



# **Moving Forward : Bioenergy, Biomaterial and Biochemical Industry**



**Tevin Vongvanich**



## Energy, Material and Biochemical

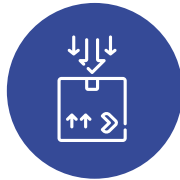
**Value Added  
for Agriculture**

**Energy Security**

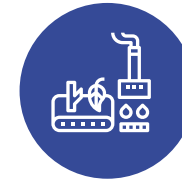
**Biobased Industry  
Initiative**



**Environmental  
Impact Reduction**



- **Import Reduction**
- **Self Reliance**



**Agriculture  
Absorption**



**Sustainable  
Community Energy**



**New Industry Through  
Research and Innovation Development**

## RENEWABLE ENERGY TARGET FOR ASEAN MEMBER STATES

### Myanmar

30% hydro and 9% other renewable energy sources in energy mix by 2030-2031

### Lao PDR

30% renewable energy in total final energy consumption by 2025 (excluding large hydro)

### Malaysia

2,080 megawatts of renewable energy installed capacity by 2020 (excluding large hydro)

### Indonesia

23% renewable energy in total primary energy supply by 2025

### Vietnam

21% renewable energy of 130 gigawatts installed capacity by 2030

### Thailand

30% (29,411 megawatts) renewable energy in total final energy consumption

### Cambodia

2,241 megawatts of large hydro by 2020

### Singapore

350 megawatts peak solar power by 2020

### Brunei

10% renewable energy generation by 2025

### Philippines

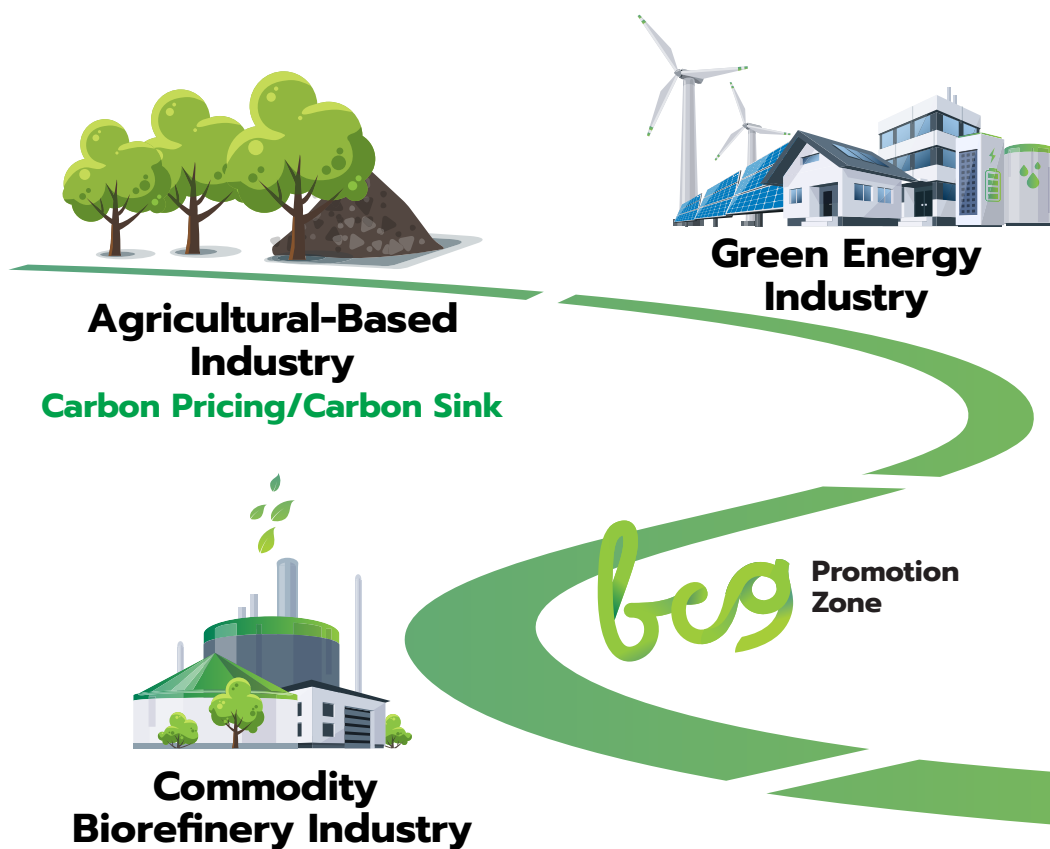
15.2 gigawatts of renewable energy 2030

### ASEAN targets

# 23%

renewable in its primary energy mix by 2025

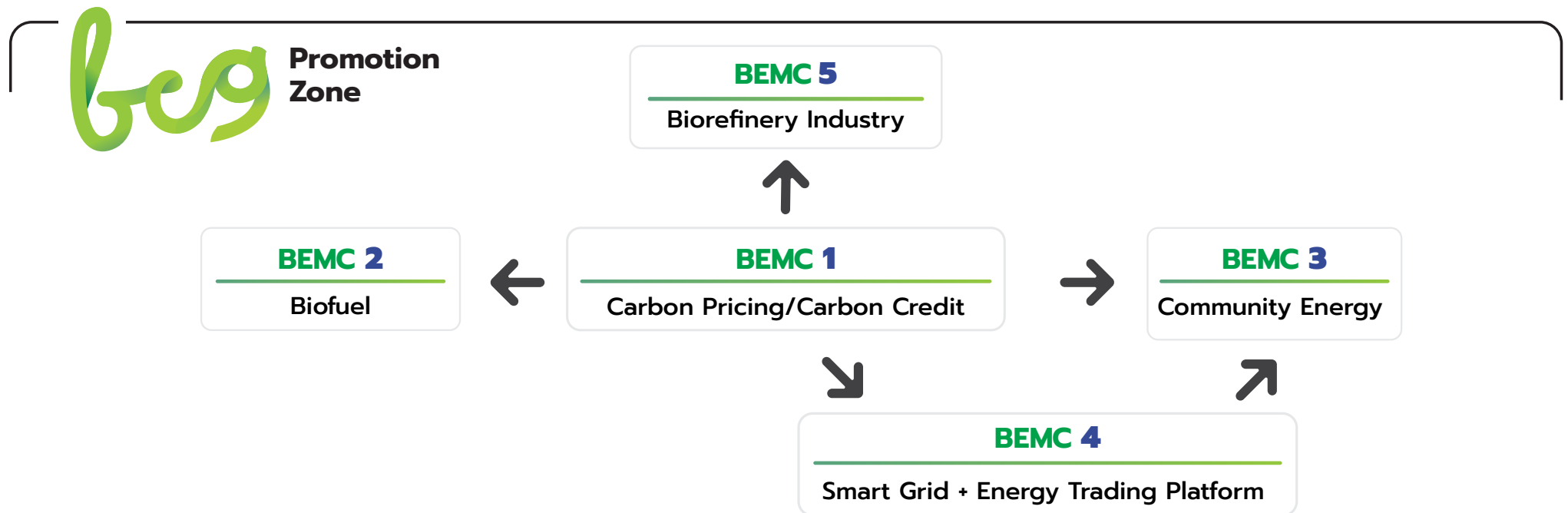
## Comparative Advantage → Competitive Advantage



### Potential Impact Within 5 Years

- Develop Value-Added Agriculture Products and Increase GDP (**0.15 Trillion Baht**)
- Increase Community Income (**10,000 Million Baht/Year**)
- Reduce Pollution Such as PM<sub>2.5</sub> & CO<sub>2</sub> (**30 Million ton CO<sub>2</sub>**)
- Reduce the Importation of Oil and Petroleum Products (**0.17 Trillion Baht**)
- Reduce Waste Disposal Cost (**15,000 Million Baht**)

