



***HAREDA***

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PROCEDURE FOR INSTALLATION OF  
SOLAR WATER HEATING SYSTEMS  
IN HARYANA

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**Haryana Renewable Energy Development Agency(HAREDA)**  
(Department of Renewable Energy , Haryana)  
**SCO-48, Sector-26, Chandigarh**  
Tel: 0172-2790918, 2791917 Fax: 01722790928  
e-mail-hareda@chd.nic.in website- [www.hareda.gov.in](http://www.hareda.gov.in)

## **INTROUCTION TO SOLAR WATER HEATING SYSTEM**

Haryana is blessed with Solar Energy in abundance at no cost. The solar radiation incident on the surface of the earth can be conveniently utilized for the benefit of human society. One of the popular devices that harnesses the solar energy is solar water heating system (SWHS). Solar Water Heating is a Renewable Technology which can be used to meet the hot requirement in domestic, Commercial and Industrial Sector.

A solar water heater consists of a collector to collect solar energy and an insulated storage tank to store hot water. The solar energy incident on the absorber panel coated with selected coating transfers the heat to the riser pipes fitted underneath the absorber panel. The water passing through the risers get heated up and is delivered to the storage tank. The re-circulation of the same water through abosrber panel in the collector raises the temperature to 80° C (Maximum) in a good sunny day. The total system with solar collector, storage tank and pipelines is called solar hot water system.

Broadly, the solar water heating systems are of two categories. They are : closed loop system and open loop system. In the first one, heat exchangers are installed to protect the system from hard water obtained from bore wells or from freezing temperatures in the cold region. In the other type, either thermosyphon or forced circulation system, the water in the system is open to the atmosphere at one point or other. The thermosyphon systems are simple and relatively inexpensive. They are suitable for domestic and small institutional systems, provided the water is treated and potable in quality. The forced circulation systems employ electrical pumps to circulate the water through collectors and storage tanks.

The choice of system depends on heat requirement, weather conditions, heat transfer fluid quality, space availability, annual; solar radiation, etc. The SHW systems are economical, pollution free and easy for operation in warm countries like outs.

Based on the collector system, solar water heaters can be of two types.

### **Flat Plate Collectors (FPC) based Solar Water Heaters (SWH)**

The Solar radiation is absorbed by Flat Plate Collectors which consists of an insulated outer metallic box covered on the top with glass sheet. Inside there are blackened metallic absorber (selectively coated) sheets with built in channels or riser tubes to carry water. The absorber absorbs the solar radiation and transfers the heat to the flowing water. There are 83 BIS approved manufacturers of Solar Flat Plate Collectors.

### **Evacuated Tube Collectors (ETC) based Solar Water Heaters (SWH)**

Evacuated Tube Collector is made of double layer borosilicate glass tubes evacuated for providing insulation. The outer wall of the inner tube is coated with selective absorbing material. This helps absorption of solar radiation and

transfers the heat to the water which flows through the inner tube. There are 14 MNES approved ETC based solar water heating suppliers. However, this being a new technology, it is advised that before installing the ETC based system, the buyer should ensure proper specification and test reports of the system issued by the Ministry of Non-conventional Energy Sources, Govt. of India.

Solar water heating is now a mature technology. Wide spread utilization of solar water heater scan reduce a significant portion of the conventional energy being used for heating water in homes, factories and other commercial and institutional establishments. Internationally the market for solar water heaters has expanded significantly during the last decade.

### **Salient Features of Solar Water Heating Systems**

Solar Hot Water system turns could water into hot water with the help of sun's rays.

- Around 60 deg. – 80 deg. C temperature can be attained depending on solar radiation, weather conditions and solar collector system efficiency
- Hot water for homes, hostels, hotels, hospitals, restaurants, dairies, industries etc.
- Can be installed on roof-tops, building terrace and open ground where there is no shading, south orientation of collectors and over-head tank above SWH system
- SWH system generates hot water on clear sunny days (Maximum), partially clouded (moderate) but not in rainy or heavy overcast day
- Only soft and potable water can be used
- Stainless Steel is used for small tanks whereas Mild Steel tanks with anti-corrosion coating inside are used for large tanks
- Solar water heaters (SWHs) of 100-300 litres capacity are suited for domestic application.
- Larger systems can be used in restaurants, guesthouses, hotels, hospitals, industries etc.

### **Space Requirement**

Approx. 3 sq. meter shadow free South facing space is required for 100 lpd system having one collector.

### **Fuel Savings:**

Depending upon the fuel replaced, the annual savings by a 100 LPD solar water heater are as under:

Fuel	Calorific Value ( K Cal/Kg)	Efficiency (%)	Fuel Saved (KG/Annum)
Firewood	4708	17.3	2127
Kerosene	9122	50.0	380
LPG	10882	60.0	266
Charcoal	6940	28.0	891
Diesel	10004	75.0	231
Electricity		90.0	2230 (KWH)

### **Avoided utility cost on generation:**

The use of 1000 nos. of Solar water heating systems of 100 litres capacity each, can contribute to a peak load shaving of 1 MW, assuming that 50% of the Electrical Geysers, each of 2 KW capacity are in use during peak hours.

### **Environmental benefits:**

A SWH of 100 litres capacity can prevent emission of 1.5. tonnes of carbon-dioxide per year.

**Life :** 15-20 years

**Approximate cost :** Around Rs. 22000 for a 100 litres capacity SWH  
Rs. 140-170 per installed litre for higher capacity systems

**Payback period:** 2-3 years when electricity is replaced  
4-5 years when furnace oil is replaced  
6-7 years when coal is replaced

Though the initial investment for a solar water heater is high compared to available conventional alternatives, the return on investment has become increasingly attractive with the increase in prices of conventional energy. The pay back period depends on the site of installation, utilization pattern and fuel replaced.

