

SOLAR THERMAL APPLICATIONS

- **SOLAR HOT WATER SYSTEMS**
- **24 X 7 ASSURED HOT WATER SYSTEMS**
- **COMPACT SOLAR COOKER**
- **SOLAR DRYING SYSTEMS**

30 Years of
Industry
Experience

18,00,000
Liters
of Hot Water
System Installed

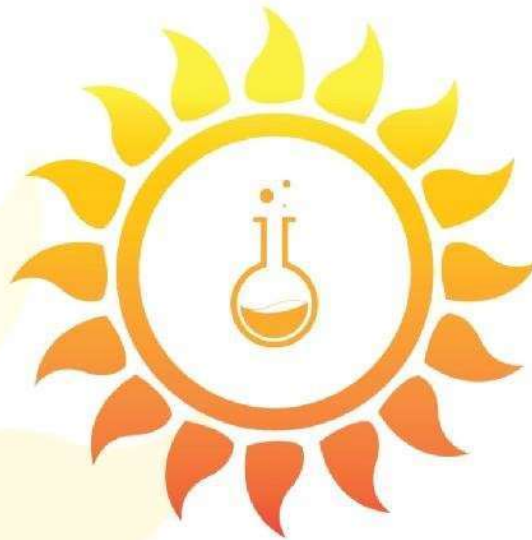
3,50,000
Installed Capacity
at Leh Ladakh
in Adverse Climate

India's **LARGEST**
Solar Thermal
Industrial Projects

Specialization In
Dairy, Chemical, Pharma

Customized
Application
For Solar
Development

9,600+
Happy
Customers



Channel Partner of
MNRE

Industrial Application of Solar Thermal

Sector	Applicable Processes
Textiles (Spinning & weaving, Finishing)	Preparing warps, Sizing, De-sizing, Scouring, Bleaching, Mercerizing, Dyeing, Drying, Finishing
Pharmaceutical	Distillation, Drying, Evaporation, Fermentation
Food Processing	Chilling/cold storage, Cooking, extraction, baking, Pasteurization, Sterilization, Bleaching, Drying, etc.
Pulp & Paper	Pulping, Digestion & Washing, Bleaching, Evaporation, Drying
Breweries	Boiling, Mashing, Cold conditioning, heat for processes like fermentation
Rubber	Heating, Digestion, Vulcanizing
Tobacco	Steam conditioning, Drying, Softening
Electroplating	Post Plating treatment, Water heating, Drying
Dairy	Pasteurization, Sterilization, Drying, Milk Powder making
Chemicals and Fertilizers	Distillation, Drying, Primary reforming, Ammonia synthesis, CO2 removal, Methanation, Steam stripping
Refining	Desalting, Coking, Thermal cracking, Cleaning, Wastewater treatment
Ceramic tile & pottery	Benefication, Drying, Presinter thermal processing, Glazing
Desalination	Multiple effect distillation, Multi stage flash distillation

Dear Associates,

Get Reinvented with WAASOL Energies LLP



Waaree Solar Thermal LLP is an initiative by Waaree Group is the largest Vertically Integrated Solar Company with Interest in all major Solar Business Verticals.

We are sure that Solar Thermal Products and Customised Application Solutions from Waaree will revolutionise Indian Solar Segment.

India is 5th largest consumer of Fossil fuels and 44 % of India Energy demand is suffice through various applications which can be replaced with Solar Thermal Applications.