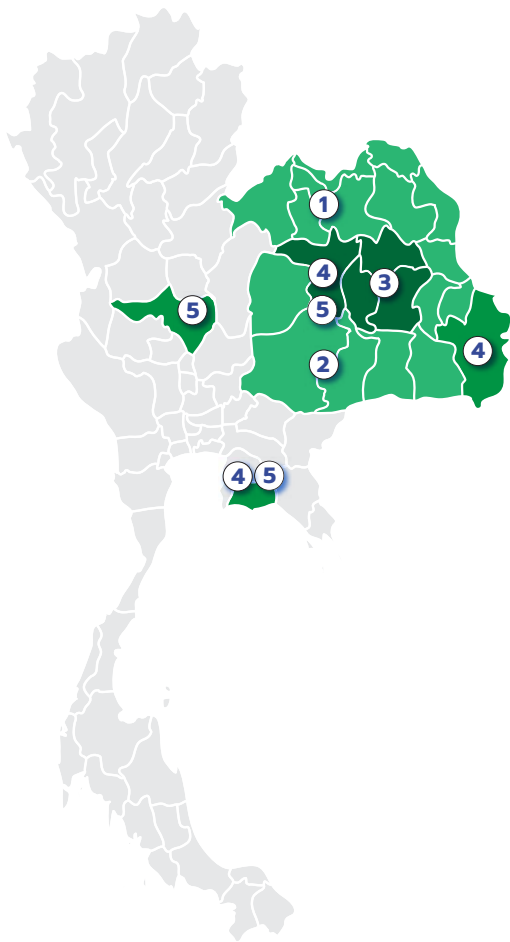
# Bio-based Energy, Materials & Chemicals



**Driver**

Bio-Based Products Promotion Through Market Mechanism Under Life Cycle Cost Concept

## Pilot Project Promotion Zone



### BEMC 1

Carbon Sink Forestry Project  
@ Isan

### BEMC 2

Ethanol/Hydrogen Fuel Cell  
@ Isan

### BEMC 3

P-P-P community energy  
@ Central Isan

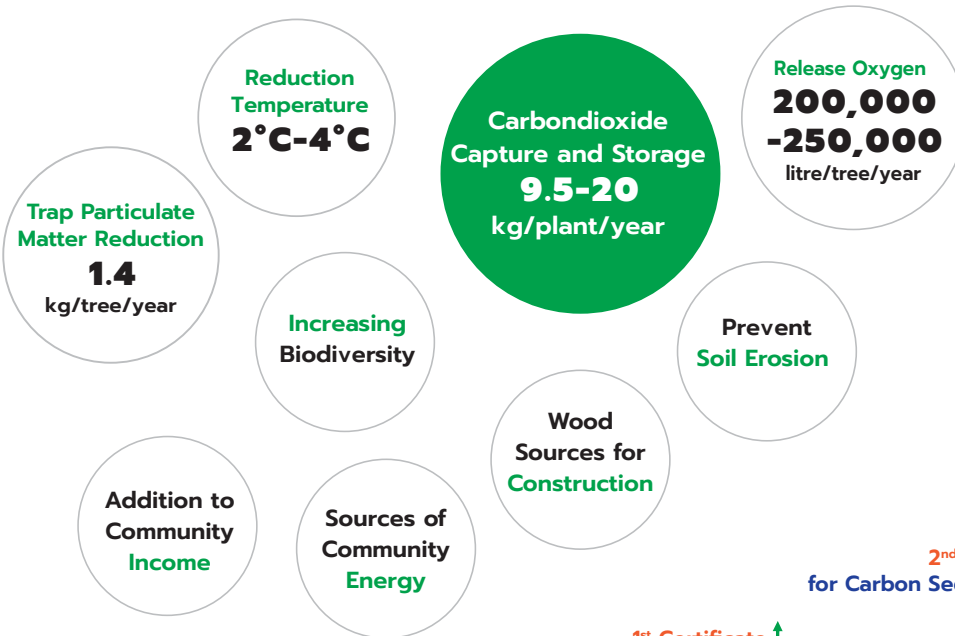
### BEMC 4

Sand Box: Smart Grid + Energy Trading Platform  
@ Khon Kaen Model, Ubon Ratchathani and EEC

