

# **NCSC -2016**

**Focal Theme**

**Science, Technology & Innovation  
for Sustainable Development**

**Sub theme- Energy**

**By**

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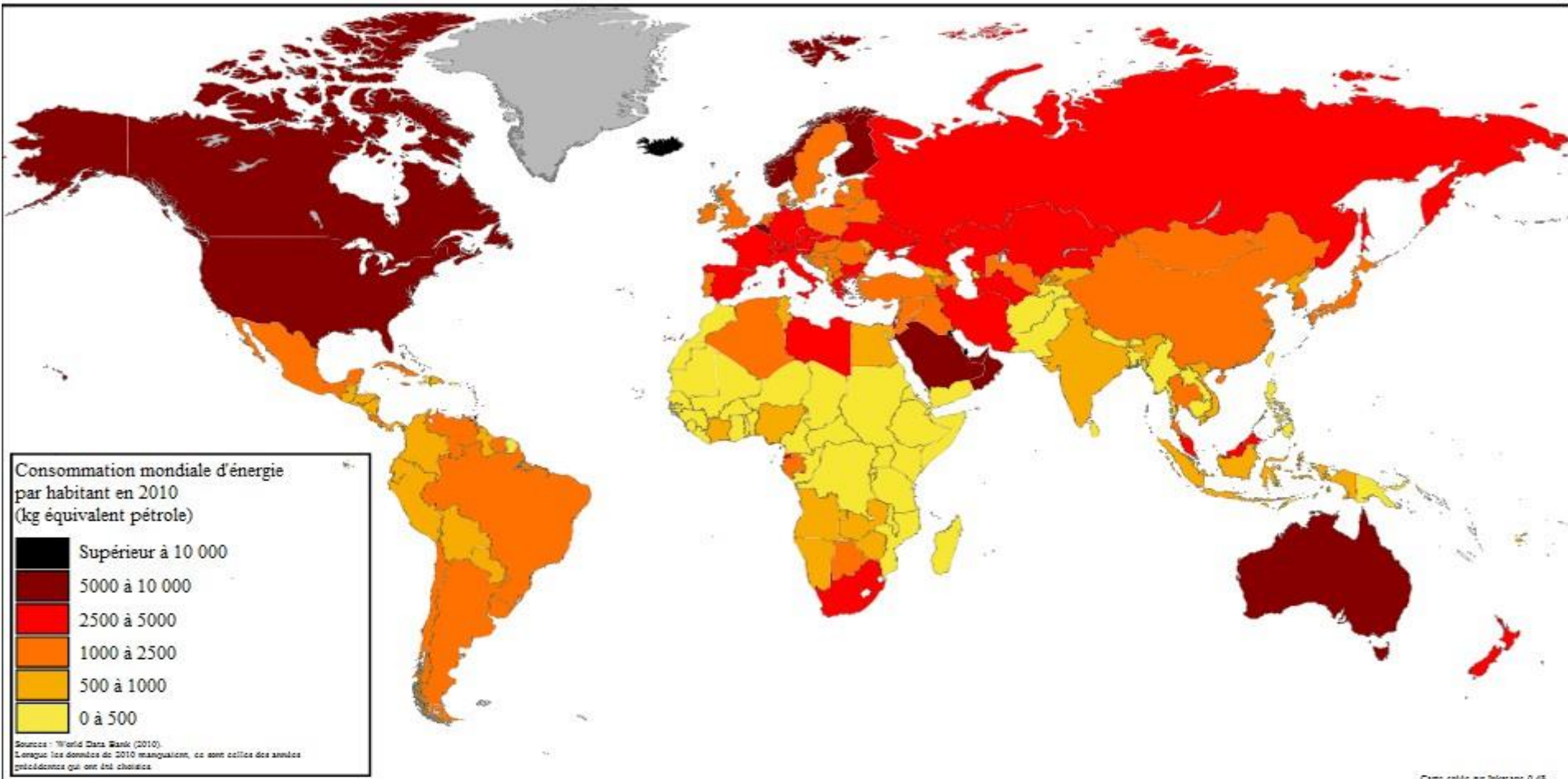
**A.P.S.A. college,Thiruppattur.**

**Economic development of any country largely depends on how its ENERGY REQUIREMENTS are satisfied**



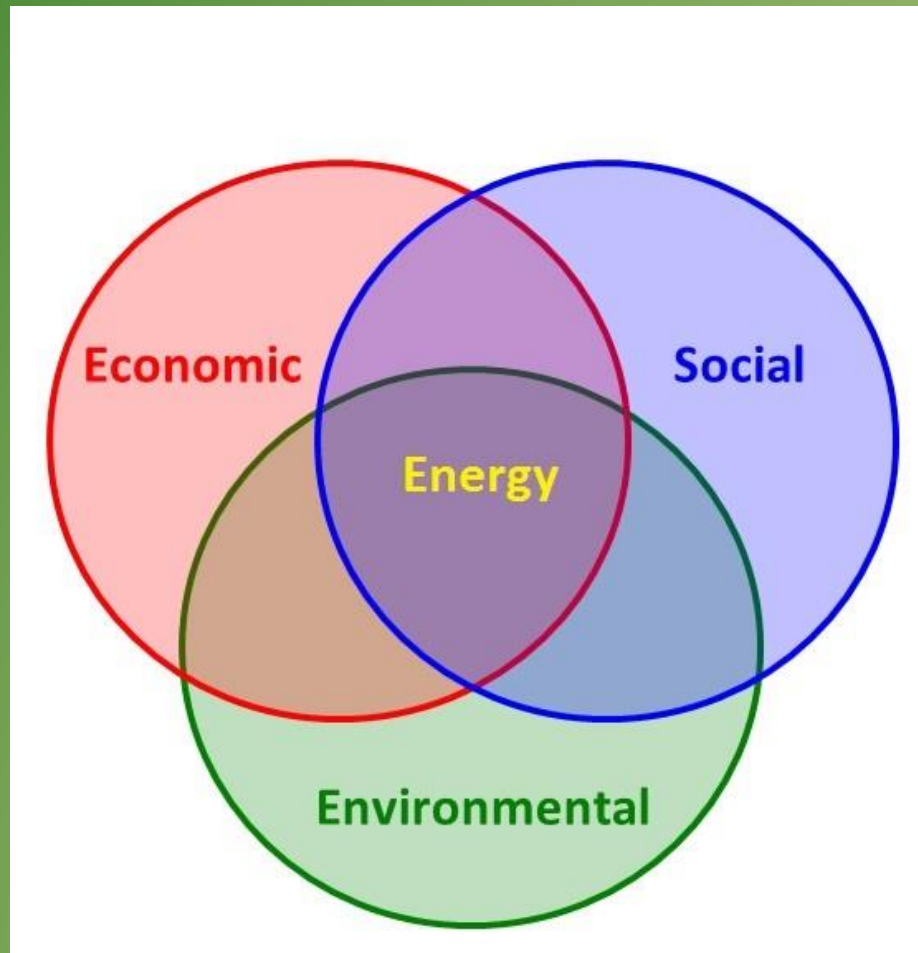
# Energy per capita consumption

key deciding factors of the level of well-being of any country.





# ENERGY IS CENTRAL TO SUSTAINABLE DEVELOPMENT



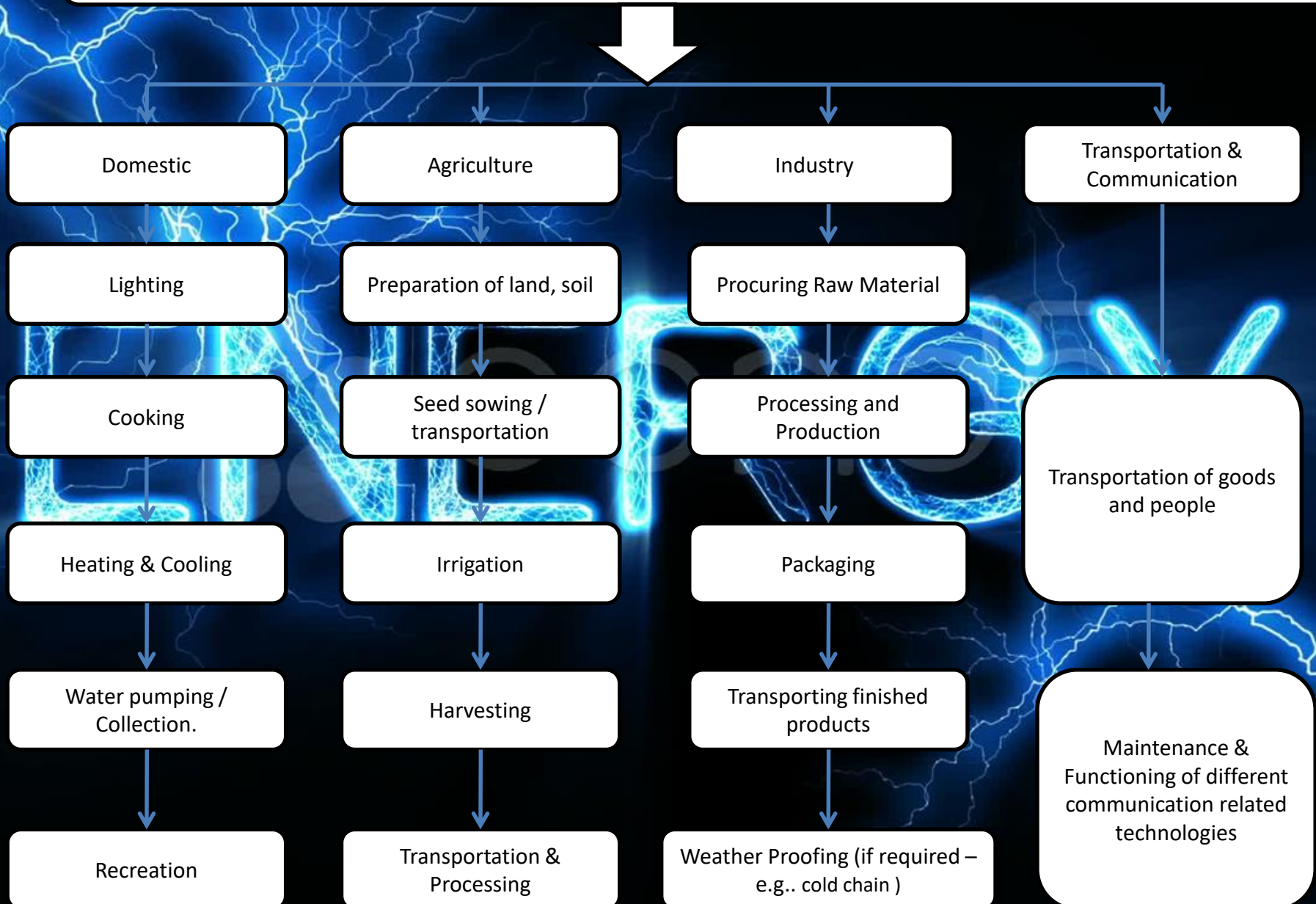
# AFFECTS ALL ASPECTS OF DEVELOPMENT

- SOCIAL, ECONOMIC, AND ENVIRONMENTAL

INCLUDING LIVELIHOODS,  
ACCESS TO  
WATER, AGRICULTURAL  
PRODUCTIVITY, HEALTH,  
POPULATION LEVELS,  
EDUCATION .



# Major areas of application and uses of Energy



# DOMESTIC

LIGHTING: EVER INCREASING WITH POPULATION  
SOURCES : FOSSIL FUELS 90%, (THERMAL POWER)  
DEPLETING RESOURCES-UNSUSTAINABLE.



