



Feasibility Study on Social Implementation of Bioenergy in East Asia (e-ASIA JRP)

Akio Nishijima (Waseda Univ.)

<Participating countries and research representatives>

Japan, Prof. Masafumi Katsuta, WASEDA University

Thailand, Prof. Paritud Bhandhubanyong, Panyapiwat Institute of Management

Vietnam, Prof. Tuan Le Anh, Hanoi University of Science and Technology

Indonesia, Dr. Anugerah Widiyanto, Agency of the Assessment and Application of Technology (BPPT)

Myanmar, Assoc. Prof. Ei Ei Htwe, Ministry of Education

LAO P. D. R., Prof. Bounmy Keohavong, Souphanouvong University

Feasibility Study on Social Implementation of Bioenergy in East Asia (Goal)

1. Database and priority setting for social implementation of bioenergy in East Asia
2. Feasibility study (economic evaluation LCA and Social acceptability) on bioenergy
3. Region wide networking for the utilization of biomass in East Asia
4. Understanding of local needs and sustainable supply of feedstocks
5. Optimization of local production for local consumption and international market
6. Sustainable Development Goals (SDGs)

Feasibility Study on Social Implementation of Bioenergy in East Asia (**Approach**)

1. Discuss and exchange information regarding research potential of each countries in the field of biomass utilization
2. Identify significant specific research areas to be jointly examined in light of future utilization in the ASEAN region
3. Form international research groups among six countries according to the research potential for meaningful results
4. Jointly confirm the progress chart of the consultation process of the groups in order to identify the critical paths and issues, thereby to make agreed modification in the activities
5. Arrange to foster young researchers' activities through the participation of this Program

ASEAN-Japan Collaboration on Biomass Energy

(Background and Strategy)

1. Biomass-Asia Strategy (2000) and Biomass-Asia workshop (2003-)
2. Thailand-Japan collaboration(2006-), SATREPS Project ; High quality BDF production, (FY2009- FY2015);
3. International policy dialogue of science and technology in East Asia (2010-), Open innovation research center in Asia (2012), Biomass forum in Bangkok (Nov. 2013) , ASEAN-Japan collaboration
4. Biomass Asia Project at EAJ (Engineering Academy of Japan) (FY2013-), Policy proposal of biomass energy to ASEAN (Jan. 2016)
5. Multilateral (**e-ASIA**, **ERIA**, **NEF**, ASEAN secretariat) and Bilateral (JICA /JST/NEDO, JCM) collaboration
6. Social implementation of biomass energy ; **Entrance strategy** (Biomass feedstock, Breeding), Technological strategy (Process optimization), Exit Strategy (Creation of demand & market),

Concept of Biomass Asia Strategy



AIST

FY2000

ASIA

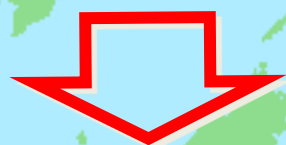
resources,
technology,
and cost efficiency

JAPAN

IP and technology



win/win
collaboration in
R&D



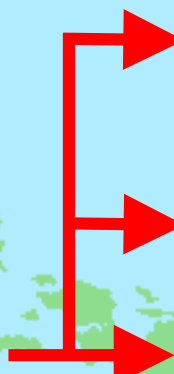
Manufacturing bases in Asia,
Create new industries and new
markets

Biomass refinery

(Innovative Biomass process)

Post-Oil Society, Low Carbon Society

Establishing Equal Partnership

- 
1. Produce new energies and materials
 2. Reduce CO₂ by using biomass
 3. Foster sustainable primary and secondary industries

ASIA

- need to diversify energy resources and maintain security
- foster sustainable primary industries
- existence of abundant biomass resources
- cost efficiency in biomass accumulation and transportation
- need to introduce advanced technologies and to foster human resources
- existence of promising genetic resources
- adoption of biomass fuel and reduction of greenhouse gas emissions
- environmental conservation (cities & forests)

