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28/08/2024 10:53 AM GMT +05:30

WELCOME

SOLAR THERMAL SYSTEM

PRESENTING TO

LT GEN HARPAL SINGH,
PVSM, AVSM, VSM, ADC, ENGINEER-IN-CHIEF

SOLAR THERMAL SYSTEM
(FOR COMMUNITY COOKING & DIRECT-INDIRECT HEATING APPLICATION)

PRESENTING COMPANY

ARS GLASS TECH PVT. LTD.

327-B Wing, Monalisa Commercial Complex, Manjalpur, Vadodara , Gujarat, INDIA.
www.arsglasstech.com

PRESENTED BY

MADAN MOHAN

TECHNICAL HEAD

ANIKET PUJARI

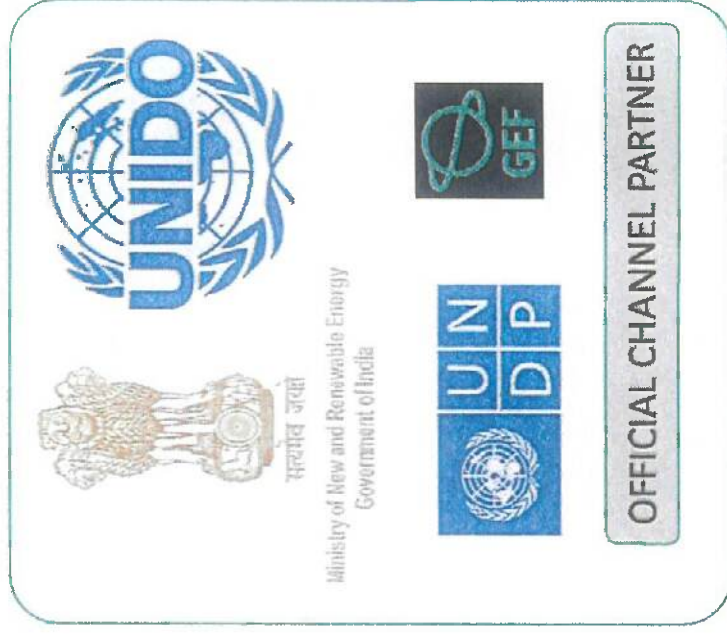
DIRECTOR

ABOUT US

- ❖ Introducing ourselves, ARS Glass Tech Pvt. Ltd. is realization of dreams of the founders who felt passionate about working in the area of renewable energy especially Solar Energy, to bring it to the masses.
- ❖ Sole & Indigenous Manufacturer of Solar Graded Mirror
- ❖ Empaneled & Tested by MNRE for Solar Graded Mirrors.
- ❖ Empaneled in GEDA (Goa Energy Development Agency) as Manufacturers of Solar Grade Mirror for promotion, supply, installation, commissioning, operation & maintenance of "Concentrated Solar Technologies".



The company is proud innovator & developer of Solar Concentrator (AGNi-69) Patent No 351477-001 and Solar Graded Mirror Patent App No 4206/MUM/2015 (Disposal Stage).



WORKING PRINCIPLE

- AGNI69 DISH technology is based on the principles of a magnifying glass and a sunflower.
- Like a sunflower, AGNI69 DISH automatically tracks the sun from sunrise to sunset on both East-West and North-South axes to catch maximum sunlight throughout the year at any location.
- Each mirror reflects the sun radiation onto a receiver that is placed at its focal area where the heat transfer happens.



SITE: GOA UNIVERSITY

AGNi69: A SOLAR BOILER

SOLAR GRADED MIRRORS

- ❖ Highly durable in tropical conditions. (weather-O-meter tested).
- ❖ Reflectivity above 92%, tested by NISE & University of Pune.
- ❖ Performance degradation 0.1% per year.
- ❖ Wholly Make in India
- ❖ Mirror life 20 years with 5 years warranty.

SOLAR CONCENTRATOR AGNI-69

- ❖ Fully Automatic Dual-Axes with 0.1° Sun Tracking Accuracy
- ❖ Reqd. Area = 69 sqm & Load = 21 kgs/sqm
- ❖ Steam @ 0.7 kg/min (180°C/10 bar) at DNI 500 w/m²
- ❖ 270-300 Annual operational days as steam generation @ even low DNI (150-200 w/m²)
- ❖ Easy to integrate with existing system.
- ❖ Thermal storage

Use-Case: CME Kirkee, Pune

- We have installed Scheffler dish and supplied solar graded mirror (through Radha Engineering, MES Contractor). We want to convey our sincere thanks for CME Kirkee team for their willingness towards green solution. Despite of system operational challenges, they are running the project successfully.

Cooking & Fuel Savings in 90 days

Item	Rice	Dal	Milk & Vegetables	Eggs	LPG Savings
Qty	4.5 tons	1.0 tons	0.53 tons	1000 pcs	>900 kgs

- We have mitigated the installed system's (CME Kirkee) operational challenges with AGNI69 such as
 - Trained Operator is not required
 - Can cater breakfast, lunch and dinner due to system's ability to operate at even low DNI.
 - Reduced the weight by 50% and space requirement by 60%.
 - Doubled the system efficiency.
 - Developed Cloud monitoring as per clients requirement.

