
Switch on the Sun
with
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SOLAR
SHiKSHA
A solar knowledge movement

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# DID YOU KNOW?

India is the world's **third largest solar power generator**. India has the largest solar harnessing potential, with an average of approximately **7 hours worth of sunlight available for over 300 days**.

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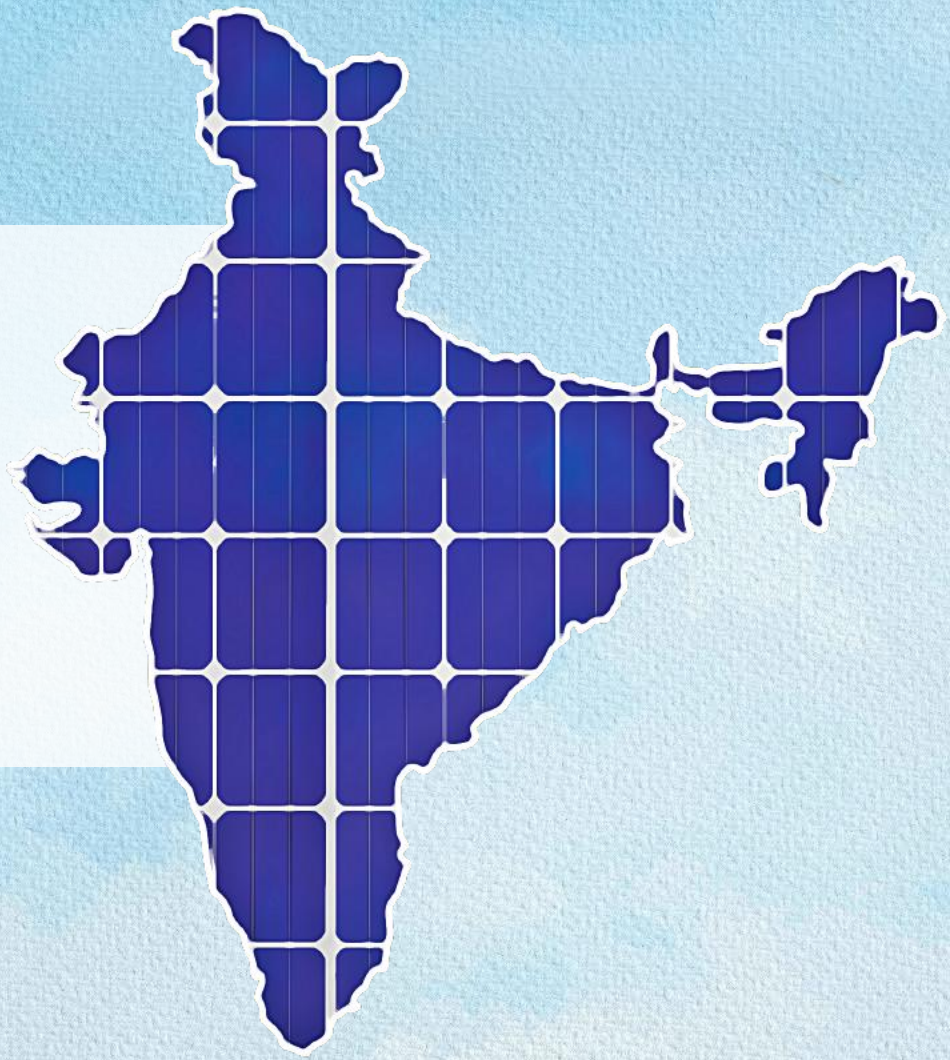
# DID YOU KNOW?

India receives approximately **₹30 lakh crore** worth of Solar Power annually if harnessed completely.



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# DID YOU KNOW?

In 2015, Cochin International Airport became the **world's first airport to be fully powered by solar energy,** saving approximately **15 crore rupees monthly**.

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# DID YOU KNOW?