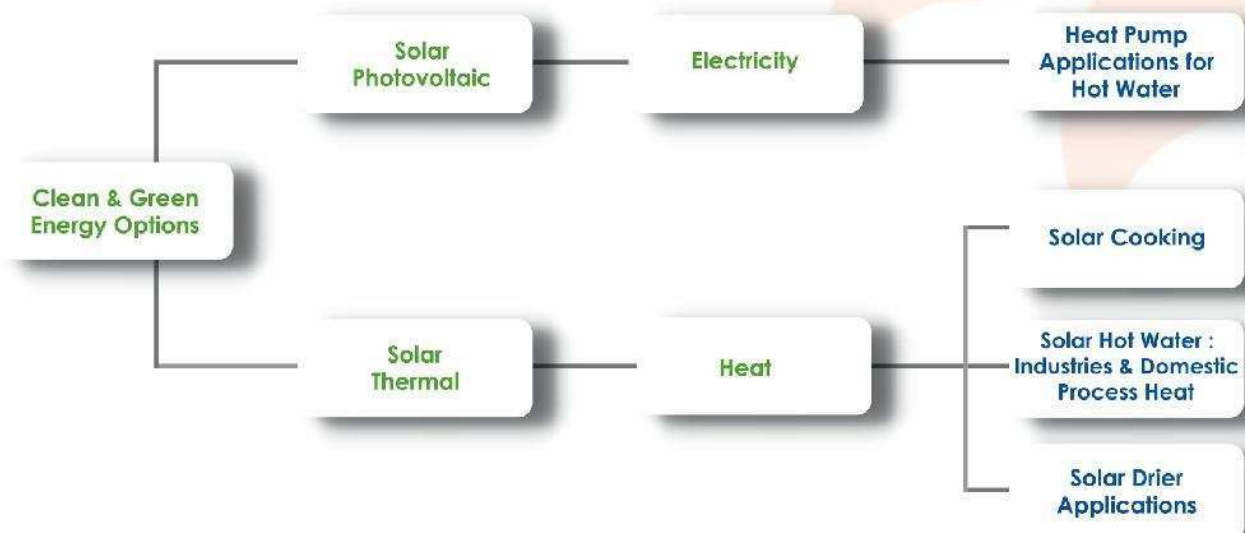
It gives huge opportunity to reduce import of Fossil Fuels which is not only helping to save huge FOREX but will also support Industries to reduce energy bills with Clean Energy Options.

Solar Thermal Applications & 24 x 7 Assured Hot Water System will surely play vital role in the country with Innovative and Customised Solutions for Various Industrial, Institutional, Domestic and various community demand for Water heating.

Waaree Solar Thermal based Cooking Systems will play Vital Role in India for Smoke Free cooking particularly in Rural Area with Clean & Economical Cooking Solutions. This is in line with PM Ujjwala Yojana & Mid - day meal Scheme for Schools.

Waaree Solar Thermal Drying Systems will be like Worship to the millions of Farmers in India for quick Drying of Farming Products and will save wastages. Solar Drying Applications has various customised Solutions for Pharmaceuticals, Food Industries, Dairies, Chemical Industries, etc. for De Humidification.

We will be happy to be part of 30 Million Liters of Hot Water Business in India is growing at the pace of 12 % PA and while promoting with Renewable Energy Source.



SOLAR HOT WATER SYSTEMS

1 Industrial Application

Waaree is well known for industrial application of solar thermal for reducing consumption of fossil fuels.

Waaree has executed several solutions for various Industrial Segments like Chemical, Textile, Paper & Pulp, Foods and Dairies, Pharmaceuticals, Automobiles Industries, Laundries, etc.

- Exposure of industrial projects of over 80 sites and different segment of industries
- Mid to large scale of solar thermal applications of 1,000 to 100,000 litres / day and more.
- Hot water application from 60°c to 85°c and upto 5 bar pressure.



2 Institutional Application



Hotels, Hostels, Community Places, Religious Places, Apartments are the biggest audience of solar thermal application which consumes huge amount of Electricity or Fossil Fuels.

- Waaree provides 24 x 7 Hybrid Hot Water Solution for Institutional Applications.
- Customised Solution for Mid and Large Hotel Requirements for Bathing and Laundry Applications.
- Hot Water Solutions for 65 degree and 85 degree are available with pressure upto 3 bar.
- Ideal for Community Hot Water Systems like Dharamshala, Hostels, Hotels, Temples, etc.

3 Domestic Application



India has one of the largest house hold consumption of hot water globally with 280 million + house hold in urban and rural segment.