Payback

- Due to increase in system's efficiency, generated steam can be used for multiple applications such as
 - degreasing, heating and cooling applications,
 - dish washing, hot water, laundry,
 - auto-clave sterilization, demineralized water



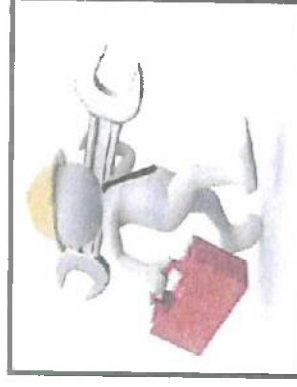
ROI/Payback in 3-5 years



Carbon Emissions Savings
(during Project Lifecycle) :
304 tons CO₂



Equivalent Tree saplings
plantation (during Project
life-cycle):
5060 tree saplings



Assured O&M

Special Case: LEH (location advantage due to high Solar DNI)

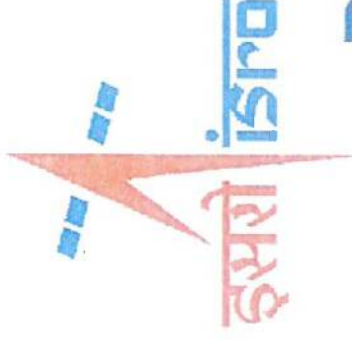
- Leh, due to geographical location: Highest Solar DNI & Cold weather
- Steam generation increased by 169%.
- Central Room heating, especially Military Hangars can be achieved at greater efficiency.
- In addition to cooking, Hot water can be supplied for barracks.

Month	DNI (Daily Avg)(watt/m ²)	Steam Generation Rate (kg/min)	Location advantage over efficiency (%)
Jan	889	1.24	148%
Feb	972	1.36	162%
Mar	1056	1.48	176%
Apr	1083	1.52	181%
May	1111	1.56	185%
Jun	944	1.32	157%
Jul	889	1.24	148%
Aug	944	1.32	157%
Sep	1000	1.40	167%
Oct	1056	1.48	176%
Nov	1222	1.71	204%
Dec	1000	1.40	167%
Increase in Steam generation rate due to location advantage			169%

Ref: <https://solcast.com/>

ARS ASSOCIATIONS

- ❖ Successfully Executed Projects with UNDP, GEF & MNRE under repair and Revamping of CST system .
- ❖ Successfully supplied Solar Graded Mirror to ISRO , IIT Madras and India's Largest 135 MW CSP etc.
- ❖ Successfully completed Pilot project in Indian Army (CME Kirkee Pune).
- ❖ Mega kitchen Shree Shirdi Sai prasadalya giving 40,000 Meals/day more than a decade.
- ❖ Empanelment in GEDA (Goa Energy Developme Agency)



Hindustan Unilever Limited

Indian Institute of Technology Madras

WE ARE HAPPY TO ANSWER YOUR QUESTIONS.



Indigenization of CST / CST
Components in the country..
Awarded by Government of
INDIA – By Mr. Piyush Goyal



Best Innovation Award for
AGNI69 Solar Concentrator by
Dept. of Science & Technology,
Govt. of India



Fastest Growing Indian
Company Excellence Award -
2017

THANK YOU.

