



# **A SCENARIO TO DEVELOP RENEWABLE ENERGY USE TOWARD ZERO CARBON ENERGY**

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REPUBLIC OF INDONESIA  
JUNE 2010**



# **M.I.T ENTREPRISE FORUM**

## ***Humanity's Top 10 Problems in 2050***

- **E N E R G I**
- **W A T E R**
- **F O O D**



# TODAY WORLD ENERGY PROBLEMS

- **Emission of Fossil Energy (Global Warming)**
- Scarcity and Limitation of Fossil Energy Reserves
- Pro-Contra of Nuclear Power (More expensive)
- Clean Technology is (still) expensive
- Renewable Energy Price is (still) expensive



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# DRIVING FORCE TO USE THE RENEWABLE ENERGY

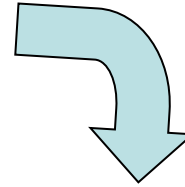
- **RESOURCES**  
(Unlimited and discontinuity)
- **TECHNOLOGY**  
(Availability, Efficiency and Price)



# **TECHNOLOGY IMPROVEMENT**

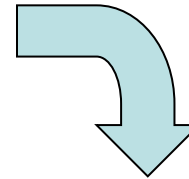
# OCEAN ENERGY

- **Wave Energy**
- **Off shore Wind**
- **Tidal and Marine Current Energy**
- **Salinity Gradient Energy**
- **Ocean Thermal Energy Conversion (OTEC)**





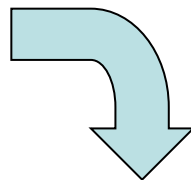
## GEOHERMAL



Courtesy of The National Renewable Energy Laboratory (NREL)

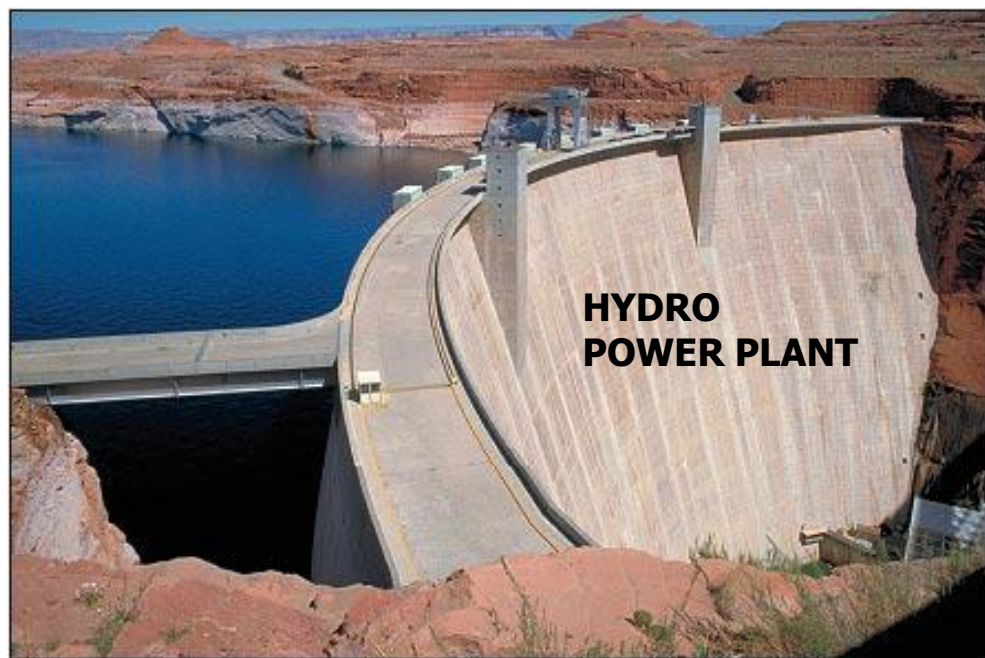
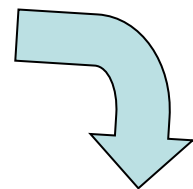


