Off Grid Scenario and outlook in India Perspective

Dr. Ahmar Raza
Director, MNRE

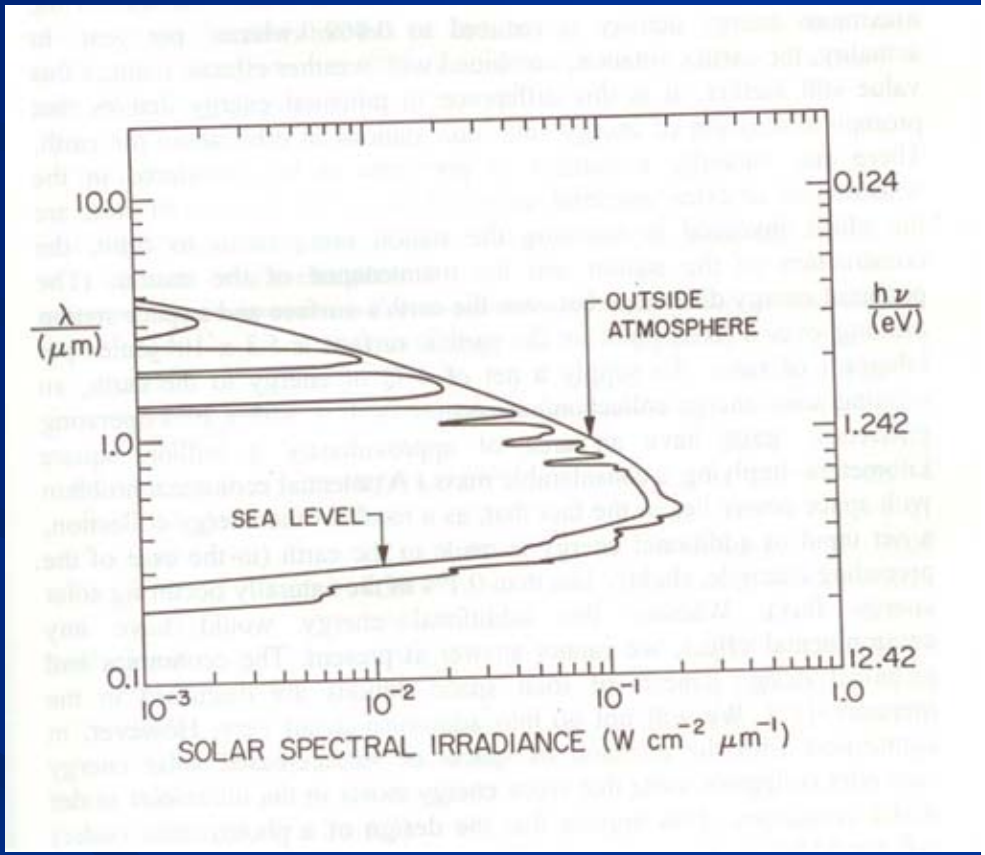
18th September, 2013
New Delhi

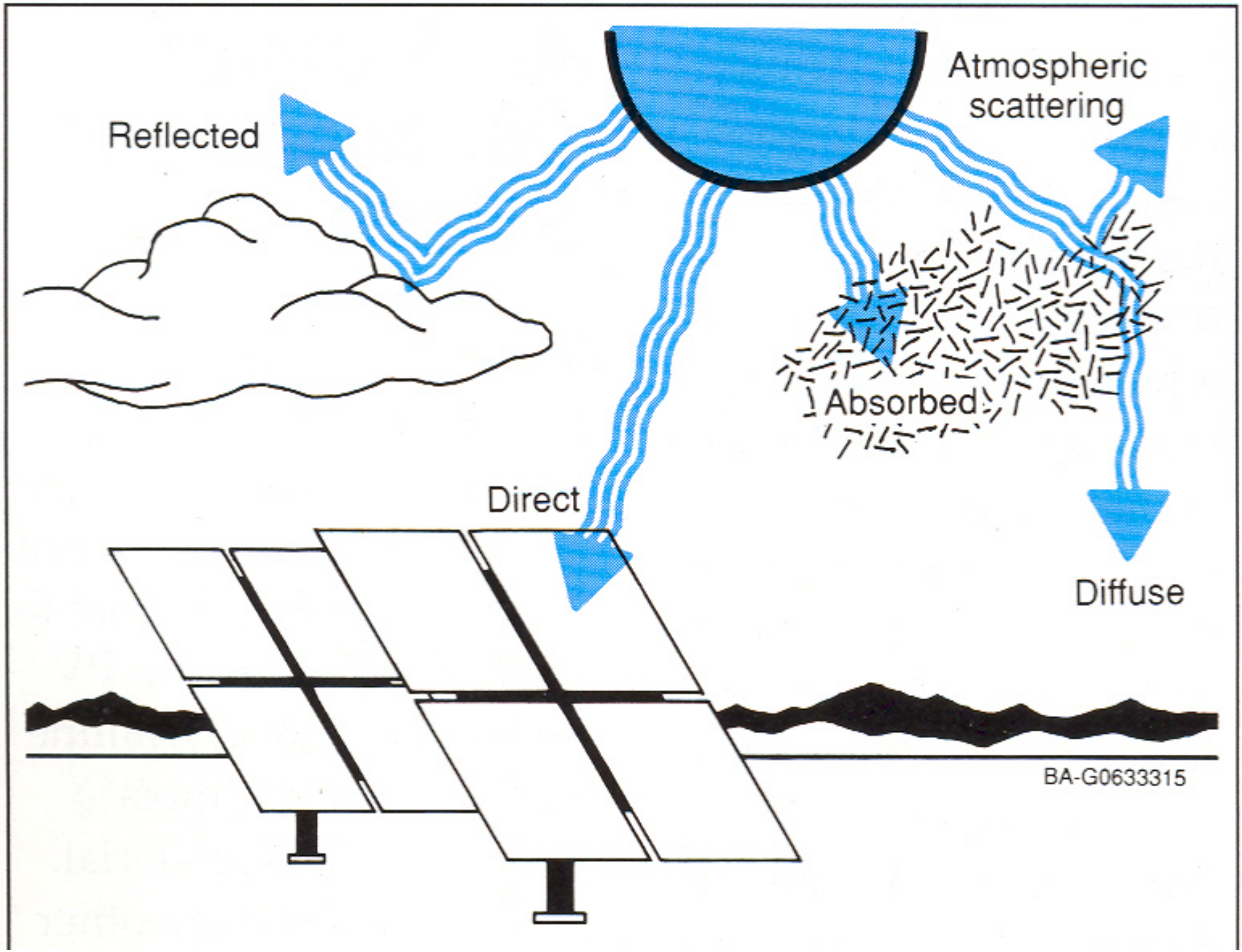
SOLAR ENERGY

- Difference between sun and earth is about 1.495×10^{11} m.
- Surface temperature of sun is 5800^{0} K.
- Solar constant 1367 W/m^2.
- AM1 is 1020 W/m^2.
- Reflection and absorption by air is 30%.

Solar Energy