**Over 1,000 households** have adapted to solar lights and heaters in the Himalayan Villages, making them energy-independent and **creating several job opportunities for the locals.**

# SOLAR ENERGY
# सौर ऊर्जा

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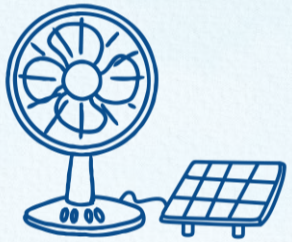
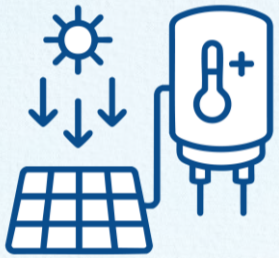
## रूप/Forms



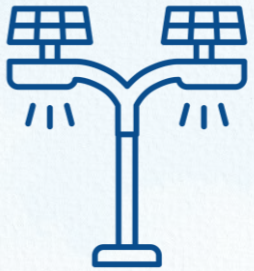
### विद्युत / Electricity

- Fans
- Tube lights
- Refrigerator
- Washing Machine



### ऊष्म / Heat

- Solar Cooker
- Solar Dryer
- Solar Water Heaters



### रोशनी / Light

- Solar Street Lights


SOLAR
SOLUTIONS

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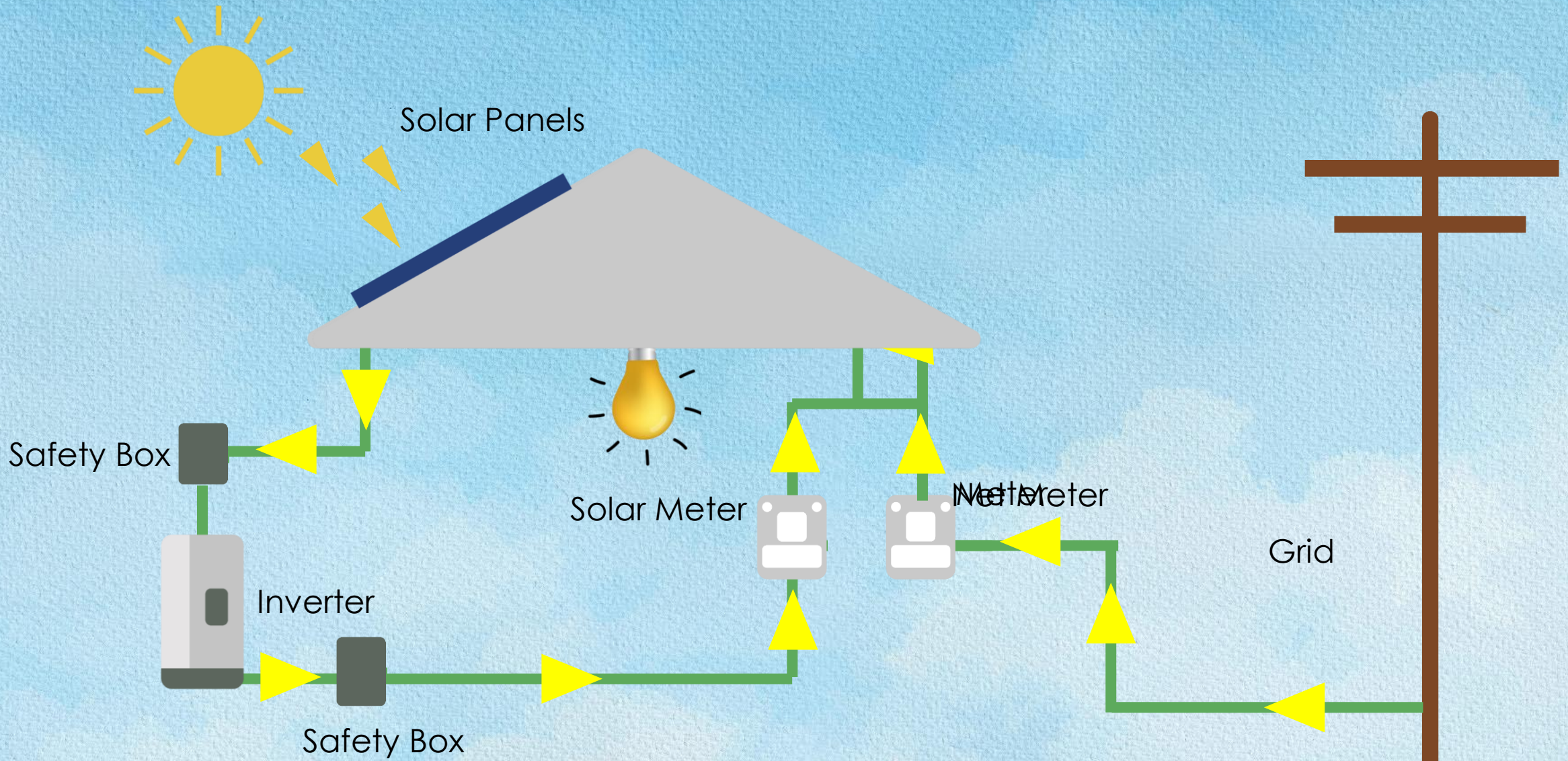
# ON GRID (NET METERING)

