

# New and Emerging Energy Technologies

*E-Power Mo! Energy Consumers  
and Stakeholders Conference*  
**24 April 2018**  
**Baguio City**

*Federico G. Domingo, Jr*  
*Supervising Science Research Specialist*



**1,000**

**40**

**1,000**

**30**

**1,000**

**20**

**1,000**

**10**

## New and Emerging Energy Technologies

Innovation's role in human's future and survival





**New and Emerging  
Energy Technologies**

Innovation's role in  
human's future  
and survival

Innovation will shape and determine  
what kind of future we will have....



## New and Emerging Energy Technologies

Innovation's role in  
human's survival



The moving force for humankind's  
adaptation, progress and survival.....



## New and Emerging Energy Technologies

Potentials of Innovation and Emerging Technologies in the Philippine Energy Sector

# INNOVATION

Around The World





## New and Emerging Energy Technologies

## Potentials Applications in the Energy Sector

# Potentials Applications in the Philippine Energy Sector

- ENERGY SUPPLY DIVERSIFICATION
- ENERGY GENERATION, CONVERSION and STORAGE
- INDUSTRY, COMMERCIAL AND RESIDENTIAL ENERGY USE
- ALTERNATIVE FUELS PRODUCTION IMPROVEMENT
- NEXT GENERATION VEHICLE TECHNOLOGIES

➤ **ENERGY RESOURCE DIVERSIFICATION**

Energy from "Waste":



Non-Recyclable Rubber and Plastics

Turning "Waste" to  
"Black Gold"





➤ **ENERGY RESOURCE  
DIVERSIFICATION**

Energy from "Waste":



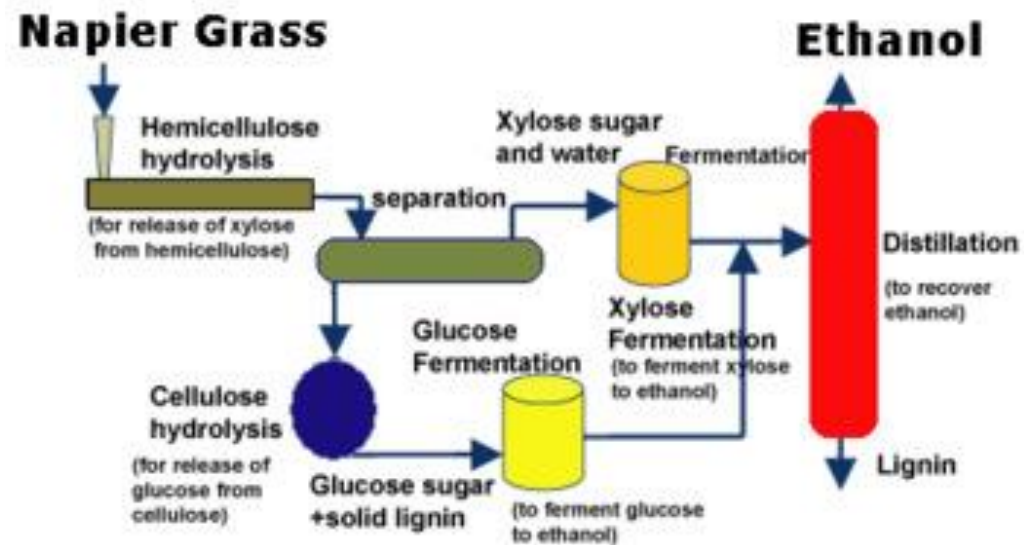
Ethanol Production from Pineapple  
leaves

➤ **ENERGY RESOURCE  
DIVERSIFICATION**

Energy from "Waste":