ANIKET PUJARI

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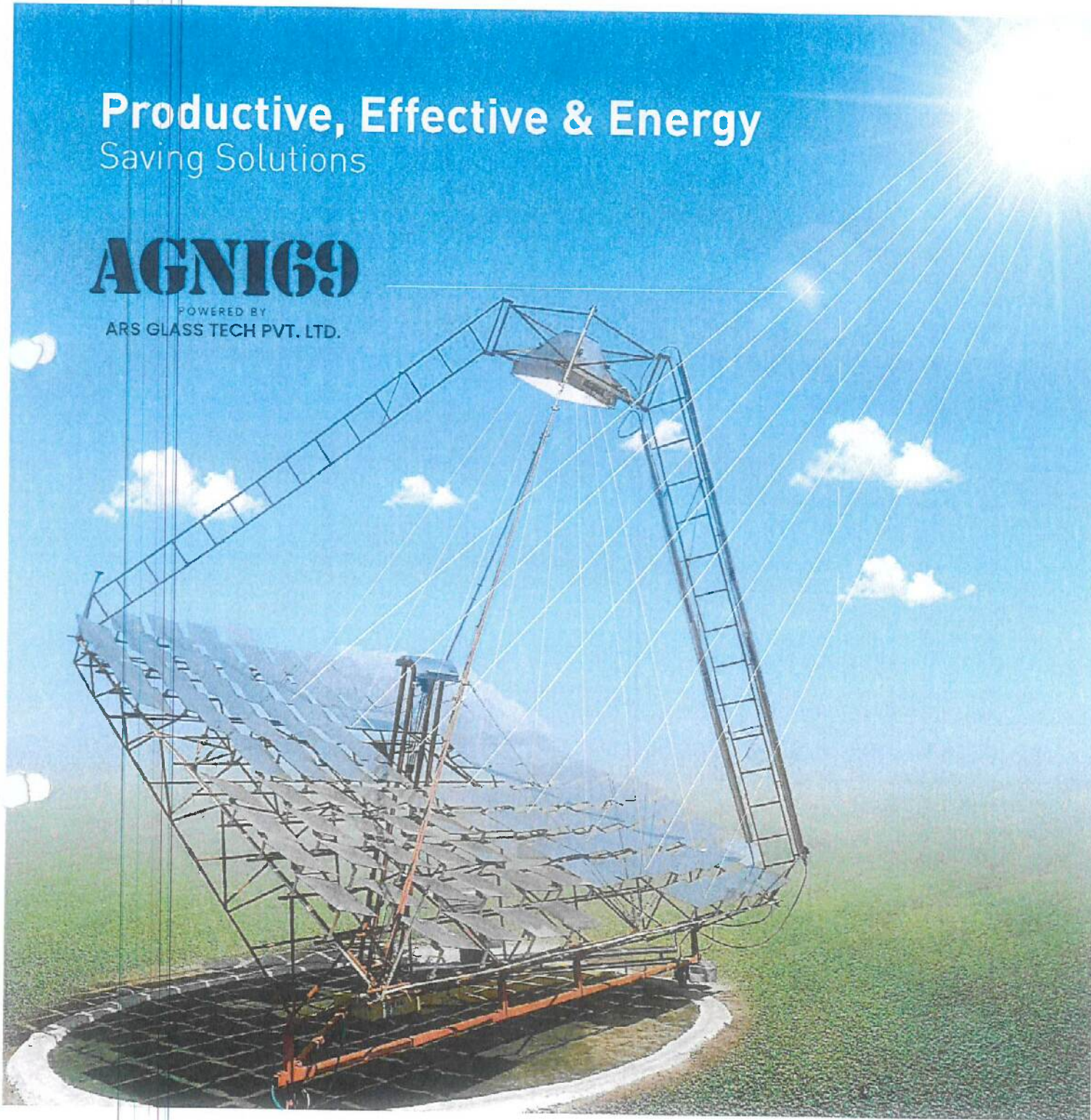
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Productive, Effective & Energy
Saving Solutions

AGNI69

POWERED BY
ARS GLASS TECH PVT. LTD.



