

# 35 FABRICATION OF SOLAR HOT WATER SYSTEM



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## 1. INTRODUCTION

The "Fabrication of Solar Hot Water System" project is a promising micro and small-scale investment opportunity in Uttarakhand, India. This profile serves as a valuable reference for aspiring entrepreneurs looking to engage in the renewable energy sector within the region. The project involves the fabrication of solar hot water systems, aligning with Uttarakhand's commitment to sustainable energy solutions.

## 2. PRODUCT & ITS APPLICATION

The core objective of the "Fabrication of Solar Hot Water System" project is to manufacture and provide solar hot water systems. These systems find applications in various sectors, including:

- **Residential Use:** Solar hot water systems offer homeowners an eco-friendly and cost-effective solution for heating water for bathing, cleaning, and domestic purposes.
- **Hospitality Industry:** Hotels, resorts, and guesthouses in Uttarakhand can benefit from solar hot water systems to provide guests with a sustainable and energy-efficient hot water supply.
- **Educational Institutions:** Schools, colleges, and universities can adopt solar hot water systems to reduce their carbon footprint and energy costs for student hostels and facilities.
- **Healthcare Facilities:** Hospitals and healthcare centers can use solar hot water systems for sanitation and patient care.
- **Industrial Applications:** Industries requiring hot water for various processes, such as food processing, can utilize solar hot water systems to cut down on energy expenses.
- **Tourism Sector:** Given Uttarakhand's popularity as a tourist destination, the tourism sector can adopt solar hot water systems in lodges, campsites, and adventure sports facilities.

The project not only caters to the growing demand for fresh and dried mushrooms in the local and regional markets but also offers opportunities for value addition through processing and product diversification.

## 3. DESIRED QUALIFICATION FOR PROMOTER

Prospective entrepreneurs aiming to establish a "Fabrication of Solar Hot Water System" venture in Uttarakhand need technical knowledge in solar energy systems and heating technologies, complemented by strong business acumen for financial planning and marketing. Understanding local market trends, ensuring quality assurance, and fostering a sustainable approach are essential. Building a local network with suppliers and customers, prioritizing customer service, and adhering to regulatory compliance are also crucial for success. Overall, a combination of technical expertise, business skills, market insight, sustainability focus, and regulatory compliance is vital for effectively running this venture in the renewable energy sector.

## 4. INDUSTRY OUTLOOK AND TRENDS

The "Fabrication of Solar Hot Water System" industry in Uttarakhand is set for expansion due to several factors. These include the rising demand for energy-efficient water heating solutions driven by environmental concerns, supported by government initiatives offering incentives for renewable energy adoption. Additionally, solar hot water systems align with energy conservation efforts and cater to the tourism and hospitality sector's need for eco-friendly amenities. Both residential and commercial sectors show promise for adoption, while technological advancements enhance system efficiency. Establishing local manufacturing units not only boosts economic growth but also generates employment opportunities in Uttarakhand.

## 5. MARKET POTENTIAL AND MARKETING ISSUES; IF ANY

The "Fabrication of Solar Hot Water System" project in Uttarakhand presents significant market potential driven by several factors. The region's high solar insolation allows for efficient water heating, attracting consumers seeking to reduce energy costs. Government incentives further incentivize adoption, particularly in the tourism sector, where eco-friendly amenities are valued. Residential and industrial sectors also show promise, with consumers increasingly opting for sustainable solutions. However, entrepreneurs may face marketing challenges such as consumer awareness, initial cost perception, and competition. Addressing these issues through education, pricing strategies, and quality service provision is crucial. Additionally, navigating regulatory compliance, seasonal demand variations, and distribution challenges are key to establishing a successful venture in the solar hot water system market in Uttarakhand.

Some of existing players in similar business:

- **InterSolar Systems Private Limited:** Village Sundran, Chandigarh, Dera bassi, Mohali-140507, Punjab, India
- **Stellar Renewables Private Limited:** Khasra No 12 22 Sanoli Jalalpur Road Village Jalalpur 1 Tehsil Cross River Mall, Kurar, Panipat-132104, Haryana, India
- **Shrishti enterprises:** 144, Shastri Nagar, Indira Nagar, Seema Dwar, Near Indra Nagar Police Chowki, Indra Nagar Colony, Dehradun-248001, Uttarakhand, India

## 6. RAW MATERIAL REQUIREMENTS

The "Fabrication of Solar Hot Water System" project requires various raw materials and components for manufacturing solar hot water systems. These include:

- **Solar Collectors:** High-quality solar collectors, including flat-plate collectors or evacuated tube collectors, are essential for capturing and transferring solar energy to heat water.
- **Insulation Materials:** Insulation materials, such as thermal insulation and glass wool, are used to minimize heat loss from the solar hot water system.
- **Storage Tanks:** Durable storage tanks, typically made of stainless steel or coated with a corrosion-resistant material, store the heated water for later use.
- **Piping and Fittings:** Piping, connectors, and fittings are necessary to circulate water through the system efficiently.
- **Heat Exchangers:** In some systems, heat exchangers facilitate the transfer of heat from the solar collector to the water.
- **Pumps and Circulation Systems:** Solar hot water systems may require pumps and circulation systems to ensure proper water flow and heat transfer.
- **Control Systems:** Electronic control systems and sensors regulate the temperature and operation of the system for optimal efficiency.
- **Mounting Structures:** Robust mounting structures and supports secure the solar collectors in the desired position for maximum sun exposure.

Safety Components: Safety devices such as pressure relief valves and temperature control mechanisms ensure safe operation.

Some of suppliers of raw materials:

- Lightsun Energy Solution, Chakrata Road, Dehradun KTY, Dehradun - 248001 (Sahaspur, Near Veshno Mata Mandir)
- Pandit G Solar Sales And Service: Inder Road, Dalanwala, Dehradun KTY, Dehradun - 248001 (Near Auto Stand)
- Swastik Group Of Industries: Unit No-229 2nd Floor, Gurgaon Sector 48, Gurgaon - 122001 (Inside Jmd Megapolis)
- Jakson Solar: A-43, Phase II Extension, Noida Phase 2, Noida - 201305

## 7. MANUFACTURING PROCESS

The manufacturing process for fabricating solar hot water systems begins with sourcing high-quality components like solar collectors, insulation materials, storage tanks, and control systems from reputable suppliers. These components are then assembled with precision, focusing on alignment and sealing to maximize energy capture. Integration of insulation materials into the storage tank minimizes heat loss. Piping, fittings, pumps, and circulation systems are installed to ensure efficient water flow. Electronic control systems and sensors are incorporated to monitor and regulate water temperature and system operation. Rigorous quality checks and testing are conducted to ensure compliance with performance and safety standards. The various components are then assembled into the final solar hot water system and packaged for transportation and installation. Distribution channels are established, and installation services are offered to customers to ensure proper setup and operation of the system.

The Bureau of Indian Standards (BIS) has standardized flat plate collectors (FPC) for solar water heaters in IS 12933; 2003.

Here are some other BIS standards for solar water heaters:

- IS 16544: 2015: All glass evacuated solar water heating systems
- IS 12976 (1990): Code of practice for solar water heating systems
- IS 13129-2 (1991): Domestic water heating

## 8. MANPOWER REQUIREMENT

Sr. No	Particulars	No.	No of month in year	Wages/Salaries per month (Rs. In Lakhs)	Annual Expense (Rs. In Lakhs)
1	Self-employed	1	-	-	-
2	Skilled Person	2	12	0.2	4.8
3	Semi-skilled Person	3	12	0.15	5.4
4	Unskilled	2	12	0.12	2.88
	<b>Total</b>				<b>13.08</b>

## 9. IMPLEMENTATION SCHEDULE

Sr. No.	Activity	Time Required (in months)
1	Acquisition of premises	1
2	Construction (if applicable)	1.5
3	Procurement & installation of Plant & Machinery	2.5
4	Arrangement of Finance	1
5	Recruitment of required manpower	1
6	Total time required (some activities shall run concurrently)	3

## 10. COST OF PROJECT

Sr. No	Particulars	Annual Expenses (Rs. in lakhs)
1	Land	-
2	Building (Rented)	-
3	Plant & Machinery	10.90
4	Equipment and Furniture Exp.	1.55
5	Misc. Fixed Asset	0.02
6	Preoperative & Preliminary Exp.	0.20
7	Working Capital	7.08
	<b>Total Project Cost</b>	<b>19.75</b>

## 11. MEANS OF FINANCE

Bank-term loans are assumed @ 60%

Sr. No.	Particulars	Annual Expenses (Rs. in lakhs)
1	Promoter's contribution	7.90
2	Bank Finance	11.85
	<b>Total</b>	<b>19.75</b>