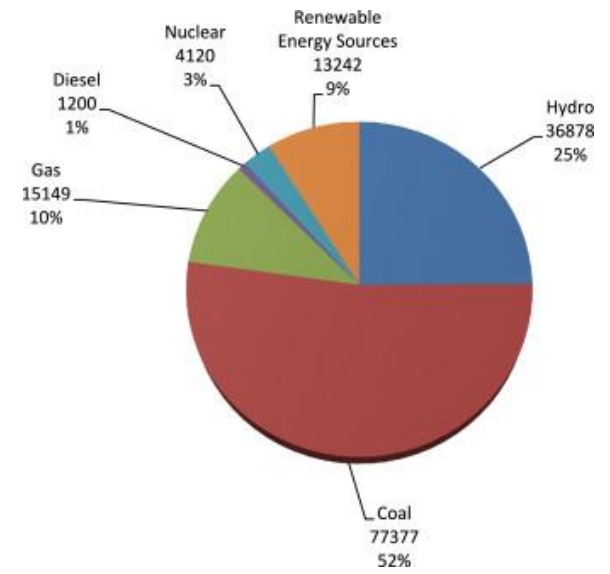
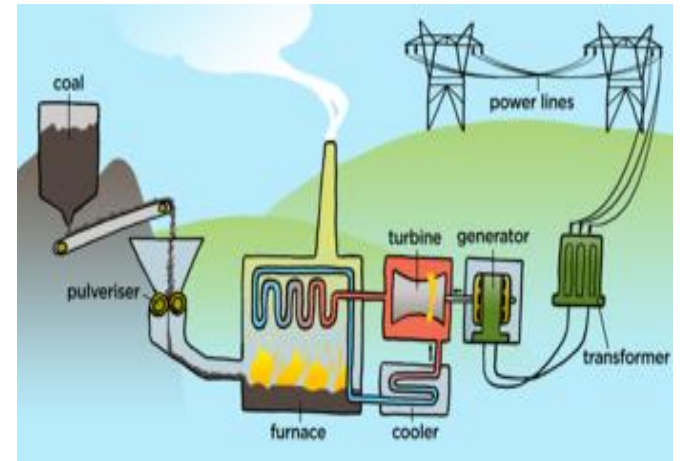


# Lighting

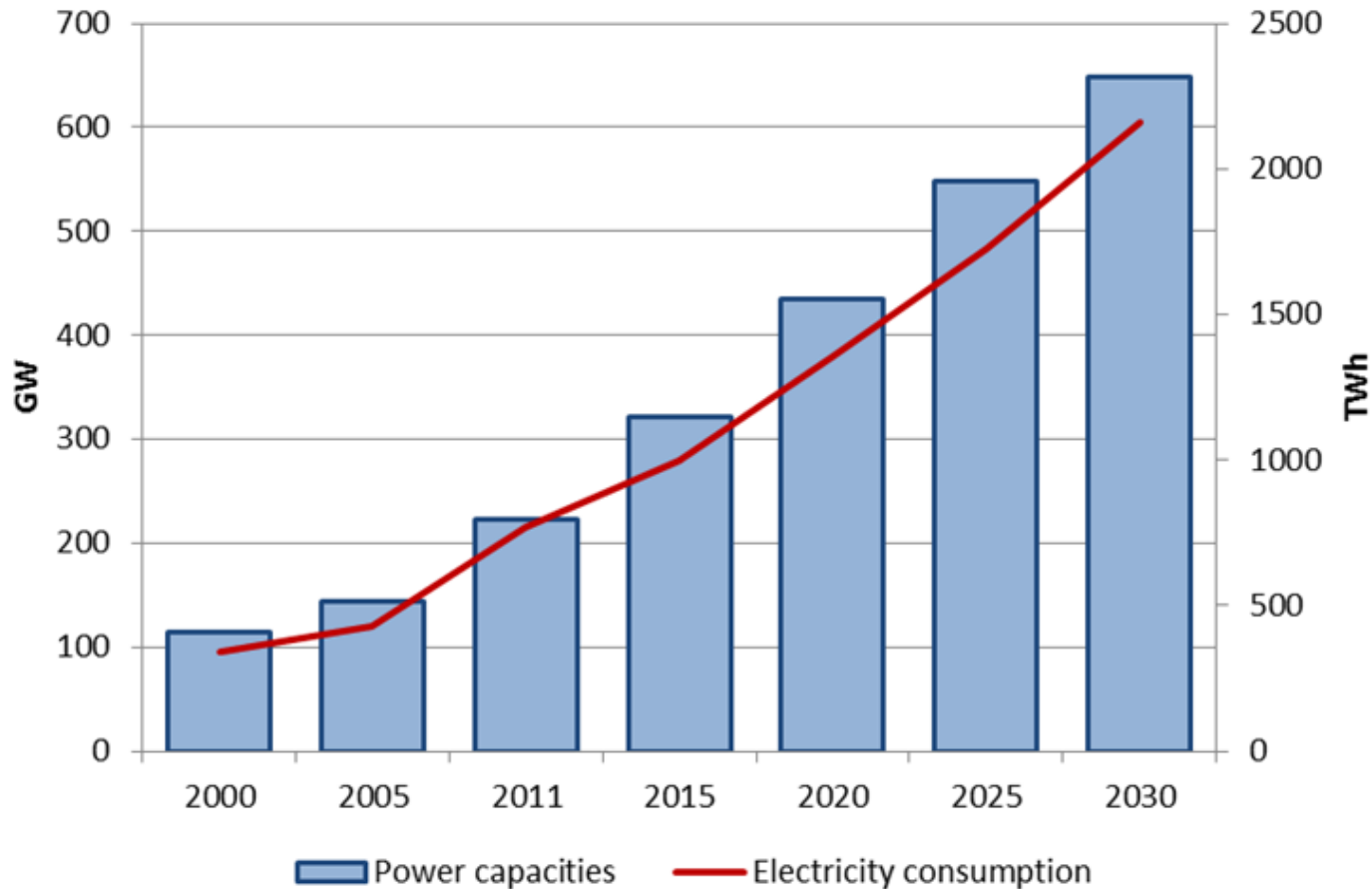
## POWER DEMAND INCREASES WITH LUXURY







# INDIA'S DEMAND FOR ELECTRIC POWER



# COOKING

## HEAVILY DEPENDANT ON FOSSIL FUELS



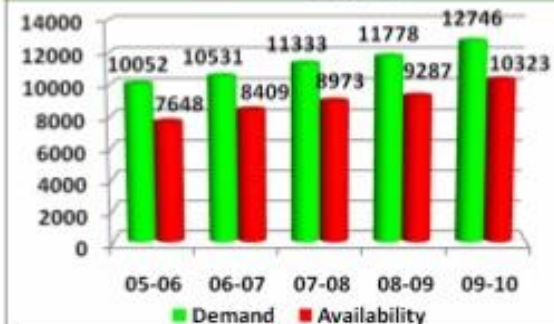
# Indian LPG Scenario

## ➤ Gap between demand & supply (indigenous production)

- Demand in 2009-10 stands at **12746 TMT**
- Indigenous Production in 09-10 was **10323 TMT**
- Imports @22% of total LPG Demand
- Indigenous LPG production through State Run, Private And Fractionators