**WIND ENERGY**





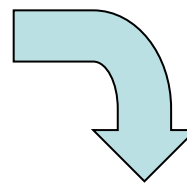
**HYDRO POWER**



**HYDRO  
POWER PLANT**



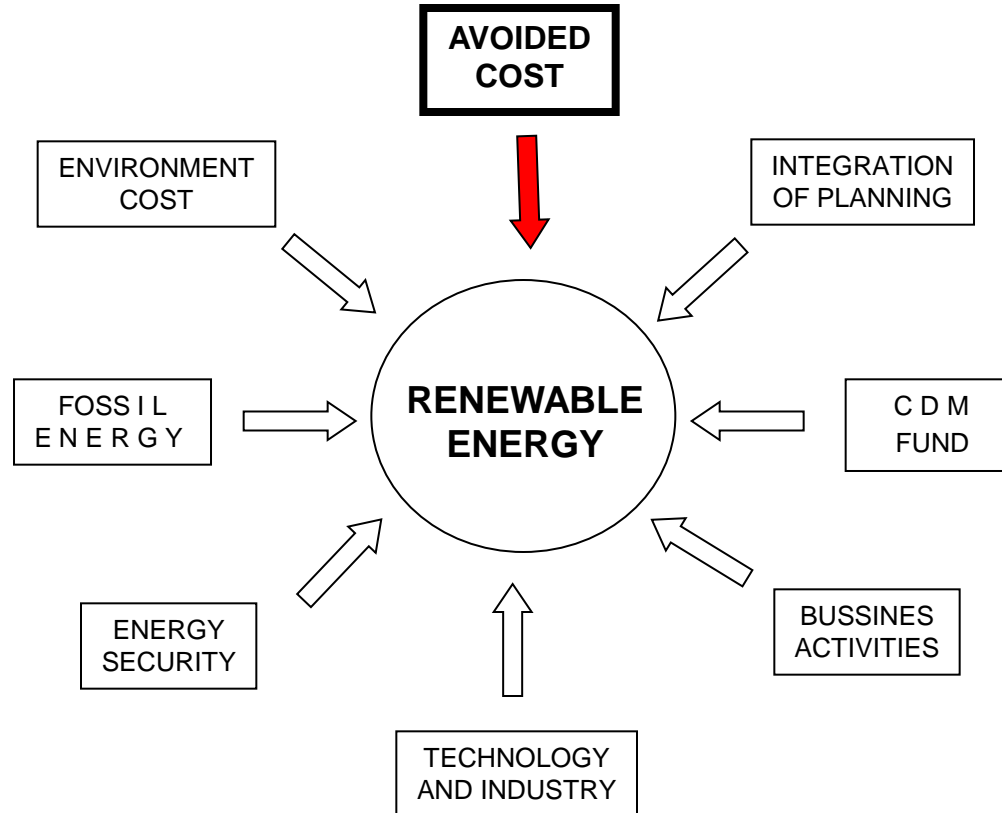
**SOLAR ENERGY**





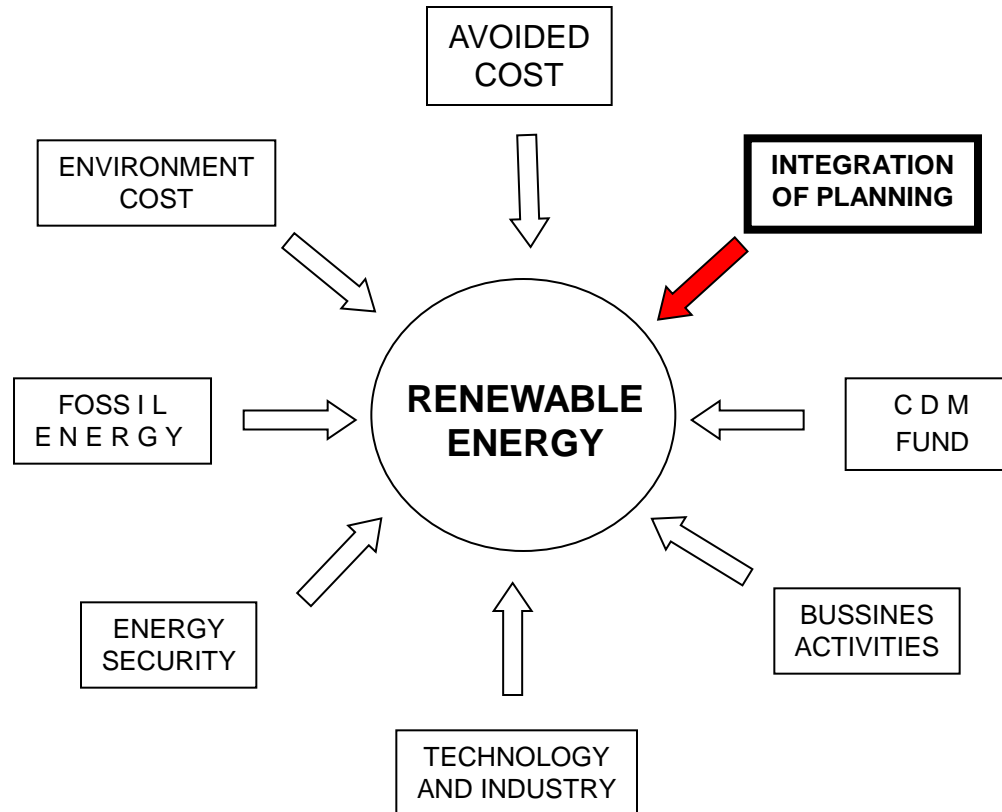