**Gasohol International  
Napier Grass to Ethanol Process**

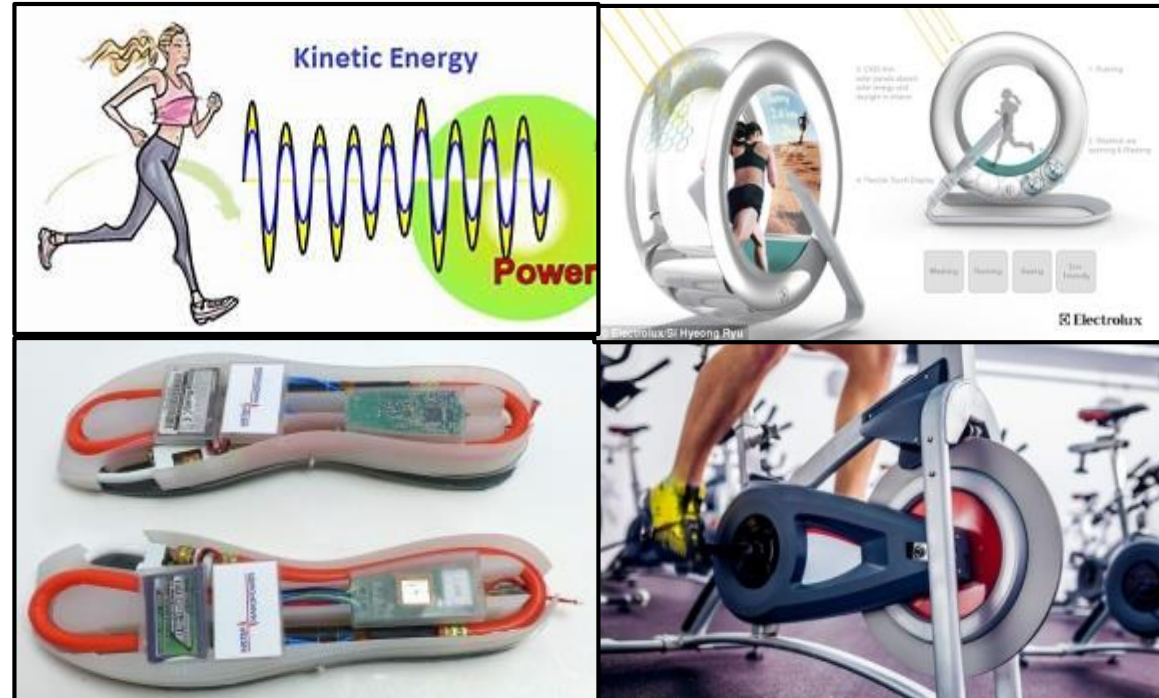


Bioethanol Production from  
Napier Grass

➤ **ENERGY RESOURCE  
DIVERSIFICATION**

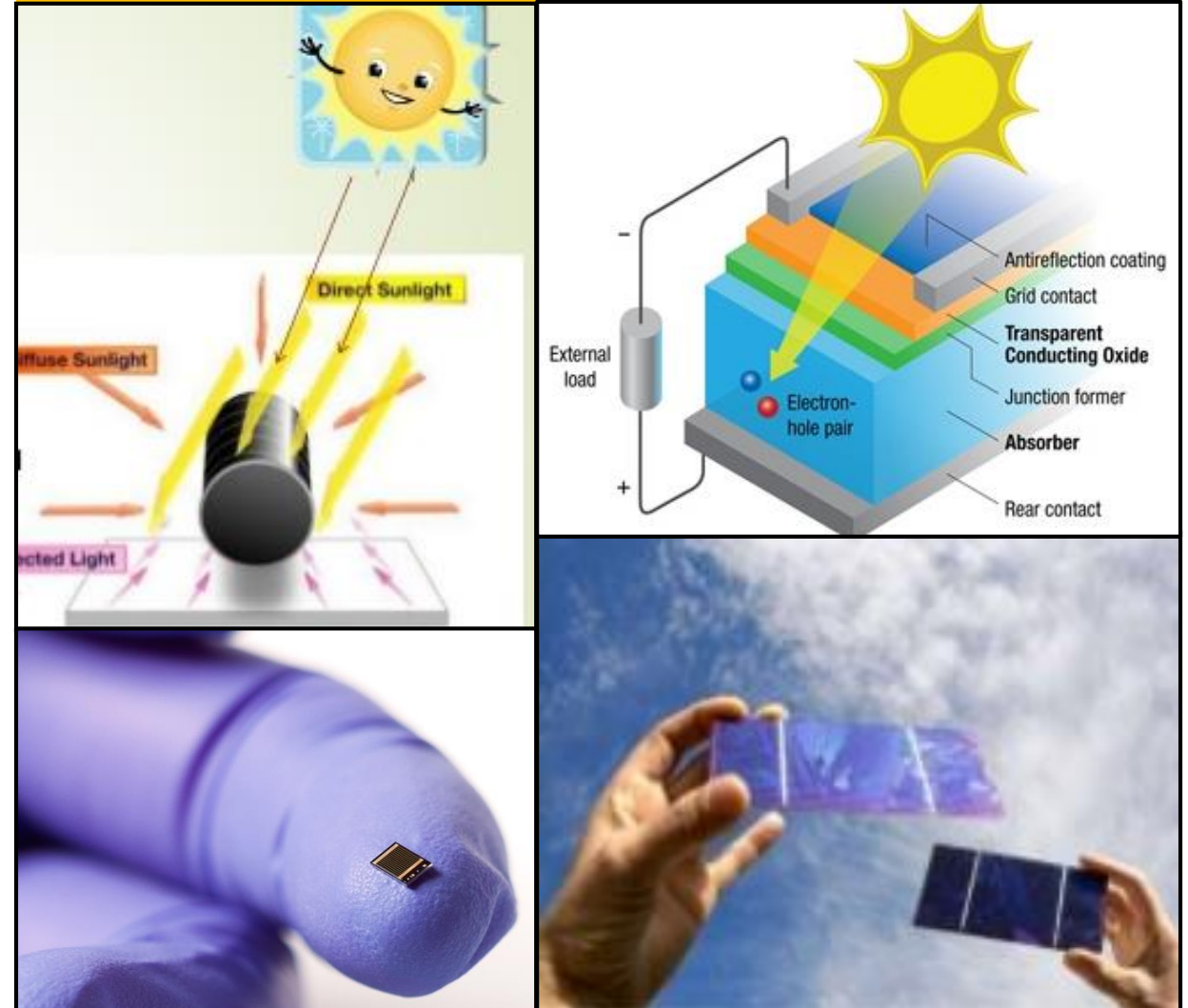
Energy from "Waste":

Energy from Wasted Human Movement  
(Human Kinetics)