- Solar Power Plant is connected to the local electrical GRID
- If you are not generating enough electricity from solar, then you can use energy from the grid
- The excess energy generated in your system shall be rolled over
- A favorable option where there are space constraints
- No need to install batteries


Solar Panels
Safety Box
Solar Meter
Net Meter
Grid
Inverter
Safety Box

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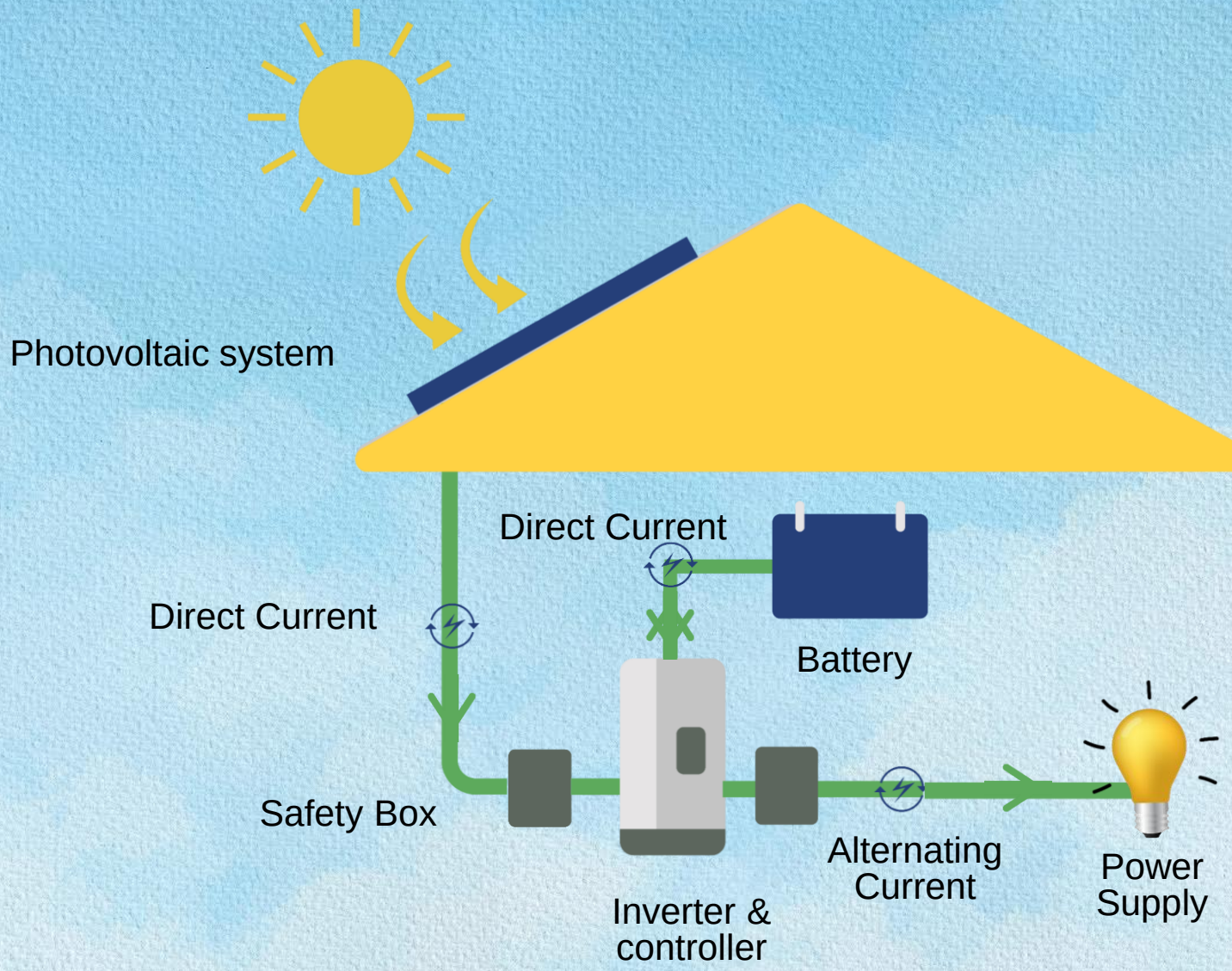
# OFF GRID