## 12. LIST OF MACHINERY REQUIRED

### A. Machinery

Sr. No	Particulars	Unit	Price per Unit (Rs. in lakhs)	Total Amount (Rs. in lakhs)
1	Solar Collector Manufacturing Equipment	set	3.00	3.00
2	Tank Welding and Fabrication Machinery	set	1.50	1.50
3	Insulation Cutting and Sealing Machine	set	0.80	0.80
4	Piping and Fittings Assembly Equipment	set	0.50	0.50
5	Quality Control and Testing Tools	set	0.60	0.60
6	Electronic Control System Integration Tools	set	0.40	0.40
7	Mounting Structure Manufacturing Equipment	set	0.70	0.70
8	Safety Component Installation Tools	set	0.30	0.30
9	Material Handling Equipment	set	0.45	0.45
10	Workshop Tools and Safety Equipment	set	0.20	0.20
11	Welding Machines and Accessories	set	0.40	0.40
12	Solar Water Heating System Testing Equipment	set	0.55	0.55

<b>Total Amount</b>	<b>9.40</b>
Tax, Transportation, Insurance etc.	1.00
Electrification Exp.	0.50
<b>Grand Total Amount</b>	<b>10.90</b>

## B. Furniture & Equipment

Sr. No	Particulars	Unit	Price per Unit (Rs. in lakhs)	Total Amount (Rs. in lakhs)
1	Office Furniture and Workstations	set	0.50	0.50
2	Storage Cabinets and Shelving Units	set	0.25	0.25
3	Computer Systems and IT Equipment	set	0.80	0.80
	<b>Total Rs.</b>			<b>1.55</b>

1. Suryam Solar Energy  
Plot No. 1643, G.I.D.C.-2, Sabalpur,  
Rajkot Highway, Junagadh-362037,  
Gujarat, India
2. Akshar Enterprise  
Plot No. 4, Shiv Aradhna Industrial Estate,  
Kathlal Road, Kuha, Ahmedabad - 382433,  
Gujarat, India
3. Indygreen Technologies Private Limited  
B-126, 2nd Floor, Phase 1,  
Mayapuri Industrial Area Phase 1,  
New Delhi-110064, Delhi, India
4. Incisive Web Solution Private Limited  
208, S.F, sharan business, sector-26,  
D-mart, Pethapur, Gandhinagar-382041,  
Gujarat, India

## 13. PROFITABILITY CALCULATIONS

Sr. No	Particulars	Annual Expenses (Rs. in lakhs)
A.	Sales realisation	85.00
B.	Cost of production	
i)	Raw materials	55.25
ii)	Utilities	1.50
iii)	Manpower Cost (Salaries/wages)	13.08
iv)	Administrative expenses	0.70
v)	Packaging Cost	2.76
vi)	Material Lost Cost	2.76
vii)	Selling & distribution expenses	1.44
viii)	Repairs & maintenance	0.00
ix)	Rent	0.40
x)	Interest	1.35

xi)	Misc. expenses	0.00
	Total (B)	79.24
	Gross profit/loss (A – B)	5.76
	Less: Depreciation	1.17
C.	PBIT	4.59
D.	Income-tax	-
E.	Net profit/loss	4.59
F.	Repayment (Annual)	1.14
G.	Retained surplus (E-F )	3.45

#### 14. BREAKEVEN ANALYSIS

Fixed Cost	
Land & Building Rent	0.40
Depriciation	1.17
Interest	1.35
Manpower	3.92
<b>Total Fixed cost</b>	<b>6.84</b>
Variable cost	
Raw materials	55.25
Utilities	1.50
ManPower	9.16
Administrative expenses	0.70
Selling & distribution expenses	1.44
<b>Total Variable cost</b>	<b>68.05</b>
<b>Contribution margin</b>	<b>20%</b>
Break-Even Point in Value	34.22

#### 15. STATUTORY/GOVERNMENT APPROVALS

For entrepreneurs embarking on the "Fabrication of Solar Hot Water System" project in Uttarakhand, compliance with statutory and government regulations is paramount. Here are key approvals and permits required:

- A. Business Registration:** Register the business entity with the appropriate government authorities, such as the Registrar of Companies (ROC) for private limited or LLP registration.
- B. Factory License:** Depending on the scale of operations, acquire a factory license from the State Directorate of Factories and Boilers.
- C. Environmental Clearances:** Ensure compliance with environmental regulations and obtain necessary clearances from the State Pollution Control Board (SPCB) for environmentally friendly operations.
- D. Goods and Services Tax (GST) Registration:** Register for GST with the Goods and Services Tax Network (GSTN) to comply with India's indirect tax system.
- E. Quality Standards Compliance:** Ensure that the solar hot water systems meet the requisite quality standards and obtain certifications such as the Bureau of Indian Standards (BIS) certification.