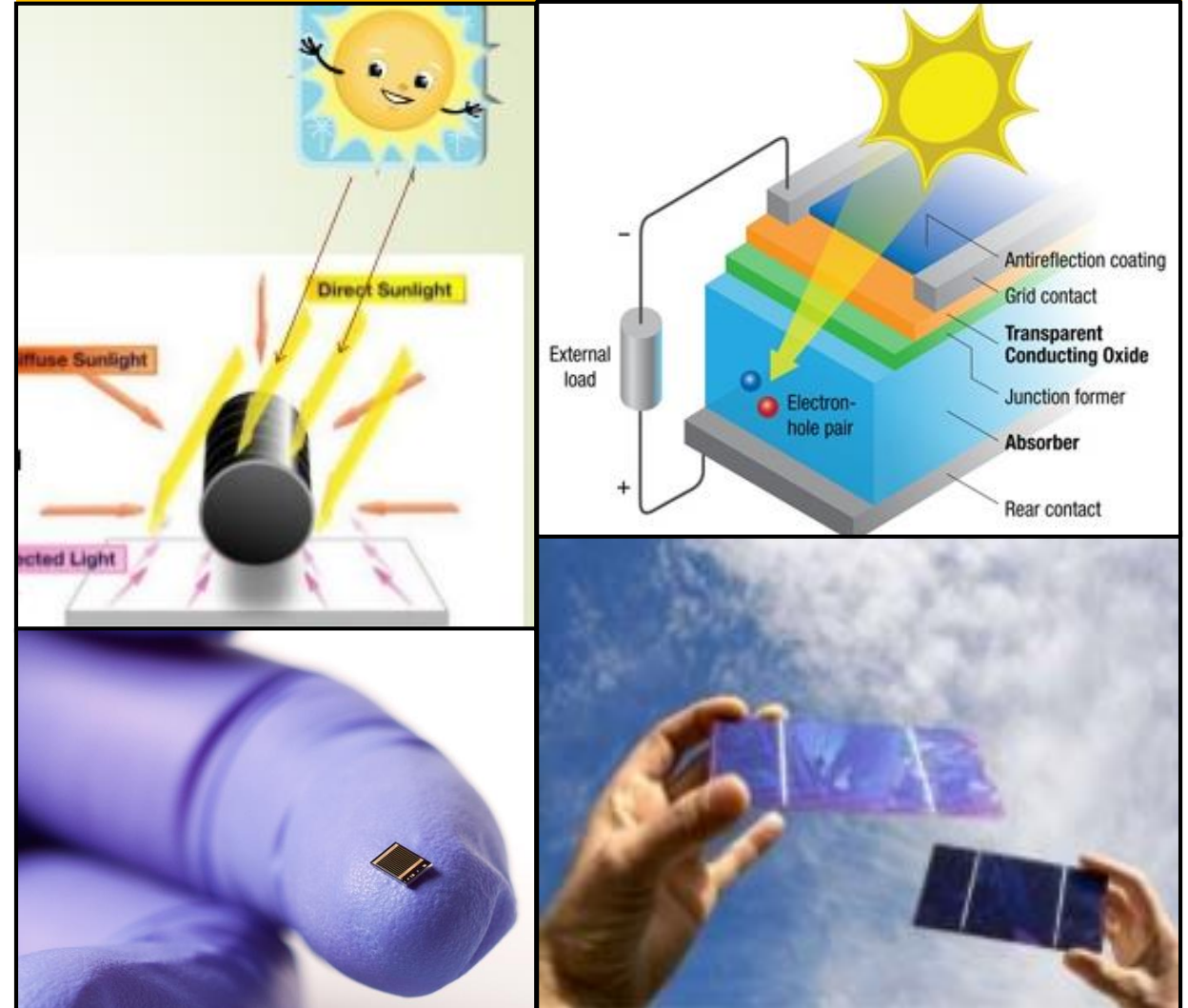
➤ ENERGY CONVERSION

### High Efficiency Nano Technology Solar Cell



➤ ENERGY STORAGE

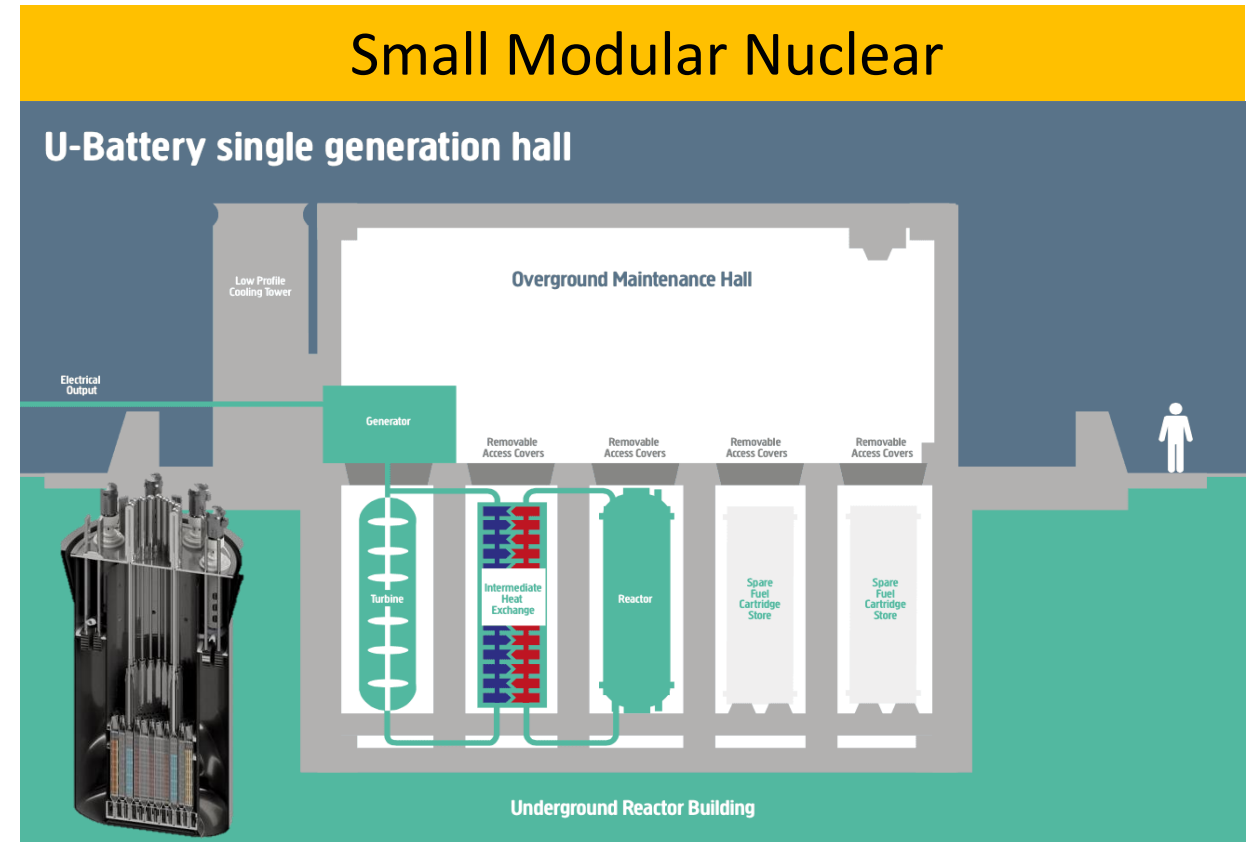
### High Efficiency Nano Technology Solar Cell



## New and Emerging Energy Technologies

Potentials Applications in the Energy Sector

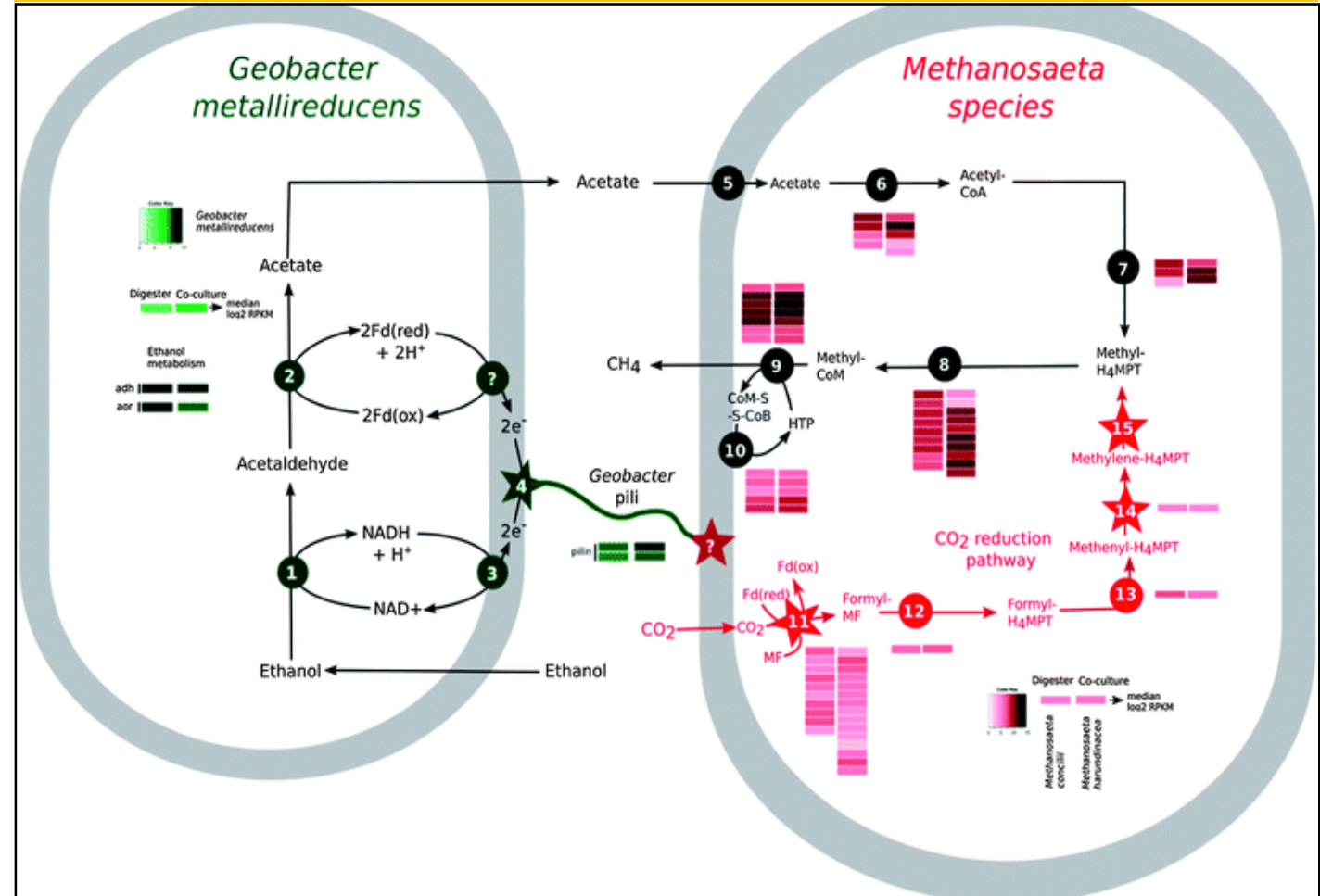
## ➤ ENERGY GENERATION



(3 Mwe - Canada LeadCold Transportable Molten lead – uranium nitride)