# The Factors Influences Renewable Energy Development



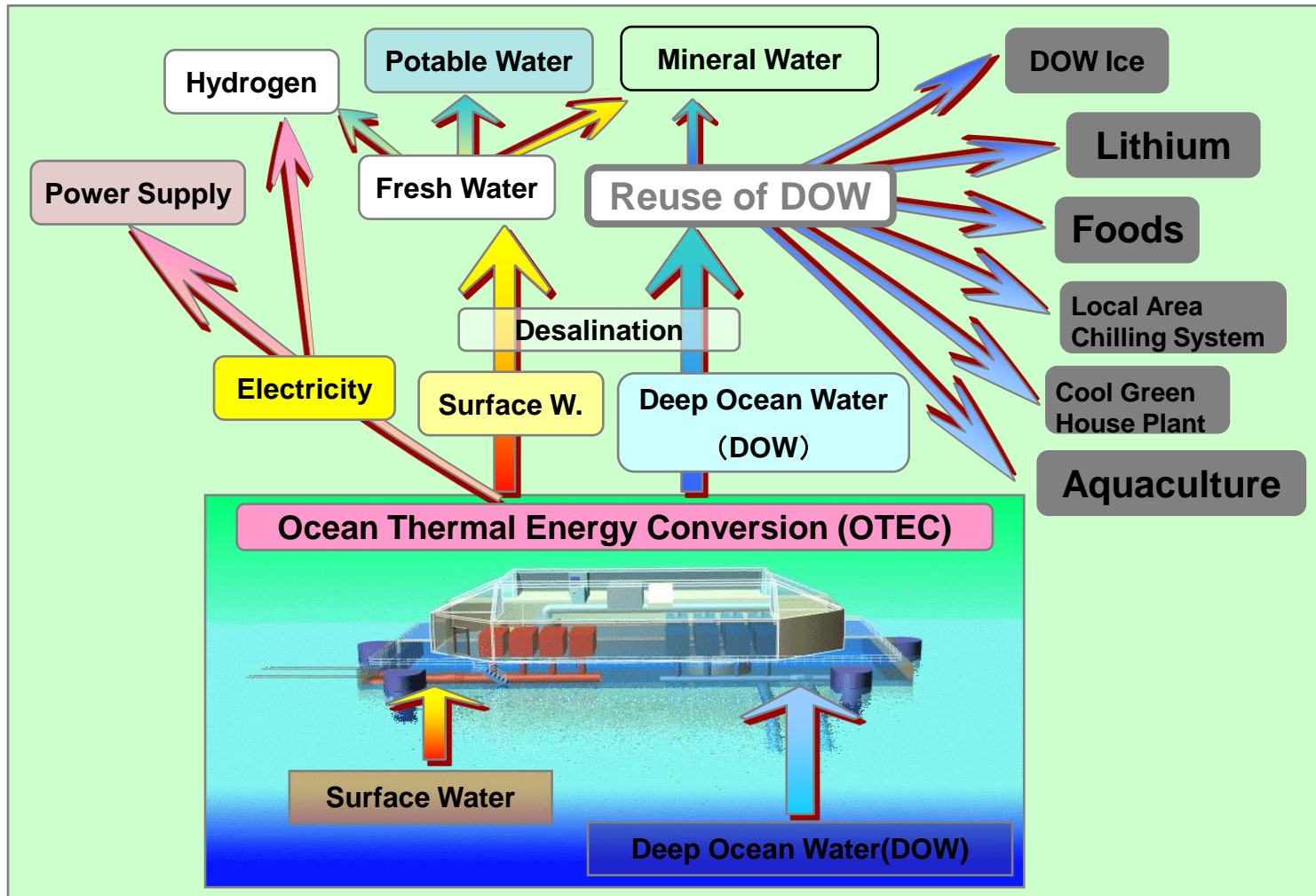


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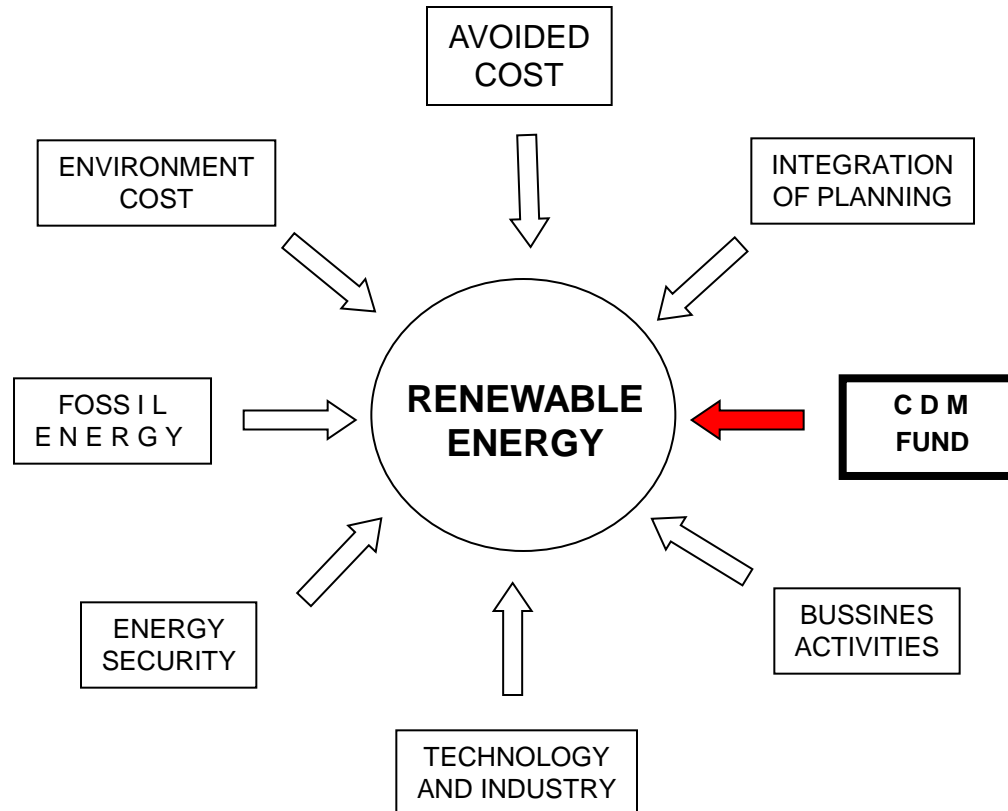