### Demand Vs Supply (TMT)



### Indigenous Production

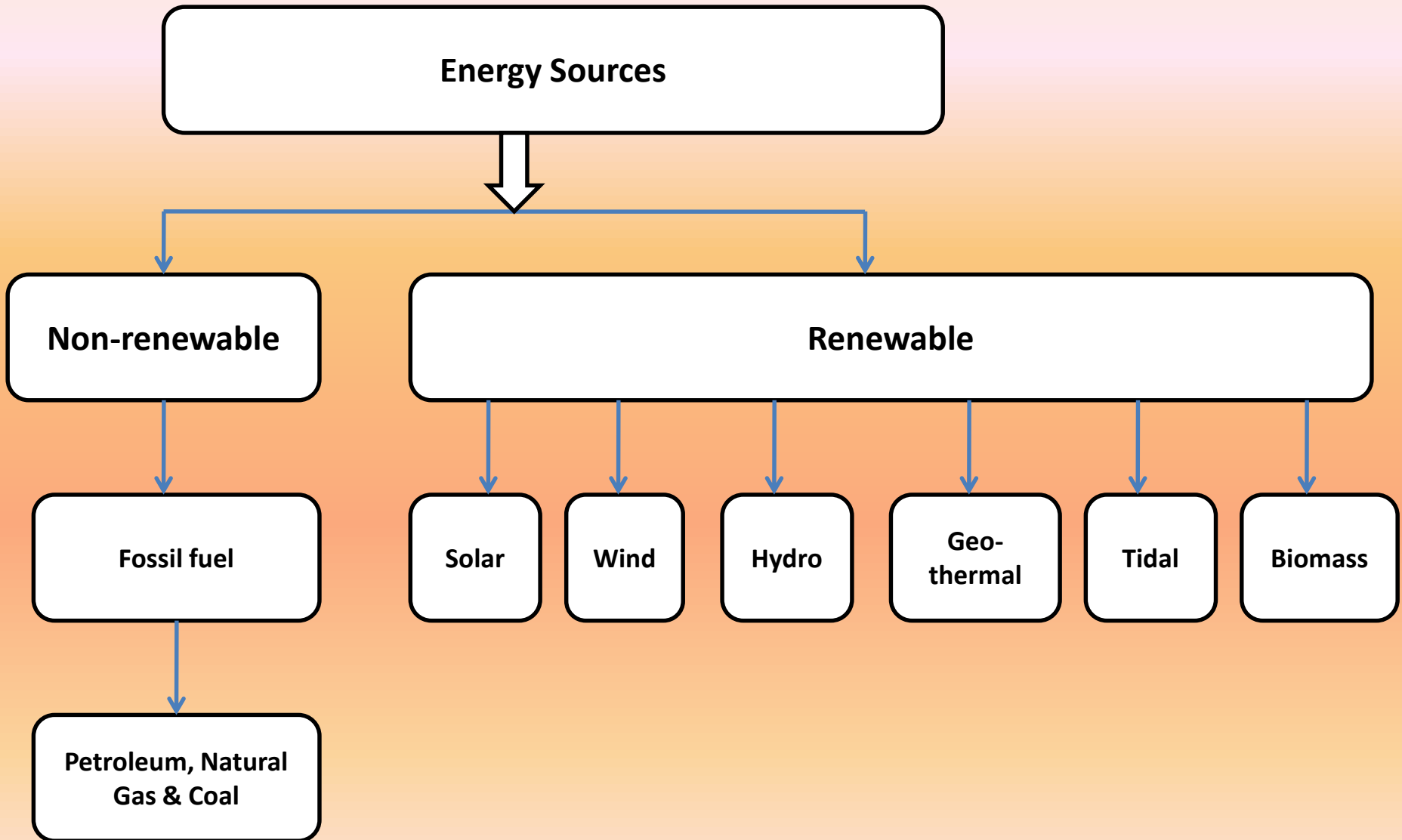




# *HVAC ( heating, ventilation, and air conditioning)*

Increasing the peak energy demand rapidly





# Fossil fuels

## coal



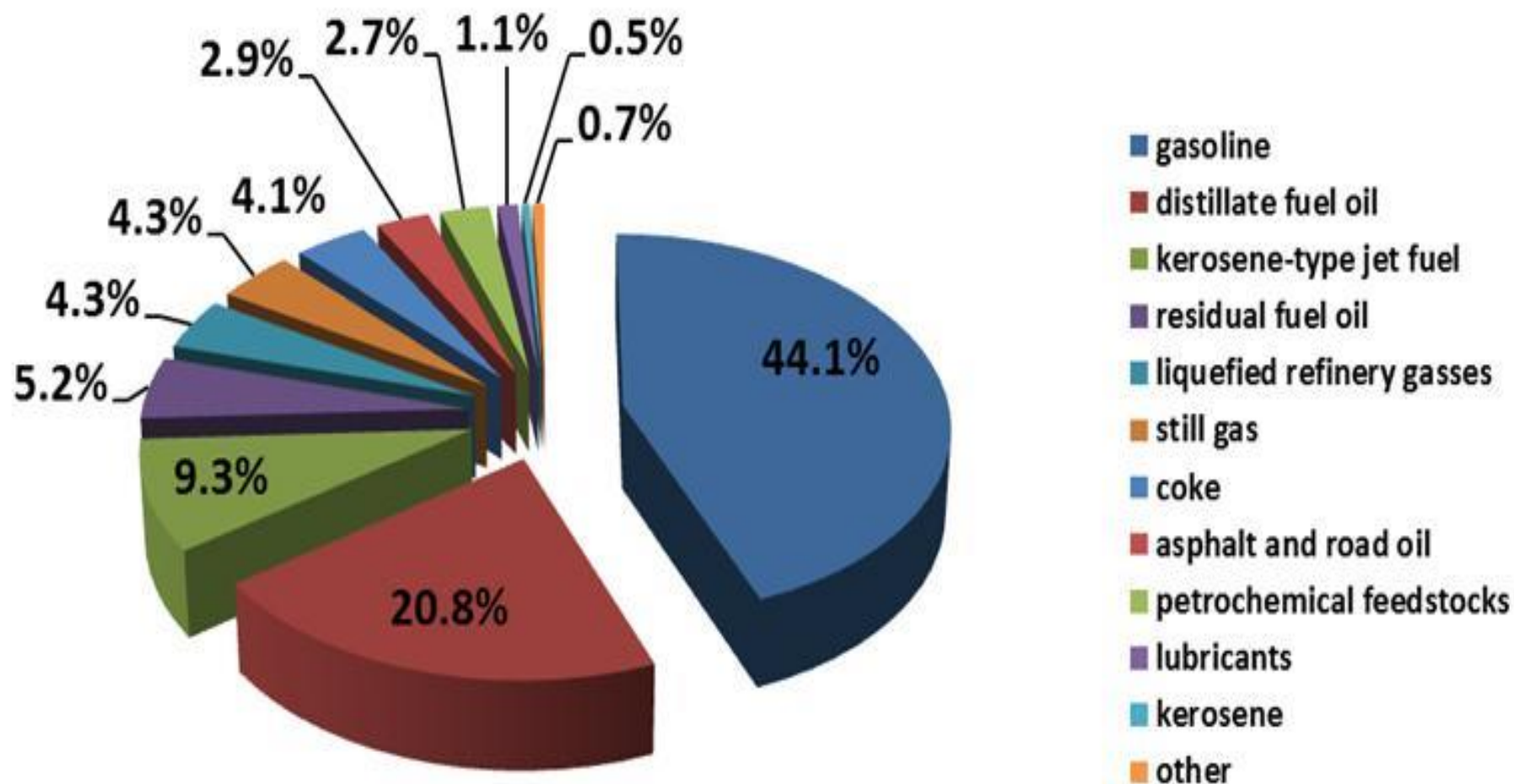


# OIL

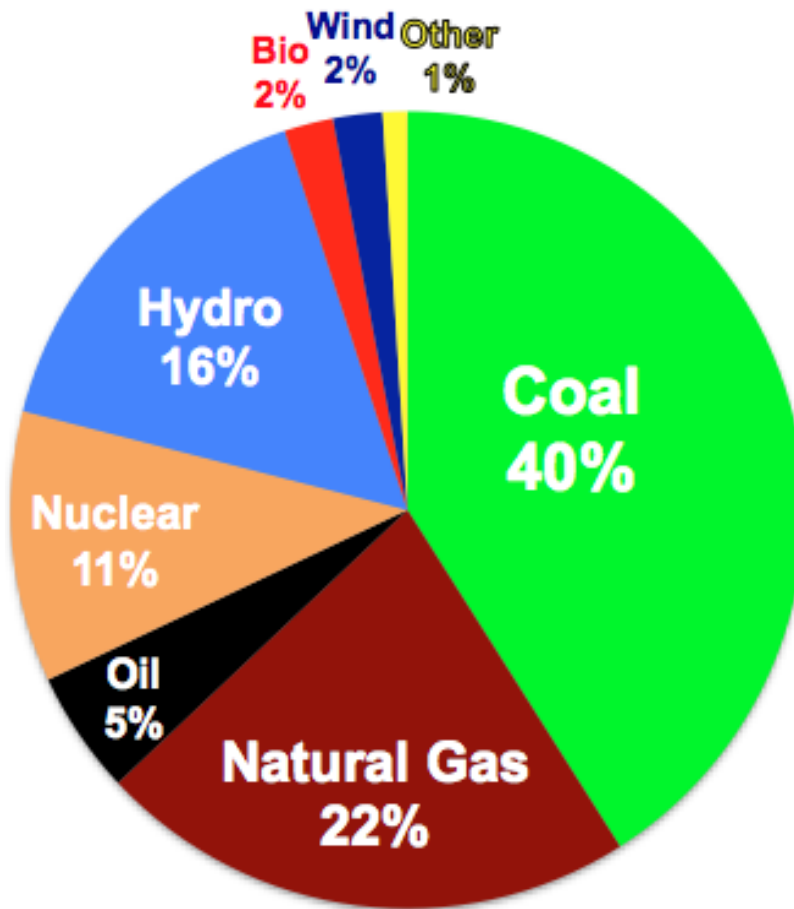




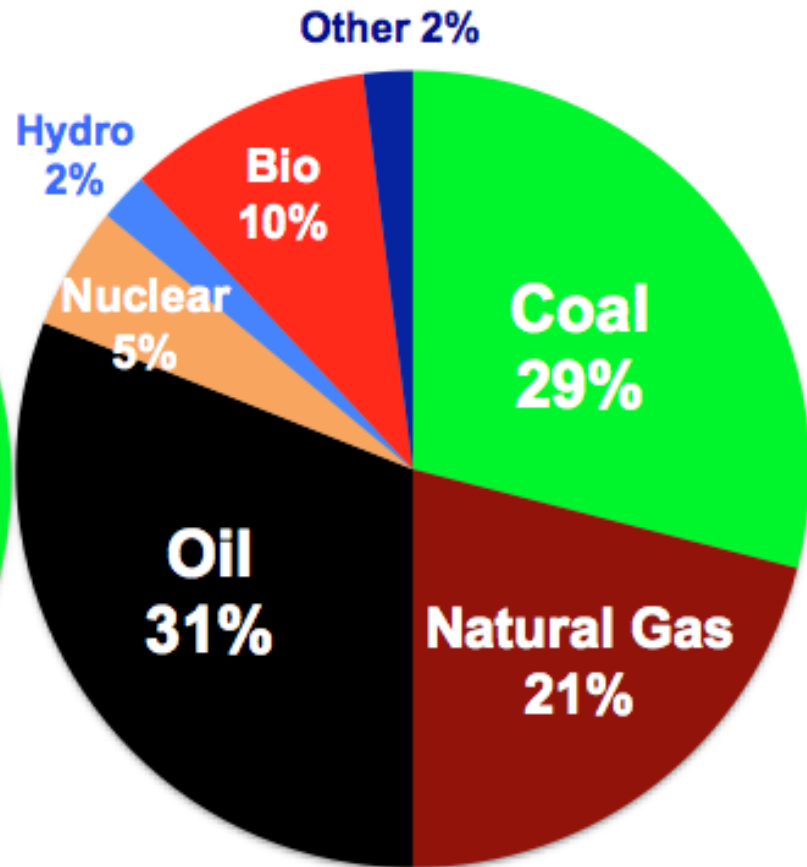
# WHAT CRUDE OIL MAKES



## Fossil Fuels Dominate the World's Energy Complex

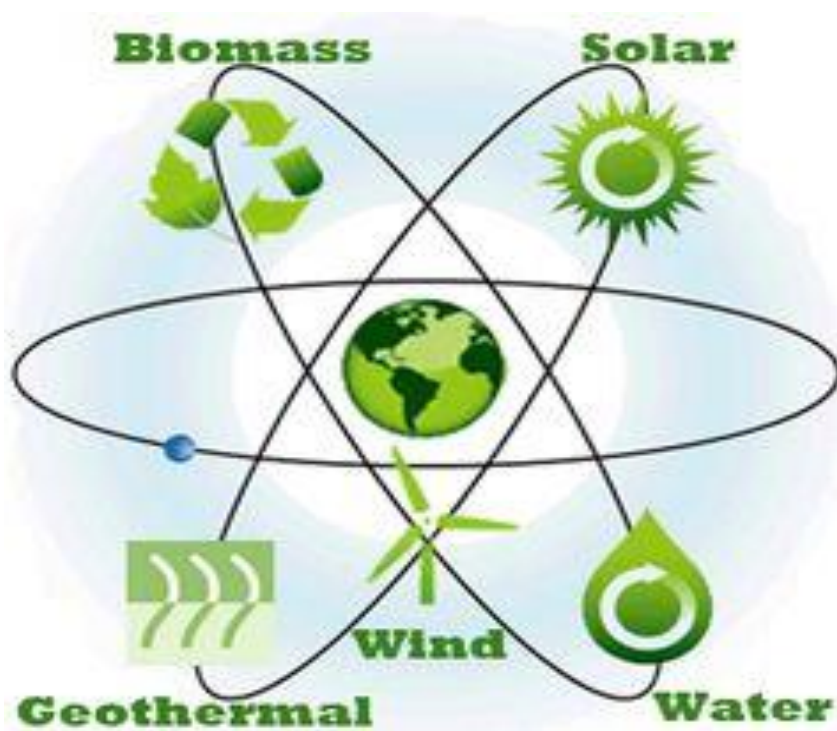


**Global Electricity Supply**  
**23,500 TWh**



**Global Primary Energy Supply**  
**13,700 Mtoe**

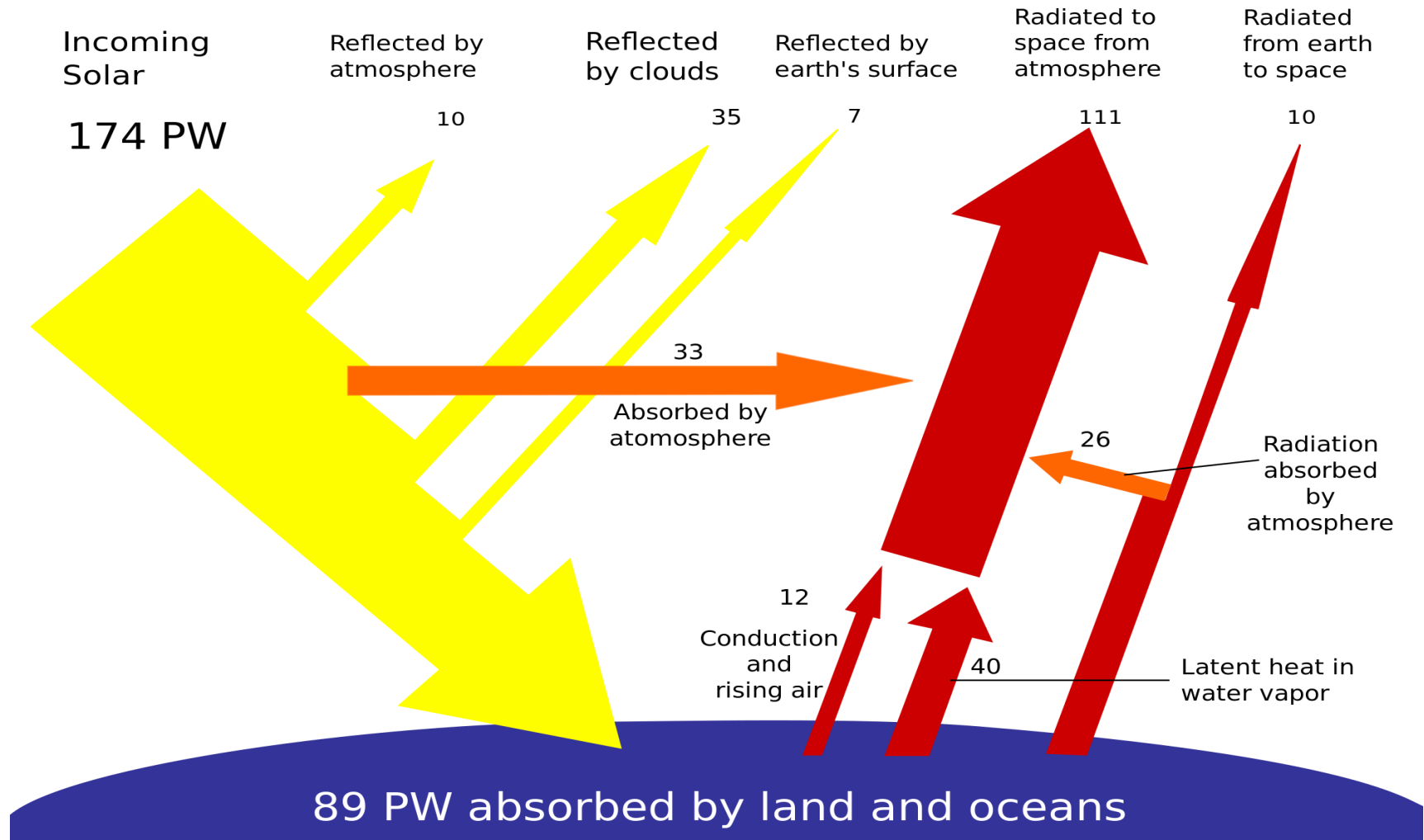
# RENEWABLE SOURCES







# SOLAR ENERGY



A close-up photograph of a human hand holding a bright, glowing light source, possibly a small lamp or a laser pointer, against a solid blue background. The light creates a starburst effect with rays emanating from the point of contact. The hand is positioned on the left side of the frame, with fingers slightly curled around the light source.