- Waaree has wide range of product mix to suit Indian condition for Domestic Application of hot water.
- Solar Thermal Systems are available for 60 & 85 Degree Solutions.
- Customised solutions with Pressurised Hot Water Applications.
- Clean and Green Solutions for Individual Bungalows, Apartments.
- Attractive Return on Investments of < 3 Years as against Electricity Usages.

Cost Benefit Analysis of Solar Hot Water Systems Vs Other Hot Water Device

Fuel	UoM	Solar Water Heater	CNG	LPG	Electricity	Coal
Required Heat	Kcal	2501	2874	3001	3 Kwh	7203
Required Fuel Qty.	kg	-	0.28	0.3	3 units	2.05
Efficiency	%	90%	85%	80%	95%	40%
Fuel Rate	INR	0	56	55	8	6
Cost per day	INR	0	16	17	24	12
Annual Cost	INR	0	5,840	6,205	8,760	4,380

Solar Hot Water Application

Application	Process Logic	Collector Type	Temp/Pressure Range	Capacity
Domestic	<ul style="list-style-type: none"> ● Pressurised ● Force Flow ● Thermosyphon 	<ul style="list-style-type: none"> ● Flat Plate Collector ● Evaporated Vacuum Tube Collector 	<ul style="list-style-type: none"> ● Up to 85°C ● Up to 3 bar Pressure 	<ul style="list-style-type: none"> ● 100 to 500 Litres
Institutional	<ul style="list-style-type: none"> ● Pressurised ● Force Flow ● Thermosyphon 	<ul style="list-style-type: none"> ● Flat Plate Collector ● Evaporated Vacuum Tube Collector 	<ul style="list-style-type: none"> ● Up to 85°C ● Up to 3 bar Pressure 	<ul style="list-style-type: none"> ● 500 to 25,000 Litres
Industrial	<ul style="list-style-type: none"> ● Pressurised ● Force Flow ● Thermosyphon 	<ul style="list-style-type: none"> ● Flat Plate Collector ● Evaporated Vacuum Tube Collector 	<ul style="list-style-type: none"> ● Up to 85°C ● Up to 5 bar Pressure 	<ul style="list-style-type: none"> ● 5,000 to 100,000 Litres ● Can be increased for Customised Project

24 X 7 - AHWS

ASSURED HOT WATER SYSTEM

+ Why to opt for Waaree 24 x 7 AHWS?

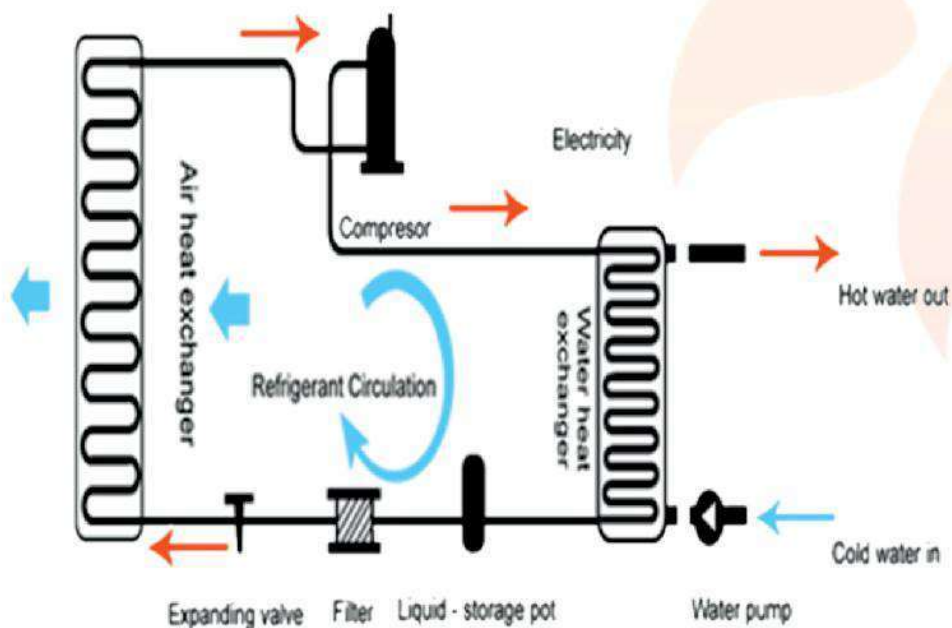
Most of world's population uses gas fired, electric, etc water heating systems. This system increases the pollution level by releasing approx. 144 kg of CO₂ per every 100 ltr. of water heating.