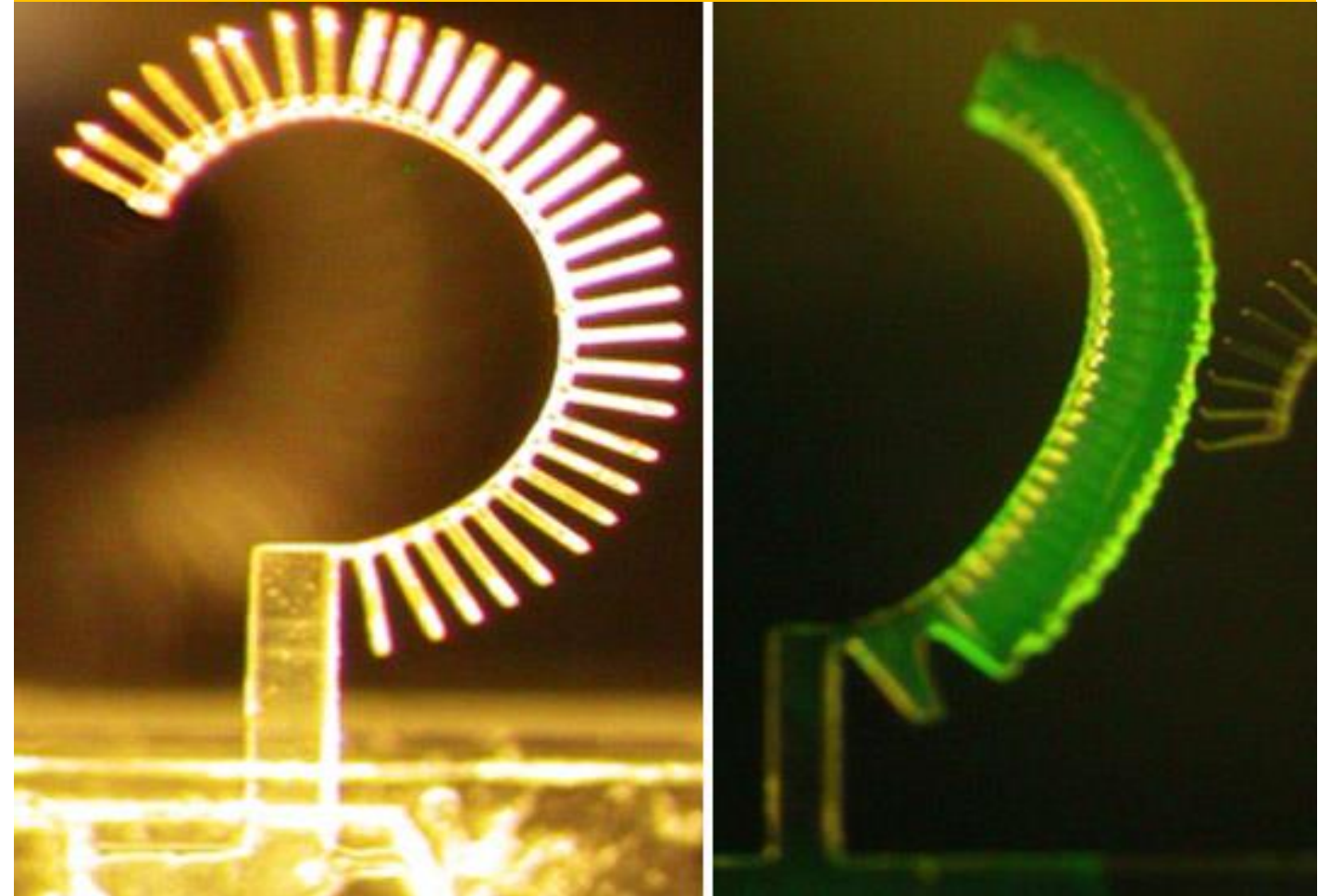
➤ BIO-GENERATION

Microbial Ethanol Production



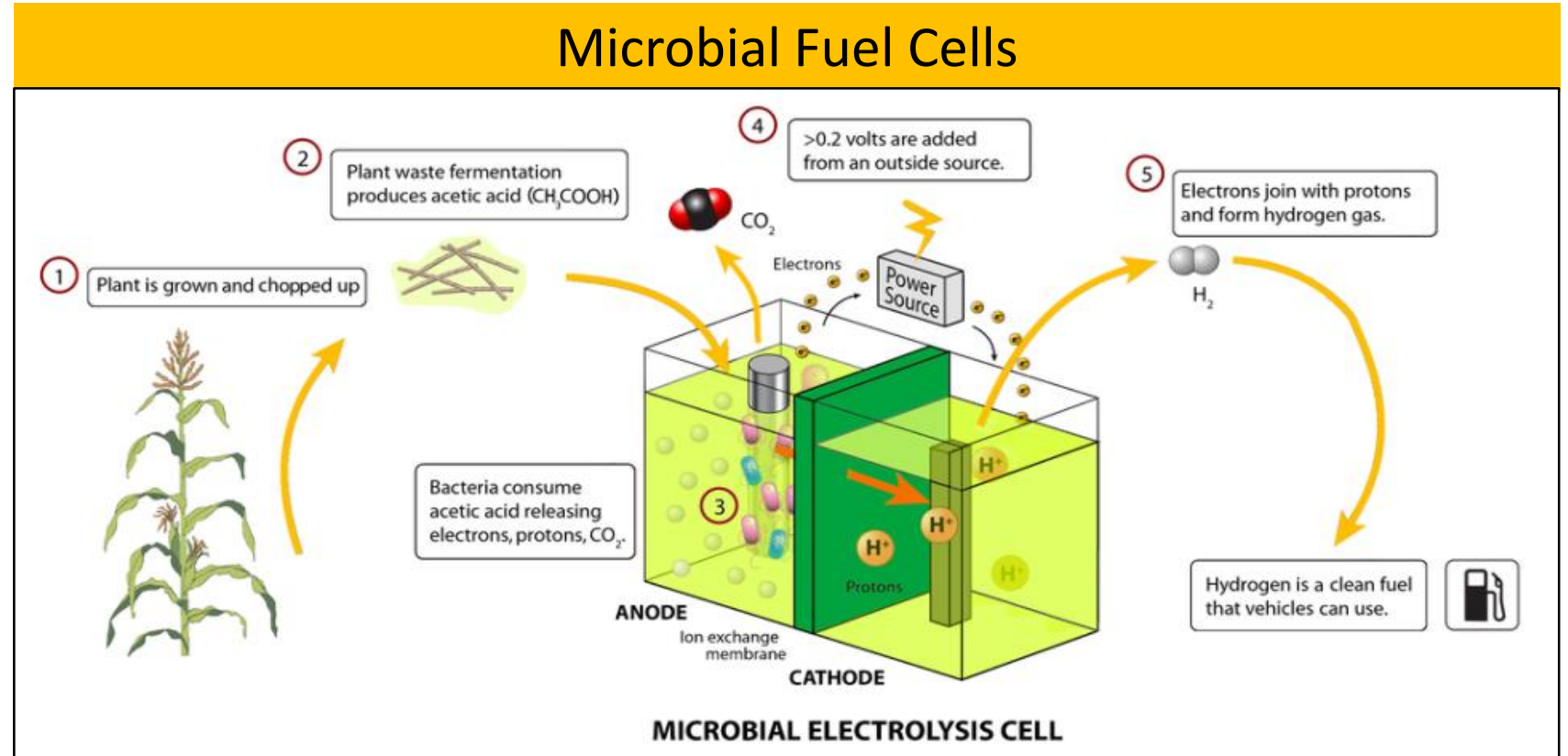
➤ **BIO-GENERATION**

Electricity Production from Plant Transpiration  
(inspired by FERN Spore Release Structure)