**1PETA WATT  
EQUAL TO  $10^{15}$  WATT**

**The total solar energy flux intercepted by  
the earth on any particular day is  
 $1.5 \times 10^{22}$  Joules.**

**world's total energy consumption of all  
forms in the year was only  
 $4.24 \times 10^{20}$  Joules**

# WAYS OF TAPING SOLAR ENERGY

## **1) SOLAR THERMAL.**

**Solar thermal** technology uses the sun's energy, to generate low-cost, environmentally friendly **thermal** energy. This energy is used to heat water or other fluids, and can also power **solar** cooling systems.

## **2) SOLAR PHOTO VOLTAIC.**

# SOLAR THERMAL





**THIS **STIRLING ENGINE** IS DRIVEN BY A PARABOLIC DISH THAT COLLECTS AND CONCENTRATES THE SUN INTO A HEAT SOURCE TO RUN THE ENGINE AND PRODUCE POWER.**



# First molten salt storage

use of molten salt (Sodium nitrite and nitrate) to capture and store the sun's heat. The very hot salt was stored and used when needed to produce steam to drive a turbine/generator that produces electricity long into the night.



# SOLAR PHOTOVOLTAIC

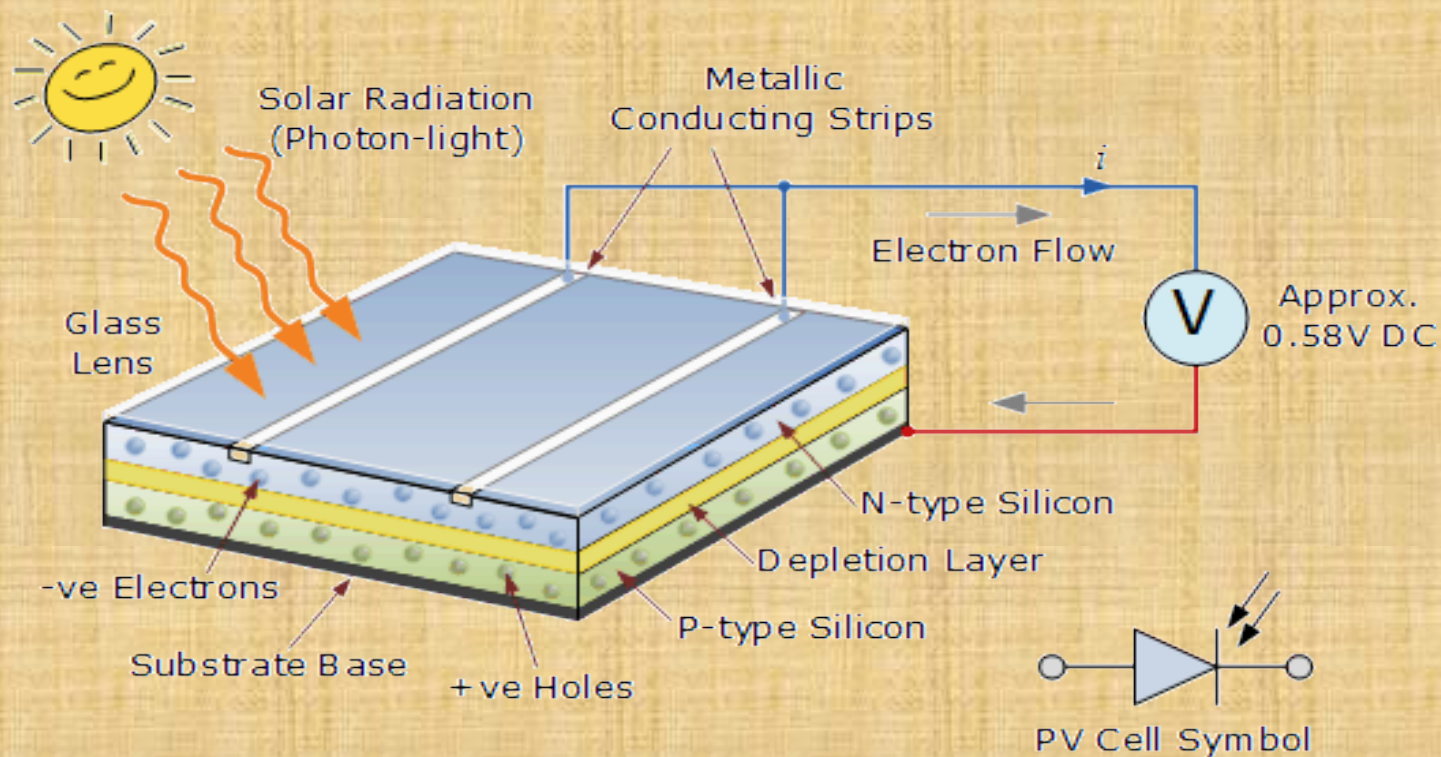
**Solar cells, also called photovoltaic (PV) cells**

**convert sunlight directly into electricity.**

**PV gets its name from the process of converting light (photons) to electricity (voltage),**

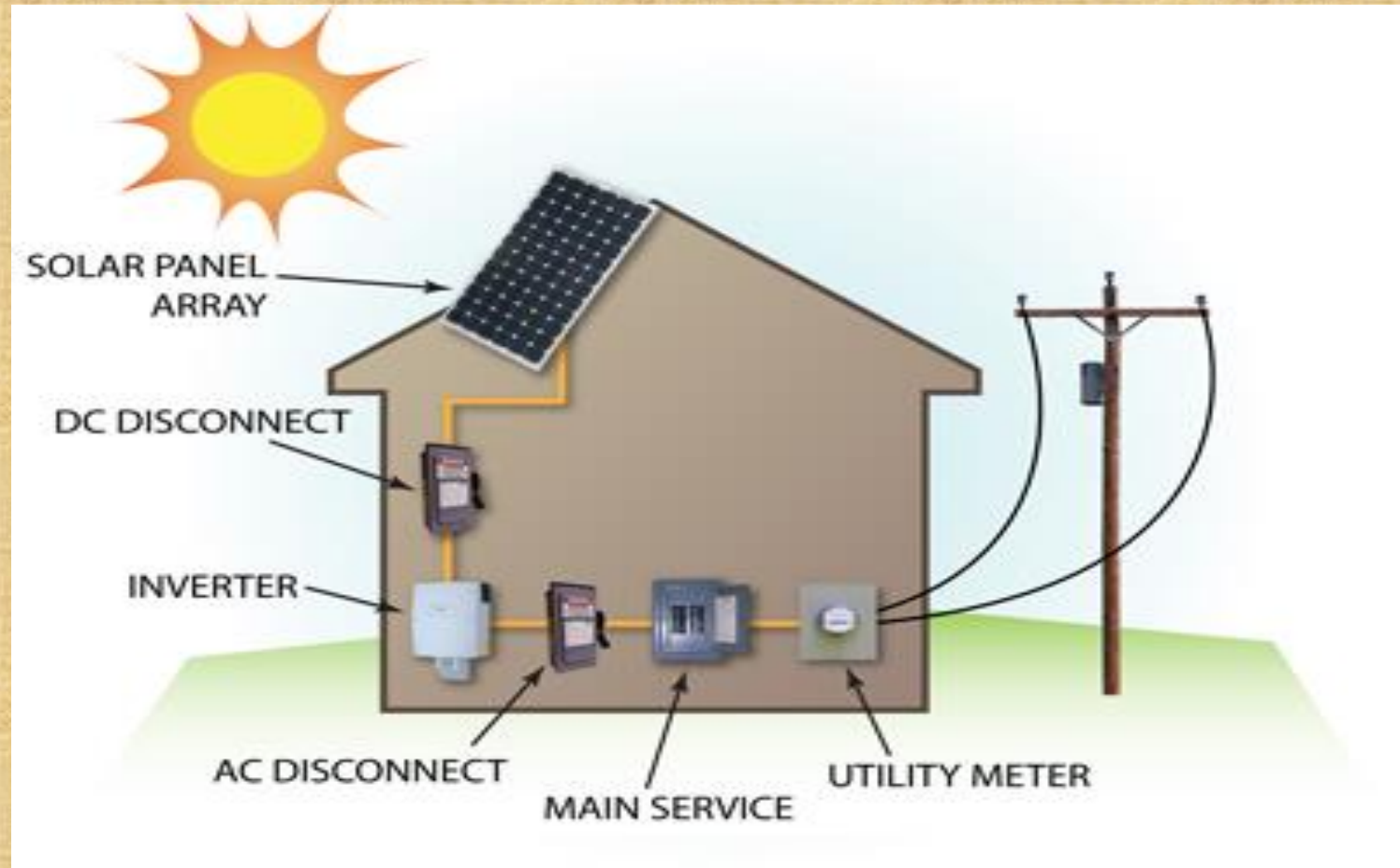


# PHOTON TO VOLT???





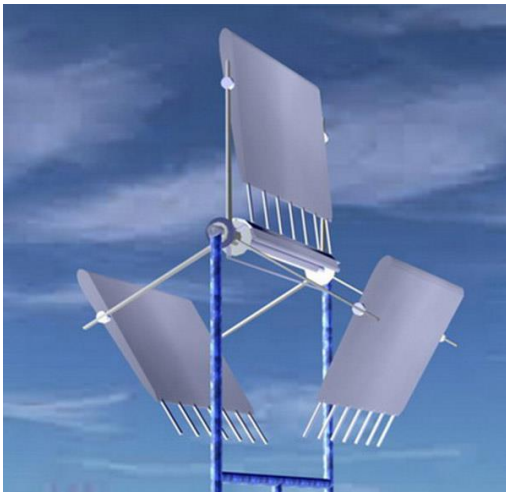
# SOLAR PV IN HOUSES



# **WIND POWER**

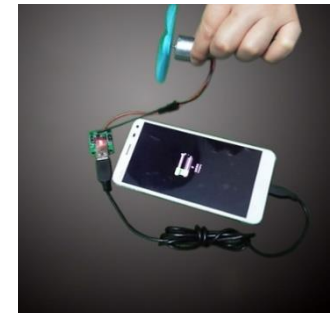
- WIND POWER IS THE USE OF AIR FLOW THROUGH WIND TURBINES TO MECHANICALLY POWER GENERATORS FOR ELECTRICITY.**
- AVAILABLE BOTH IN DAY AND NIGHT.**
- SEASONAL**
- THE TOTAL INSTALLED CAPACITY IN TAMIL NADU IS 7253MW.**

# Wind turbines



# MINI WIND TURBINES

## 100W to 2KW





# Projects

(studying the potential for wind power in your area)