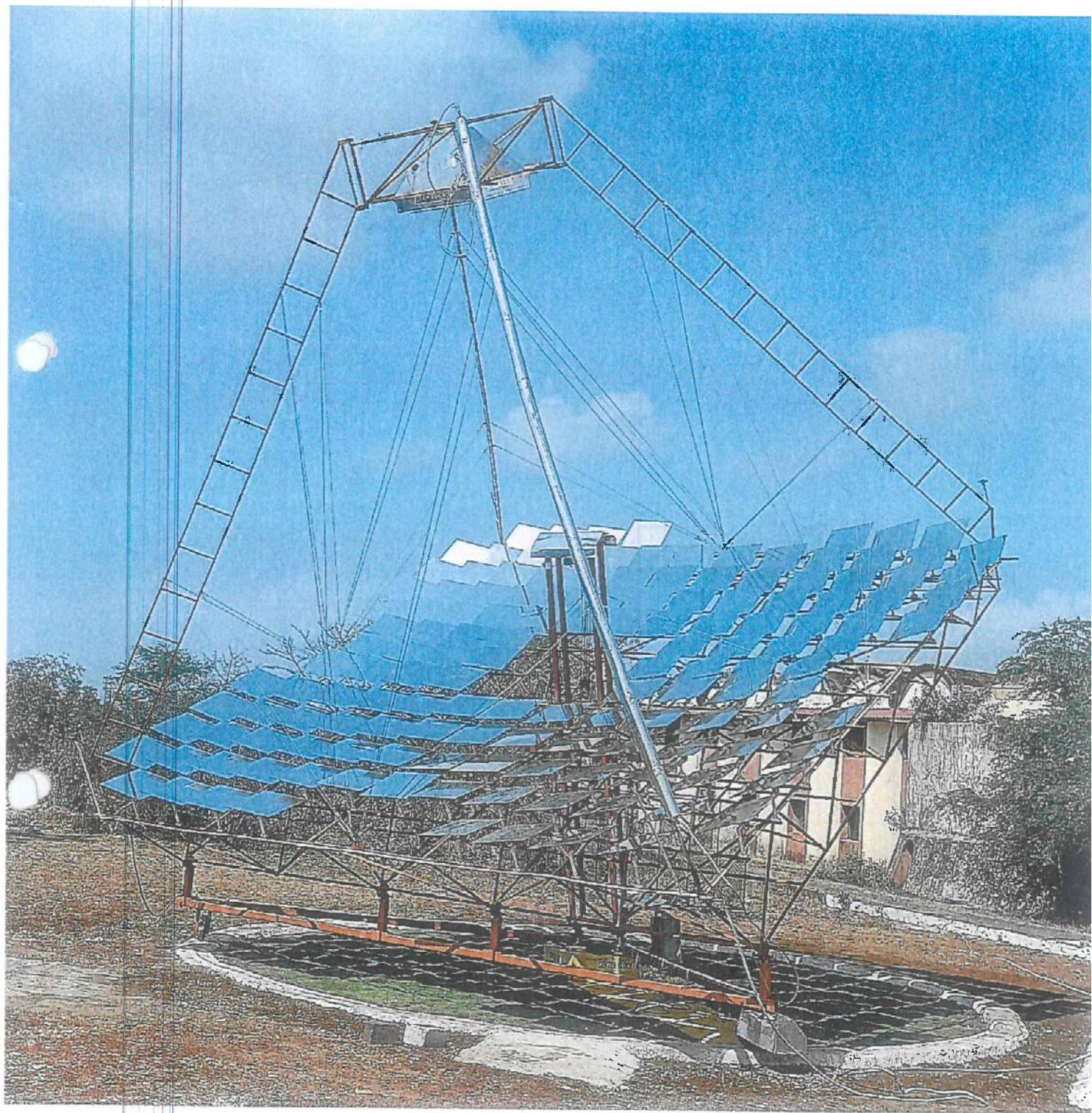


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Introduction

ARS is realization of dreams of the founders who felt passionate about working in the area of renewable energy especially Solar Energy, to bring it to the masses. The company is proud innovator & developer of solar grade mirrors for PAN INDIA with its patented technology. ARS is an official channel partner of Ministry of New & Renewable Energy [MNRE] since six successful years. Currently more than 85% of Concentrated Solar Thermal (CST) market in India is being served by ARS for their primary component requirement. ARS has experience of revamping & developing CST projects for various applications such as solar steam cooking, process heating, process cooling & thermal power generation. With support of MNRE & UNDP Schemes, ARS has revamped all the non-functioning CST plants in India with it's efficient & durable solar grade mirrors.

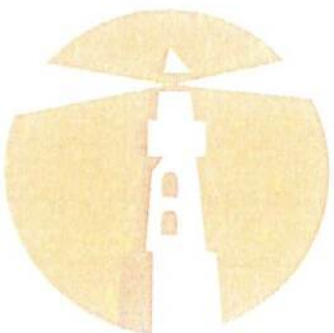
ARS has a vision to fulfill country's huge demand of pressurized steam for various sectors using it's innovative, cost-effective & highly efficient AGNI69 dish technology which will generate solar steam in easy plug-and-play model and reduce massive consumption of fossil fuel in many Industries. AGNI69 technology is next generation technology through which steam requirement will be fulfilled for Mass Cooking, Process Heating & Process Cooling applications.

Certificate of Registration of Design
for Solar Concentrator
Patent No. : 105702 (By The Patent Office, Govt. of India)



Mission

Maintain positive growth of the company together with our customers and partners by offering them the best quality, technology and service.



Vision

To be a socially responsible and comprehensive "Solar Glass Solution Provider" while creating greater values for our nation, customers and employees.



Values

- Teamwork in all things
- Innovation in all Thinking
- Quality of all Products
- Responsibility in all Sectors
- Integrity in all Solutions

