

PROJECT REPORT ON

SOLAR WATER HEATER

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UNDER THE GUIDANCE OF

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WEST BANGAL

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CERTIFICATE

This is to certify that the project entitled, "SOLAR WATER HEATER" has been successfully Complete by AKASH DOLAI (Reg.No.-D192008833) along with his team members, at GHATAL GOVERNMENT POLYTECHNIC in The Department of Mechanical Engineering under my supervision and guidance in the fulfillment of requirements of 6th semester, Diploma in Mechanical Engineering of WBSCT&VE & SD (TECHNICAL EDUCATION DIVISION), KARIGARI BHAVAN, WB.

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H.O.D

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ABSTRACT

In solar heater water is heated by the use of solar energy. Solar heating systems are generally composed of solar thermal collectors, fluid system to move the heat from the collector to its point of usage. The systems may be used to heat water for a wide variety of uses, including home, business and industrial uses.

In many climates, a solar heating system can provide up to 85% of domestic hot water. Solar energy provides power security, enabling you to continue getting power even when utility power is disrupted. Business can save 40% to 80% on electric or fuel bills by replacing their conventional water heater with a solar water heating system.

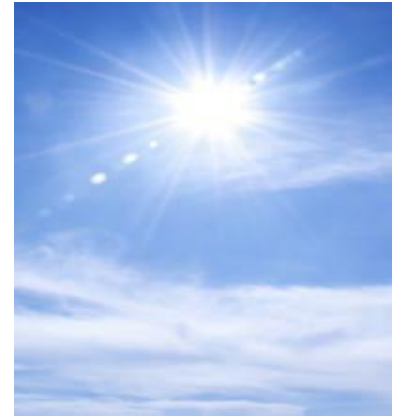
Home solar heating can lead to saving of 85% on utility bills over the costs of electric water heating. Using solar energy is free and it is an environmentally friendly source of power. Solar energy can be integrated with existing energy methods, such as wood stove and demand boiler, to produce 100% of the required thermal loads.

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What is a Solar Water Heater?

➔ Solar water heater is a device that use the solar energy from the sun to generate heat (not electricity) which can then be used to heat water.



INTRODUCTION :

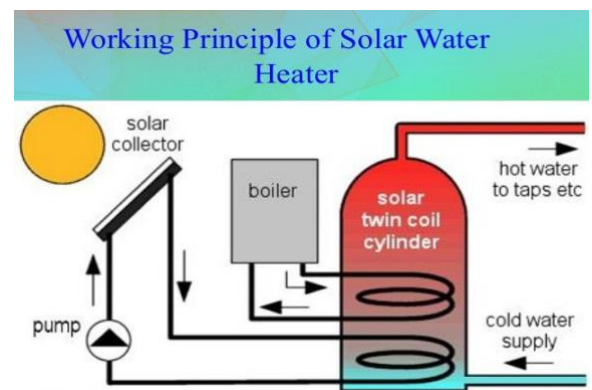
- Heat the water by using solar energy.
- Solar water heating is a well establish, highly effective, pollution free technology for water that can be used through the country for various Applications.
- The solar water heater capture the sun's heat in the form of discrete packets Of photons, that sun heat is utilized in the system for heating the water

WORKING PRINCIPLE :

First of all the Sun rays fall on the Solar Collector, which is consisted a black absorbing surface (absorber) that absorbs solar radiation, and transfers the heat energy to water flowing through it.

After this, heated water is collected in a tank, insulated to prevent heat loss. Then the circulation of water from the tank through the collector and back to the tank continues automatically.

An Insulated Storage Tank of a Solar Water Heater is useful to collect solar energy by collector panels to store hot water.



COMPONENTS:

- Solar collectors convert sunlight to heat energy.
- Heat transfer fluids carry the heat from solar collectors to Water storage tanks. In warm climates, the heat transfer fluid May be potable water; in cold climates, a non-toxic anti-freeze.
- Heat exchangers transfer solar heat from the transfer fluid to The home water supply.
- Storage tanks store hot water when it is not in use.
- Pumps control the flow of the transfer fluid through the Collector and storage tank.
- Pump station/system controller.

SOURCE OF MATERIALS :

Large number of components uses in this project are collected from nearby market. And some of this collect from online market.

MY Contribution :

In this project there is big role of me from collecting Materials about this project , collecting some important data & component for making this project to implement the plan to reality. And make this beautiful and successful.

SOLAR PANEL:-

The solar water heater absorbs light by means of a collector placed on the roof and converts it into heat. It passes this heat to a water tank by means of a circulating pump. This exchange is triggered by the thermal regulator, but only when the collector is hotter than the water in the tank. This prevents the circulating pumps using electricity needlessly. Conversely, it also prevents overheating. The efficiency of the collectors is at its highest at midday, in summer, when the sky is cloudless, and when the collectors face south. When there is insufficient sunlight, the water is preheated and a back-up system takes over to bring the water to the required temperature. This system can therefore be used to produce hot water at a constant temperature throughout the year without emitting any CO₂.



SOLER WIRE: -

Solar wires, used to connect the components of a photovoltaic system, come in various types. Typically, it connects four components: the solar panel, the inverter, the charge controller and the batteries.

Choosing an appropriate type of wire in a PV system is crucial to its operation and efficiency. Using a wrong solar wire might not deliver the appropriate voltage and fail to power up the electrical units or result in the battery bank's failure to charge fully.

