

# ARUN solar thermal concentrator for thermal power

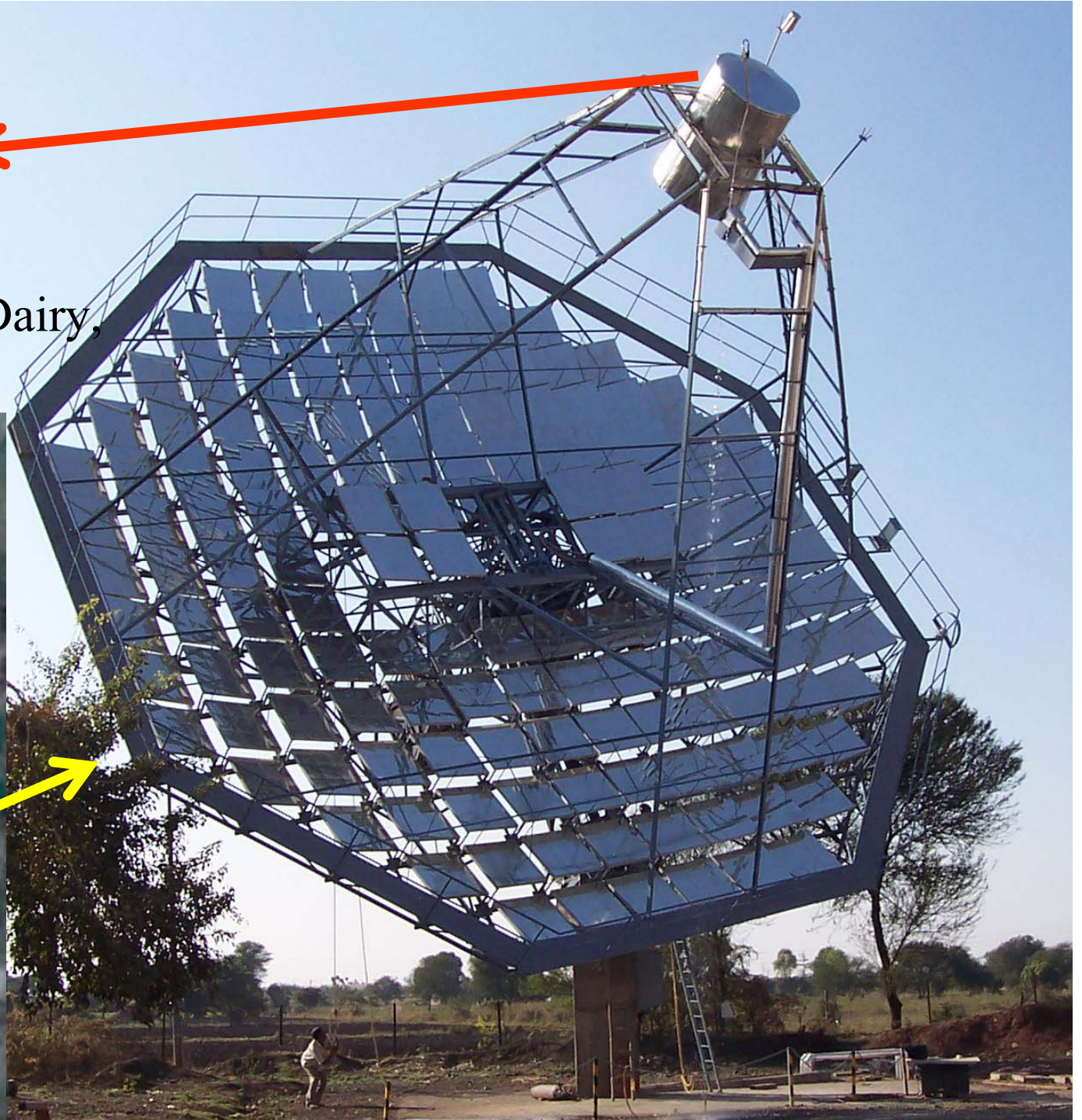
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# Expertise available

- A paraboloid solar thermal concentrator with point focus is developed
- It is installed at Mahanand Dairy, Latur
- This system – ARUN160 – is monitored for 2 years



Arun at Mahanand Dairy,  
Latur, India



- Paraboloid Fresnel mirror arrangement

Small mirror facets, protection provided

- Flat dish of space truss

Light, less costly, tested in the field





mirror arrangement

protection provided

SS

used in the field



- Point focus fixed to the dish

Maximized intercept factor

- Coiled tube cavity absorber

Minimized thermal losses

- Two-axes tracking

Facing the Sun, maximum insolation



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Facing the Sun, maximum insolation

- Storage in pressurized water & Heat exchanger

- Further modified for improved performance



# ARUN Solar Concentrator

*Installed at Latur under RandD project sponsored by MNRE with IIT-Bombay*

For the **FIRST TIME** in India a solar concentrator is available for **Solar Thermal Power Applications**. Its **improved version** has following capabilities

- Largest aperture area of a single module: 169 m<sup>2</sup>
- Highest modular thermal output : About 650,000 kcal/day  
or about 80 to 85 kW<sub>th</sub> for 8 to 9 hours a day  
at the temperature of 400 to 450°C
- Highest stagnation temperature : 1050° to 1200°C
- Highest efficiency of 55 to 60% at temperature of 400 to 450°C
- Lowest cost per energy at 400 to 450°C
- Pressurized water / Oil / Air as thermal medium
- More insolation compared to any other concentrator
- Testing procedure is developed that can characterize the dish

$$\eta = 0.75 - \{0.4 + 2.4 \times 10^{-5} (T_m - T_{amb}) + 0.9 \times 10^{-3} (\sin \theta_z)\} (T_m - T_{amb}) / I_{bn}$$