## Using anemometer

**8 kph (2 m/s) minimum is required to start rotating most small wind turbines.**

**12.6 kph (3.5 m/s) is the typical cut-in speed, when a small turbine starts generating power**

**36–54 kph (10–15 m/s) produces maximum generation power.**

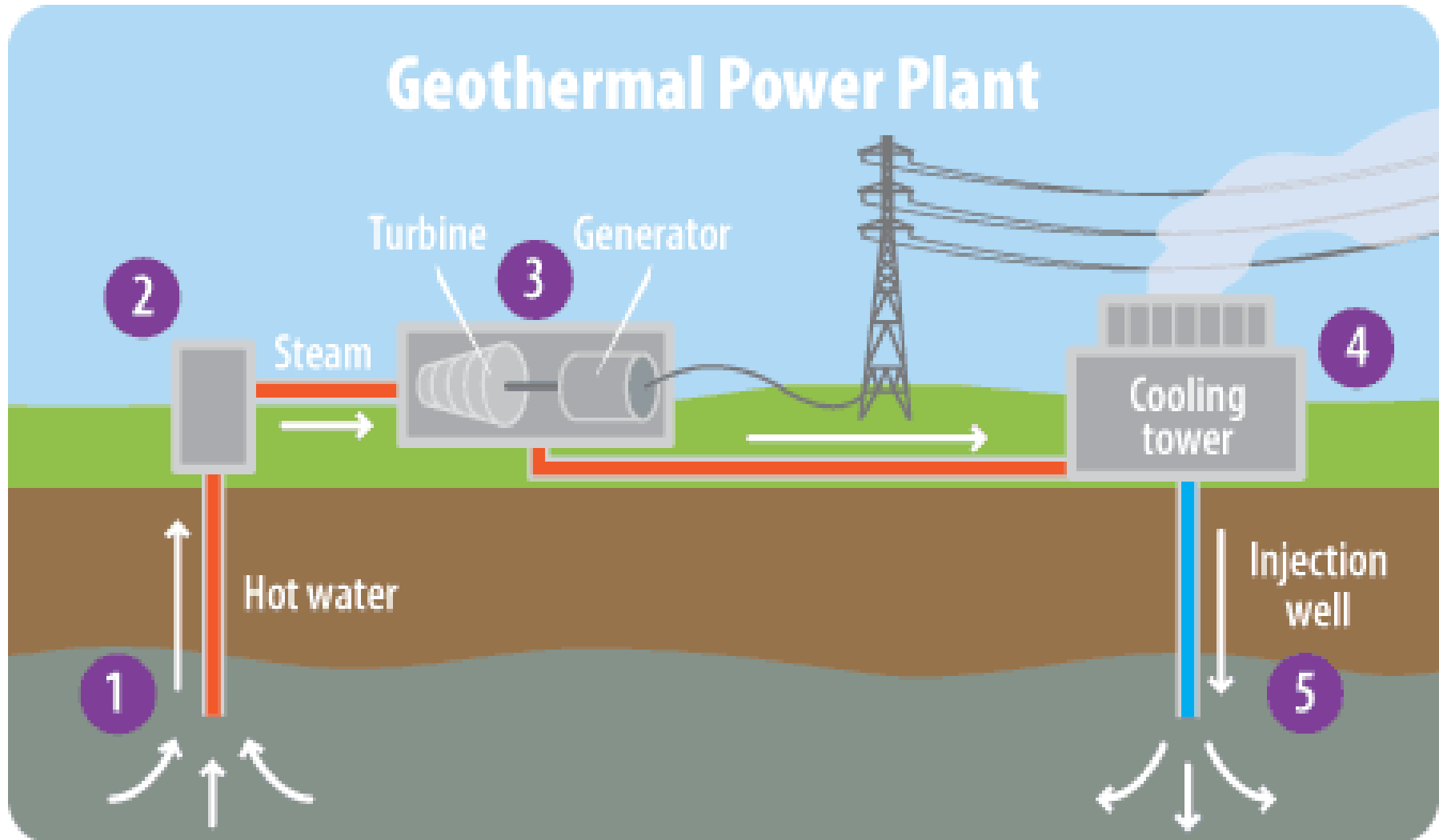


# AREA FOR INTALLATION PROJECT -SURVEY





# GEOHERMAL

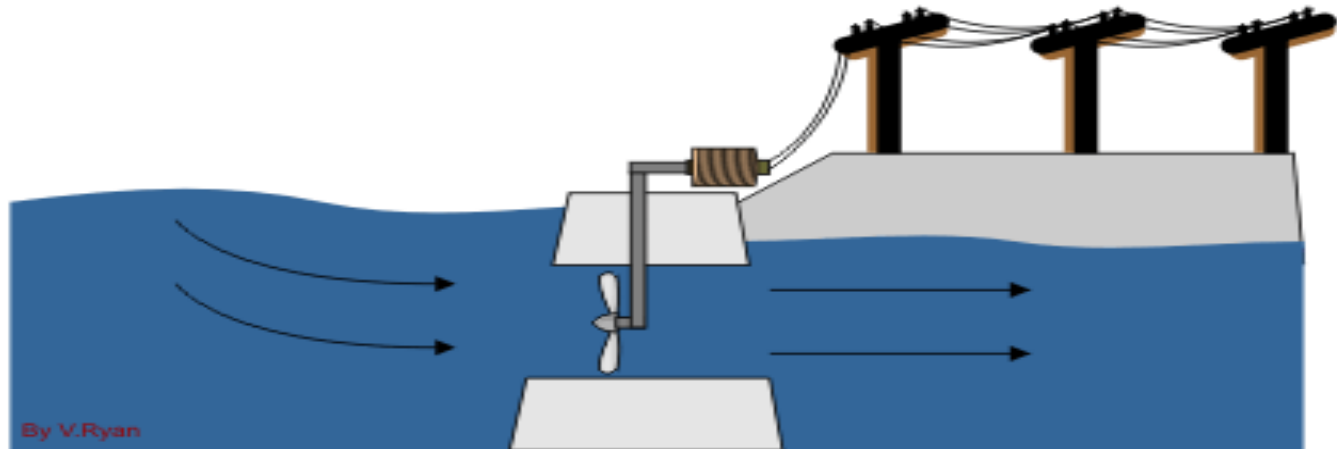




# GEOHERMAL POWER STATION

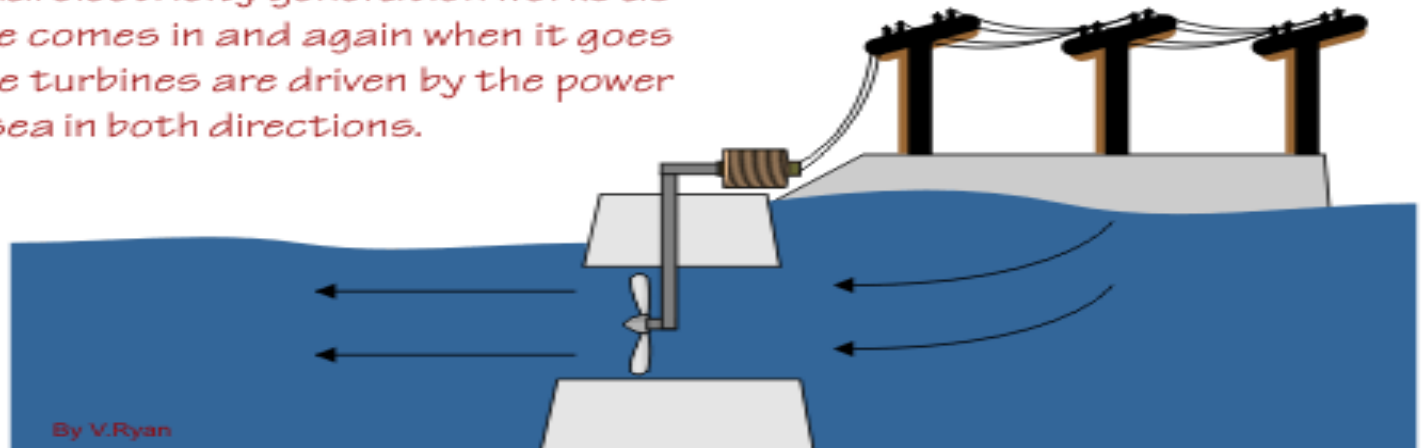


# TIDAL POWER



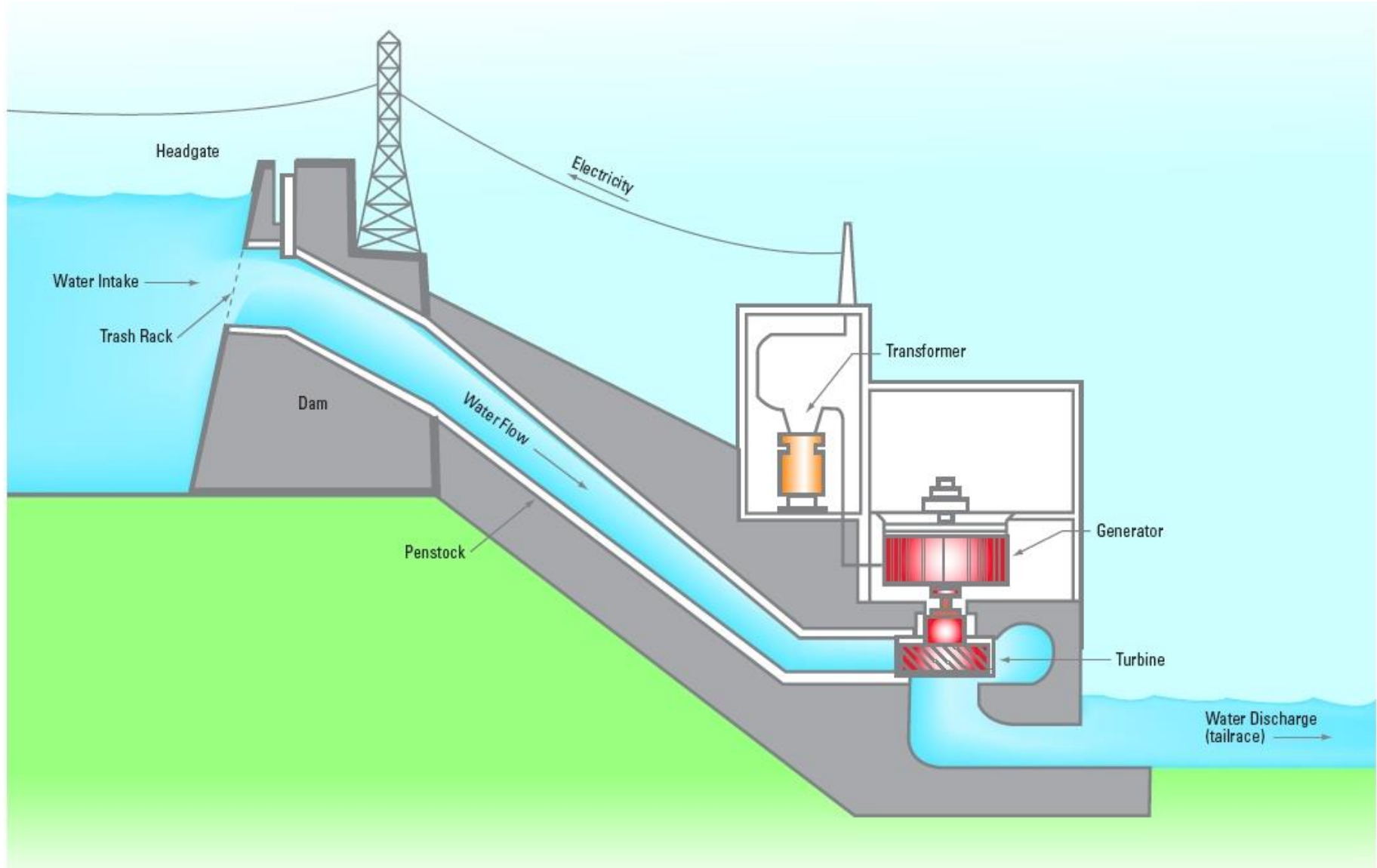
TIDE COMING IN

*This tidal electricity generation works as the tide comes in and again when it goes out. The turbines are driven by the power of the sea in both directions.*