- The Solar Power Plant is not connected to the electricity grid
- Off-grid systems will be helpful for the regions where grid connectivity is not available or where there is frequent load - shedding
- Stores electricity in a battery so that electricity can be used during non-sunlight hours

https://apserc.nic.in/pdf/Solar_roof_top.pdf


Photovoltaic system
Direct Current
Direct Current
Battery
Safety Box
Inverter &
controller
Alternating
Current
Power
Supply

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# MYTHS ABOUT SOLAR

- Solar Panels have a low life expectancy
- Solar can only help you run a limited number of appliances
- Solar Power Plant requires constant maintenance
- Solar Power Plants harm the roof due to heat
- Solar Panels only work in warm areas
- Solar Panel do not work in cloudy weather

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# BENEFITS

## DIRECT

- Return of Investment On Grid: 2.5 to 3.5 years
- Return of Investment Off Grid: 4 to 4.5 years
- Free Electricity for up to 25 years
- Up to 80% monthly saving in electrical cost

## BONUS

- Ensure Power Security
- Encourages Power Independence
- Environmentally Friendly

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# CASE STUDY

## On-Grid (Net Metering) - Installation of 6 KWp Solar Rooftop Power Plant for Educational Institute

- Saradeswari Kanya Vidyapith in Hoogly has saved an annual sum of Rs 31,000 annually
- This rooftop power plant produces 8,100 units of electricity annually, and this power plant cumulatively offsets nearly 7.6 tons of carbon emissions every year, which is equivalent to 350 tree plantations

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# CASE STUDY

## Off-Grid Plant for Educational Institute

- The municipal school fully operates on an Off-Grid Solar System of 5 kW
- Generates 750 units per month, which saves Rs. 63,000 annually
- This reduces the environmental emissions by 8100 kgCO2 per annum which is equivalent to planting 115 trees

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# CASE STUDY

**Orphanage: Solar Panels of 6kW capacity were installed on the roof of The Hope House, Karigiri, Vellore generating 30 units of power per day.**

Resulting in:

- Reduced electrical cost by Rs. 10,000/- per month
- Generation of 30 units per day
- The savings help to pay for 75% of the monthly groceries to feed 20 people each month

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# PM SURYA GHAR: MUFT BIJLI YOJANA

**Aims**

- Install 1 crore Grid Connected Rooftop Solar (RTS) projects in the residential sector

**Eligibility**

- The household must be an Indian citizen.
- The household must own a house with a roof that is suitable for installing solar panels.
- The household must have a valid electricity connection.
- The household must not have availed of any other subsidy for solar panels.

**Benefits: Govt. Subsidy for residential households**

- For installations up to 2 kW, Rs. 30,000/- per kW
- For an additional 3 kW capacity, Rs. 18,000/- per kW

**Govt. Subsidy for Group Housing Society/ Resident Welfare Association (GHS/RWA)**

- Rs. 18,000 per kW

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## Off-Grid – Gov Schemes

# PRADHAN MANTRI JANJATI ADIVASI NYAYA MAHA ABHIYAN (PM JANMAN)

**Period: 2023-24 to 2025-26**

**Aims**

- Electrify one lakh un-electrified households (HHs) in Particularly Vulnerable Tribal Groups (PVTG) areas where electricity supply through the grid is not techno-economically feasible
- Provide solar lighting in 1500 Multi-Purpose Centres (MPCs) in PVTG areas
- Solar Home Lighting System (SHLS)
- Solar Mini-Grids
- Solarization of Multi-Purpose Centers (MPC)