# By Products of Hybrid OTEC Plant



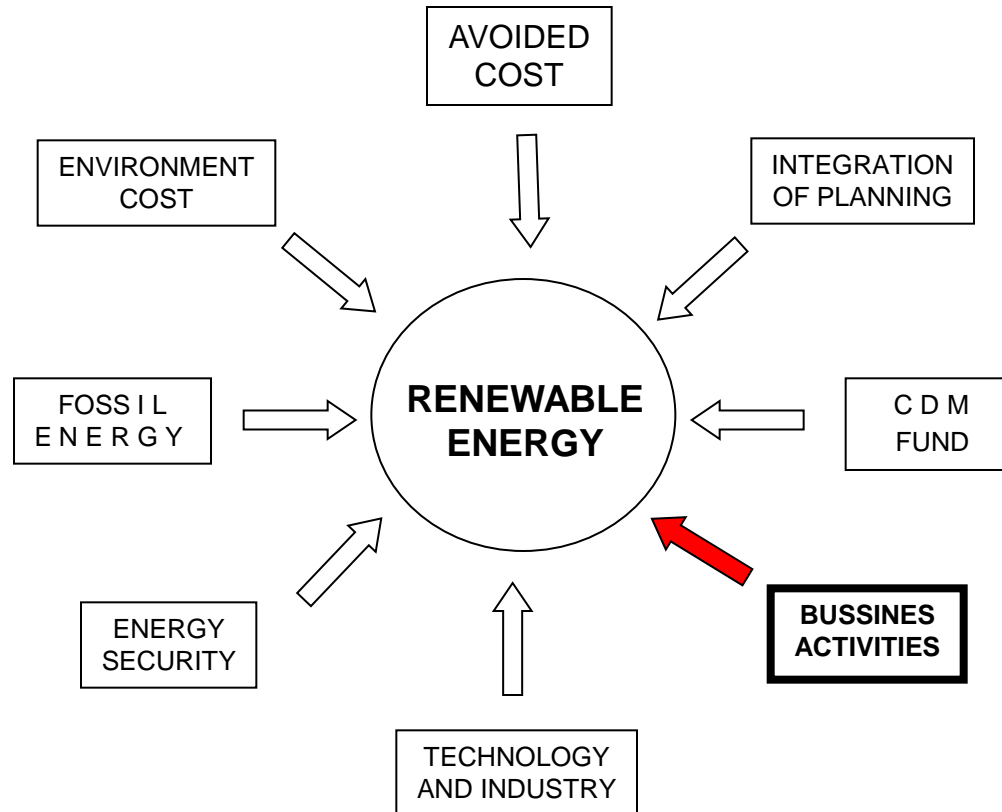


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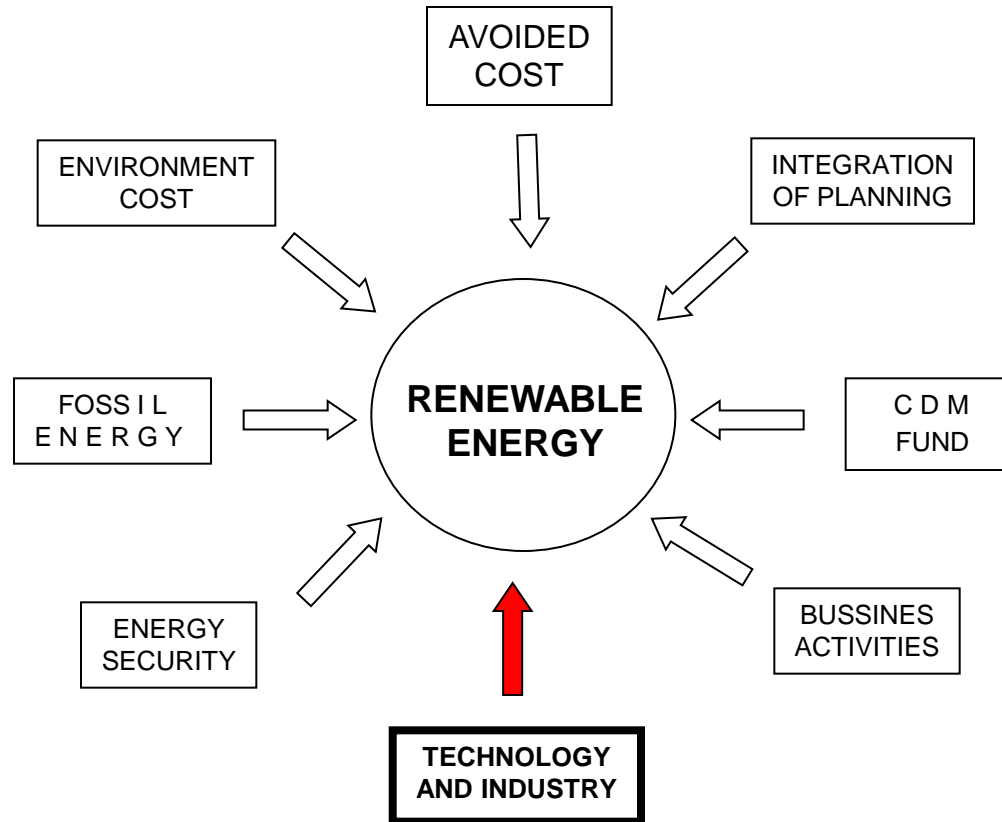


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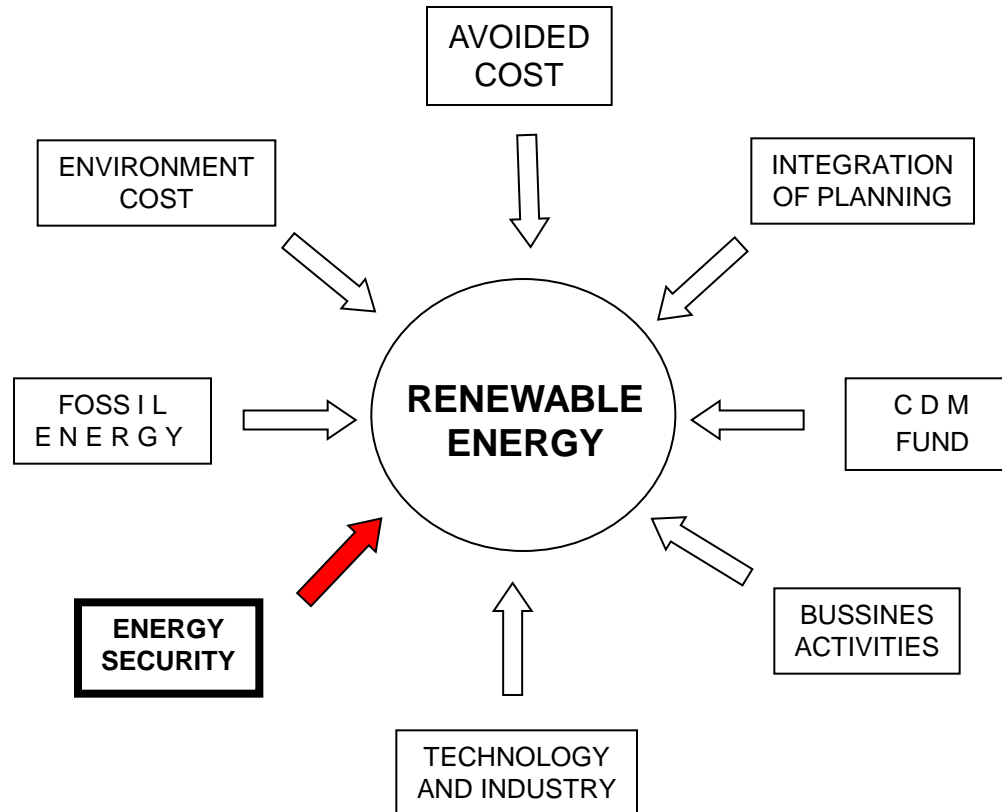