### BEMC 5

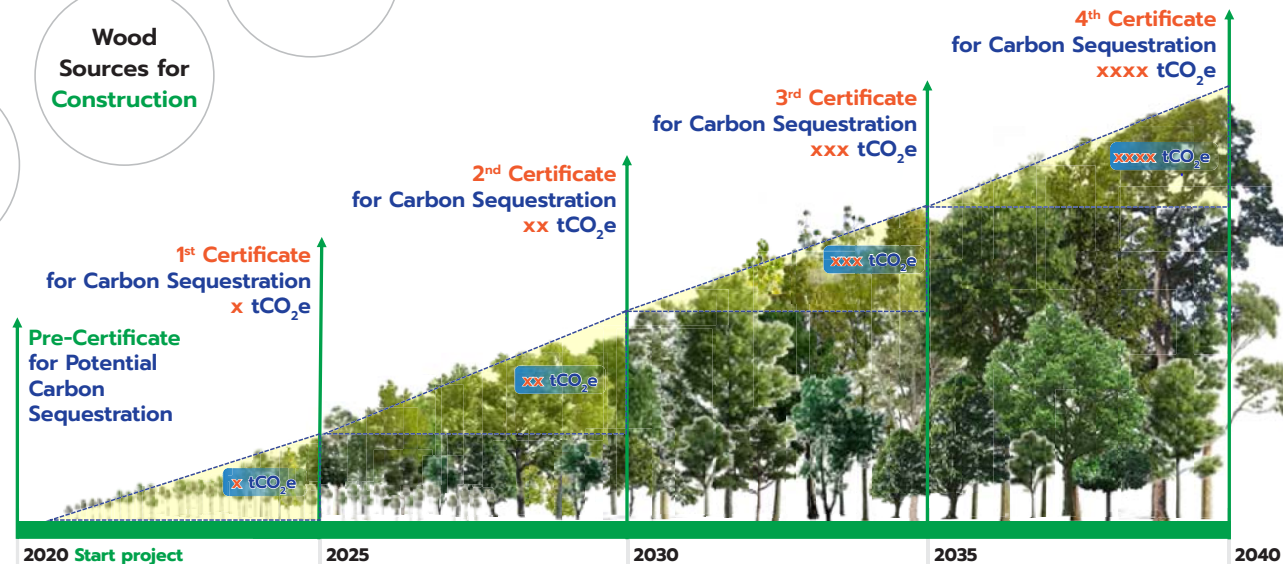
Biorefinery Innovation Center  
@ Nakhon Sawan, Khon Kaen and EEC

# BEMC 1 Carbon Pricing: Carbon Sink Forestry Project



## Carbon Credit Allocation Guidelines

Forest Plantation	Developer	Carbon Credit Allocation
(National Forest, Community Forestry, State Property)	Government Organization	Government Owned 100%
	P-P-P	Shared Ratio
Private Property	Private Sector	100% Landowner



## BEMC 2 Future Transportation Energy Transition



Leverage **Thai Farmers' Quality of Life**  
Stable **Circular Energy** Supply  
**Environmental Friendly**

### Clean Energy for Thai People

**Biodiesel**  
**B100**

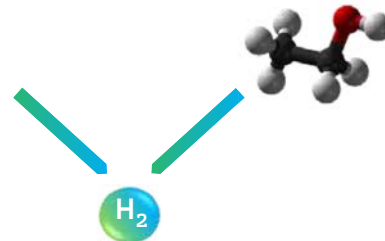


**4.9 Million Liters/Day**  
(2019)

+ **Diesel**



Internal Combustion  
Engine



Fuel Cell

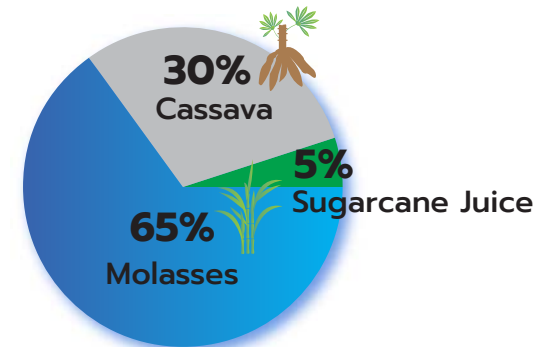


Ethanol  
Fuel Cell

**Ethanol**  
**4.5 Million Liters/Day**  
(2019)



Hybrid  
(ICE + Battery)



