean. OTEC technology uses small temperature differences (about 10–30 °C), which makes it a relatively inefficient technology due to the second law of thermodynamics. Carnot efficiency would be 11% at a temperature difference of 30 °C. This low heat to electricity

conversion efficiency is a disadvantage for OTEC deployment. However, electricity is not OTEC's only possible application. Other products that can be sold besides electricity are for instance: desalinated water, cold water supply for air-conditioning, refrigeration, and mariculture. The benefits of multiple products from an OTEC plant may thus well justify its presently high electricity costs.

2.4 The Solar Tower Technology

Particularly high concentrations and therefore high working temperatures as well as efficiencies of the subsequent thermodynamic working processes can be attained in point-focusing systems (central receiver systems, CRS). Figure 2 show one of those CRS-Systems, the solar tower power plant.



Fig. 2 Solar Tower power plant in the USA

The operation of such a plant is based on the concentration of incoming solar energy. A group of sun-tracking mirrors defines the heliostat field, which reflects the incident solar radiation onto a receiver (Hennecke *et al.*, 2008). The heliostat field concentrates sunlight to fluxes of 500–1000 suns. This concentration is sufficient to achieve temperatures above 1200 °C on the receiver. The receiver is located at the top of the tower and acts as an energy exchanger. Receivers are made of material, which can withstand high temperature changes and high energy density. Ceramic or metal structures are most suitable for this application. They receive concentrated solar energy and transfer it to heat. The heat is transported via ambient air to a thermo hydraulic circuit. After heating up in the receiver it is fed into a state-of-the-art heat recovery steam generator (HRSG).

In this conventional cycle, steam is produced in the boiler and transported to a steam turbine. The steam expands in the turbine producing mechanical work which is then converted into electrical energy through a generator. Exhaust steam from the turbine is condensed in a condenser, and the condensate thereafter pumped to the boiler where it again receives heat from the solar receiver, and the cycle is repeated.

The solar tower is an emerging technology that offers the potential to supply utility-scale peaking power competitively. In European countries such energy production facilities are already in operation or are under construction. They can be used to provide base-load or dispatch able power. The economically exploitable potential of the solar tower technology of Greece and Cyprus is quite high. In both countries there are many areas where solar tower power plants can be erected for the production of electricity and for desalination. Since this solar thermal technology has been successfully implemented in other Mediterranean countries, in Greece and Cyprus, countries with high solar potential, the development of this technology is imperative (Alexopoulos and Hoffschmidt, 2010).

3. SOLAR ENERGY STATUS IN MALAYSIA

Solar energy innovations are likely to concern public and business policy makers in the decade ahead. Sooner or later, the focus of concern must move from the general to the specific, from the macro- to the micro-environment, from the national level to the regional and state levels. The problem what the world is facing nowadays is the energy problem. So, everyone should create awareness about solar energy because Government is also planning to do a lot of awareness regarding the renewable energy and Malaysia Government is further pursued in the 9th Malaysia Plan (2006–2010) which has also set a target of 5% RE in the country's energy mix. Coming to this alternative energy it is beneficial for people (Mohamed and Lee, 2006; Saidur *et al.*, 2010)

Nowadays green campaign is one of the hot topics among the Malaysian. The main objective of green campaign is to create awareness among the public to protect our environment. In Malaysia there are a lot of organization organizing green campaign such as Environmental Protection Society Malaysia (EPSM), Malaysia Environment NGOs (MENGO) and Treat

Every Environment Special Sdn. Bhd. (TRESS). Furthermore, from the researcher research, there also few business company supporting on green campaign such as Panasonic, TESCO, and Nippon weather paint company (Zhong, 2008; Güler, 2009).

Besides; price of solar energy is very reasonable and vary depending upon the amount of energy you need and the size of the panels required. Domestic hot water solar energy systems cost between £2,400 and £5,000 installed. DIY hot water heating kits are available which cost about £1,500. Photovoltaic systems are more expensive costing from £5,000 to around £9,000 installed.

The payback time for solar water heating now makes solar energy financially viable for the majority of domestic applications. An extra financial incentive is that your property will increase in value by installing a solar energy system and you will be less affected by future energy price rises

Solar photovoltaic technology could harness the sun's energy to provide large-scale, domestically secure, and environmentally friendly electricity. Photovoltaic's research and development is continuing intense interest in new materials, cell designs, and novel approaches to solar material and product development in Malaysia. The price of photovoltaic power will be competitive with traditional sources of electricity within 10 years. Solar electricity will be used to electrolyze water, producing hydrogen for fuel cells for transportation and buildings.

Solar power has been identified and incorporated into SREP as one of the REs in 2003 but most of the solar power used in Malaysia is domestic level only and large scale commercial use is not significant yet. Solar power in Malaysia or also known as photovoltaic (PV) system is estimated to be four times the world fossil fuel resources (Hitam, 1999). In 2005, the 5-year Malaysian Building Integrated Photovoltaic Technology Application Project (MBIPV) was launched. This project is jointly funded by the Government of Malaysia, the Global Environment Facility (GEF) and the private sector. The project has several demonstration PV projects in various sectors including residential houses and commercial building. The most significant recent project is the Green Energy

Office (GEO) building, an administration-cum-research office for PTM. Another national MBIPV program that is SURIA-1000 program initiated in 2007, targeting the residential and commercial sector to establish the new BIPV market and provide direct opportunities to the public and industry in RE initiatives.

Recently Applied Materials hosted a high-level solar delegation from Malaysia at Santa Clara, California headquarters. Malaysia, like many other developing countries, is at a crossroad of deciding how to balance fast-growing energy needs with environmental concerns, energy security and economic development. Until today, Malaysia has prioritized industry and economic development. Now it is set to expand its solar industry, from producing solar panels to producing solar power. Malaysia is already home to large scale production facilities of three leading photovoltaic (PV) module manufacturers: SunPower, Q-Cells and First Solar.

As the world moves towards a greener future, Malaysia is taking a look at the other side of the equation: sustainability. This is driving the Ministry of Energy to invest in a new portfolio of green technologies. The delegation, led by the Malaysian Energy Centre, is recommending a policy framework for renewable energy adoption. A lively discussion ensued between Malaysia's top policy makers and Dr. Winfried Hoffmann, chief technology officer of Applied's Energy and Environmental Energy Solutions (EES) and Display businesses, and president of the European PV Industry Association (EPIA) over the merits of clean energy.

4. CONCLUSIONS

Malaysia is one of the most developing countries and for developing country energy crisis is the main problem for development. It is said that energy crisis is a big impediment in the growth of the economy, and solar energy could be seen as the best solution for the present situations.

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