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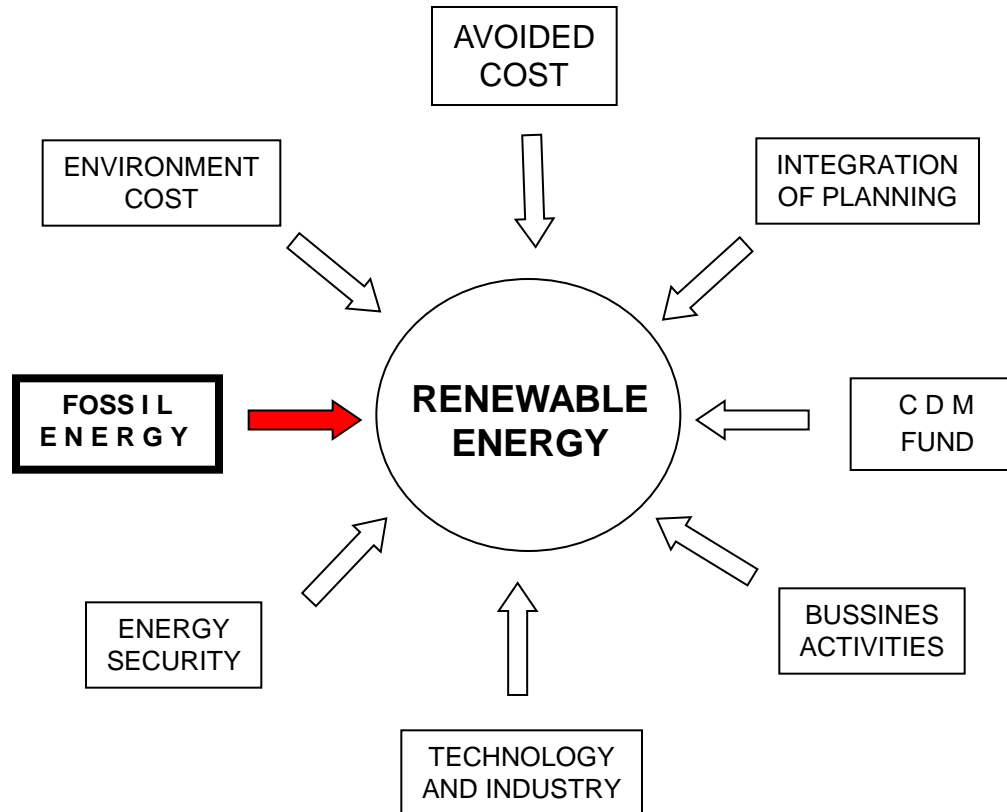


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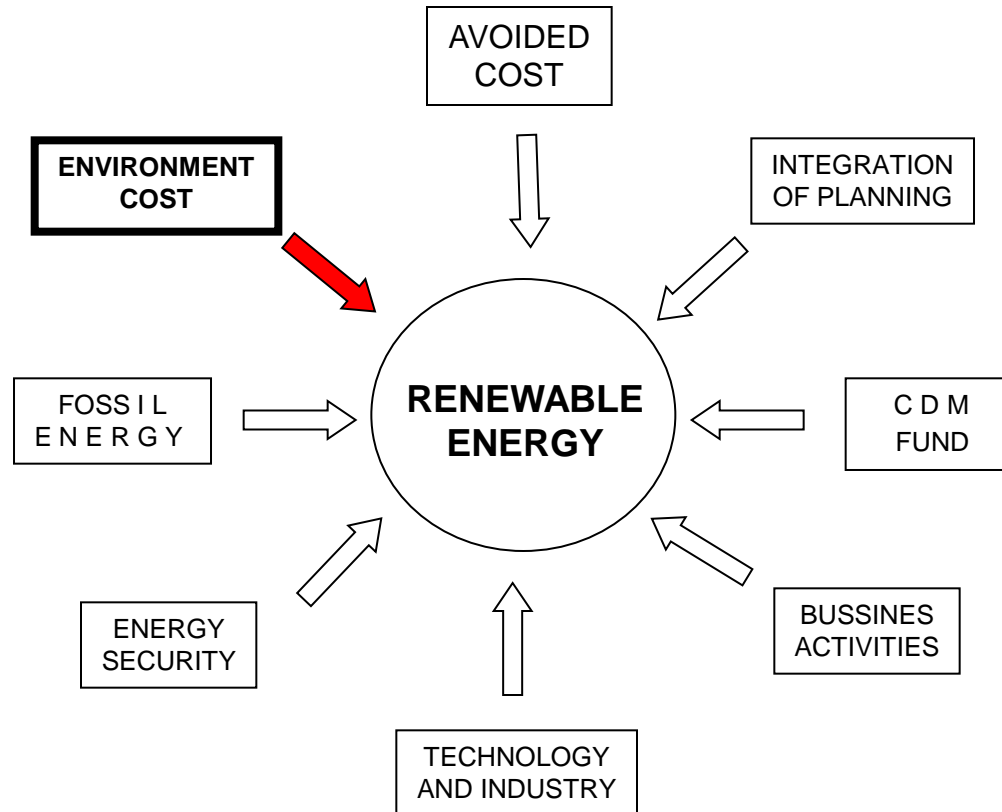
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# THE FUTURE OF WORLD ENERGY

If man kind could use a small portion of sun radiation through earth which is equal with 178,000 terawatt per year or approximately 15,000 times the worlds energy supply nowadays, thus the energy problem faced by the global society today could be resolved<sup>[1]</sup>.

