

Effective Implementation of Solar Thermal Energy in Industries

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Abstract

In current days the global world recognizes that solar thermal energies are useful technology, for this reason the demand for solar thermal technologies are increasing day by day. Solar thermal energies are used for several applications such as space heating, air conditioning, hot water, industrial process heats and many more. However, there are various problems with using solar energy in industries, the implementation cost of solar energy is high, and companies face trouble to implement solar technologies.

The solar thermal energies are renewable and sustainable for this reason organisations are showing their interest to use the solar thermal energies. The maintenance cost of solar thermal energy is also lower than conventional energy and it reduces the extra maintenance cost of electricity. Companies are trying to use effective technologies to use solar thermal energies nowadays. On the other hand, solar thermal energy needs extreme water and creates a major problem for desert areas. There are some environmental disadvantages also such as this releases some harmful gases sometimes and creates problems for common people. However, this provides the safe alternative resources of energy, in current days industries are concerned with using solar thermal energy. There are three groups of solar thermal energies that are used in current days: solar air collectors, solar water systems and solar concentrators. In the thermal solar energy process the sunlight is converted into electricity power, companies are trying to improve the solar power technologies to provide the solar thermal energy for generating electricity at a low price.

Keywords

Domestic consumption, solar thermal energy, sustainable energy.

INTRODUCTION

Energy is reviewed as a key agent in the creation of wealth and a crucial element in economic development. Restricted availability of fossil resources and environmental issues aligned with them has highlighted the requirement of fresh sustainable energy supply. The Indian industries are more into applying solar thermal energies in economic development. This paper consists of the context of solar thermal energies, application of these energies in Indian industries. It also tries to explain the advantages and disadvantages of solar thermal energy and its effectiveness in various industries in the Indian context. Based on the discussions, conclusions have been drawn.

Overview of Solar Thermal Energy

Solar thermal is also commonly known as solar heating that utilizes the energy gained by the sun by receiving a heat water of thermal energy. The hot water that is produced by the solar heat are used to supplement the hot water domestically by storing it in large gallons, for space heating and underfloor heating [10] 2019. A well-designed system of solar thermal energy provides 55% of the requirement of hot water for annual domestic consumption that is dependent on the sun that intends to produce more heat. There are various types of solar thermal energy that are more complex. They are as follows:

Table 1: Different types of solar thermal energies

Flat panel solar collectors	This is considered as the most common type of solar heating system that consists of a dark absorption plate at the bottom ([6]. 2020). These types of solar panels are needed to store until the solar collectors are required for the house.
Plastic Collectors	These types of solar collectors are very cheap and consist of black pipe made of plastic for the degradation of UV. Plastic collectors are most permitted to the context temperature as no insulation is involved at this place. So in case there is too cold outside, the heat will generate very less.
Evacuated tube solar collectors	The evacuated tube of solar collectors is most convenient and efficient to use specifically in cold weather. However, the advanced design of evacuated tubes is very expensive, consisting of transparent tubes of glass and parallel rows.

(Source: Influenced by [6]. 2020)

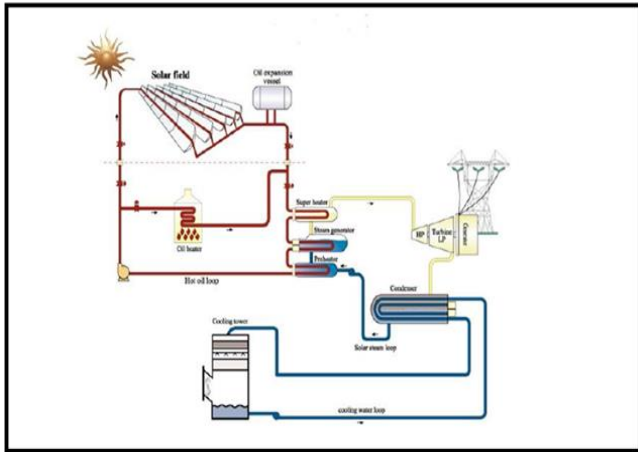


Figure 1: Working of solar energy
(Source: [6] 2020)

The collectors of solar power energy produce a special type of heat that exchanges to transform the solar radiation to internal energy of transportation. The key element of the solar energy system is the solar energy collector. This is a device that captures the inward solar radiation, converts them into heat, and shifts the heat to a fluid succeeding via the collector. The solar energy then collected is taken from the flowing fluid. There are generally two sorts of solar collector that consist of non- centralized or stationery and centralized. These two types of solar collectors are the most important element.