Waaree make 24 x 7 AHWS uses just 35 % of electricity along with solar energy for hot water heating systems. Reduction in CO₂ gas per day will be very low or negligible.

Waaree make 24 x 7 AHWS is an Efficient Solutions for round the clock – 365 days Solutions of your Hot Water Solutions. This is Ideal Solutions for Guaranteed Hot Water Solutions irrespective to Cloud, Rain or any seasons.



+ Working Principle



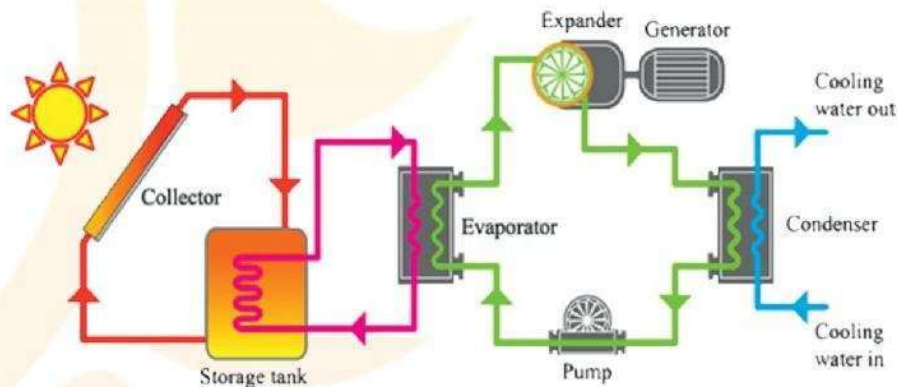
WAAREE 24 x 7 Assured Hot Water System – AHWS, consist of air to water heater, heat pump unit and hot water tank, it works under Reversed Carnot cycle principle.

Based on similar technology to air conditioners and freezers, **Waaree 24 x 7 AHWS** uses the heat from air, water or the ground and compress it using electricity. This compression causes the extracted warmth to heat up and then be released into the conditioned space through the use of water within a wet central heating system. Electrical power required is much less than the energy that we get from these devices as an end product which is as good as 35 %.

The high-pressure liquid refrigerant is decompressed to temperature that lower than the outside through the expanding valve, and thus capable of absorbing the heat. Through the air heat exchanger, the low-temperature low-pressure liquid refrigerant evaporates by absorbing the heat in the air. The compressor again compresses the gaseous low-temperature low-pressure refrigerant, which has absorbed the heat. In Such circulation, heat is constantly absorbed from the air and released to the water heat exchanger, producing hot water.

Air Source heat pumps have become much more efficient over the last few years and can now provide significant savings on energy bills.

Schematic Application of Hybrid Hot Water Solutions – Solar with Heat Pump



+ Typical Applications

Waaree make 24 x 7 AHWS is ideally being used where High Service Level is demanded to cater Hot Water as below.



Ideal to use in homes with hydronic heat distribution systems. During the heating season, the heat pump takes heat from the outside air and then transfers it to the water in the hydronic distribution system. If cooling is provided during the summer, the process is reversed: the heat pump extracts heat from the water in the home's distribution system and "pumps" it outside to cool the house.

Auto Controller Temperature Panel



1 High COP

2 saves up to 75% energy

3 Heating in Winter Cooling in Summer

Cost Benefit Analysis of 24 X 7 - AHWS

Particulars	UoM	Heat Pump Water Heater	Electric Water Heater	Gas fired Water Heater	Oil Water Heater	
Source Type		Electricity	Electricity	NG	LPG	HSD
Efficiency	%	400%	90-100%	87%	87%	87%
Cost	INR	8	8	45	75	65
Cost per Day	INR	18.6	82	58	72	62
Annual OPRN Cost	INR	6,790	30,180	17,426	26,280	22,268

Reference Conditions

Ambient Temperature 20°C. 200 Lt/h water heating from 15°C to 55°C.