- Distance between sun and earth is about 1.495×10^{11} m or 150 million km.
- Surface temperature of sun is 5800^0 K.
- Solar constant 1353 W/m^2.
- Reflection and absorption by air is 30%.
- AM1 is 1070 W/m^2
- AM 1.5 is 1000 W/ m^2




Atmospheric
scattering
Reflected
Absorbed
Direct
Diffuse
BA-G0633315

Solar Energy

Solar energy is being used through two main routes:

- **SOLAR THERMAL**

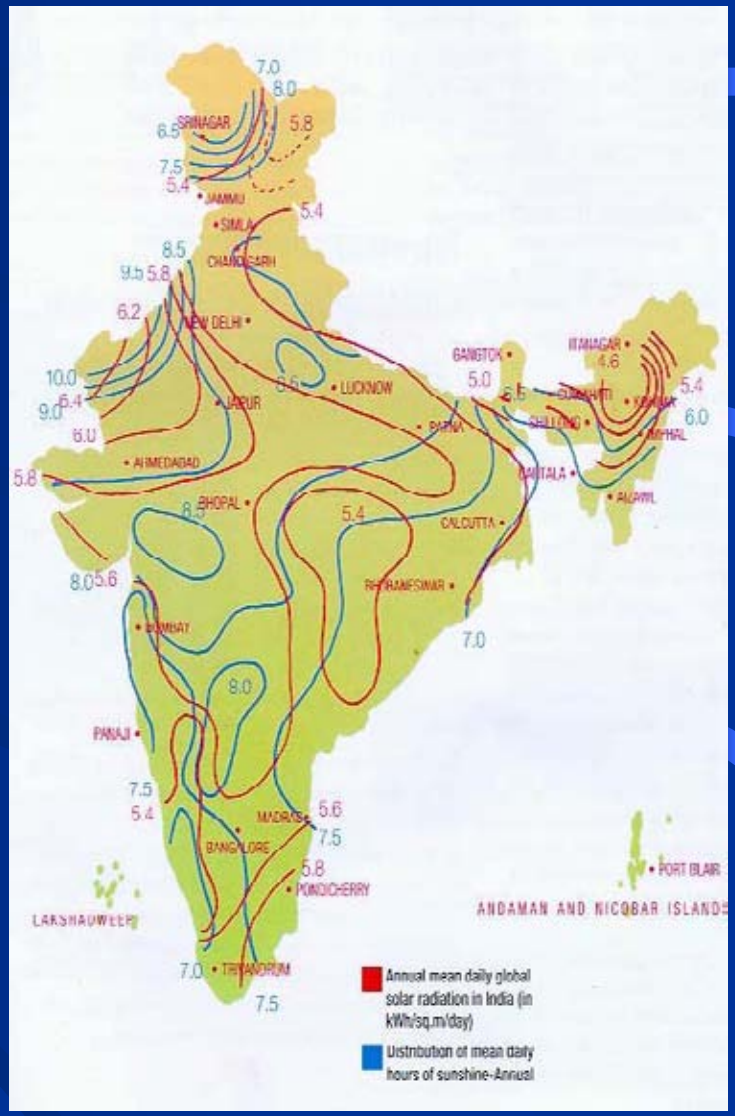
  For heating , cooking, drying and electricity generation