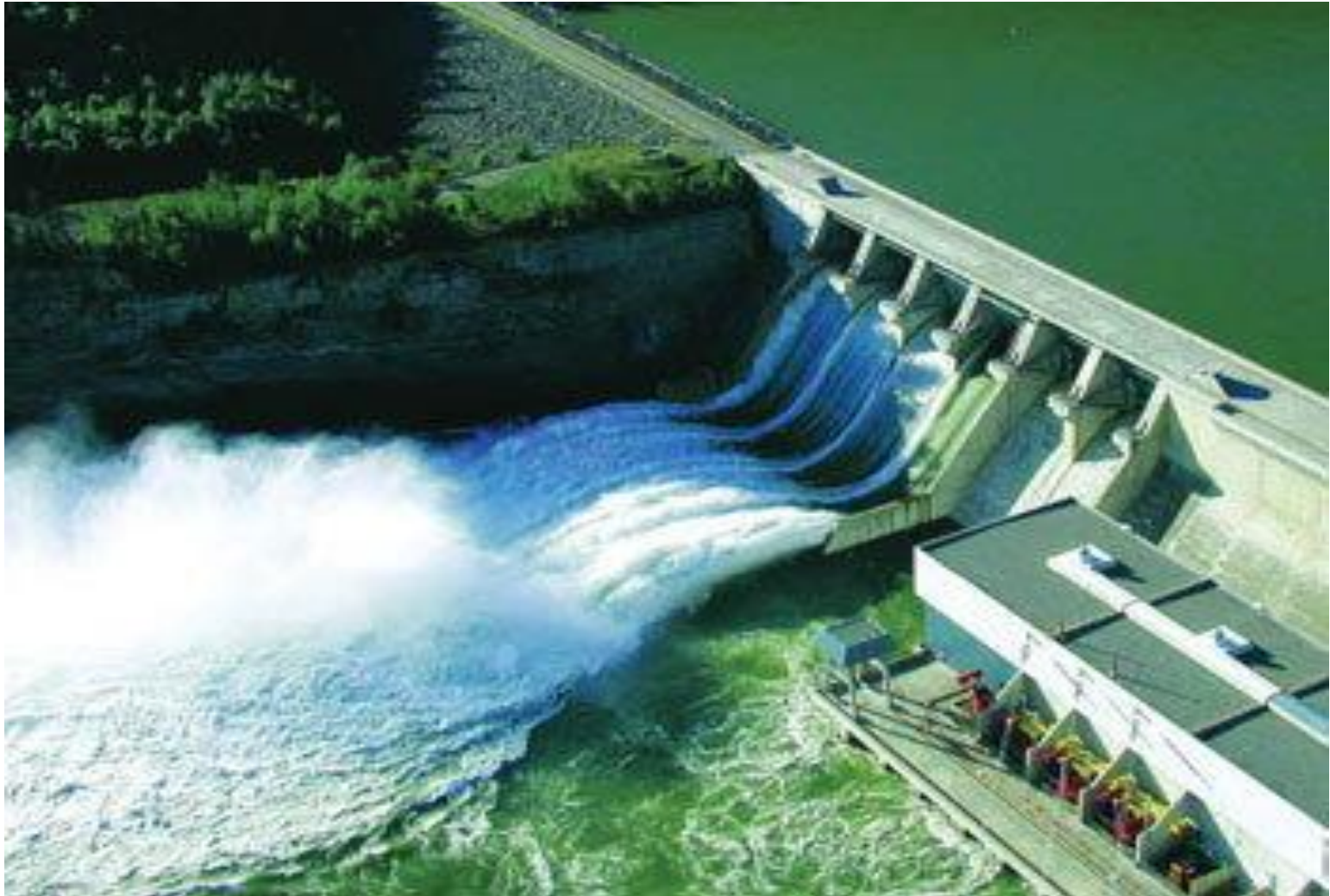


TIDE GOING OUT

# HYDRO ELECTRIC POWER



# DAMS-HYDROELECTRIC POWER







Biomass Innovation Centre  
*Fueling growth through clean technology*

educate > develop > implement

# What is Biomass?

Biomass is fuel that is developed from organic materials, a renewable and sustainable source of energy used to create electricity or other forms of power.

MSW





# AGRICULTURE CROP RESIDUE



# ANIMAL RESIDUE





# FORESTRY CROP RESIDUE

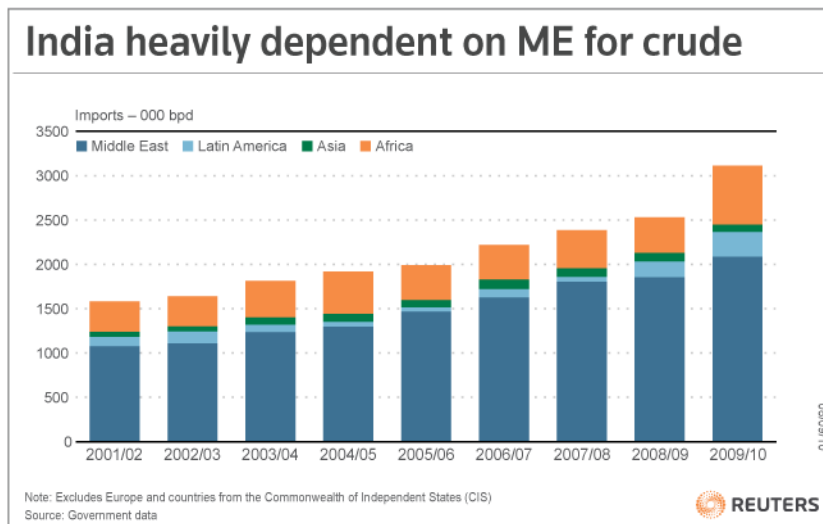


# BIODIESEL

SUSTAINABILITY OF INDIA GREATLY THREATENED  
REASON

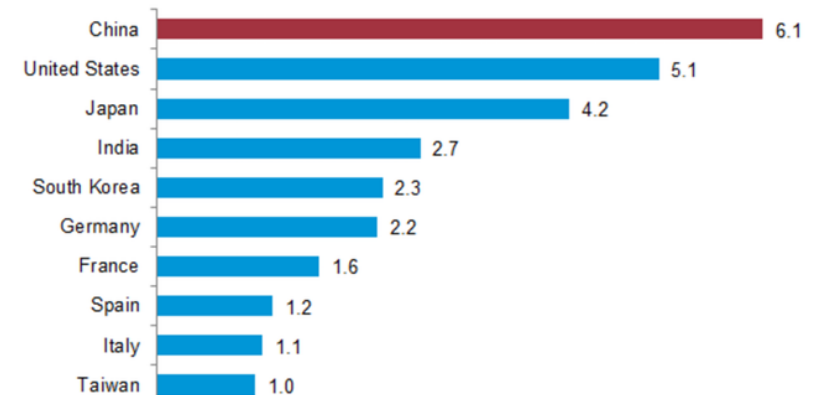
DEPENDANCE ON OTHER COUNTRY.

DEPLETION OF RESOURCES WORLD WIDE.



Reuters graphic/Christine Chan

**Top ten annual net oil importers, 2014**  
million barrels per day



Market Realist

Source: EIA

# OTHER OPTIONS???

BIODIESEL- CAN BE USED IN PRESENT VEHICLES.  
ELECTRIC VEHICLES-LOT OF DRAW  
BACKS.(RANGE,COST,INFRASTRUCTURE)





# PROBLEMS WITH BIODIESEL

-AREA FOR PLANTATION (THINK OF A PROJECT)