Wire composition: -

In general, there are two types of solar panel wires either single or stranded wire. As the name suggests, single or solid wire contains single metal wire core while stranded wire consists of multiple stranded conductors.



WATER TANK: -

Water tanks are used to provide storage of water for use in many applications, drinking water, irrigation agriculture, fire suppression, agricultural farming, both for plants and livestock, chemical manufacturing, food preparation as well as many other uses. Water tank parameters include the general design of the tank, and choice of construction materials, linings. Various materials are used for making a water tank: plastics (polyethylene, polypropylene), fiberglass, concrete, stone, steel (welded or bolted, [citation needed] carbon, or stainless). Earthen pots, such as matki used in South Asia, can also be used for water storage. Water tanks are an efficient way to help developing countries to store clean water.

In this model water tank is used for collecting water.



GLOW PLUG: -

A glow plug (alternatively spelled as glow plug or glow-plug) is a heating device used to aid in starting diesel engines. In cold weather, high-speed diesel engines can be difficult to start because the mass of the cylinder block and cylinder head absorb the heat of compression, preventing ignition. Pre-chambered engines use small glow plugs inside the pre-chambers. Direct-injected engines have these glow plugs in the combustion chamber.

A standard glowplug

The glowplug is a pencil-shaped piece of metal with a heating element at the tip. This heating element, when electrified, heats due to its electrical resistance and begins to emit light in the visible spectrum, hence the term glowplug. The visual effect is similar to the heating element in a toaster. The fuel injector spray pattern then impinges directly upon the hot tip of the glow plug during the injection of fuel at top dead center. This ignites the fuel even when the engine is insufficiently hot for normal operation, which reduces the cranking time required to start the engine.



BATTERY: -

Batteries are a collection of one or more cells whose chemical reactions create a flow of electrons in a circuit. All batteries are made up of three basic components: an anode (the '-' side), a cathode (the '+' side), and some kind of electrolyte (a substance that chemically reacts with the anode and cathode).

When the anode and cathode of a battery is connected to a circuit, a chemical reaction takes place between the anode and the electrolyte. This reaction causes electrons to flow through the circuit and back into the cathode where another chemical reaction takes place. When the material in the cathode or anode is consumed or no longer able to be used in the reaction, the battery is unable to produce electricity. At that point, your battery is "dead."

In this model battery use for help to solar to heating water.



➔ **MATERIAL PRICE**

1. **SOLAR PANEL:** - Minimum price this material Rs.400-17000.
But we will use the medium priced material in this Model.
2. **WATER TANK:** - There are many types of water tanks in the market but we will use small water tank in this model. That water tank price is minimum 100.00 Rs.
3. **GLOW PLUG:** - Depending on the quality and brand, we can get a plug for anywhere between Rs. 100 to 500. But in this model we use 12 volts glow plug and the range of price is minimum Rs.200.
4. **BATTERY:** - We will use the battery to heat the water quickly. In this model use battery price is minimum Rs.200.
5. **LED LIGHT:** - In this model we use led light for checking the power of solar panel.

BANEFITS OF SOLAR WATER HEATER: -

The energy saved from using a solar water heating system helps to reduce domestic energy demand from power utilities. A solar water heater is a long-term investment that will save money spent on water heating after the system has paid for itself. In addition to the reduced electrical energy and cost savings from water heating, there are several other benefits derived from using the sun's energy to heat water.

Most solar water heaters come with an additional water tank, which feeds the conventional hot water tank. Users benefit from the larger hot water storage capacity and the reduced likelihood of running out of hot water.

Some solar water heaters do not require electricity to operate. For these systems, hot water supply is secure from power outages, as long as there is sufficient sunlight to operate the system. Solar water heating systems can also be used to directly heat swimming pool water, with the added benefit of extending the swimming season for outdoor pool applications (Ret screen, 2012).

FUTURE SCOPE: -

The primary objective of the study is to understand and gain insights about the India solar water heater market and its segmental analysis by technology, by collector type, by end use and by regional share.

To estimate and forecast market size of India solar water heater market.

To categorize and forecast India solar water heater market by technology such as Active Solar Water Heating System and Passive Solar Water Heating System.

To categorize and forecast India solar water heater market by collector type such as Flat-Plate Solar Collector and Evacuated-Tube Solar Collector.

To categorize and forecast India solar water heater market by end use Residential, Commercial & Industrial.

To categorize and forecast India solar water heater market by regions North, East, West and South.

To identify major drivers & challenges for India solar water heater market.

To identify major trends in India solar water heater market.

To profile major companies operating in India solar water heater market.

APPLICATION :

- 1) Domestic Flats Bungalows and Apartments.
- 2) Commercial Hotels Hospitals Hostels and Dormitories.
- 3) Industrial Process Industries. Preheating boiler feed water. In domestic sector. Hot water is used for bathing. Washing of clothes & utensils etc. The requirement may, however, vary with the season of the year & number of family members. Our experience says that on an average 30 to 35 litres of water at 50 to 55° C. is consumed by an individual.

CONCLUSION :

- Solar water heating is a well established, highly effective. Pollution free technology for water that can be used through the country for various applications.
- > After watching the present scenario of the energy crisis we can say that solar water heater is not only the technology but also the need of the world.

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DECLARATION

I hereby declare that this submission is our team work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgement has been made in the text.

Signature:-

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