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<sup>[1]</sup> SCIENTIFIC AMERICAN : Energy for Planet Earth, by W.H. Freeman and Company, New York 1991.



# **SOLAR ENERGY TODAY**





## The Apartement in USA Supplied by Solar Cell



**Mitsubishi Electric produce Solar Cell, its efficiency 19,3 percent  
1,66 x 0,86 meters Solar Cell will produce 190 watt (Kompas 10/3/10)**



# THE STADIUM SUPPLY BY SOLAR CELL IN TAIWAN







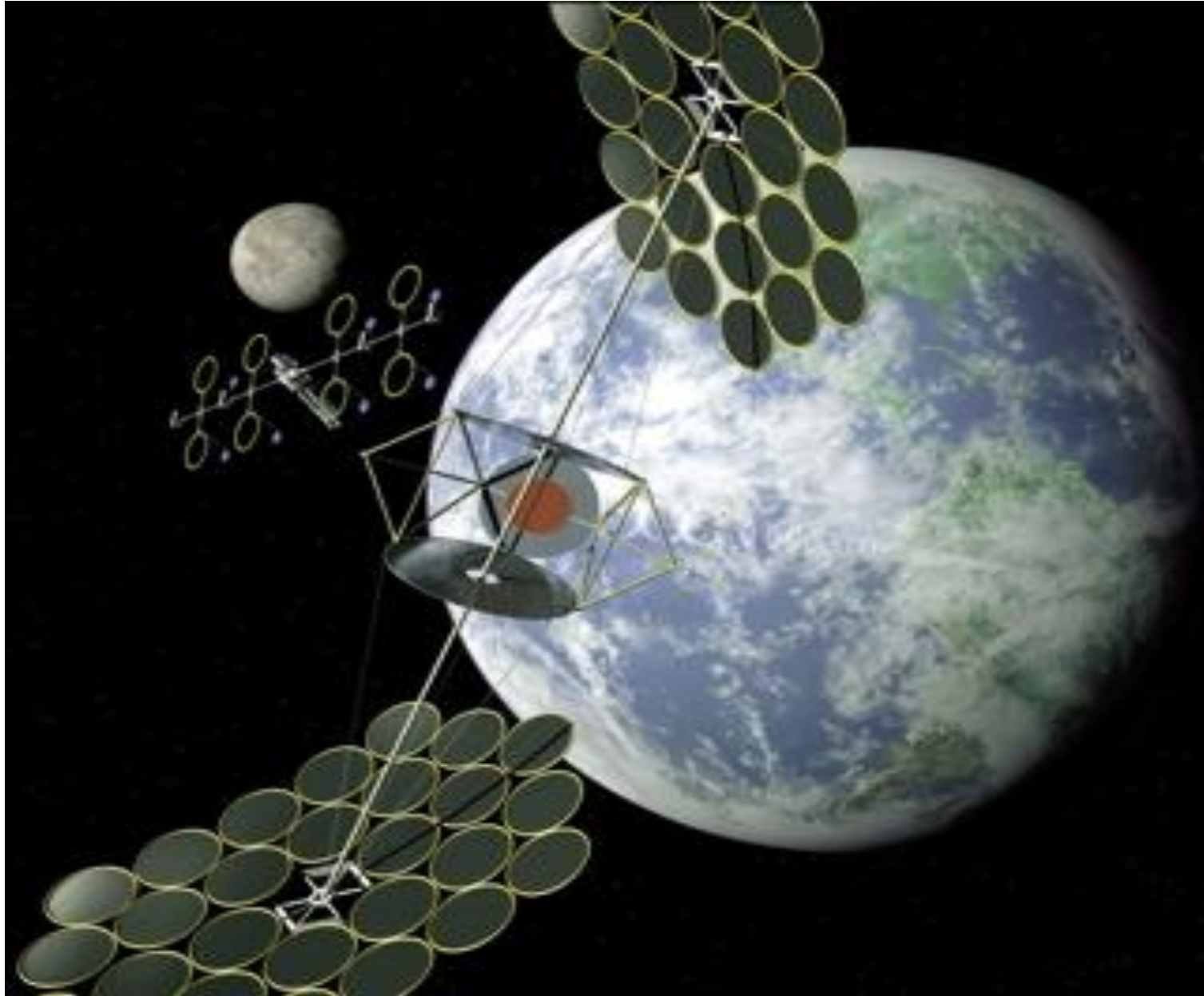
[www.gdsoutheast.ecvv.com](http://www.gdsoutheast.ecvv.com)