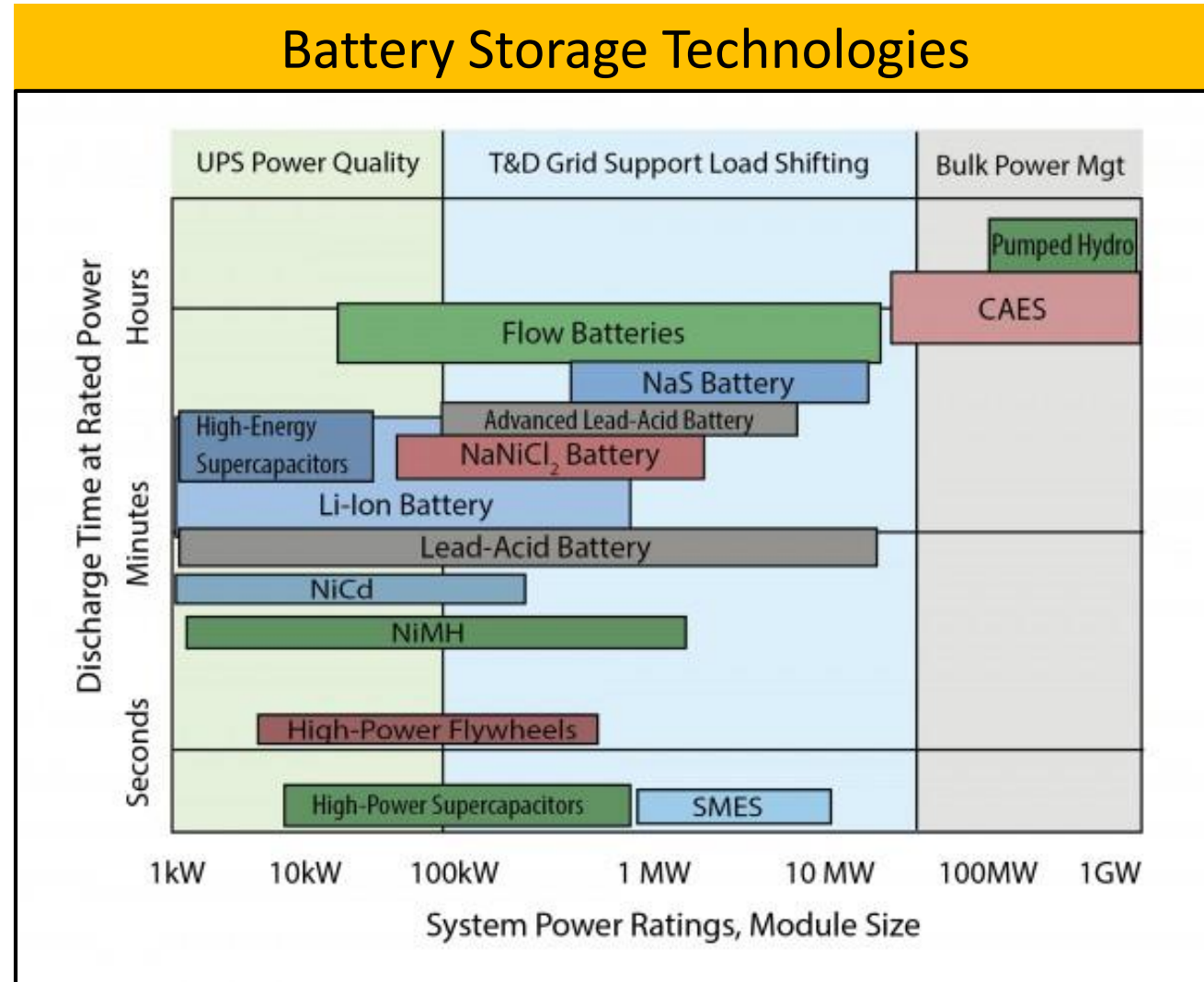




➤ ENERGY GENERATION

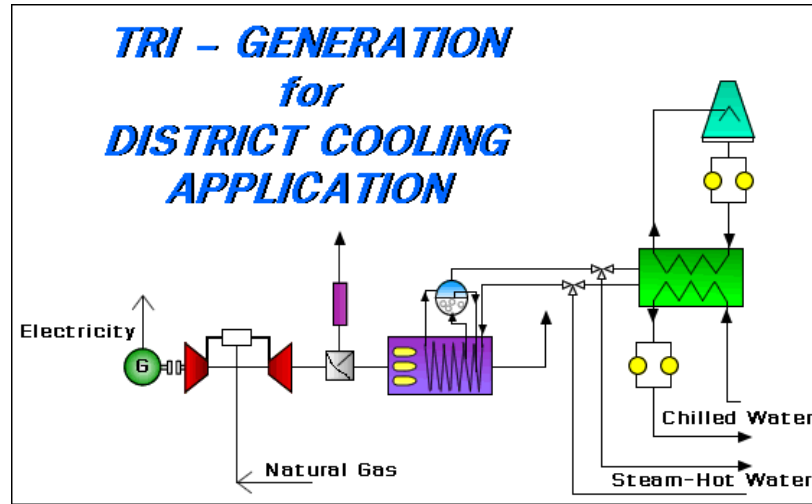


➤ ENERGY STORAGE

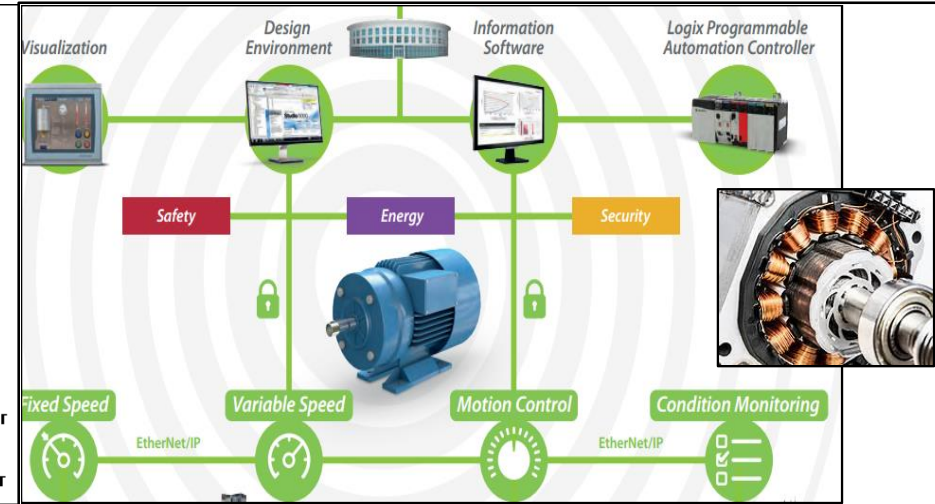


## ➤ INDUSTRY, COMMERCIAL AND RESIDENTIAL ENERGY USE

### New and Emerging Energy Technologies

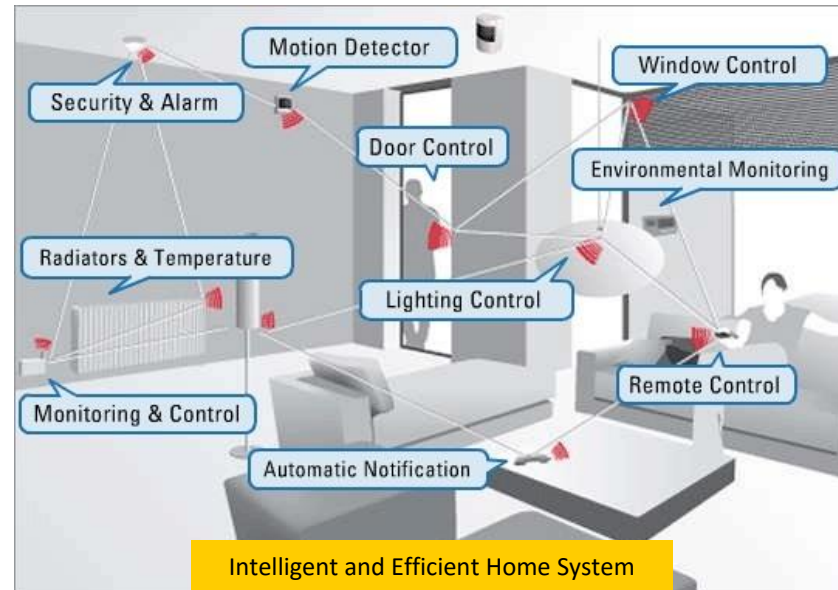


Tri-generation System

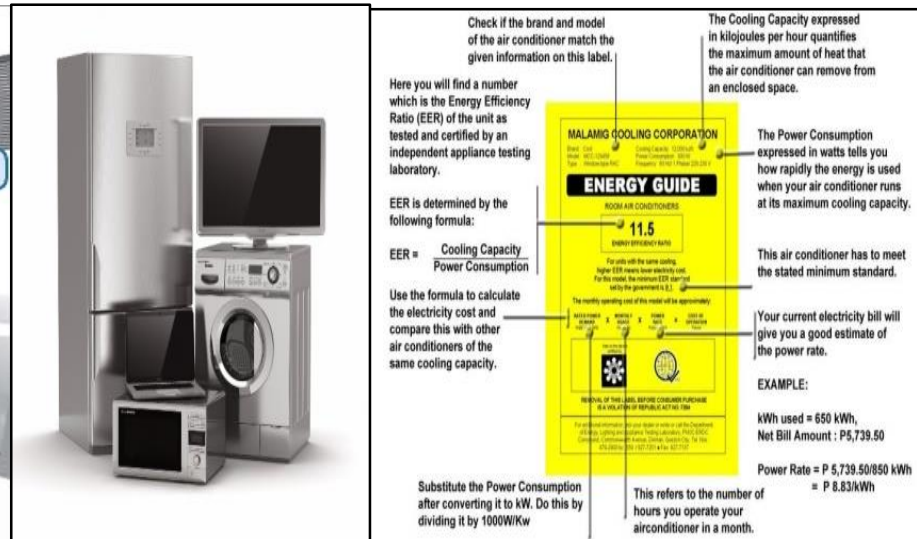


Efficient Motors and Intelligent Drive Control

### Potentials Applications in the Energy Sector



Intelligent and Efficient Home System



**Energy Efficient Appliances**

This section shows a refrigerator, a washing machine, and a microwave. It includes an **ENERGY GUIDE** label for a room air conditioner with an **ENERGY EFFICIENCY RATIO (EER) of 11.5**. The label provides information on how to calculate electricity costs and compare different models.

Check if the brand and model of the air conditioner match the given information on this label.

Here you will find a number which is the Energy Efficiency Ratio (EER) of the unit as tested and certified by an independent appliance testing laboratory.

EER is determined by the following formula:

$$EER = \frac{\text{Cooling Capacity}}{\text{Power Consumption}}$$

Use the formula to calculate the electricity cost and compare this with other air conditioners of the same cooling capacity.

The Cooling Capacity expressed in kilojoules per hour quantifies the maximum amount of heat that the air conditioner can remove from an enclosed space.

The Power Consumption expressed in watts tells you how rapidly the energy is used when your air conditioner runs at its maximum cooling capacity.

This air conditioner has to meet the stated minimum standard.

Your current electricity bill will give you a good estimate of the power rate.

EXAMPLE:

kWh used = 650 kWh,  
Net Bill Amount : P5,739.50

Power Rate = P 5,739.50/850 kWh  
= P 8.83/kWh

Substitute the Power Consumption after converting it to kW. Do this by dividing it by 1000W/Kw

This refers to the number of hours you operate your air conditioner in a month.

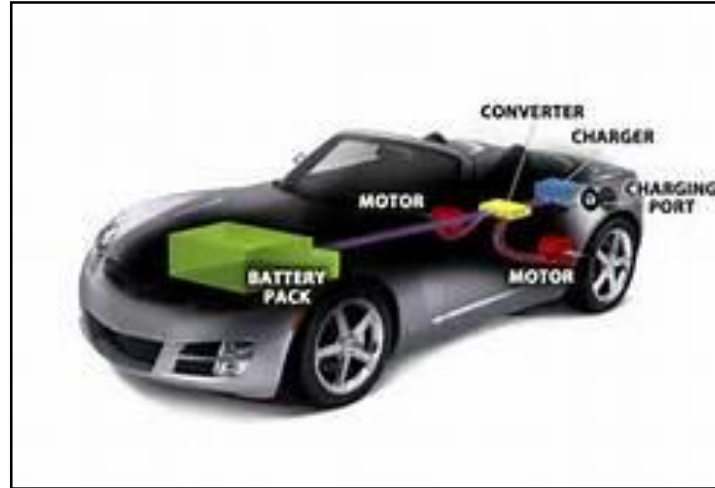
Energy Efficient Appliances

## New and Emerging Energy Technologies

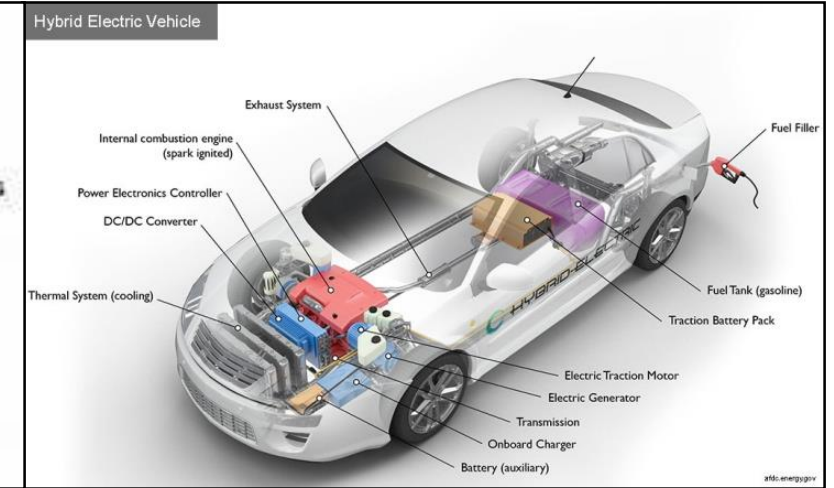
# Potentials Applications in the Energy Sector

