INTRODUCTION TO SOLAR ENERGY
ENERGY
THE BACK BONE BEHIND HUMAN ACTIVITIES
Where do we get the energy from

- Oil 37%
- Coal 25%
- Gas 23%
- Nuclear 6%
- Biomass 4%
- Hydro 3%
- Solar heat 0.5%
- Wind 0.3%
- Geothermal 0.2%
- Biofuels 0.2%
- Solar photovoltaic 0.04%
What is the origin of the energy sources

- Coal, oil and Gas – Vegetation matter buried under the earth (Fossil fuels)

- Hydro – Running rivers

And they are all gifts from the sun
SUN - SOME FACTS

- Is a middle aged star
- Is mid sized
- 4.5 bn yrs old
- Converts 60 core tons of $H_2$ to $He$ every second
- Loses 40 Lakhs tons of mass each second
- Nuclear reaction will stop in about 500 crore yrs
Will fossil fuels last for ever

Unfortunately not –

At 5% growth rate, our coal reserves can not last for >than 86 years

World oil production likely to reach a maximum by 2010-15 and would rapidly decline thereafter.
They Pollute the atmosphere releasing Carbon Monoxide, Sulphur and other toxic gases.

They cause global warming that can cause drought and floods and increase in sea levels.
Fossil fuels give very high energy per unit weight.

They are easy to transport and convenient to use.

**AND THEREFORE**

There are no immediate substitute for fossil fuels.

**BUT**

We have to find solutions soon.

**WHAT ARE THE ALTERNATIVES**
RENEWABLE ENERGIES ARE ALTERNATE ENERGY SOURCES

Solar

Wind

Wave

Biomass

Geothermal
**Definition:** Energy from sources that are ‘regenerative’ and for all practical purposes cannot be depleted.

**Examples:** Sun, Wind, Hydro-electricity, Geothermal, Ocean currents, Biomass.

Power generated adds **ZERO** **CARBON** into the atmosphere thus you leave the Earth a better place…
RENEWABLE ENERGY ADVANTAGES

• No extraction process involved
• No transportation of fuel
• De-centralized generation
• Green energy – no pollution
• Inexhaustible
• Conserves precious natural resources
The Power of Sun ...

The Sun in Perspective:

- India’s energy demand is expected to rise by 9% annually, one of the highest in the world.
- At **4-7 kWh/m²** solar insolation we receive an energy equivalent of 5000 trillion kWh/yr!
- Energy from wood, coal, oil, natural gas or petrol can be traced to the sun.
- Solar potential: 20MW/sqkm (current **0.8**)

*Source: //ireda.nic.in.*
Classification ...

- Sun is a massive source of **heat and light**.
- India receives abundant solar radiation.
- Two distinct solar technologies:
  - **Solar Photo-Voltaic (SPV)**
  - **Solar Thermal Systems**

**SPV** is the technology that converts light into electricity.

- Lighting systems.
- Water pumping.

**Green Power !!!**
**Why Solar Energy ...**

- Solar is clean & green energy, available in plentiful.
- Not dependent on local conditions like wind/water.
- Fossil fuel has its inherent problems like depletion, pollution, dependency on global oil prices, problems that are bound to increase in the coming future.
- Develop a responsible image for the owner.
- No recurring fuel cost, can be grid/battery connected.
- No moving parts therefore negligible maintenance.
- Avail 80 % tax depreciation for any solar product.

- **RENEWABLES ARE THE FUTURE...**