### **ESTIMATES OF REQUIREMENT OF HOT WATER –SOME USEFUL THUMB RULES**

Application	Typical Requirement of Hot Water at 60 C
Household bathing using buckets	10-20 litres per person per bath
Household bathing using shower	20-30 Litres for 10 Minute bath
Shaving, while a tap runs	10-15 Litres
Household bathing in bathtub ( one filling)	75-100 Litres
Wash basin ( hand wash, brushing of teeth, etc.)	3-5 Litres per person per day
Kitchen washing	2-3 Litres per person per day
Dish washer	40-50 Litres per washer cycle
Clothes washing machine	7-110 Litres per Wash cycle
Industrial Canteen	3-5 Litres per worker per day
Small unstarred hotels	30-40 litres per occupant per day
Starred hotels	100-150 Litres per room per day
Hospitals	10-15 Litres per bed per day
Multistoreyed apartments	
i. for flats having two bedroom	Minimum 100lpd per flat
ii. for flats having three bedrooms or more	Minimum 200 lpd per flat
iii. for community system	Capacity may be increased by 25%

Note : All the estimates are given for hot water at 60° C. This hot water has to be mixed with cold water to bring down its temperature to endurance limits. Mixing will also increase quantity of hot water actually required.

### **MANDATORY USE OF SOLAR WATER HEATING SYSTEMS**

Vide Haryana Government Gazette Notification No.22/52/2005-5P dated 29/7/05, the use of solar water heating systems has been made mandatory in **industries where hot water is required for processing, hospitals and Nursing Homes, Govt. Hospitals, Hotels, Motels and Banquet Halls, Jail barracks, Canteens, Housing Complexes set up by Group Housing Societies/Housing Boards, all Residential buildings built on a plot of size 500 sq.yds. and above falling within the limits of Municipal Committees/Corporations and HUDA Sectors, all Govt. buildings, Residential Schools, Educational Colleges, Hostels, Technical/Educational Institutes, District Institute of Education and Training, Tourism Complexes and Universities etc. HAREDA has been declared as an approved sources for supply and installation of solar water heating systems in the State to ensure installation of optimally designed quality systems as per the specifications.**

In order to streamline the installation of Solar Water Heating Systems in the State, following procedure has been laid:

### **PROCEDURE FOR INSTALLATION OF SOLAR WATER HEATING SYSTEMS**

#### **1. Application:**

The applicant will be required to apply in the prescribed format for approval of provision of Solar Water Heating Systems in the buildings at the time of start of construction of the building. The application must be accompanied by approved drawing of the building. The format would include, name of the building, architect, occupancy. No. of toilets, kitchens, covered area and area available in the terrace for installation of SWHS. For domestic systems and systems up to 1000 lpd capacity the application should be submitted to the ADC-cum-CPO (IREP) office of the concerned district. For non-domestic, Group Housing, industrial and commercial categories, systems of capacity more than 1000 lpd capacity the application should be submitted to the Director, HAREDA, SCO No.-48, Sector-26, Chandigarh.. The ADC Office/HAREDA may call for any additional information if required for assessment of hot water requirement of the proposed building.

#### **2. Fee**

The applicant will be required, to pay non-refundable processing fee of *Rs. 50/- per square meter of the collector area* of the system in the shape of a Demand Draft in favour of Director, HAREDA payable at Chandigarh along with the application.

#### **2. Assessment of hot water required:**

Within one month from the date of receipt of application, the site will be inspected by the Project Officer/ APO of the concerned district/HAREDA for the assessment of hot water requirement of the Project.

Based on the assessment of hot water, a letter for making provision of recommended capacity of Solar Water Heating System for the proposed building will be issued. The ADC offices shall issue the letter for accordingly approval on the capacity of the systems to be taken up for installation of capacities upto 1000 LPD. While for capacities more than 1000 LPD, the letter recommending the capacity of SWHS in the proposed building will be issued by the Director, HAREDA.

**4. Supervision of Installation:**

The applicant will be required to intimate the ADC office/HAREDA about the start of installation of Solar Water Heating System. The site will be inspected by the PO/APO during the installation phase to check the quality and capacity of the system.

**5. Issuance of NOC**

Once the Solar Water Heating System has been installed, the ADC office will issue the NOC to the concerned authority i.e. HUDA/HSIDC/Municipal Corporation/ Urban Dev. Department after verifying the installation of solar Water Heating system in case of system upto 1000 LPD capacity. For systems of capacity more than 1000 LPD, the NOC will be issued by Director, HAREDA after joint inspection by a team of officers from the concerned district and HAREDA.

**6. Installation of SWHS on deposit work basis**

HAREDA has expert manpower to design, supervise and install Solar Water Heating Systems as per the BIS specifications. HAREDA has been declared approved source for supply, installation and commissioning of Solar Water Heating Systems in the Haryana State. For the building project of private developers also, HAREDA may get the Solar Water Heating systems installed for which it will charge 5% of the system cost as service charges.

## **FORMAT FOR APPLICATION**

1. Name of the applicant:
2. Complete address
3. Site Address
4. Name of the architect:
5. Details of the site
6. Total covered area of the project:
7. No. of dwelling units
1. No. of toilets in each dwelling unit(DU):
9. No. of kitchens in each dwelling unit
1. Occupancy in each DU:
11. Building plan attached
12. Terrace plan attached:
13. Consultants report on installation of SWHS attached;

14. Details of processing fee :

D.D. No.  
Amount

Dated  
Bank

Signature of the authorised signatory