(https://pib.gov.in/PressReleseDetailm.aspx?PRID=1990256&reg=3&lang=1)

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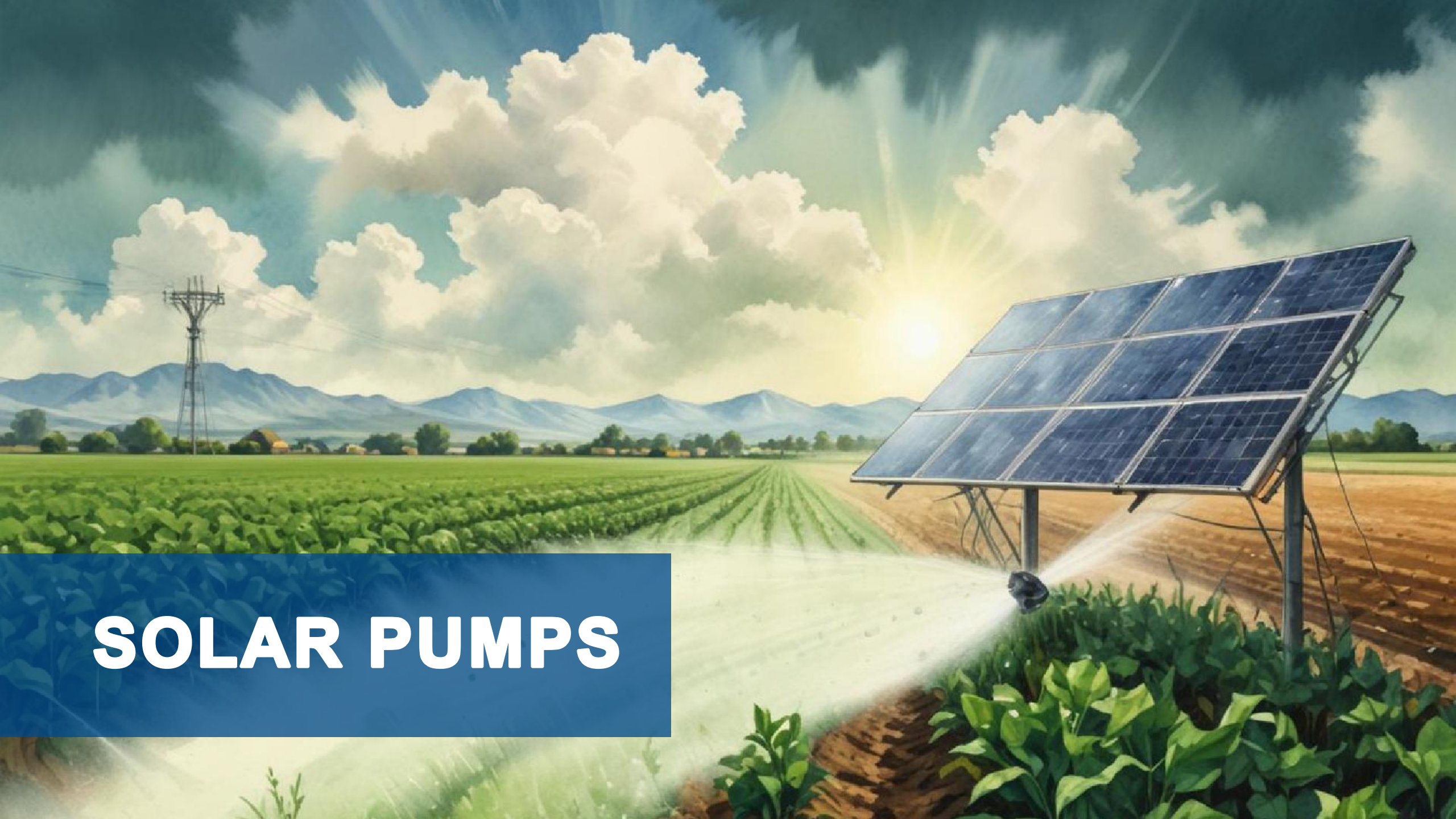
## On-Grid & Off-Grid – Gov Schemes