## 16. BACKWARD AND FORWARD INTEGRATIONS

### A. Backward Integration

Backward integration in the "Fabrication of Solar Hot Water System" project involves activities that bring the business closer to the source of raw materials and enhance control over the supply chain. Potential strategies for backward integration include:

1. **Solar Collector Manufacturing:** Consider investing in or collaborating with solar collector manufacturing units to ensure a consistent supply of high-quality solar collectors for hot water systems.
2. **Tank and Insulation Production:** Establish or partner with manufacturing units capable of producing storage tanks and insulation materials to control costs and quality.
3. **Piping and Fittings Manufacturing:** Explore the possibility of in-house production or collaboration with manufacturers of piping and fittings to meet specific system requirements.

### B. Forward Integration

Forward integration focuses on activities that take the "Fabrication of Solar Hot Water System" business closer to end customers and markets. Potential strategies for forward integration include:

1. **Retail Outlets:** Establish dedicated retail outlets or showrooms in prominent locations within Uttarakhand to showcase and sell solar hot water systems directly to customers.
2. **Online Sales:** Develop a strong online presence through an e-commerce platform to reach a broader customer base, offering the convenience of online shopping.
3. **Installation and Maintenance Services:** Offer installation and maintenance services to ensure the long-term performance and satisfaction of customers, enhancing brand reputation.
4. **Distribution Network:** Build a robust distribution network to efficiently reach customers across different regions of Uttarakhand and neighboring areas.
5. **Export Opportunities:** Explore the export market for solar hot water systems, capitalizing on Uttarakhand's proximity to major cities and potential export hubs.

## 17. TRAINING CENTERS AND COURSES

For entrepreneurs and individuals interested in venturing into the "Fabrication of Solar Hot Water System" industry in Uttarakhand, it is essential to acquire the necessary knowledge and skills. Training centers and courses can play a pivotal role in building expertise and understanding the nuances of solar technology. Here are some notable training centers and courses relevant to this field:

### 1. National Institute of Solar Energy (NISE):

- NISE, an autonomous institution under the Ministry of New and Renewable Energy (MNRE), offers various training programs and courses related to solar energy technology. These programs encompass topics such as solar thermal systems, solar photovoltaics, and solar water heating systems.

### 2. Government Industrial Training Institutes (ITIs):

- Uttarakhand's ITIs offer courses in electrical and electronics engineering, providing a foundational understanding of electrical circuits and components, which are essential for working with solar hot water systems.

### 3. Renewable Energy Training Centers:

- Several renewable energy training centers and organizations conduct workshops and training sessions focused on solar technologies. These programs can range from basic introductions to advanced technical training.



#### **4. Solar Equipment Manufacturers' Training:**

- Some solar equipment manufacturers and suppliers offer training programs to individuals interested in fabricating and installing solar hot water systems. These programs provide insights into the specifics of the equipment they produce.

#### **5. Skill Development Initiatives:**

- Government-sponsored skill development initiatives often include courses related to renewable energy and solar technologies. These initiatives aim to enhance the employability of individuals in the renewable energy sector.

#### **6. Advanced Solar Technology Courses:**

- For individuals seeking in-depth knowledge, advanced courses in solar technology, including system optimization and integration with existing infrastructure, are available through various institutions.

#### **7. Safety and Compliance Training:**

- Training programs related to safety measures, compliance with industry standards, and certification processes are crucial for ensuring product quality and regulatory compliance.

Prospective entrepreneurs and individuals interested in the fabrication of solar hot water systems should explore these training options to gain the necessary skills and knowledge. These courses empower individuals to design, fabricate, install, and maintain solar hot water systems effectively, contributing to the growth of the renewable energy sector in Uttarakhand.

#### **Disclaimer**

Only few machine manufacturers/institutes are mentioned in the profile, although many machine manufacturers/institutes are available in the market. The addresses given for machinery manufacturers/institutes have been taken from reliable sources, to the best of knowledge and contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.