Prices mentioned are indicative & for reference only. Kindly refer local price for exact calculation

Technical Specifications

Model	UoM	AHWS 160	AHWS 200	AHWS 350	AHWS 420
Capacity	Ltr.	160	200	350	420
Heat pump Input power	W	420		1300	
Heat pump Output	W	1780		5300	
Coefficient of performance		4.28		4.07	
Electric heater input power	W	2500		3000	
Max. input power	W	3200		5000	
Max. Current (A)	A	16		23	
Power supply		220V/1ph/50Hz			
Heating capacity in Eco mode	L/h	38		118	
Heating capacity in hybrid mode	L/h	91		190	
Max. Temperature by Eco Mode	° C	65° C			
Max. Temperature by hybrid Mode	° C	75° C			
Heat pump noise level	dBa	40		45	
Refrigerant		R134a			
Refrigerant Volume	g	870		1150	
Water heater exchanger		Micro channel			
Operating temperature range	° C	- 7 to 45			
No of Fans	No.	1		2	
Fan input power	W	29		70	
Tank rated pressure	Bar	8			
Water Inlet / Outlet connection	Inch	3/4			
T/P valve connection	Inch	3/4			
Hot water circulation connection	Inch	-		3/4	
Condensation water out connection	mm	16			
Drain water connection	Inch	3/4			
Insulation Density	Kg/m3	45			
Insulation Thickness	mm	50			
Weight	Kg	102	114	192	207
Product size	Mm	525x1735	525x1955	675x937x1720	735x1006x1720
Magnesium anode protection	g/M2	400			

SOLAR COMPACT COOKER

+ Why to opt for Waaree Solar Compact Cooker ?

Half of the world's population burn wood or dried dung to cook food. Wood cut for cooking purposes contributes to the 16 million hectares of forest destroyed annually.

Waaree Solar cookers primarily to cook food and pasteurize water without any external source of Energy besides of Solar Energy. **Waaree Solar Cooking Systems - WSCS** is perfect Solution for over 1.2 billion people uses wood or other harmful fuels in day to day cooking usages.



Waaree Solar Cooking Systems - WSCS is one of Clean Solutions for Rural and Urban Cooking Fuels demand across the country. It's not only Supporting Green Solutions but also quite economic solutions with ZERO Recurring Cost.

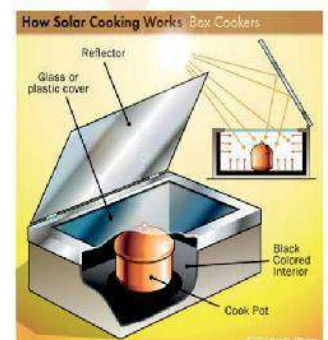
Few of the benefits are

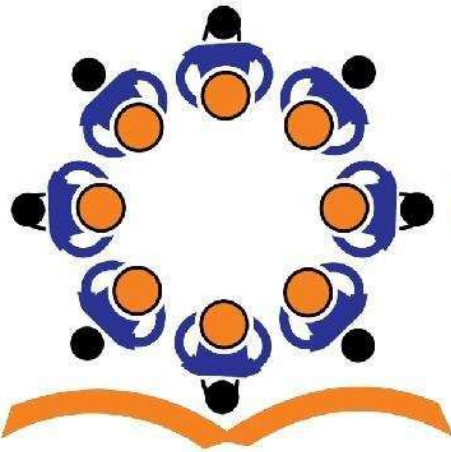


+ Working Principle

Solar cookers are passive solar devices works on the principle to convert Sun Light into Heat Energy which is trapped in closed chamber to generate steam for cooking.

Solar heating device mainly consist of Reflectors to Specified area where the cooking container is placed in Closed Heat Chamber. The light from the sun is actually focused at the container which gets heated thereby cooking the food.