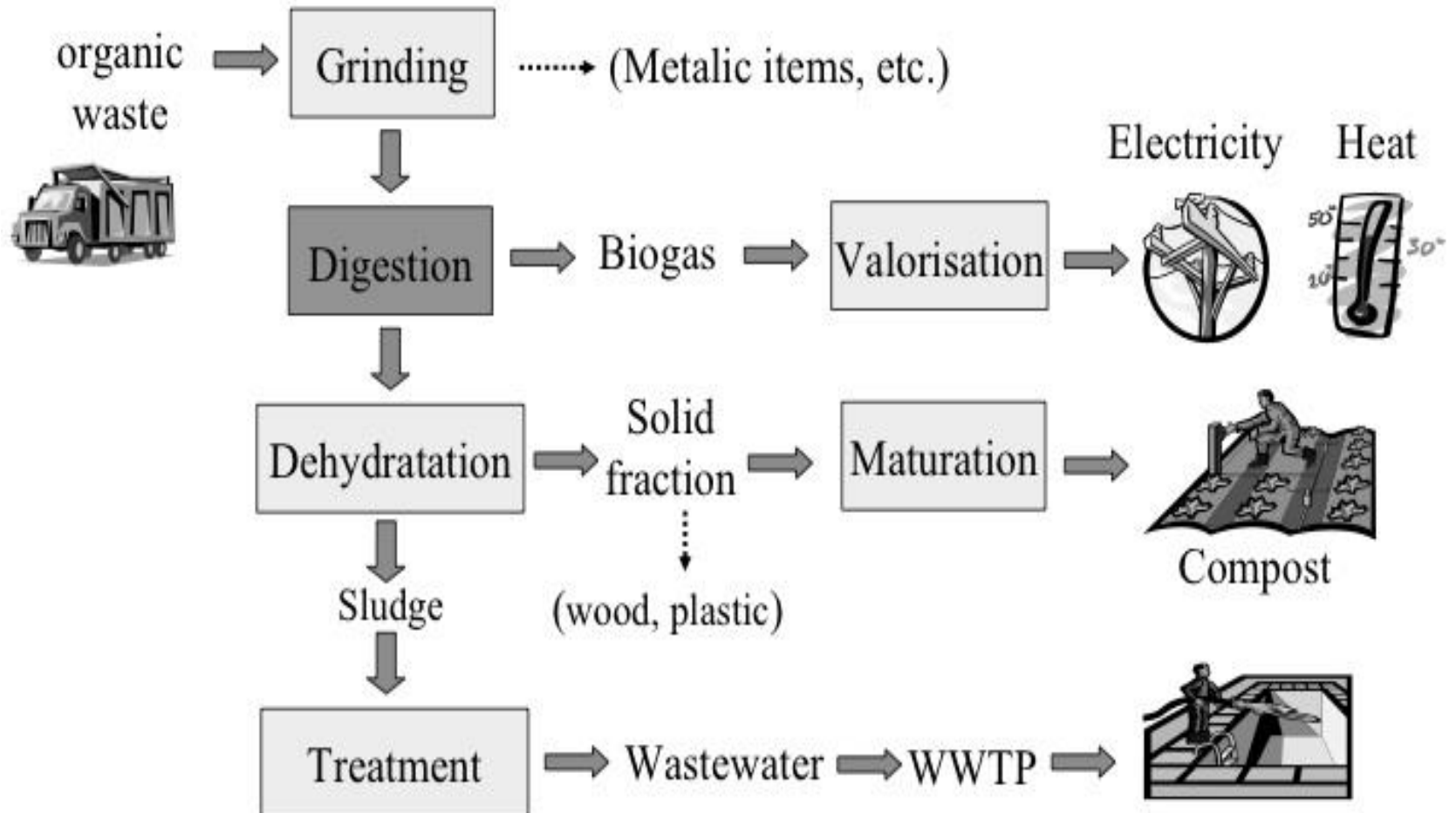
# THINK ABOUT VARIOUS PLANTS AND TREES FOR OIL



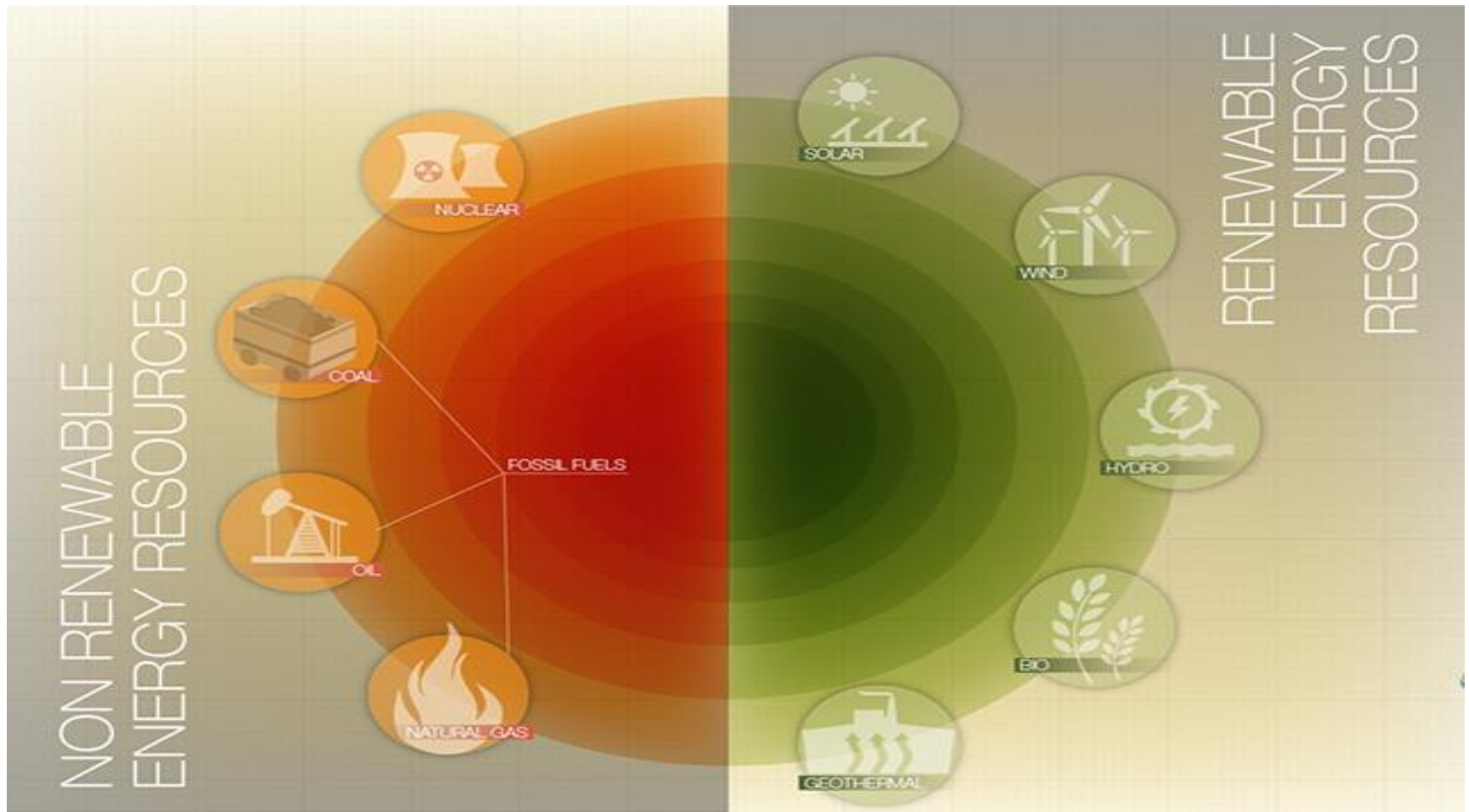
**Pongamia pinnata**



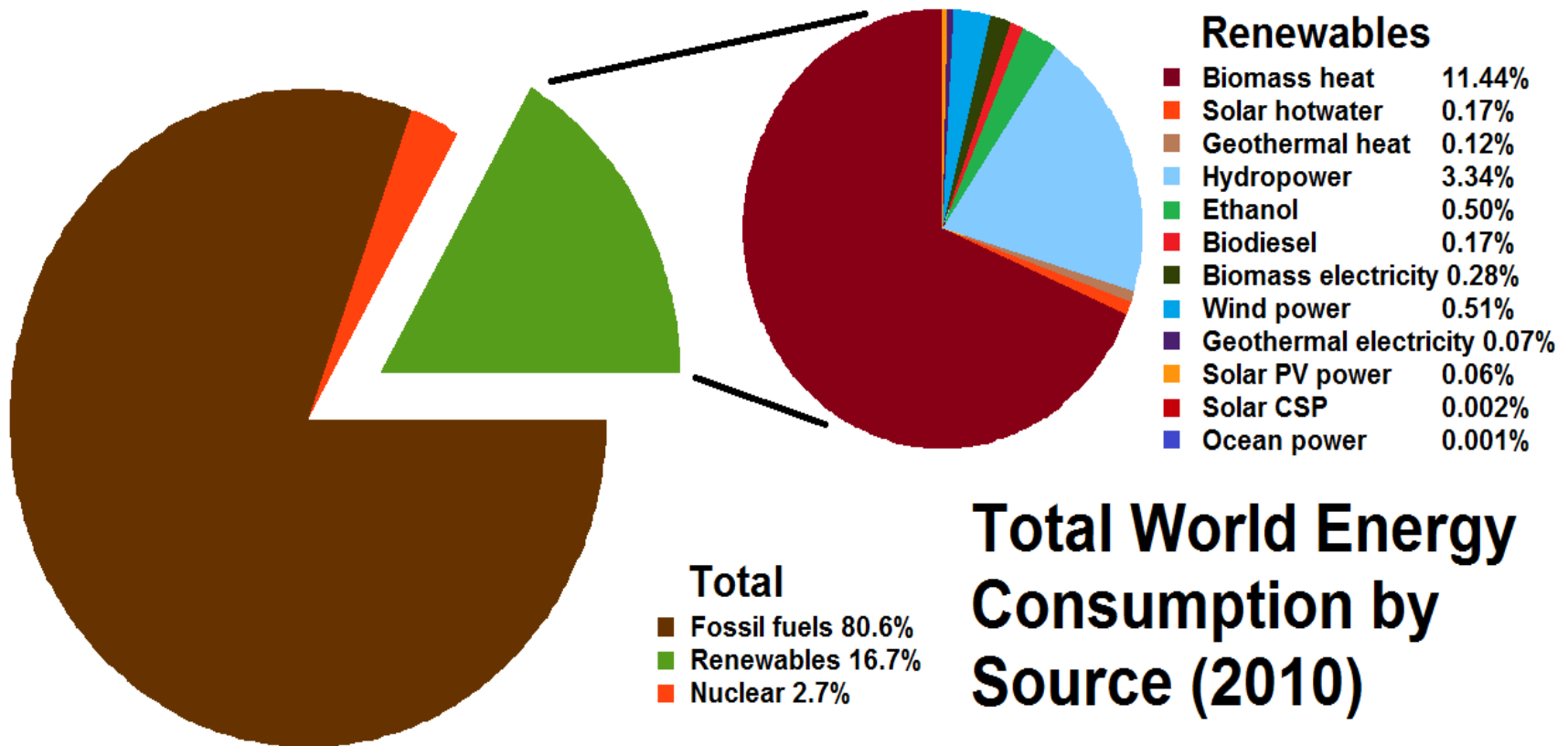
# WASTE TO ENERGY



# NON-RENEWABLE TO RENEWABLE UNSUSTAINABLE TO SUSTAINABLE









# **Energy sufficiency ,Energy efficiency and renewable energy - the pillars of sustainable energy.**

**For development process to be sustainable → increase the efficiency of energy utilities and processes, conserve energy and explore renewable sources of energy.**

**Decentralization of energy Production, Processing, Transmission, Consumption and Disposal**

# Project ideas

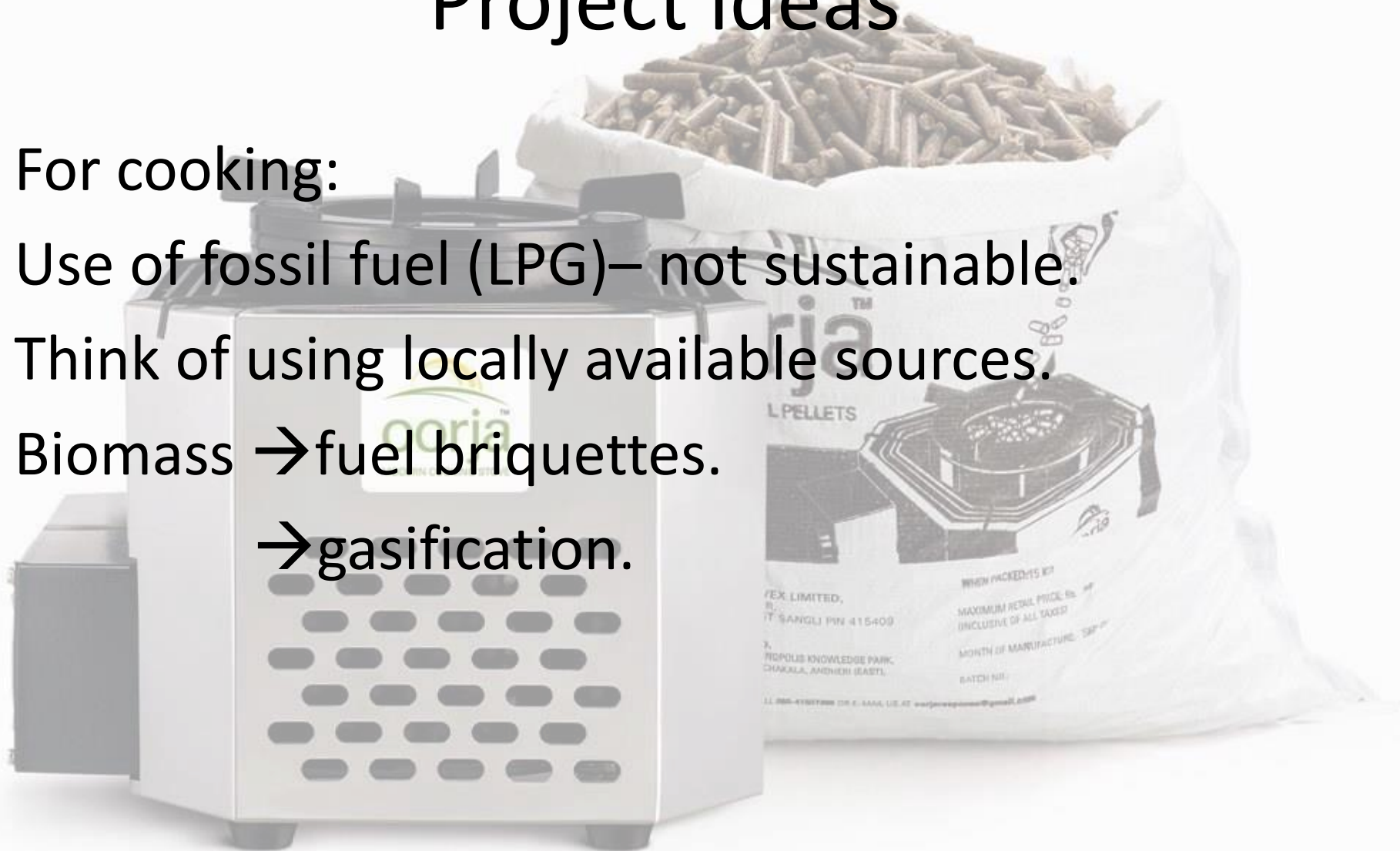
For cooking:

Use of fossil fuel (LPG)– not sustainable.

Think of using locally available sources.

Biomass → fuel briquettes.

→ gasification.







- Cooks all bulk meals fast
- Saves fuel cost by over 25% as compared to LPG
- Enhances food and flavour

First Energy Pvt. Ltd., is an alternative energy company based in Pune, India that applies biomass and gasification technology to heating applications, specifically home and commercial cooking. It was launched in 2005 as BP energy, a 100% subsidiary of British Petroleum



Shell Foundation  
and US NGO  
Envirofit plans to  
sell 5-7 million  
stoves in 5 years.



BP's biomass pellet  
stove, plans to sell  
20 million stoves by  
2020.