**INTRODUCING
INDIA'S
MOST EFFICIENT
SOLAR BOILER**

Solar Boiler

Why Solar boiler

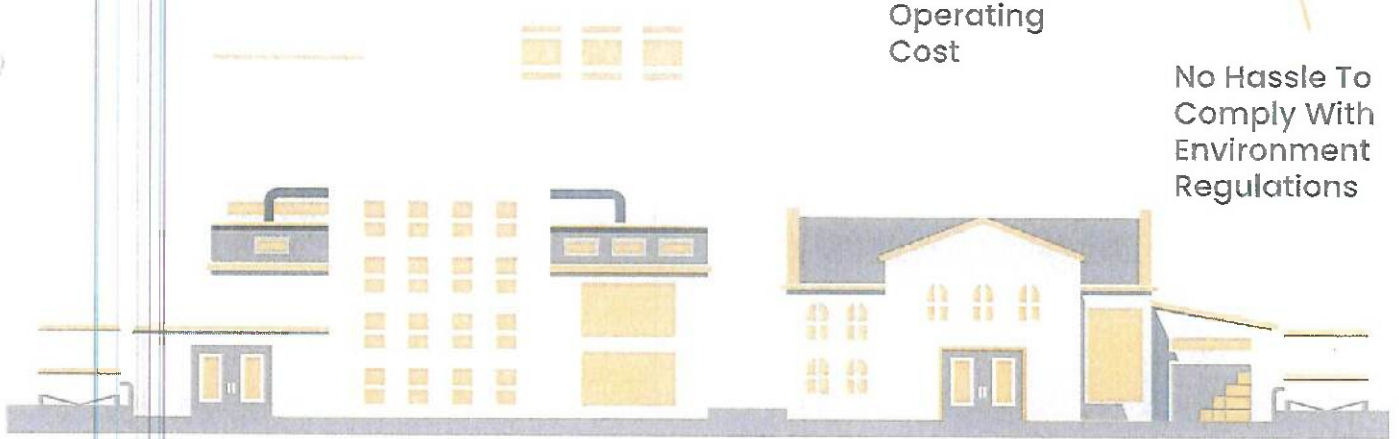
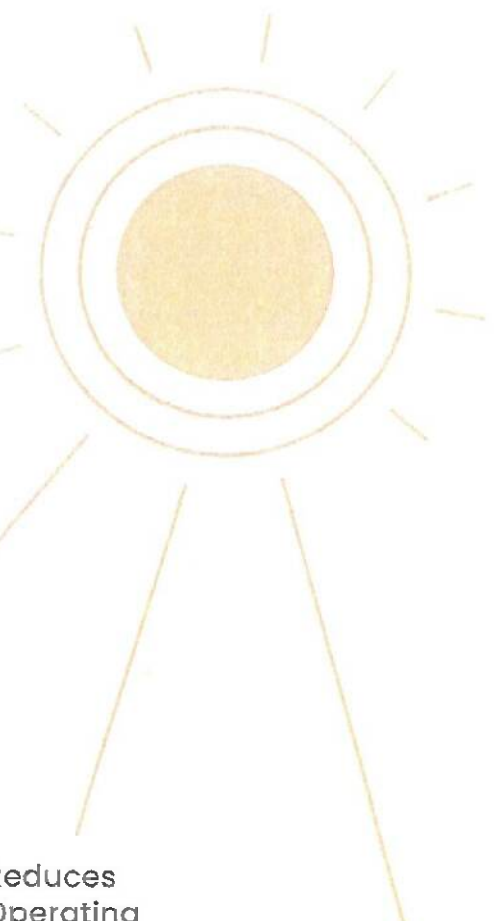
Free Unlimited Source Of Energy