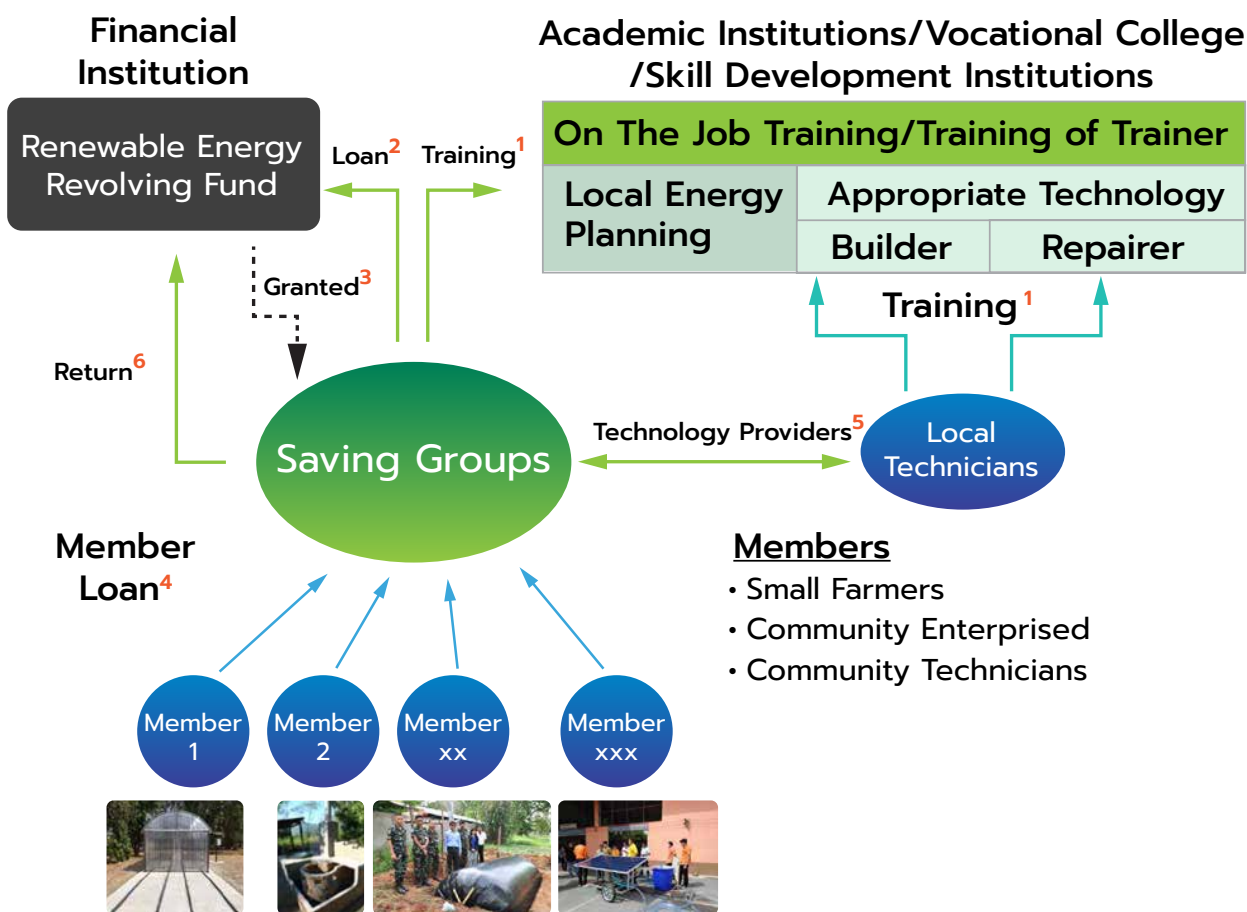
+ **Gasoline**



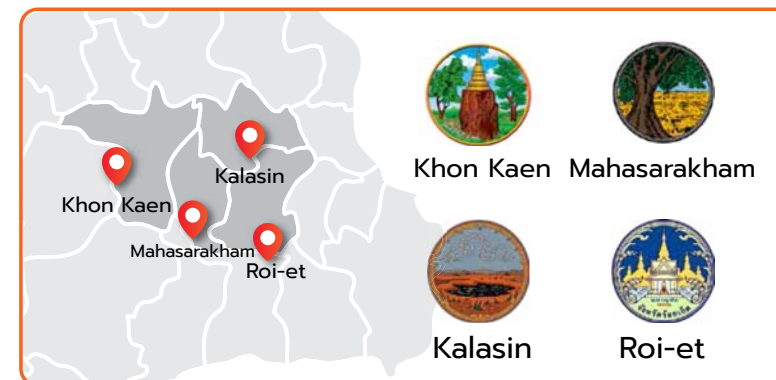
Internal Combustion  
Engine



# BEMC 3 Energy for All: Community Energy Revolving Fund for Grassroots Economy Development Project



## Central Isan Groups



## Supporting All Types of Investment

- Biorefineries for Biofuel
- Renewable Energy Power Plant
- Bio-based Industry Parks (Food Processing, Biochemical Processing, Cosmetic Manufacturing)
- Recycle Industries (Biogas, Community Waste)
- Community Energy Project for Grassroots