# SAUBHAGYA- PRADHAN MANTRI SAHAJ BIJLI HAR GHAR YOJANA

- Free metered connection for economically poor households and a charge of Rs. 500 for households other than poor, only after release of connection.
- Web-based real-time monitoring and updating of progress
- Standalone Solar PV systems for households located in remote/ difficult areas

(doc2021122321.pdf) • (Saubhagya | Government of India | Ministry of Power) • (Press Release: Press Information Bureau) (https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1945212)


SOLAR PUMPS

# SOLAR PUMPS

Solar Pumps can be installed on  bore wells, open wells, river streams and water reservoirs.

Solar Powered Pump can operate a motor from 1Hp to 5 Hp.

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# APPLICATIONS

Irrigation in remote areas where electricity is not available

Provide clean water to entire communities, powering water treatment facilities and distribution networks

A reliable source of water for livestock in remote areas

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# MYTHS ABOUT SOLAR PUMPS

- Solar Pumps are unreliable
- Solar Pumps are complicated to operate
- Solar Pumps are expensive to install
- Solar Pumps are inefficient

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# BENEFITS

## DIRECT

- No fuel cost - as it uses available free sunlight
- ROI 2.5 Years
- Easy to operate and maintain
- Reduces labor of collecting water from longer distances
- Creates wealth for farmers by improving crop yield

## BONUS

- Can be operated lifelong
- Equivalent to planting 45 trees
- Useful for clean, drinking water sanitation and irrigation
- Reduces the dependence on rain

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# CASE STUDY

## Solar pump cooperative supports climate-smart agriculture in Gujarat

- In the village of Dhundi, in Gujarat, solar pumps for irrigation were introduced from 2015 to 2016
- Use of Solar Powered Pumps has generated income for Farmer Cooperative from selling harnessed water and the Farmers are able to buy water at a lower price saving up to Rs **5.4 lakh per annum.**

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# SUBSIDY SCHEME - PRADHAN MANTRI KISAN URJA SURAKSHA EVAM UTTHAAN MAHABHIYAAN (PM KUSUM)

**Period: 2019 - 2026**

**Aims**

- 20 lakh independent Solar Powered Agricultural Pumps
- Transfer 15 lakh Agricultural Pumps from the grid to Solar Power
- The State Government will give at least a subsidy of 30%, and the remaining at-most 40% will be provided by the farmer. Bank finance can be availed by farmers, so the farmer must initially pay only 10% of the cost and the remaining up to 30% of the cost as a loan.


SOLAR COOKERS
& STOVES

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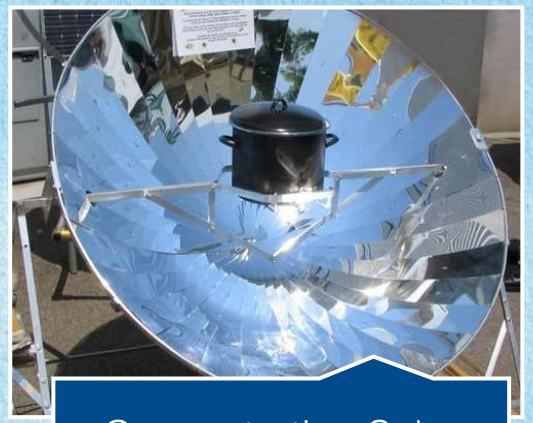
# Solar cookers have been designed to cater to specific cooking methods (boiling, frying, roasting, baking) and can be broadly classified into four types.

