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# Solar Heat and Power Generation via Central Receiver System (CRS)

CSMCRI's strengths and focus as a consortium partner

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**[www.csmeri.org](http://www.csmeri.org)**

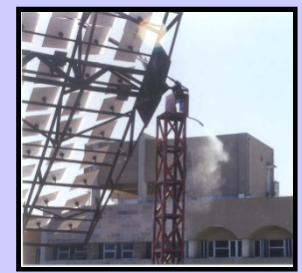
# CRS –Design Issues under Time & Cost Constraints

<b>Issues</b>	<b>Considerations</b>
<b>Project USP</b>	<b>High Temp Application Unique to CRS</b>
<b>Application</b>	<b>High temp central heat &amp; power generation for remote low grade applications?</b>
<b>Location</b>	<b>Orissa, AP, TN, Maharashtra, MP, Gujarat or Rajasthan?</b>
<b>Heliostat Design</b>	<b>How much permanent strength to face a casual gust/storm?</b>
<b>Sun Tracking Strategy</b>	<b>Open loop / Closed loop / Combo?</b>
<b>Receiver geometry</b>	<b>Cavity/External/Volumetric/Direct absorption?</b>
<b>Hi Temp Storage</b>	<b>Diurnal vs. seasonal Media: Air /steam / oil / molten salt?</b>
<b>Project value</b>	<b>Application, spin-off technology, R &amp; D, global marketability</b>

# CRS-Challenges

Policy	Project or Program? Flexibility for new entrants & exits of under performers; coordination in consortium
Value projection	Environ conservation; Energy security; Replicability or scalability; material development
Technical HRD	Recruitment /Re-orientation / Retention
Socio-Legal	Acceptability ; Community Cooperation
Risk Analysis	Weather; health hazard from invisible radiation
Value Realization	Environ conservation; Energy security; Replicability or scalability; materials development
Knowledge Pool	Dedicated cell for maintaining the knowledge pool and continuity of R & D efforts

# CSMCRI's Renewable Energy Integrated Sea Water Centered Focus



Mirror templates

10KW dish concentrator



Flex sheet mirror



Curved mirror prototype

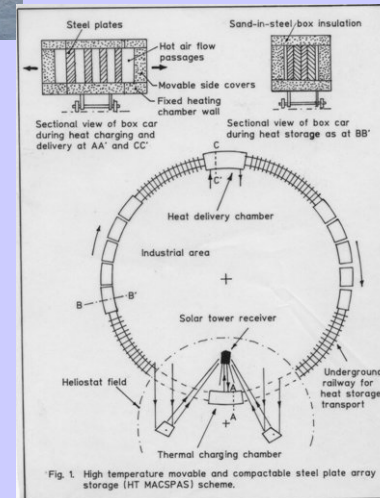
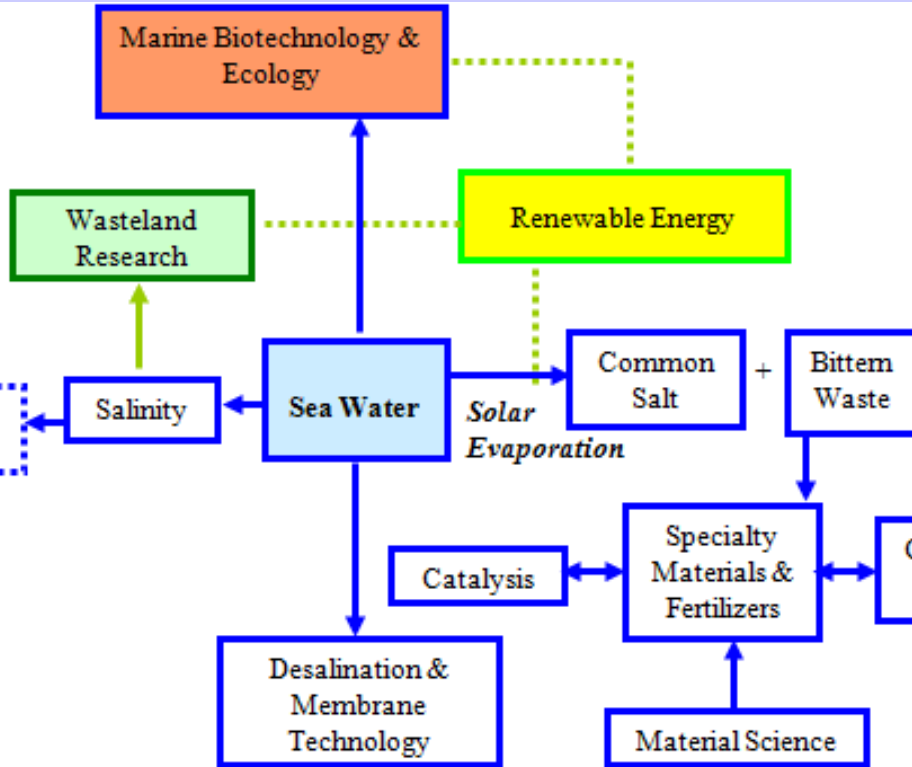