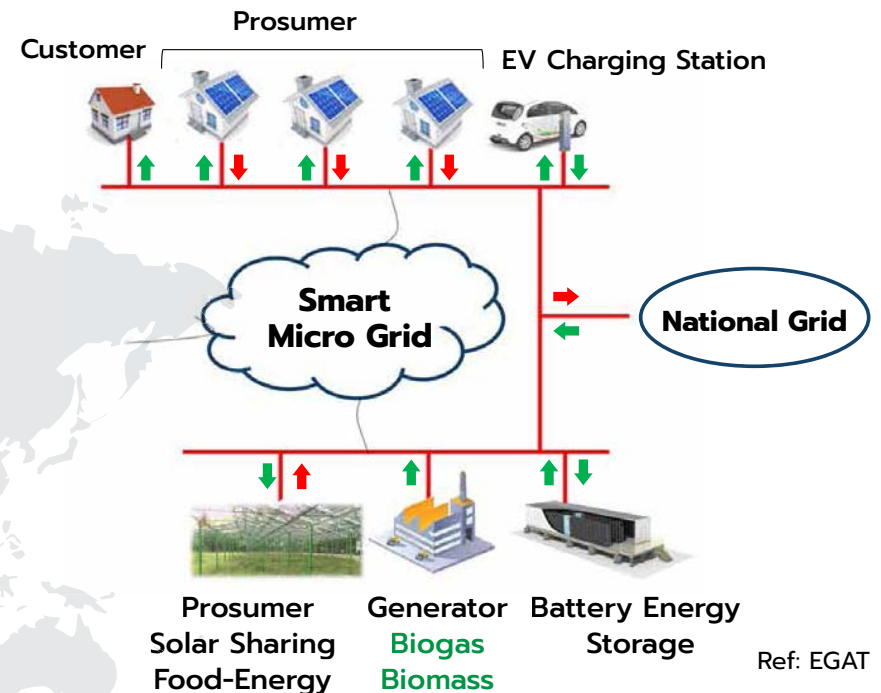


# BEMC 4 Smart Micro Grid and Energy Trading Platform

## 5 Main Functions

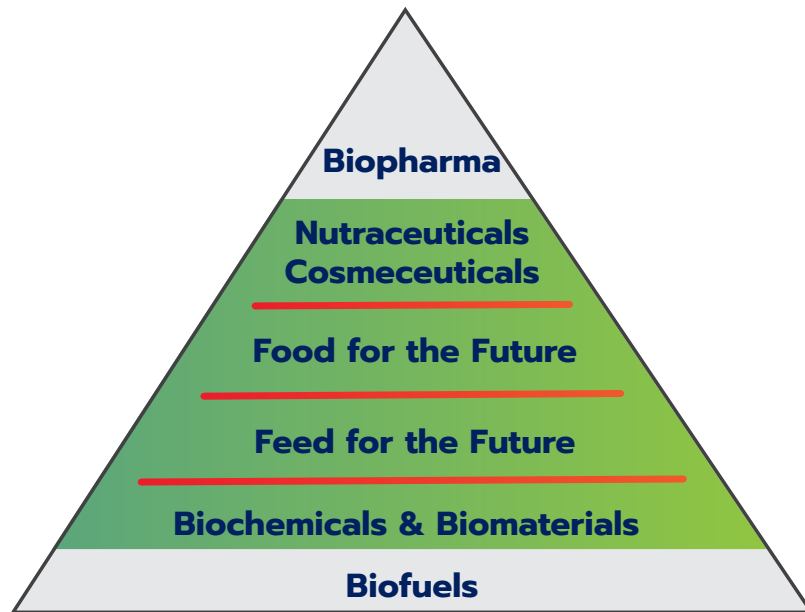
1. Microgrid Energy Balance Management (Demand vs Supply)
2. 2 Modes of Functional Microgrid
  - Grid Connected Mode
  - Islanding Mode
3. Electricity Data Sharing for Energy Consumption Plan
  - Power Consumption
  - Power Consumption Information
  - Electrical Equipment and Their Power Consumption
  - Event Report
4. Appropriate Maintenance Plan, Expansion Plan, Electric Power Delivery System
5. Peer-to-Peer Energy Trading

- Unlock TESI
- Structure Transformation to Support ETP



**ETP was initiated from Thailand's Energy Reform Plan.** The 5<sup>th</sup> Plan on Electric Energy Reform supports efficient energy conservation and consumption to be more competitive and to be able to produce renewable energy for domestic trading

# BEMC 5 Biorefinery Innovation Center



Low Price of  
Agricultural Products



Most Research Activities Are at TRL4  
Inadequate Pilot Plants

Value-Added: **“Waste to Wealth”** Through **R**esearch & **D**evelopment **I**nnovation **M**anufacturing