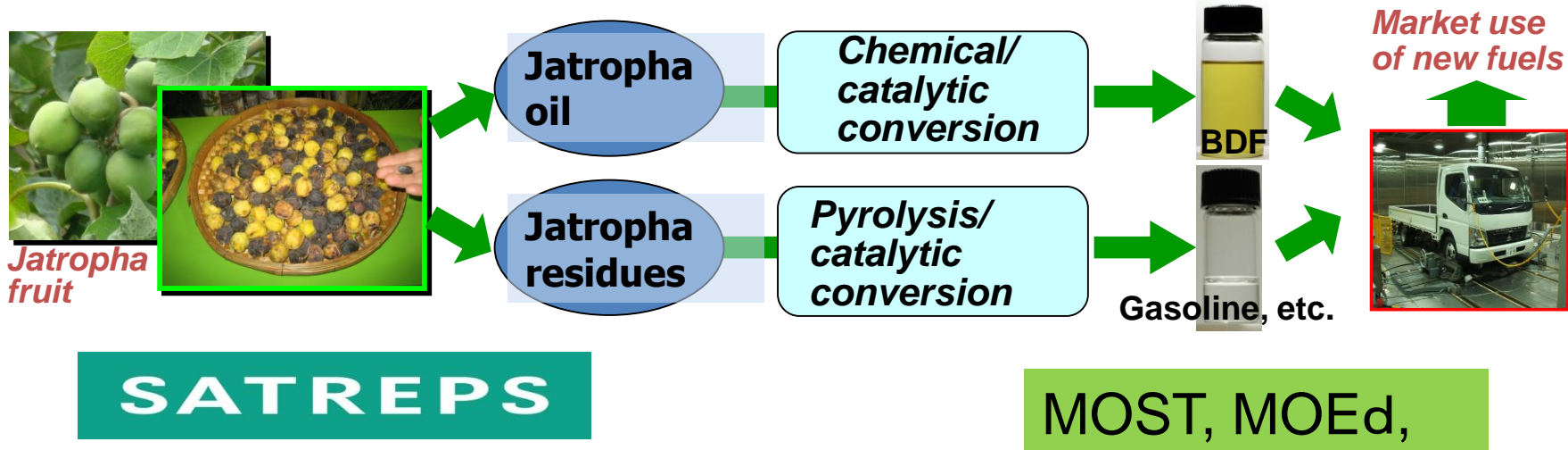
ASEAN-Japan Collaboration on Biomass Energy

Akio Nishijima (Waseda Univ.)

1. Biomass-Asia Strategy (2000) and Biomass-Asia workshop (2003-)
2. Biomass related SATREPS projects in ASEAN (10 projects)
3. Thailand-Japan collaboration, SATREPS Project ; High quality BDF production, (FY2009- FY2015); ASEAN-Japan collaboration
4. Social implementation of biomass energy ; **Entrance strategy** (Biomass feedstock), Technological strategy (Process optimization), Exit Strategy (Creation of demand & market),
5. International policy dialogue of science and technology in East Asia (2010-), Open innovation research center in Asia (2012), Biomass open innovation forum in Bangkok (Nov. 2013)
5. Biomass Asia Project at EAJ (Engineering Academy of Japan) (FY2013-), **Policy proposal of biomass energy to ASEAN** (2016)
6. Multilateral (e-ASIA, ERIA, ASEAN secretariat) and Bilateral (JICA /JST/NEDO, JCM) collaboration

Thailand-Japan collaboration (JST-JICA project)

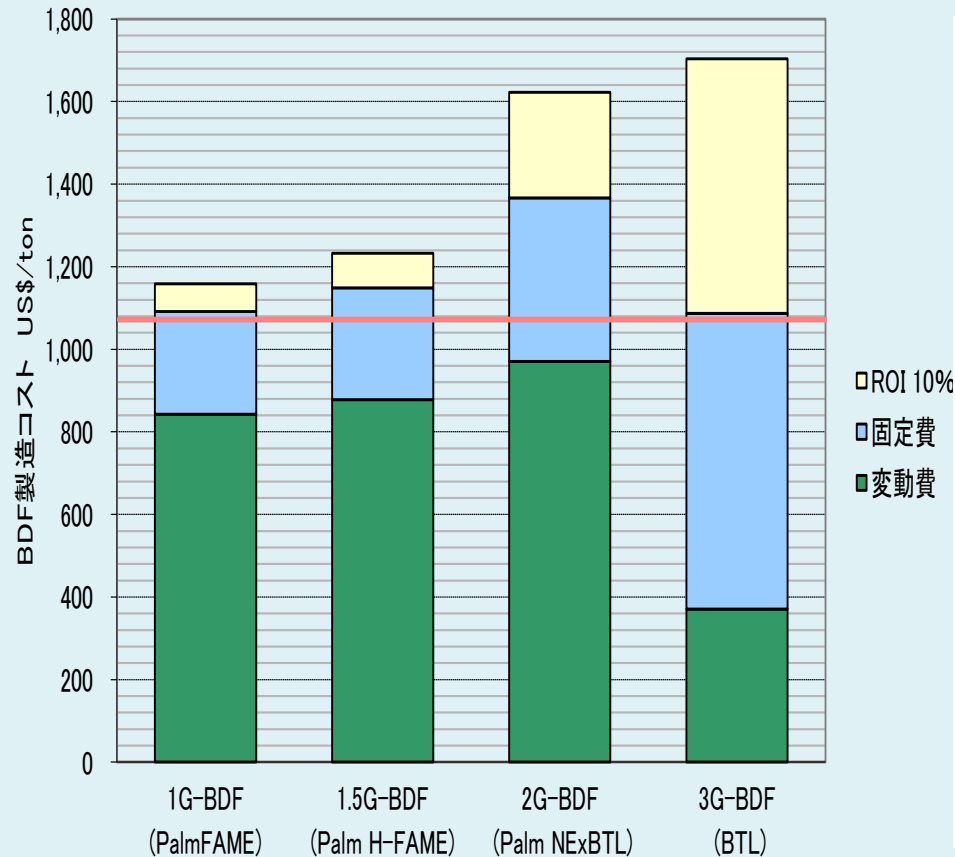
6 years' project (FY2010-2015)