Fig. 1. High temperature movable and compactable steel plate array storage (HT MACSPAS) scheme.



5000 lpd solar distillation plant

Multi Purpose Solar Oven

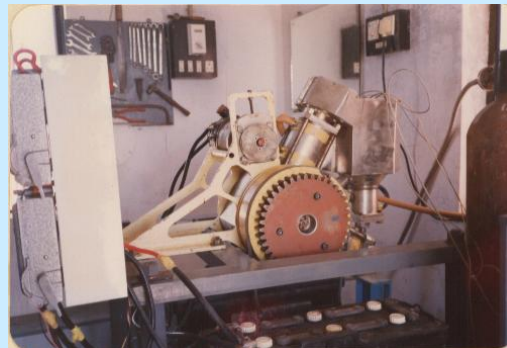
Engine waste heat recovery for potable water

Concentrated solar disinfection

Scheme for high temp solar thermal storage

# CSMCRI's International Collaborative Solar Thermal Activities

- **Indo-Swiss: Solar Thermal Water Pump (1980-82)**
- **Indo-USSR: Solar Dish Stirling Engine System (1982-1988)**
- **Indo-US: Parametric design studies of solar central receiver systems (Fulbright award) (1988)**
- **Indo-Uzbek: Solar Fluid Piston Pump (1992-93)**



# CSMCRI's global & national achievements

## Global

***Production of Euro IV compliant neat bio-diesel from Jatropha***; automobile usage tested by Daimler Chrysler, General motors; setting up of integrated Jatropha bio-diesel production plant with zero-waste, demonstration of improved techniques of micro propagation and cultivation of Jatropha

***Production of round common salt***: Citation by Reader's Digest in 2007

## National

***Tech Transfers to industries***: Detergent grade Zeolite-A to NALCO, Bhubaneswar  
Bromine recovery from waste sea bittern (Navin Fluorine); for 100,000 tonne/yr sulfate of potash (SOP) with co-production of MgO

***Export***: RO membrane based desalination units to Afghanistan and other countries  
Drugs from sea weed for TB; Malaria

### ***Social mission oriented deliveries***

**Potable water production**: from sewage water: 1million litre/day plant installed in Chennai; by solar distillation 5000 litre/day plant at Avania village in Bhavnagar

**Tech transfer to industry**: iodized salt; vegetable salt; Sea weed cultivation (Pepsico Foods)

**Training**: of marginal salt workers for production of better quality salt

# **CSMCRI's prospects as a partner of Consortium for Central Receiver System (CRS) Technology Development**

- CSP applications to salt & marine industries**
- Radiation & weather data collection & analysis specific to application**
- Development of solar material (for mirrors, receiver & thermal storage)**
- High temperature solar thermal storage in molten salt**
- Development of heliostat and heliostat field layout**
- Optimization of central tower systems design with reference to receiver thermal loss**
- Human Resource Development in CRS design and applications**
- Project implementation: in Saurashtra or Kutch, for Integrated Sea Water Processing or Coal Gasification or Bio fuel production**