## Grant for Great

Industry Target: **Biochemical and Biomaterial**  
**Food for the Future**

- ✓ Scale Up (from **kg** -> **Ton**)
- ✓ Process Optimization
- ✓ Talented Biochemical Process Engineers
- ✓ **Techno-Economic Feasibility Study**

Financial Support Package: **Matching Fund**  
**Supporting to SMEs Rather**  
**Than Large Companies**

TRL 4 → TRL 7-9

**“Biorefinery Pilot Plant”**

## Recommendation from BCG Summit

BEMC Group	Recommendation
<b>BEMC 1</b> Carbon Pricing: Tree Planting for Carbon Sink	Alternatives for CO <sub>2</sub> Reduction Such As Process Improvement or Cleaner Technology
<b>BEMC 2</b> Future Transportation Energy Transition	Encouraging Biofuel Consumption to Support Value-Added Thai Agricultural Production
<b>BEMC 3</b> Energy for All	Encouraging The Utilization of Community's Technology which They Create on Their Own
<b>BEMC 4</b> Smart Micro Grid and Energy Trading Platform	Regulatory Reform to Support the Ease of Doing Business
<b>BEMC 5</b> Biorefinery Innovation Center	Human Resources/ Talent Development in Bioprocess and Scale-Up Technology



Assembly on  
**BCG: An Economic Model  
for Sustainable Development**  
15 July 2020