100% Eco Friendly & Sustainable

Become Energy Independent

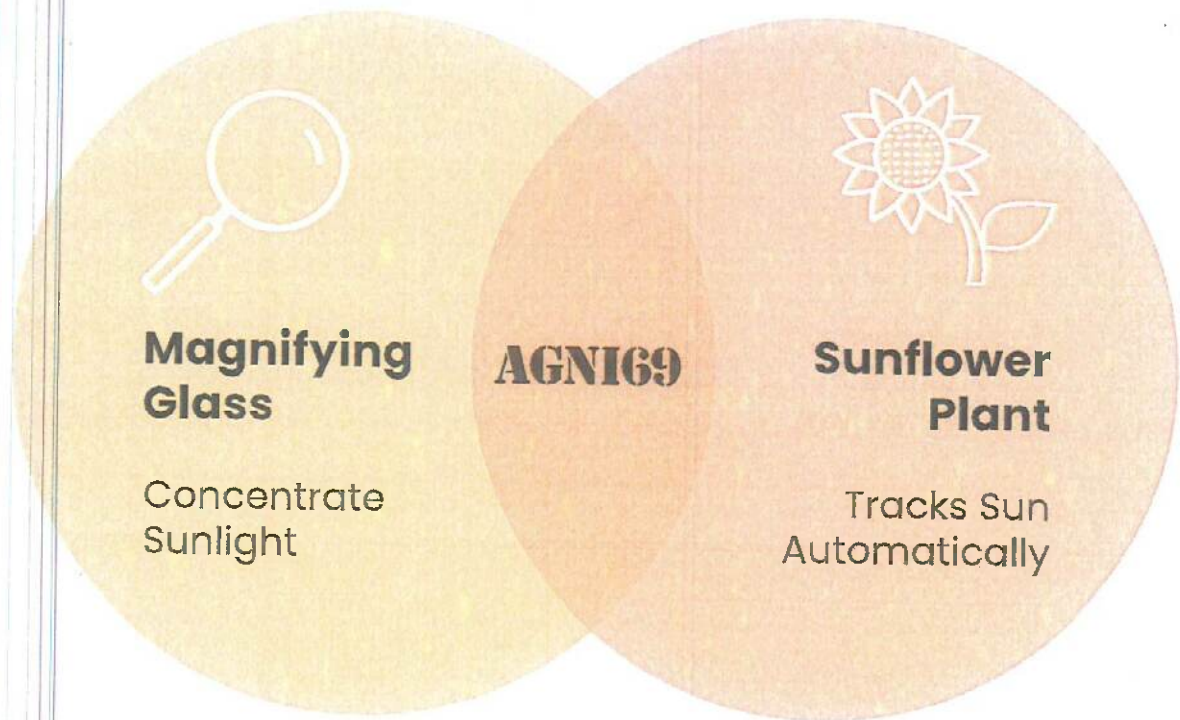
Reduces Operating Cost

No Hassle To Comply With Environment Regulations



Agni69 Dish Technology

Concept

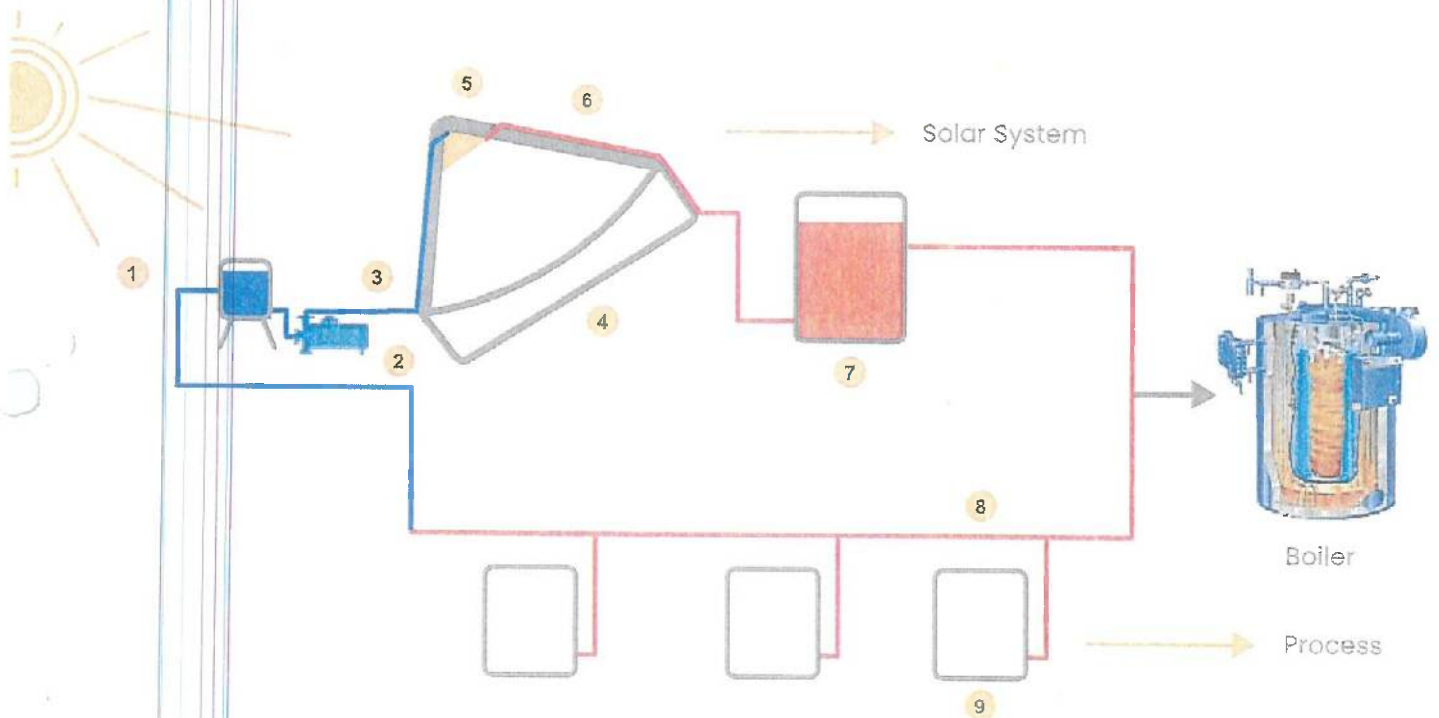


AGNI69 Dish Technology generates heat energy using concentrated sunlight through either magnifying glasses that concentrate sunlight or the Sunflower Plant technique that tracks the Sun automatically. AGNI69 can also produce heat energy by combining both the above methods.