## ➤ NEXT GENERATION TRANSPORTATION TECHNOLOGIES

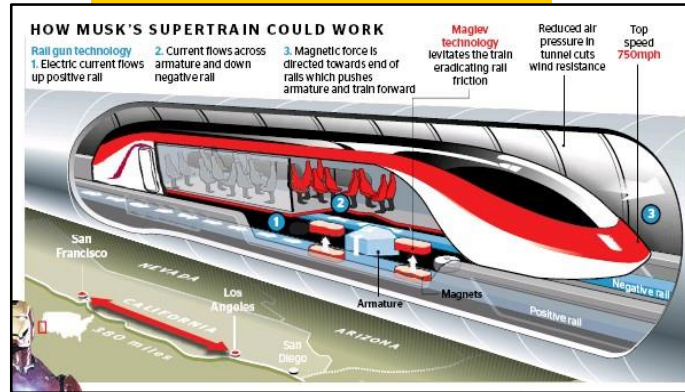
### New Concepts in Transportation Technology



E-Vehicles



Hybrids



Rail-Gun Train



WalkCar Personal transport



STEP-GO Personal transport



New and Emerging  
Energy Technologies

Innovation and  
Emerging Energy  
Technologies

Where is

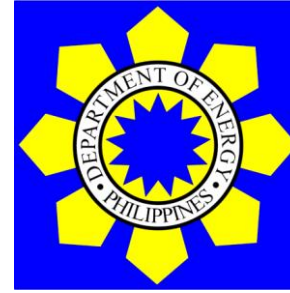


ENERGY  
INNOVATION



New and Emerging  
Energy Technologies

Innovation and  
Emerging Energy  
Technologies



The Department of Energy's

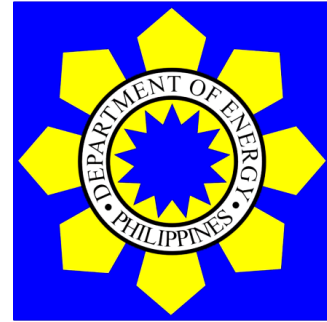
**ENERGY  
INNOVATION**

initiatives.....



**New and Emerging  
Energy Technologies**

**Innovation and  
Emerging Energy  
Technologies**



**ALTERNATIVE FUELS AND  
ENERGY TECHNOLOGY  
DIVISION**

**(1)  
MOA on STEA**

**(2)  
Energy Research &  
Capacity Building**

**(3)  
Collaborative  
Technology  
Validation**

**(4)  
Inclusive Energy  
Sector Innovation  
Approach**

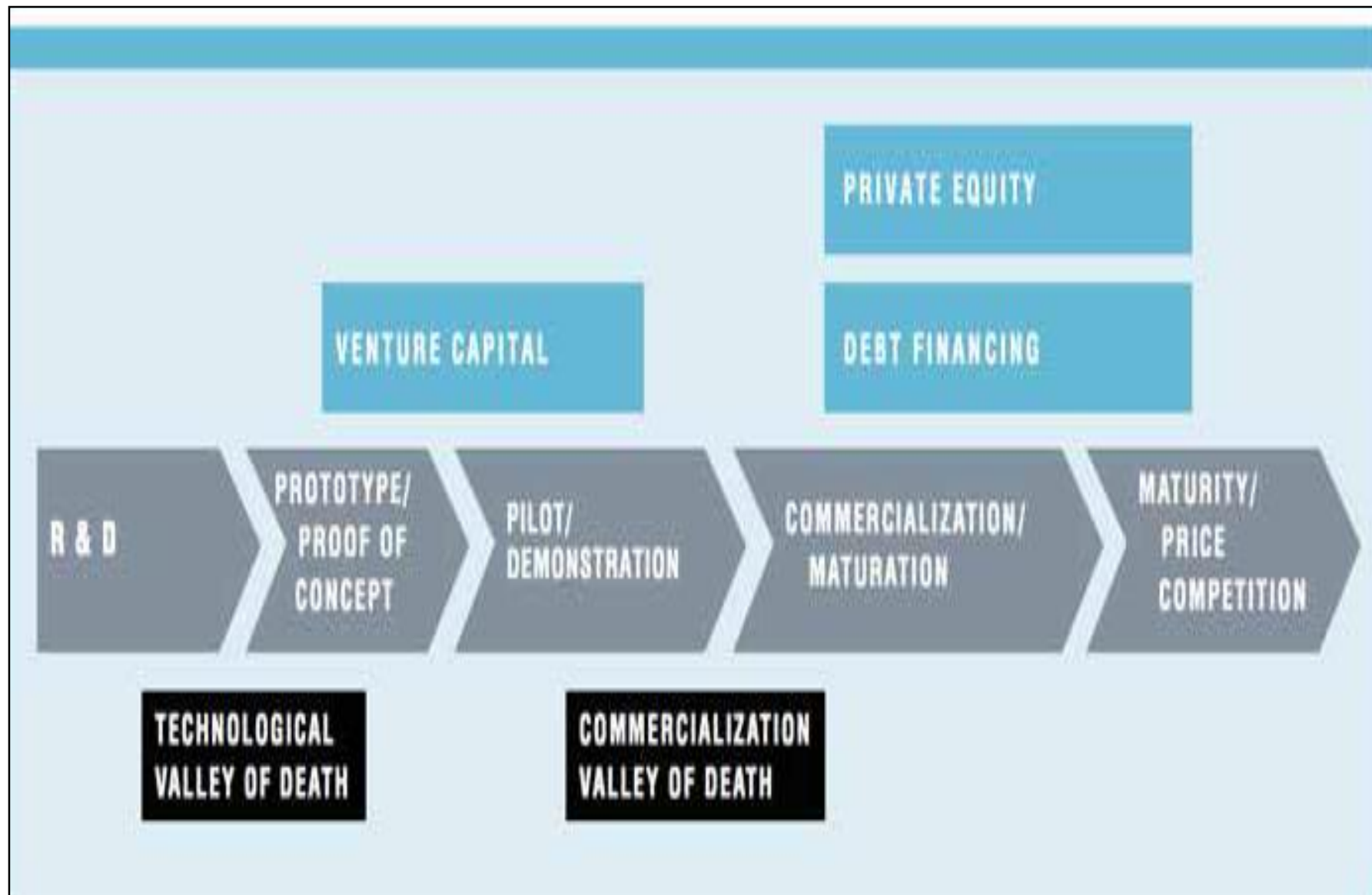


**STATE UNIVERSITIES AND  
COLLEGES**

**DOST, Private and  
International Research  
Institution**

**The DOE Energy Sector  
Innovation Challenge**

## Challenges in pursuing commercialization of innovation







## New and Emerging Energy Technologies

DOE's Status on  
emerging local  
energy technology  
innovation

### ***Technology Evaluation for 2017***

#### ***Local Concept for Energy Innovation and Technologies (In coordination with TAPI and PCIEERD )***

- 1. Independent Power Generation (IPG)***
- 2. Drive-in Electric Turbine (DIET)***
- 3. Air Hydro Power Plant***
- 4. Modular Hydrogen Generation System***
- 5. Alternative Synchronous Electric Motor and Generator Energy Device***