# **RESEARCH IN SOLAR ENERGY**



# ORBITING POWER PLANT



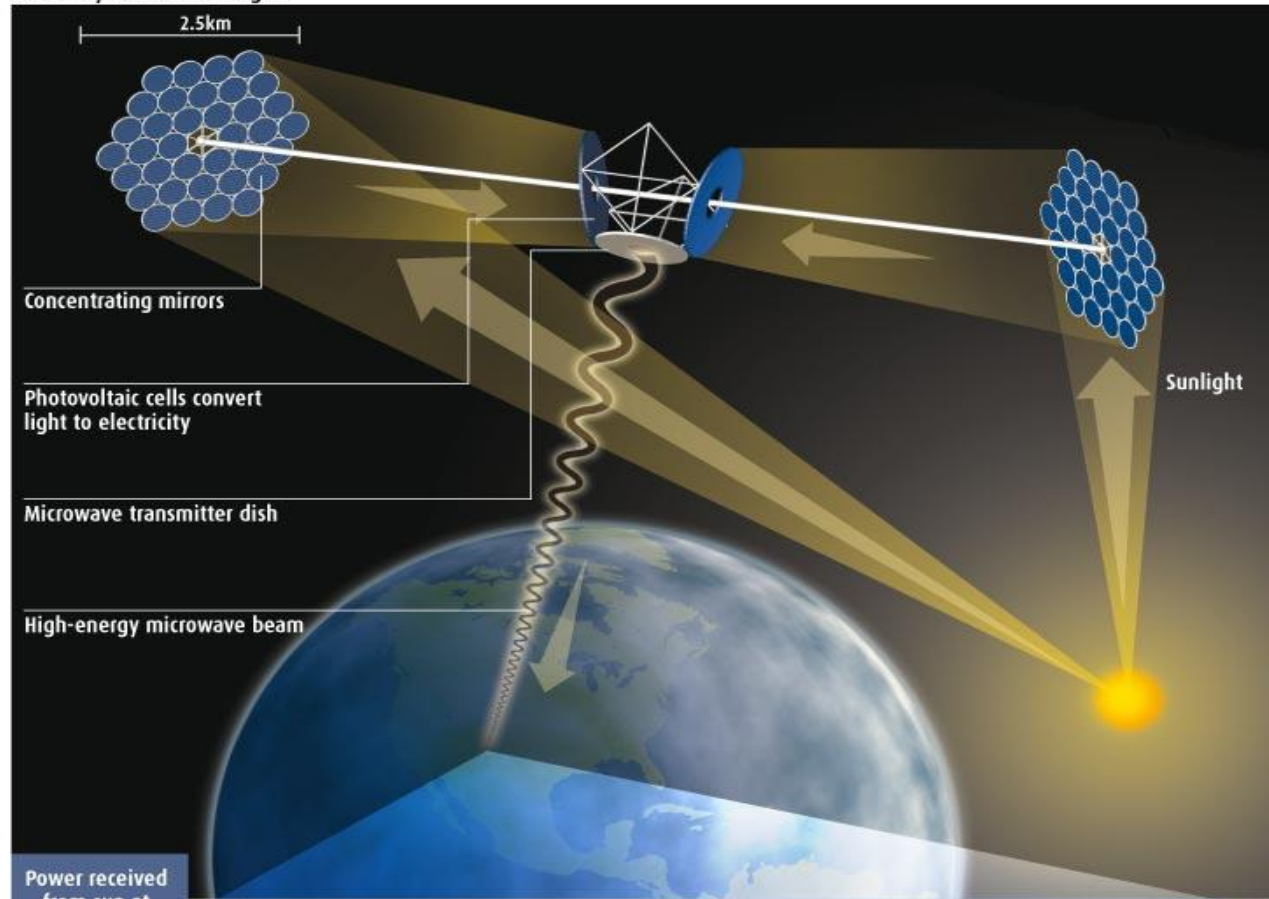


## Three Targets of Solar Energy Development

- Efficiency Solar Cell
- Wireless Transmission
- Storage (Battery)

### BEAMING DOWN

A space-based solar power station will use an array of mirrors to concentrate the sun's rays on photovoltaic cells. The electricity produced is converted into a powerful microwave beam directed at an antenna on Earth, where it is converted back into electricity and fed to the grid



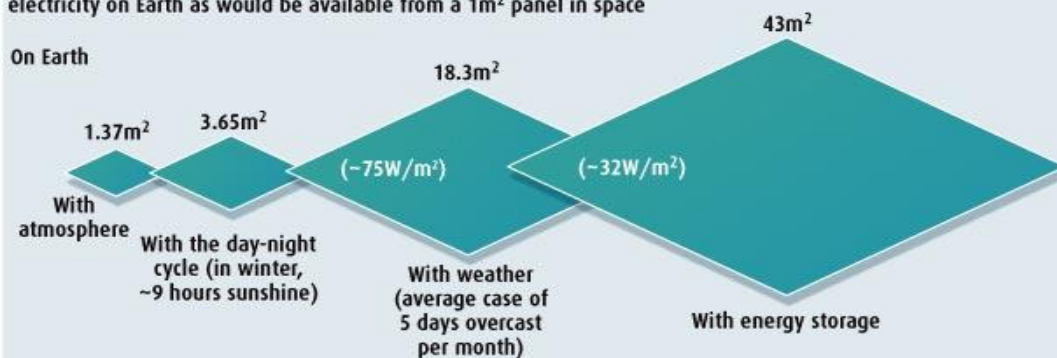
Power received from sun at outer edge of atmosphere  $1360\text{W}/\text{m}^2$



$1\text{m}^2$

Size of photovoltaic panel needed to produce the same amount of electricity on Earth as would be available from a  $1\text{m}^2$  panel in space