- **SOLAR PHOTOVOLTAIC**

  For direct electricity generation

Solar Resource Availability in India

- Daily solar radiation 4 - 7 kWh per sq. m.
- 250 - 300 sunny days in a year
- 600,000MW from 1% land area
- 5000 trillion kWh solar radiation incident in a year
- Radiation data collected by India Meteorological Department. Data Hand Books available. Update available on MNRE website



Jawaharlal Nehru National Solar Mission

– Jawaharlal Nehru National Solar Mission (JNNSM) is one of the major global initiatives in promotion of solar energy technologies.

– Mission aims to achieve grid tariff parity by 2022 through
  - Large scale utilization, rapid diffusion and deployment of solar technologies across the country at a scale which leads to cost reduction
  - R&D
  - Local manufacturing and support infrastructure

JNNSM Road Map

	Target for Phase I (2010-13)	Cumulative Target for Phase 2 (2013-17)	Cumulative Target for Phase 3 (2017-22)
Grid Solar Power incl. roof top & distribution grid connected plants	1,000 MW 100 MW	4,000 MW 10,000 MW	20,000 MW
Off-grid solar applications	200 MW	1,000 MW	2,000 MW
Solar thermal collectors	7 million sq meters	15 million sq meters	20 million sq meters

Ground Measurements of Solar Radiation

Andhra Pradesh	7
Chhattisgarh	1
Gujarat	11
Haryana	1
Karnataka	5
Ladakh	1
Madhya Pradesh	3
Maharashtra	3
Pudducherry	1
Rajasthan	12
Tamil Nadu	6
Other States	6

- C-WET is implementing the project for setting up 57 ground monitoring stations
- Centralized data collection, analysis and calibration of measuring sensors

Setting up of 1 MW Solar Thermal Power

testing, research & simulation facility being set up at SEC through IIT Bombay & Industry consortium

- Combination of different collector technologies
- Direct and indirect steam generation to be demonstrated

SOLAR COOKERS

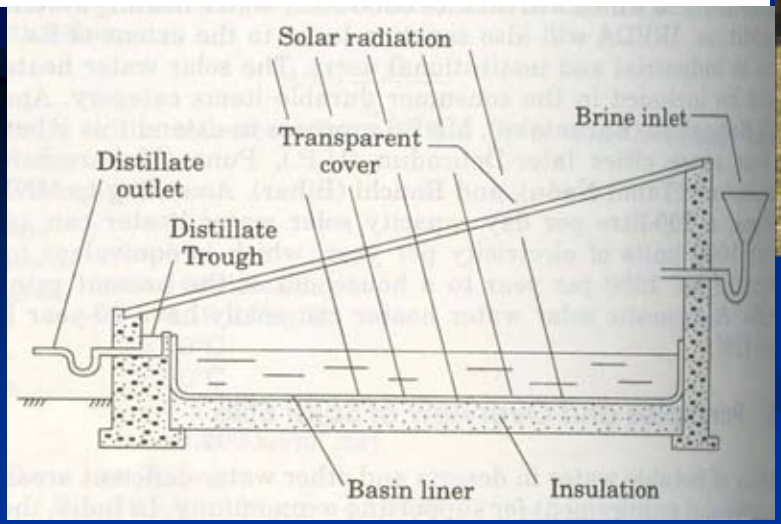
A Solar Steam Generating System at Global Hospital, Mount Abu, Rajasthan