***All Concepts did not passed the Valley of Death due to lack of sound scientific basis***

### ***Technology Evaluation for 2018***

#### ***Local Concept for Energy Innovation and Technologies (In coordination with DOST -PCIEERD )***

- 1. Complete design of Transport Network Vehicle Service system network for e-trike  
(UP IEEE)***
- 2. Stability Study for E-trike in Cagayan State University***

***All Concepts or Technical Panel Evaluation on April 20, 2018***



## New and Emerging Energy Technologies

Innovation and  
Emerging Energy  
Technologies





## New and Emerging Energy Technologies

The Push for Local and Indigenous Energy innovation

## On-Going Programs

### Commercial/Industrial Sector

#### Transport Sector

- Prototyping of Original Equipment Manufactured (OEM) and Philippine National Standards (PNS) compliant AutoLPG Jeepney
- Tricycle Modernization Program

#### Non-Biomass based waste-to-energy generation

- Collaboration with international technology provider for pilot technology demonstration

### Household Sector

#### Non-wood based fuel for domestic cooking

- Collaboration with Central Mindanao University for the identification and characterization of grass-based fuel for use in domestic cook stove

### Agriculture

- Collaboration with Isabela State University for the prototyping and demonstration on the use of LPG in agricultural machineries

## Technologies lined-up for research

Human Kinetic Energy Harvesting

Micro-Energy Harvesting

Enzymes for ethanol production from biomass

Battery Energy Storage for grid application

Fast Charger Field Performance Validation

Universally-compatible EV Quick Charging Station



## New and Emerging Energy Technologies

The Push for Local  
and Indigenous  
Energy innovation

1st



ENERGY SECTOR







## New and Emerging Energy Technologies

The way to  
innovative thinking



**WHAT'S  
THE PROBLEM...**

## New and Emerging Energy Technologies

The way to  
innovative thinking



**TOO MANY SEEDS**

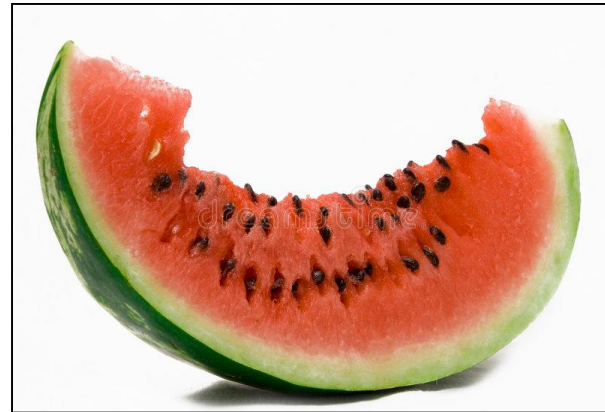
**CREATED**



**SEEDLESS VARIETY**

## New and Emerging Energy Technologies

The way to  
innovative thinking



**UN-APPEALING**

**IMPROVE** →



**ARTISTIC DESIGN**



## New and Emerging Energy Technologies

The way to  
innovative thinking



**INCONVENIENCE IN  
HANDLING**

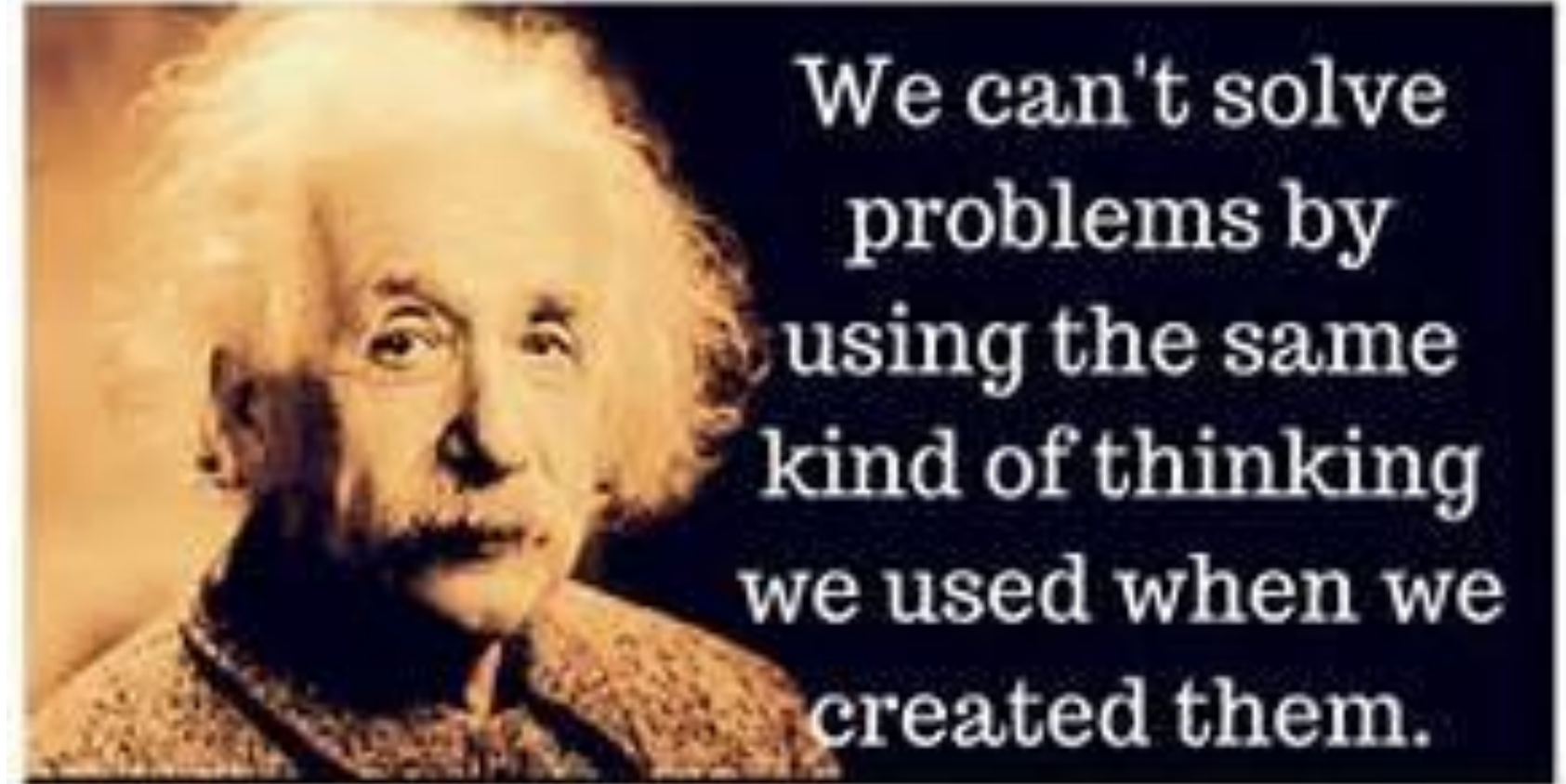
**INNOVATE**



**STABLE GEOMETRIC  
SHAPE**

## New and Emerging Energy Technologies

The way to  
innovative thinking





*Thank you!*