Application of Solar Thermal Energy in various Industries

The first solar thermal energy of 50kW has been launched in India by MNRE that follows the intersected channel of the technology collector. The plant has survived with the development of the elements such as tracking system, mirrors etc. ([4], 2020).

Table 2: Application of solar thermal energy in industries

Industry	Process
Dairy	Pressurization
	Sterilization
	Drying
	Concentrates
	Boiler feed water
Tinned food	Sterilization
	Distilled
	Bleaching
	Cooking
Textile	Bleaching, Dyeing

	Fixing
	Drying, oil removing
	Pressing
	Dyeing
Paper	Bleaching
	Cooking and drying
	Boiler feed water
Chemical	Soap
	Pre- heating water
	Processing heat
Meat	Cooking
	Washing
	Disinfecting
Beverage	Washing, disinfecting
	Pasteurization
Flour and by-products	Sterilization
Timber and by-products	Drying
	Preparation pulp
	Thermo diffusion beams
	Pre- heating water
Bricks and blocks	Curing
Plastics	Preparation
	Drying
	Distillation
	Blending
	Extension
	Separation

(Source: Influenced by [2], 2019)

METHODS

The researcher collects the authentic data and information to create this research more valuable and credible. The effective data collection method is needed to collect the authentic data and information. In this study the researcher employed the secondary research methods and secondary thematic data analysis methods. In the secondary thematic data analysis method the researcher creates two themes such as the advantages and disadvantages of solar thermal energy and the effectiveness of solar thermal energy in industries

([2], 2019). Thematic analysis is the theory of quantitative analysis that collects all the reliable information and data to make this research more effective.

The advantages and disadvantages are discussed in the secondary thematic data analysis process. There are several advantages to using solar thermal energy. The advantages are that solar thermal energy is renewable and sustainable for these reason industries are trying to use the solar thermal energies. However there are some disadvantages of using solar thermal energies such as the solar thermal energies are more costly and that needs more water and creates problems in desert areas. Solar thermal energy is around 80% more efficient than solar PV. The solar thermal energies minimize the dependency on conventional energies and this is sustainable and the maintenance charge is also low ([5], 2020). Companies are using solar technologies for its effectiveness and sustainability. In the secondary data analysis process the researcher collects all the data about solar power energy and tries to make a reliable theory of using solar thermal energy efficiently.

FINDINGS AND DISCUSSION

Advantages and disadvantages of Solar Thermal Energy

Solar power energy is one of the optimal and primary used renewable energies. While this solar thermal energy has various advantages, it contains few disadvantages too. The advantages and disadvantages are explained below.

Advantages

Renewable: unlike energy produced from fossil fuels, just like organic gas, petroleum and coal, solar thermal energy is endlessly renewable. This helps the technology to become more dependent on solar energy for a long term period ([1], 2019). The application of solar energy can help countries become more energy- independent by diminishing the use of fossil fuels.

Non- polluting: The solar thermal energies produced zero pollution as compared to fossil energies that produce toxic chemicals. With enhanced concern about the environmental pollution, the manufactures are more into using solar thermal energies for a safer environment.

Lower maintenance cost: after the first instalment, the solar thermal energy basically needs less maintenance. Contrary to fossil energies that are generated from coal or gas, solar energy devices do not need any assistance. It needs slightly more work to run the devices than those critical electric generating devices ([3] 2021). Various solar thermal energies, more specifically those that make the water warm involve easier technology than photo- voltaic boards.

Disadvantages

Expensive: till 2010, it was much more expensive to introduce solar energy than power from orthodox fossil fuels, just like coal and gases. Normally, steam generated from flaming of coal, organic gases and oil is lower in cost than steam generated from solar thermal energy ([9] 2019). The

initial cost of installing the solar thermal energy is higher as the cost per unit of energy generated is higher.

Inconsistent: the solar thermal energy devices cannot produce energy on a constant basis like fossil fuels as it is dependent on the weather and cannot work in cloudy weather. This is one of the main reasons for making solar thermal energy less reliable and needs a backup source of energy production.

Storage: unlike fossil fuels, solar thermal energies cannot store sunlight to produce energy on other times as needed. It makes them unreliable, as the producers are not capable of producing increased amounts of energy for consumption in future or for situations of emergencies. While electricity produced by turbines can be stockpiled in batteries, it is expensive and inefficient.