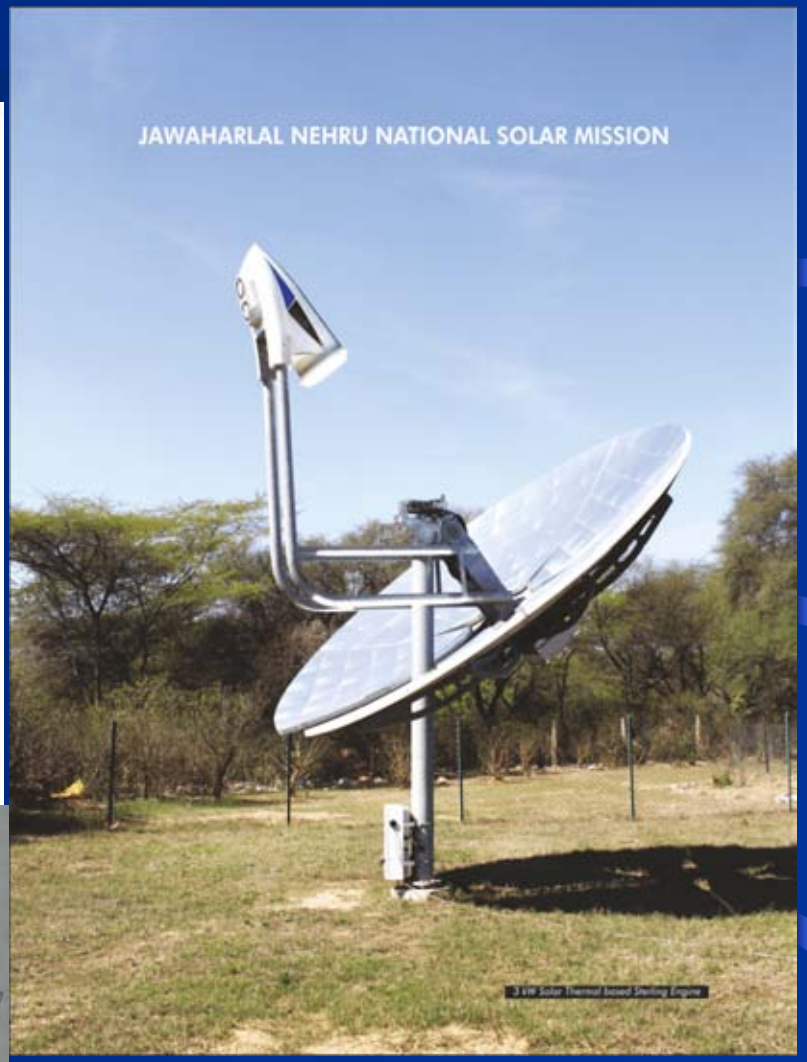
Solar Dish Concentrator

MWS
Clean Energy For All

SEC

Domestic Solar Water Heaters





Solar Still

Solar Energy Centre

Solar Air Heating System, Rajasthan

Solar Air Heating System, Laddakh

Solar Collector Field

Solar Photovoltaic Systems

- Solar Lanterns
- Solar Home Systems
- Solar Street Light
- Community Lighting
- Water Pumping Systems
- Village Power Plants
- Vaccine Refrigeration
- TV Sets, Radio Receivers and VLPTS for Doordarshan
- Telecommunication
- Railways
- Battery Chargers For Defence Applications
- Unmanned Off-shore Oil Wellhead Platforms
- Power Plants

Solar Lanterns

MNRE

Solar Light in a House in Tribal Village

Solar charging station

Solar Powered TV in a Village

Street light in Amberdkar village in UP and street lights in Deoghar, jharkhand

Solar pump and other applications

Mission’s Achievements as on 31.3.2013

Grid connected Power projects	-	1686.441 MWp
Off-grid SPV systems (sanc)	-	252.00 MWp
Installed systems	-	67.07 MWp

Solar Photovoltaic and Thermal Systems – Achievement (31.08.2013)

Solar Lanterns (nos.)	939862
Solar Home lights (nos.)	961665
Street Lights (nos.)	255879
Pumps (nos.)	11626
Stand Alone Power Plants	42157.6 kWp
Grid-connected Power plants	1951 MWp
Solar cookers	6.34 lakhs
Water Heaters collector area sqm	7.14 million

THANK YOU