On Earth







# RESEARCH OF SOLAR IMPULS TODAY







# FUEL CELL



Courtesy of UTC Fuel Cells





## CAR FUEL CELL “HONDA”



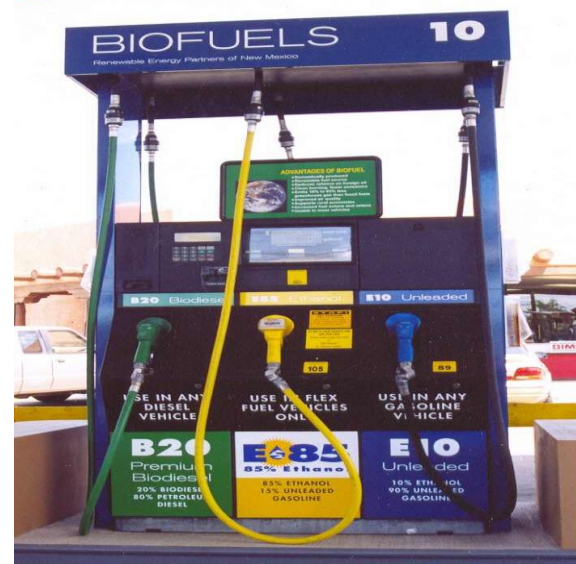
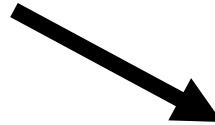


# GENERATOR FUEL CELL





# BIOFUEL





# SCENARIO RENEWABLE ENERGY USE 2050

All motor vehicle are supplied from Biofuel, Fuel Cell, and Solar Cell.

Electricity needs for household and commercial buildings supplied by Solar Cell, Wind, and Fuel Cell.

Energy needs for Industri supplied by electricity grid which is their primary Energy are Geothermal, Hydro, Ocean, Biofuel, Solar, Fuel Cell.



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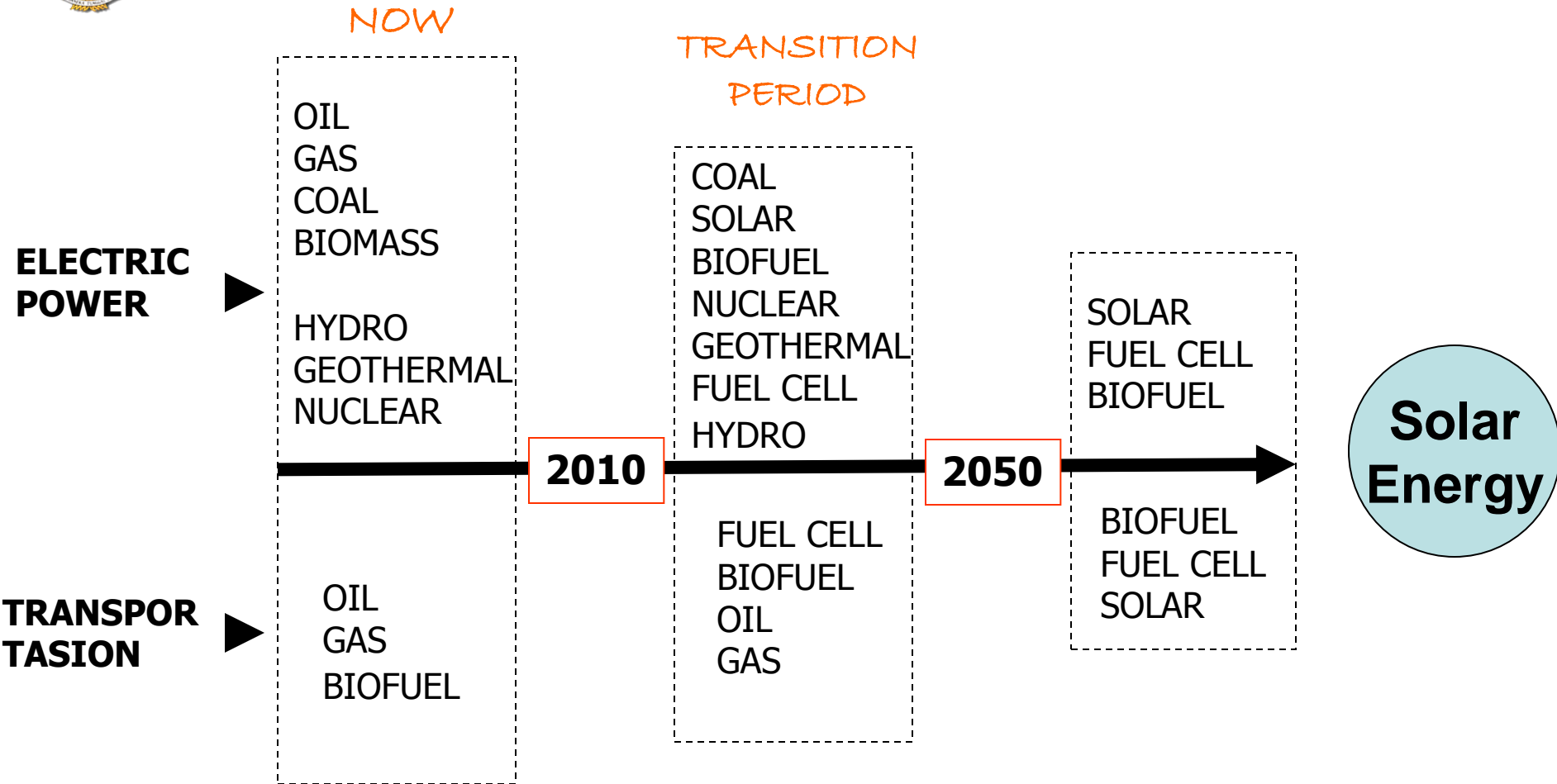
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# THE TRANSITION PERIOD OF WORLD ENERGY



*For the countries who have the fossil energy, which is enough for the transition period, do not develop the Nuclear Power*



# **VISION of International Network for Sustainable Energy**

**(INFORSE)**

**100% OF WORLD ENERGY NEED**

**WILL BE SUPPLIED BY**

**RENEWABLE ENERGY**

Let us support the vision of INFORSE

by influencing the Energy Policy

based on the condition and interest of each country

and develop a collaboration research and activities

to improve the renewable energy technology

For the mankind

**Thank you**