**Mid Day Meal Scheme**

Compiled with PM Mission
United With Vision

**Product Specification**

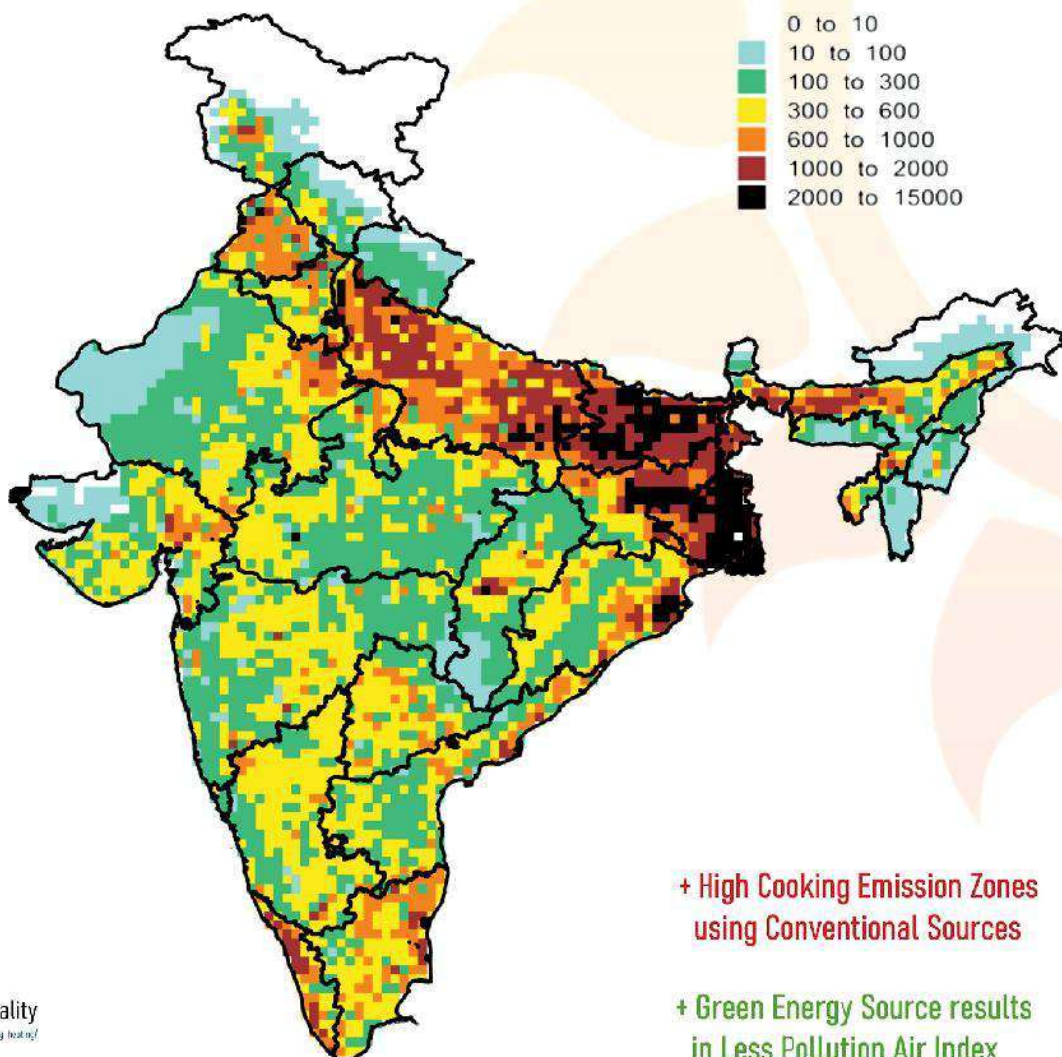
Size	Without Packing 480 x 480 x 170 (+/- 10) mm With Packing 500 X 500 X 200 (+/- 10) mm
Weight	13.5 KG
Shape	Square
Design	As per IS13429
Outer Box	High Glossy Finish with Aluminium Sheet
Cooking Pots	4 Nos. SS Food grade Dia. 160mm, Height 70mm, Top Cover Matt Black Powder Coated
Castor Wheels	4 Nos of Ball bearings as per IS5932
Insulation	With Thermal Resistance 0.96m ² oC/W At side 25mm At Bottom 50mm thick
Cooking Tray	Made of Aluminium, Bottom Size 350 x 350 (+/- 5) mm, Height 70(+/- 5) mm, Thickness 0.5mm, Matt Black Powder Coated Finish
Useful Cooking Area	375 x 375 (+/- 10) mm
Reflecting Mirror	Standard Quality of size 470 x 470 x 3mm Free from bubbles and waviness toughened float glass mirror
Heat Trapping Glass	Free from bubbles and waviness toughened float glass with Size 468 x 468 x 3mm
Heat Trapping Gasket	Durable , High Temperature Rubber to prevent heat escape
Temperature Range	During the bright sunny days 120°C to 140°C
Cooking Capacity	It is designed to cook for the family of 4-5 people
Cooker's Life	It is designed to give you the best cooking efficiency up to 10 years , However it depends on how it is being used