Solar Box Cookers (~100 °C)



Concentrating Solar Cookers (>100 °C) (e.g., Parabolic dish)

Advanced Round-the-Clock (RTC) with heat storage / Indoor Solar Cookers (>100 °C)

Community Solar Cookers

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# APPLICATIONS

Due to high temperature, it is possible to cook almost all traditional food, boiling rice, eggs, sauces and gravies

| | | |
|---|---|---|
| Purification of water and pasteurization on a larger scale | Boiling animal feed | Disinfect dry medical supplies |
| Sanitize dishes and utensils | Bakery food preparation | Extract wax from honey |

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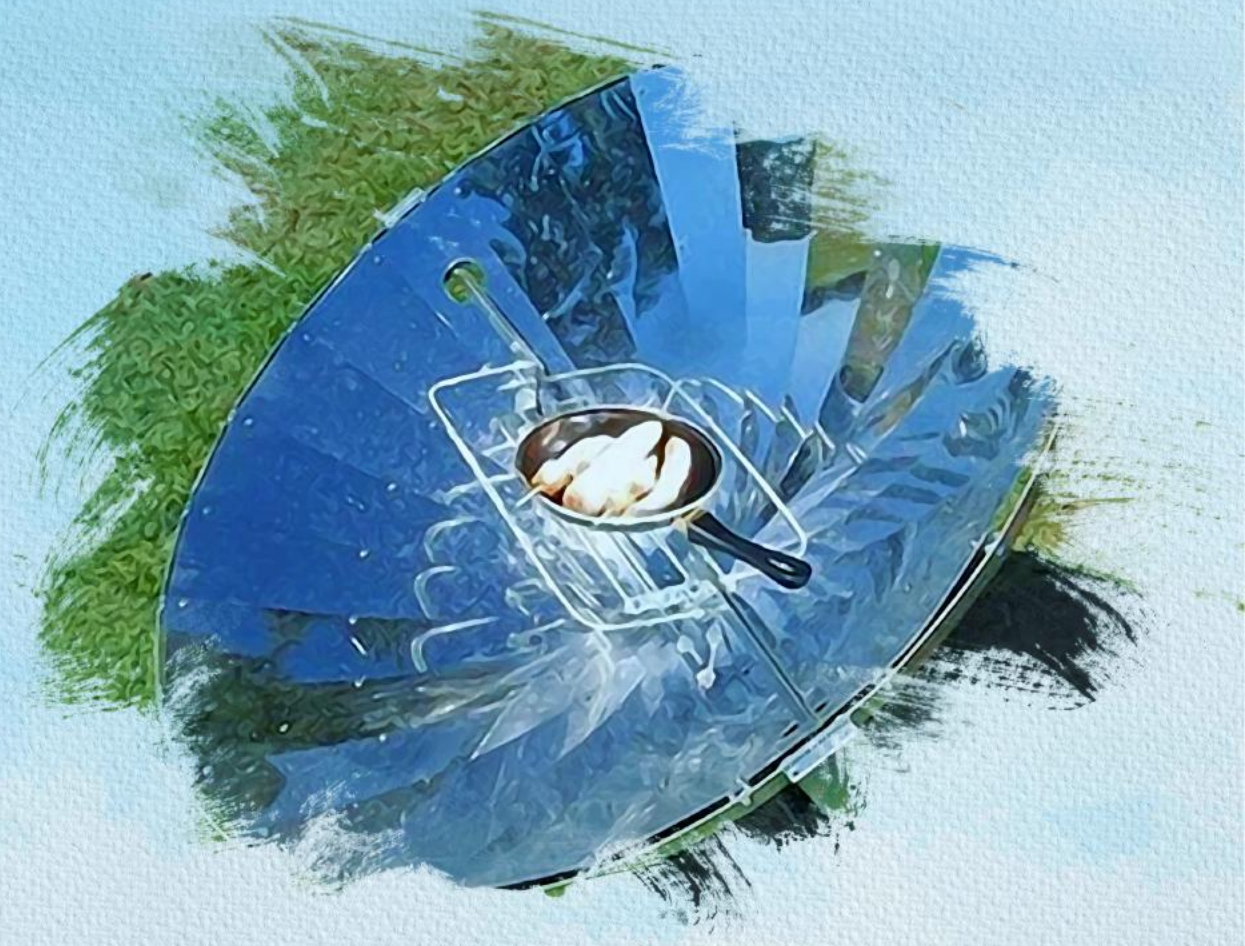
# MYTHS ABOUT SOLAR COOKER

- Solar Cookers are more expensive than conventional cookstoves
- You have to stay in the sun to operate the Solar Cooker
- Solar Cooker works slowly



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# BENEFITS

## DIRECT

- No requirement for cooking gas or kerosene, electricity, coal or wood
- ROI of 4.5 years
- Conventional Stoves need constant spending whereas Solar Cookers don't

## BONUS

- Solar cooking is pollution-free and safe
- The use of one Solar Cooker is equivalent to planting 15 trees per annum.
- Solar Cookers come in various sizes. Based on the number of family members, the size of the cooker can be chosen.