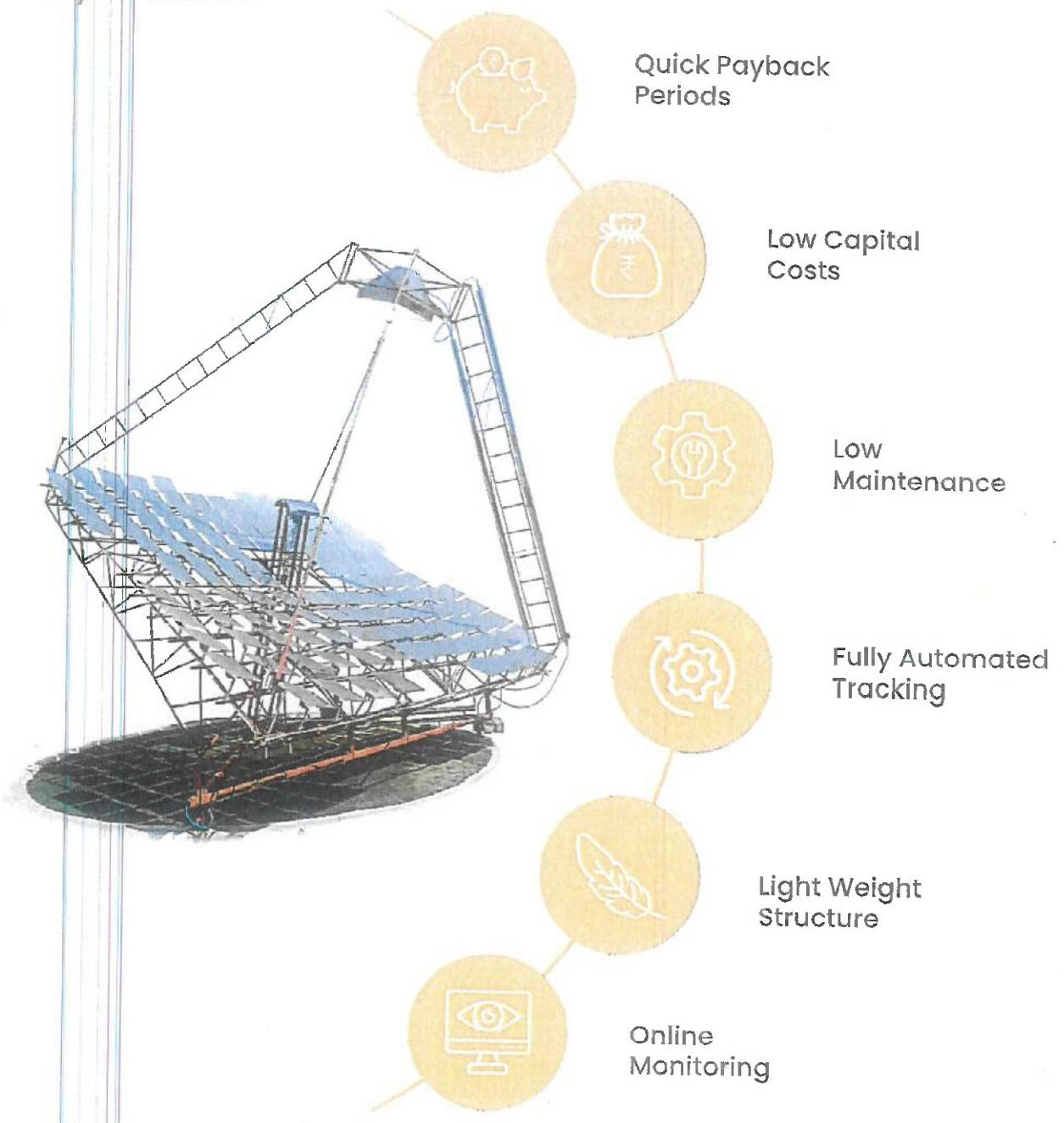
- Our DISH technology is based on the principles of a magnifying glass and a sunflower. It uses a smart, two dimensional, fresnelized mirror arrangement scheme to get a 3-D parabola effect.
- Like a sunflower, our DISH automatically tracks the sun from sunrise to sunset on both East-West and North-South axes to catch maximum sunlight throughout the year at any location.
- Each dish reflects the sun radiation onto a receiver that is placed at its focal area.
- The heat transfer fluid gets heated when being sent to the receiver.
- The heated fluid will then be transferred to the application by transferring the solar heat through a heat exchanger or connect to the existing boiler headerline.
- The extra heat energy can be stored in the insulated storage tank for non-sunny hours.

Solar Dish Typical Integration with Existing Process Setup

- | | | |
|-------------------|------------------|------------------|
| 1. Feed Tank | 4. Solar Dish | 7. Buffer Tank |
| 2. Pump | 5. Receiver | 8. Common Header |
| 3. Cold Fluidline | 6. Hot Fluidline | 9. Processes |



Key Features



Technical Data

Geometry	Any one from the table
Dish Size (m)	8.3 x 8.3
Aperture Area (m ²)	68.89
Focal Length (m)	6.2
Performance	
Peak Thermal Capacity (KW _{thp})	18.5
Energy generation per day (KWh _{th}) or (Lakh.Kcal)	148 KWh _{th} or 1.27 lakh Kcal
Max. Temperature & Operating Media	Hot Water - 95-100°C Steam - 180°C Thermic Oil 250°C
Operating Media	Thermic Fluid/Water
Operating Temp. & Pressure	250°C (thermic fluid) & 1-8 bar (water)
Steam Generation Capacity (up to 180 °C & 10kg/cm ²)	25 kg/hr or 200 kg/day
Equivalent fuel savings per day	Diesel = 17 lit LPG = 12.7 kg FO = 18 kg
Weight (tons)	1500 kgs
Sun Tracking	Fully automated Dual axes
Sun Tracking Accuracy	0.5°
Structure	Galvanized/Painted Structural Steel
Max. Survival Wind Speed (Parked) (kmph)	200
Operating Wind Speed (kmph)	50
Method of Solar Integration with existing setup	Hybrid mode: integrated with existing setup
Reflectors	Solar Grade Mirrors
Installation Mode	Roof top (RCC type) or Ground