Conventional Energy Source v/s Green Energy Source

Shift to Safe, Shift to Save - Cook Healthy, Eat Healthy

Household Cooking and Heating Emissions



+ High Cooking Emission Zones using Conventional Sources

+ Green Energy Source results in Less Pollution Air Index

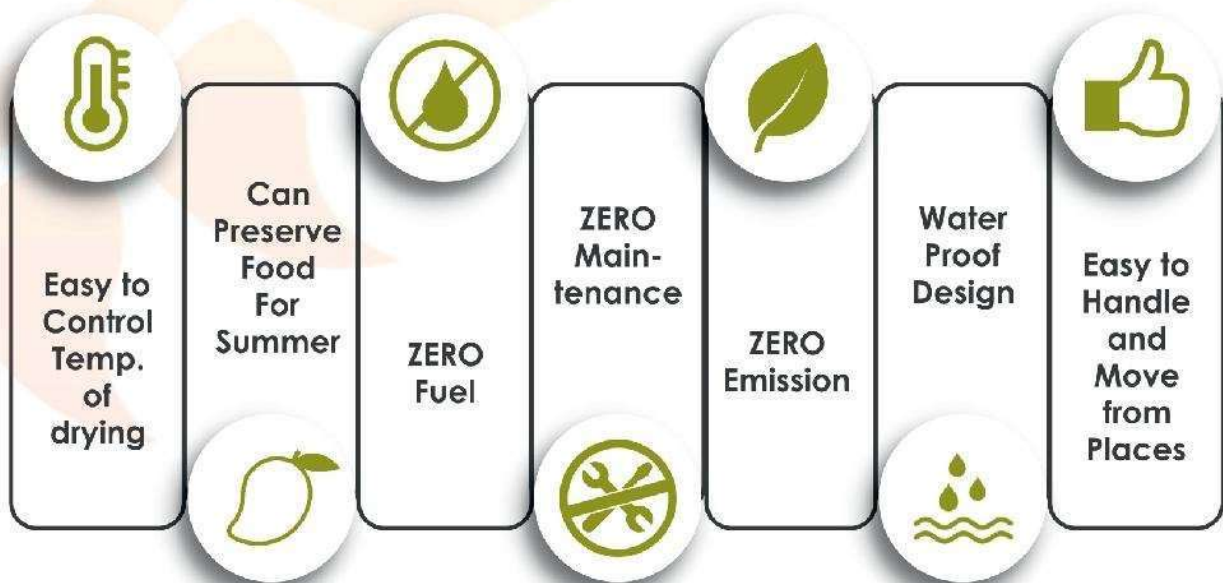
SOLAR DRYING SYSTEMS

+ Why to opt for Waaree Solar Drying Systems?

Most of the world's population uses electric dryer to dry food products and preserve it for longer period of time, but consumes electricity power and not economical process.

Waaree Solar Drying Systems - WSDS helps to preserve food for longer period without destroying the nutrients of Fruits and Vegetables. **Waaree Solar Drying Systems - WSDS** is best for all farmers who dry the products of their own farm with low cost and increase productivity in terms of energy saving.