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# CASE STUDY

## Jhabua District, Madhya Pradesh, India

- Barli Development Institute for Rural Women (BDIRW) cooks entirely with Solar Energy for 300 days a year providing food for 150 people and saving monetary expenses on Cooking Gas, Kerosene and Wood.


SOLAR LIGHTS

# SOLAR LIGHTS

The lack of visibility on the streets, community gathering areas, and a multitude of public spaces is a leading cause of an increase in anti social activities and safety concerns

Availability of sufficient Illumination is a necessity to ensure safety, commute and connectivity and better quality of life

Our day -to- day life does not need to stop for not having enough sunlight hours

In areas surrounded by forests and wild animal habitat, having a source of light will be a boon for the safety of the residents

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## Wattage: 40 to 100 Watts • Lumens: 2400 to 4200 Lumens

Integrated Fixed Solar Street Lights

Solar Powered Flood Lights

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# APPLICATIONS

Security around houses

Portable Solar Flood Lights – for use on farmlands, storage areas

Solar lamps can be used inside the houses

Workability security around farmland and crop storage area

Illumination of public areas such as bus stops and community centres

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# MYTHS ABOUT SOLAR LIGHTS

- They are not bright enough
- Solar Lights are too expensive
- Solar lights do not turn on during cloudy weather
- Solar Lights are difficult to install
- Solar Lights do not stay for long

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# BENEFITS

## DIRECT

- Better and longer visibility at night
- ROI of 3 to 4 years
- Reduction in risk of road accidents
- Safer commute for students in night schools

## BONUS

- Safety of store houses
- Reduction in carbon emission equivalent to
- Better security around farmlands

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# CASE STUDY

## Solar street lighting in Mawlynnong

- 30 Solar Street Lights of 10W capacity were installed in the village

**Resulting in**

- Safer movement for school children
- Reduced anti-social activities
- Reduced animal attacks
- Reduced electrical cost for the village by Rs 2.5 lakhs per month
- Generation of 630 units per month

# SOLAR WATER HEATER

# SOLAR WATER HEATER

Similar to Solar Cookers, Solar Water Heaters utilise heat energy from sunlight to boil water for a multitude of uses

It can be used on a household level as a replacement for traditional geysers, replacing the requirement for electricity

Solar waters used on a community level in schools can provide safer drinking water and better sanitation

It can replace the use of firewood used for boiling drinking water in drought-prone areas

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## Temperature Range: 60 to 80 °C


Evacuated Tube Collector (ETC) type Solar Water Heating Systems


Flat Plate Collector (FPC) type Solar Water Heating Systems

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# APPLICATIONS

Heating bath water

Sanitizing of drinking water on household and community levels

Pasteurizing of dairy products, increasing the shelf life and livelihood opportunities

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# MYTHS ABOUT SOLAR WATER HEATER

- Solar Water Heaters only work in areas with constant hot climate
- Solar Water Heaters do not provide hot water at night
- Solar Water Heaters require constant upkeep
- Solar Water Heaters are too expensive and complicated to install
- Solar Water Heaters are not aesthetically pleasing
- Solar Water Heaters are not suitable for larger households or community buildings

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# BENEFITS

## DIRECT

- Monetary savings on conventional electric Water Heater
- ROI of 3 years
- Simple installation and minimal maintenance
- Lesser use of firewood, decreasing deforestation

## BONUS

- Improved public health due to sanitized drinking water
- Reduction in carbon emission equivalent to planting 25 trees per annum

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# CASE STUDY

## The Impact of Solar Water Heaters

- Provide an instantaneous steady supply of warm water in larger quantities than before without burning any wood protecting Ladakh’s delicate ecosystem.
- Along with providing comfort the device saves time for education and community activities.
- Each Solar Water Heater removes 2000 kgs of $CO_2$ emissions annually, equivalent to planting 400 trees.

# THANK YOU