Performance values are measured in Standard Test Conditions (STC) @ 8 hours of Solar DNI = 600W/m² or 4.8kWh/m²/day

Application

Solar Boiler For Industrial Process Heat



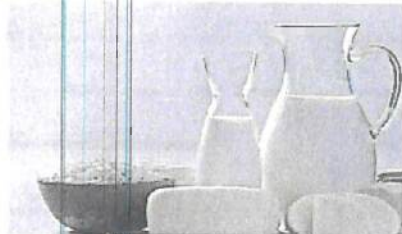
Textile



Hospitality



Pharma



Dairy



Food Processing



Paper Pulp



Brewery



Cement



Chemical



Agro

Any other industry having thermal energy requirement from 50°C up to 250°C

Solar Boiler For Community Solar Cooking

Solar thermal cooking systems are efficient and hygienic for community cooking like industrial / institutional canteens, religious places, community centers, etc. Several organizations in India are successfully using solar thermal energy for cooking and industrial applications.

AGNI69 solar dish can assist in cooking food on a community scale, occupying less space & providing efficient output at the same time. As AGNI69 solar dish can deliver temperatures as high as 300°C (thermic oil), it can be used in frying or baking chapatis, that require higher temperatures of around 250°C.



A Typical Solar Kitchen

Why Agni 69



AGNI69

- Higher Output Generation
- Fully Automated System
- Sun Tracking Accuracy of 0.1°
- Attractive ROI
- Low Maintenance

Why ARS Glasstech

AGN169 is an advanced and productive solar solution that implements innovative techniques. It possesses a fully automated system that enables higher output generation. It is also highly convenient and economical with an attractive ROI and low maintenance. It also induces precision and accuracy with Sun Tracking Accuracy of 0.1°.



Clientele

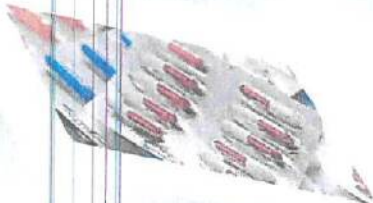


Recognition Nationally & Globally



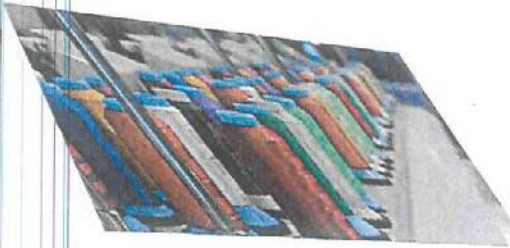
Indigenization of CST / CST Components in the country.. Awarded by Government of INDIA – By Mr.Piyush Goyal

c/A

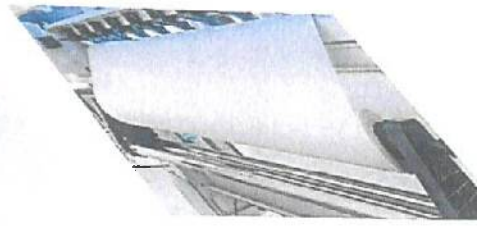


EFFICIENT

PROFITABLE



SUSTAINABLE



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AGNI-69 USPs

Factors	AGNI-69
Patented technology	Proprietary
Steam Generation Rate & Quality	0.5kg/min @ 180°C/10 bar
Performance Conditions	Steam generation @ even low DNI (150-200 w/m ²)
Technology	Make-In-India (Indigenously developed)
Site Marking	Not reqd.
Tracking Mechanism	Double Axes
Seasonal Adjustment	Not reqd.
Focus adjustment	Automatic
Concentration losses (Cosine losses)	Low
System Efficiency	>60% (Solar to Thermal conversion)
Mirrors	Solar Grade with >92% Reflectivity with 5 years warranty
Tracking Accuracy (in degrees)	0.1°
Structural load benefit	Distributed load (Ground-hugging design approach: This innovative approach of supporting the dish from its edge rather than from the centre reduced the need for heavy structural needs to withstand against wind loads, leading to drastic reduction in costs)
Design Validation	BARC & CSIR-CMERI under DST (Dept. of Science & Technology)
Mirror cleaning	Automatic (Auto-Cleaning using Proprietary Sprinkler Spraying system)
Operator dependency	Not reqd.
Space requirement	Less
Project Installation time	7 days
User friendliness	High
Emergency Shutdown	Yes (Auto-parking mechanism)
Wind Load Stresses	Low
Trouble Shooting	Online (less break-down times)
Performance Monitoring	Cloud-based
Integration with existing boiler setup	Very easy due to highest quality steam (180°C/10 bar) & automatic steam quality control setup by using micro-controller enabled pressure sensors
System assembly	Easy due to modular construction
Transportation	Easy due to modular construction
Scheduled Maintenance	Easy
System Weight	Very Light
ROI (payback period)	< 3 years
Carbon Emissions Savings (during Project Lifecycle)	304 tons CO ₂
Equivalent Tree saplings plantation (during Project life-cycle)	5060 tree saplings