Waaree Solar Drying Systems - WSDS is best for solutions for drying food products with economically zero running cost and safe to environment.

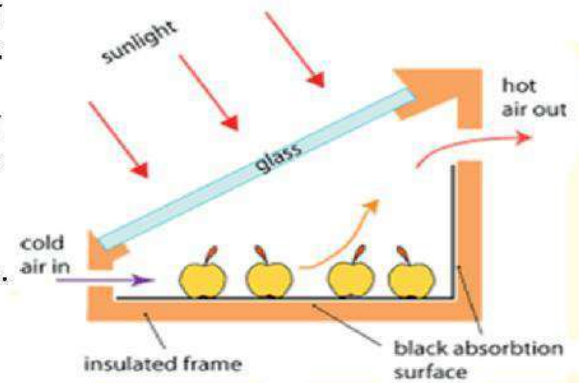


+ Working Principle

Converting light to heat : Any black on the inside of a solar dryer will improve the effectiveness of turning light into heat.

Trapping heat : Isolating the air inside the dryer from the air outside the dryer makes an important difference. Using a clear solid, like a plastic bag or a glass cover, will allow light to enter, but once the light is absorbed and converted to heat, a plastic bag or glass cover will trap the heat inside.

This makes it possible to reach similar temperatures on cold and windy days as on hot days.



Traditional outside drying

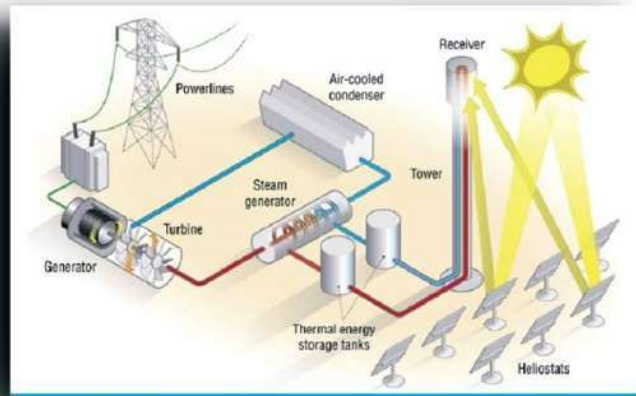
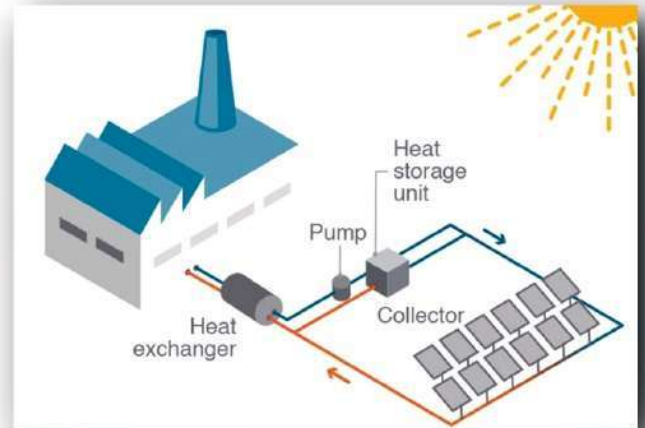
Innovative solar drying

Product Specification

	WSDS 5	WSDS 10	WSDS 25
Size	2 x 3 ft.	4 x 3 ft.	7 x 3 ft.
Weight	18 kg	40 kg	85 kg
Capacity	5 kg	10 kg	25 kg
Top Cover	Poly Carbonate	Poly Carbonate	Poly Carbonate
Fan Qty.	1	3	2
Fan Size	3 inch	3 inch	4 inch
Qty. of tray	2	4	8
Tray Material	SS 202	SS 314	SS 202
Tray Size	16 x 32 inch	16 x 32 inch	16 x 32 inch
Insulation	Side - 25 mm Bottom - 50 mm	Side - 25 mm Bottom - 50 mm	Side - 25 mm Bottom - 50 mm

Upcoming Projects

SOLAR THERMAL STORAGE



STEAM GENERATION

Authorised Dealer

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