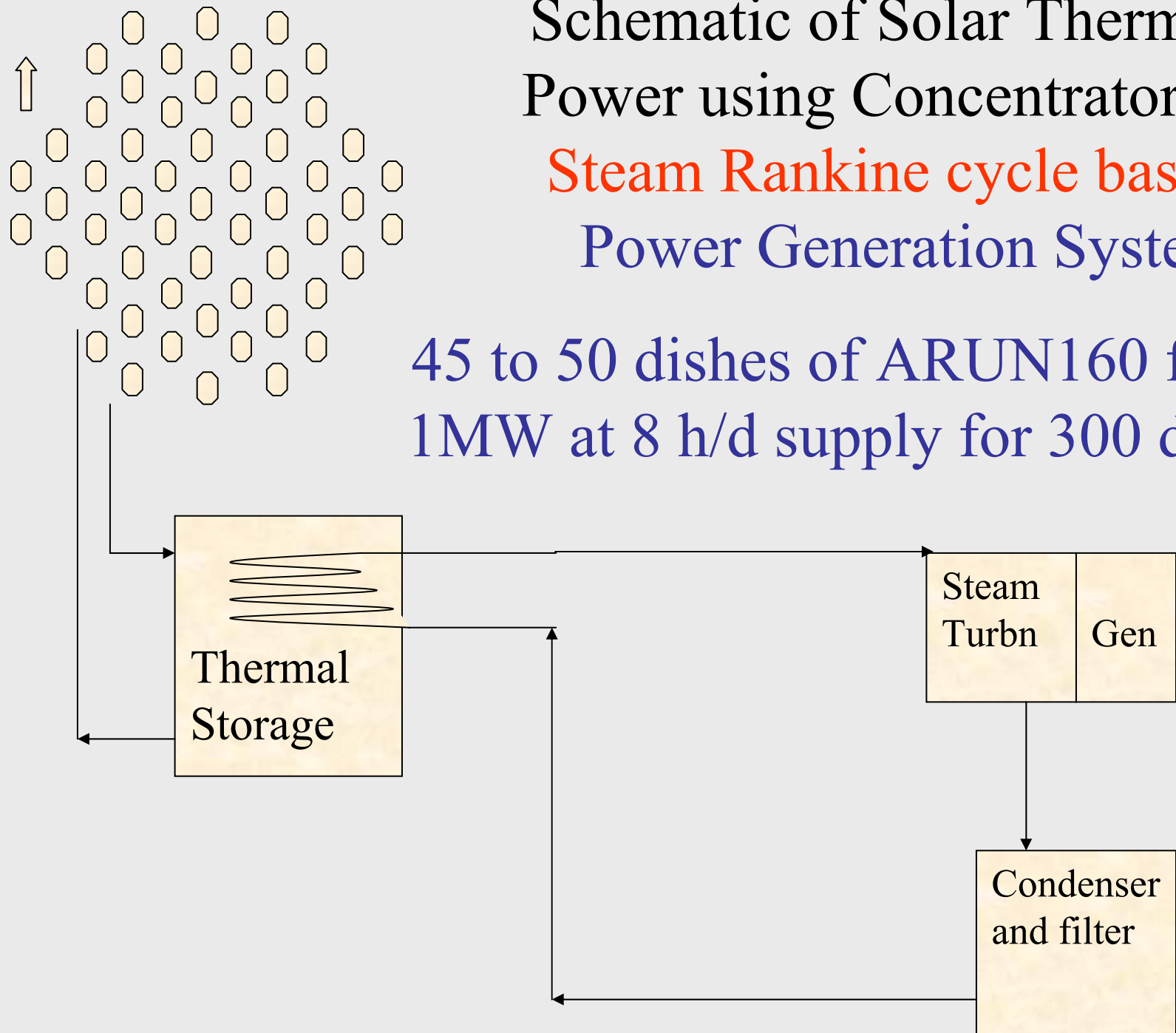
# **Solar Thermal Power from Large Solar Concentrator : ARUN**

**Many ARUN™ dishes can be used to  
generate power by thermal route**

- Using **steam engine / turbine** with steam from Solar units superheated with oil / gas / biogas
- In **combined cycle plant** with steam in Rankine cycle from Exhaust-Gas-Heat-Recovery-Boiler augmented by Solar units
- In **Co-Gen** mode **with VAR** system

# Schematic of Solar Thermal Power using Concentrators : Steam Rankine cycle based Power Generation System

45 to 50 dishes of ARUN160 for  
1MW at 8 h/d supply for 300 d/y



# Current Activities and Future plans

- Manufacturing unit in place
- Installing 6 units in field
- Designing and optimizing 1 MW and 5 MW solar thermal power plant using steam based Rankine cycle at 400 to 450°C
- Working on modifications in dish to suit requirements of heliostat as well as stirling dish

# Specific interests

- To supply medium to high temperature heat using Arun dishes for solar thermal power system
- To work on cost reduction
- To work in collaboration with experts on storage, heat-exchangers and turbines to optimize the system design



*Clique Developments Pvt. Ltd.*

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# Thanks