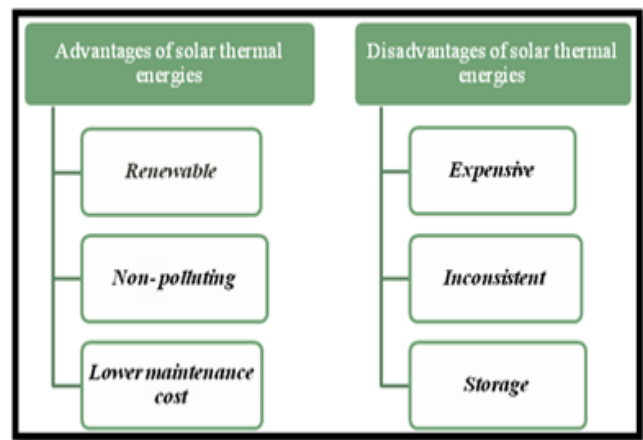


Figure 2: Advantages and disadvantages of Solar Thermal Energy
(Source: [9] 2019)

Effectiveness of solar thermal energy in industrial process

Solar energies help several industries to create hot water, hot air and conditioning. The air companies are making their trust in solar thermal energy more than conventional energy. Solar thermal energies are renewable and sustainable. Conventional energies are not renewable for this reason companies are focusing on solar thermal energy. Solar thermal energy provides the alternative resources of energy and companies are not dependent on conventional energy nowadays as solar thermal energies provide the alternative resources. The maintenance fees of solar thermal energy are also lower than conventional energies ([8], 2018). This is another reason for depending on the solar thermal energies more than conventional energies companies are trying to use the solar thermal energies in their business and manufacturing process for its effectiveness.

Solar thermal energies also reduce the consumption of fossil companies that are continuously concerned with using renewable energies more than conventional energy. The O2 emission also reduces with the usage of solar thermal energy. However there are some problems implementing solar thermal energies that are costly and companies face trouble

for its extra costs. However the industries are trying to implement effective strategies to overcome these problems and using solar thermal energy for its effectiveness. The companies are using solar thermal energies nowadays because the continuous use of conventional energies is harmful for the environment. The customers are more concerned about the environment in recent days ([7], 2018). Companies are using solar thermal energy to create a positive brand image. In addition that it can be recognizing that the solar their energy creates an effective impact in the industries.

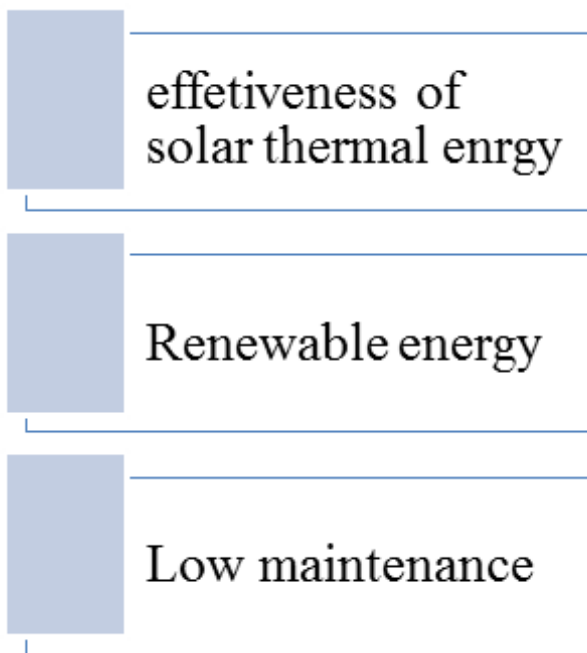


Figure 3: effectiveness of solar thermal energy
Source (MS word)

CONCLUSION

Solar thermal energy is significantly useful for industries; several industries are using solar thermal energy for its effectiveness. This type of energy provides hot air, hot water and air conditioning facilities. Companies are trying to improve the technologies that are more efficient and lower in cost. There are some advantages and disadvantages discussed in this study. Though the solar thermal energies are renewable and sustainable however this needs more money to implement companies face trouble for this reason. Engineers are trying to create more efficient technologies at an affordable price. In current days businesses and industries are showing their interest to generate electricity from renewable energy. Solar thermal energy is a renewable energy, and the maintenance cost is really low for these reason industries are trying to implement solar thermal energies. In this researcher the researcher employs the secondary data analysis process and secondary thematic analysis process and collects all the reliable data and information to create this study more reliable.

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