# PROJECT IDEAS

## IDENTIFYING LOCAL SOURCES:



# FOOD INDUSTRY RESIDUE

## MANGO PULP INDUSTRY





# ARECANUT LEAF PLATE MANUFACTURING waste



# CARBONISATION & BRIQUETTING

## Wood/Agro waste

(straw, sawdust, slab, sunflower cake, agro waste)



Grinding



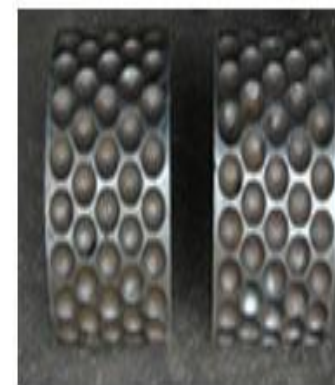
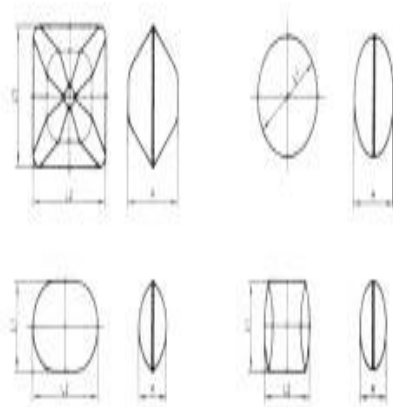
Drying



Briquetting



Sale



Oval charcoal briquettes



Square charcoal briquettes



Pillow charcoal briquettes





Wood Pieces



Tree Trimmings



Wood Shavings



Wheat Straw



Peanut Shell



Empty Fruit Bunch



Rice Husk



Corn Cob



Maize Stralk



Sunflower Seeds Husk



Waste Carton



Wood Chip/Paring





# **NEW Energy conservation ideas**

**Decreasing the load of AC's**

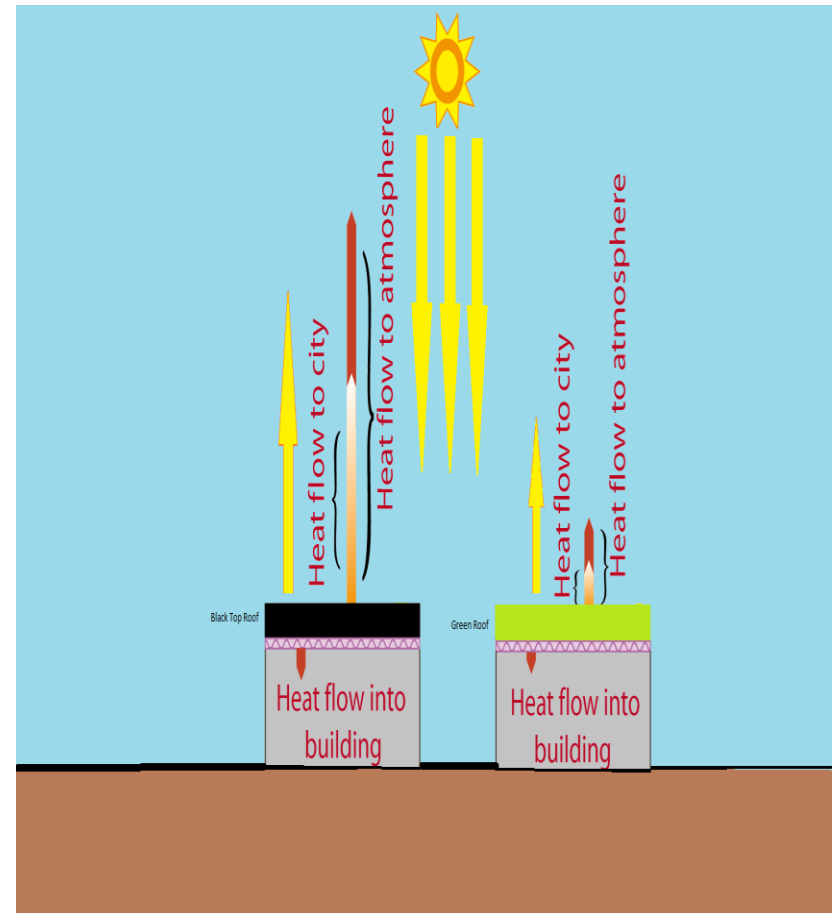
**AC's no more a luxury, will become a basic need with increasing global average temperature.**

**Ideal thermal comfort at a room temp. of 27 deg C.**

**In summer room temp. can go up to 35deg C during night.**

**Can reduce the load or avoid using AC's -  
HOW?**

# Find ways to reduce the direct impact of sunlight on the roof.











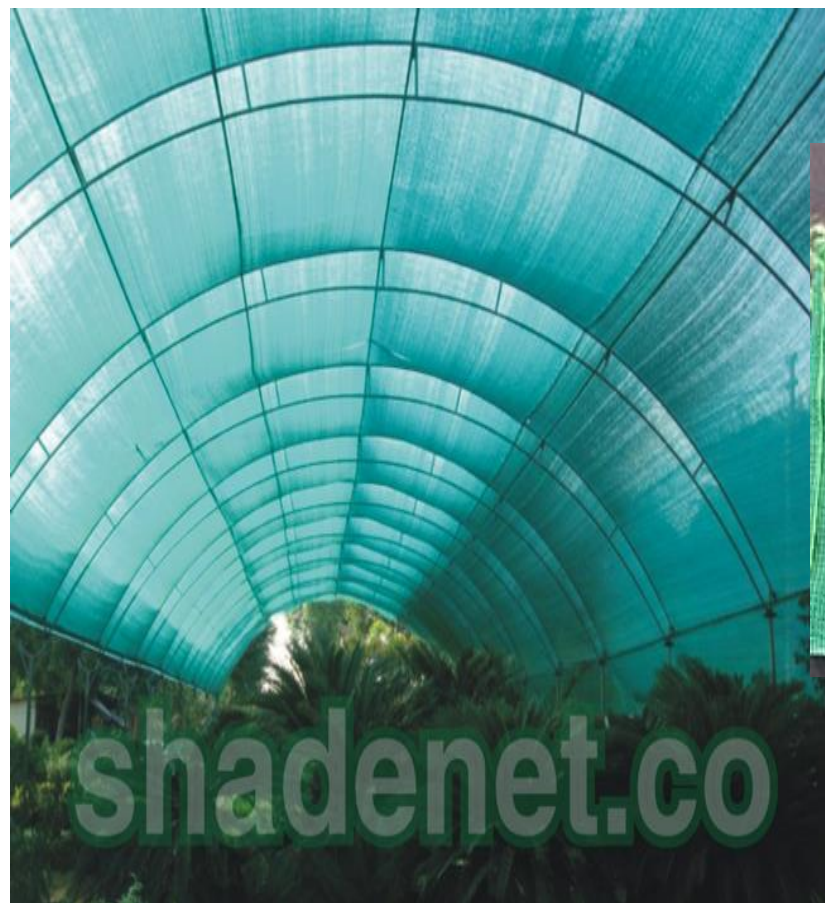


# White coating on the roof surface

Develop cost effective materials

Materials already in the market costly Rs.10-15 per sq.ft.

Try using shade net.



**86°F**  
OUTSIDE  
TEMPERATURE

**Roof Color:  
Terra Cotta**

Conventional Roof Paint  
(on the left)

NXT Cool Coat Roof Coating  
(on the right)

Heat gets absorbed  
with conventional  
roof paint

Heat gets reflected with  
NXT Cool Coat  
Roof Coating

**150°F**  
ROOFTOP  
TEMPERATURE

**114°F**  
ROOFTOP  
TEMPERATURE

NO INSULATION

NO INSULATION

**104°F**  
CEILING TEMP.

**89°F**  
CEILING TEMP.



**91°F**  
ROOM AIR TEMP.

**77°F**  
ROOM AIR TEMP.

**42°F to 50°F cooler with  
NXT COOL COAT**



# DC lighting

**HOUSES use AC power supply.**

**All most all devices uses AC power.**

**UPS –AC power to Battery (DC power)**

**DC converted back to AC power –lot of wastage in this process (40-45%)**

**LED lights uses DC power,also consumes less energy.**

**CAN DEVELOP A MODEL**

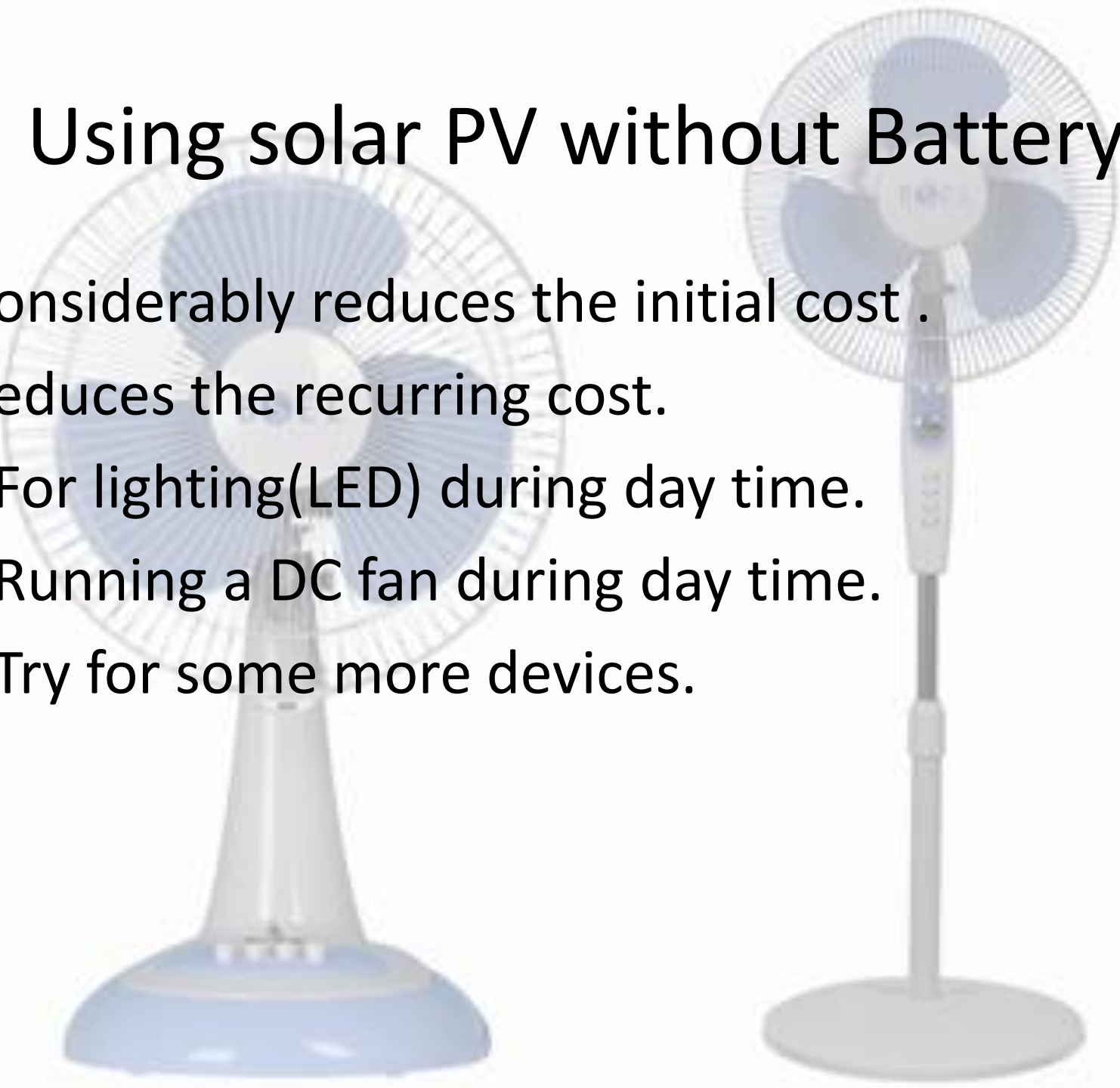
**Solar panel → Battery DC → LED lighting.(lots of saving in cost)**





# Using solar PV without Battery

- Considerably reduces the initial cost .
- Reduces the recurring cost.
- For lighting(LED) during day time.
- Running a DC fan during day time.
- Try for some more devices.



# Sub Theme 4

## Health, Hygiene & Nutrition

**IDEAS FOR SOME PROJECTS**

# FOOD ADULTERATION (SIMPLE DETECTION METHODS)

FOOD ITEMS:

- EDIBLE OIL
- GHEE
- TEA
- ASAFOETIDA
- SUGAR
- HONEY.
- MILK







# THANKYOU

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