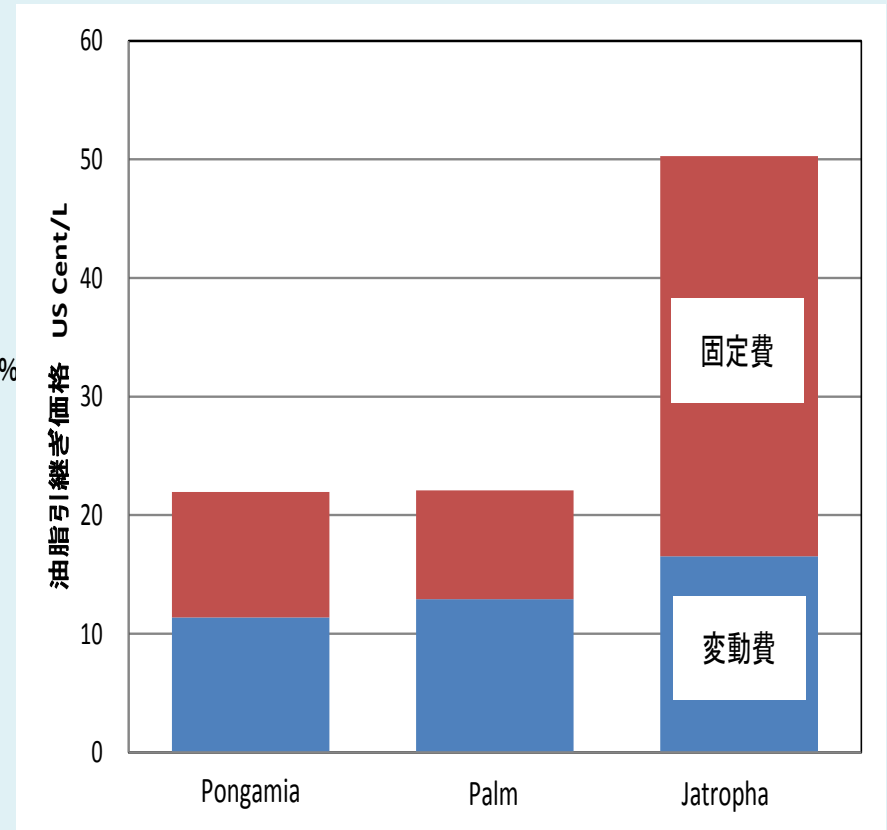
Innovation on production and automotive utilization of biofuels from non-food biomass

Dr. Paritud and Dr. Yoshimura

Production Cost of BDF and Oil Cost of Pongamia, Jatropha and Palm (Waseda Univ.)



Production cost of BDF



Oil cost of Pongamia, Jatropha and Palm

Challenges to be Addressed !

1. Practical Application of BDF

- **Entrance Strategy** (Procurement of feedstock)
 - Sustainable supply of raw materials at lower cost
 - Development of high-yield energy crops (Pongamia and etc.)
- **Exit Strategy** (Creation of demand & market)
 - Economics (market) and environment (collaboration among industry, research institute and government)
 - Feed-in Tariff scheme, Tax reduction, Carbon credit system, JCM
- **Technological Strategy** (Technological development)
 - Optimization of the manufacturing process

2. Collaboration among East Asia countries

- Thailand, Vietnam, Indonesia, Myanmar, Laos (e-ASIA)
- Pongamia plantation in Australia, India and Thailand (Indonesia)

The Biomass Industrialization Strategy

Basic policies for biomass industrialization

1 Technological Strategy (Technological development)

- Accelerate development of **Next-generation technologies** such as liquid fuel (cellulosic ethanol fermentation) and solid fuel (torrefaction)
- Process optimization, Simultaneous production of fuels and chemicals

2 Exit Strategy (Creation of demand & market)

- **Fully utilize Feed-in Tariff scheme** introduced in July first, 2012
- **Tax reduction** such as property and corporation tax
- **Utilize carbon credit system**
- Price reduction by downcycling
- **Create biomass-related industries with high-value added goods** such as carbon fiber and highly-functional resin

3 Entrance Strategy (Procurement of feedstock)

- **Establish an agricultural and forest management system to supply biomass resources** to manufacturers in a stable manner
- **Establish an efficient and integrated biomass utilization systems**
- **Develop high-yield energy crops and plants**
- **Fully utilization waste-related biomass** such as food, animal and human waste

Joint Crediting Mechanism (JCM)

- To facilitate diffusion of leading **low carbon technologies**, and contributing to sustainable development of ASEAN
- To appropriately evaluate contributions to GHG emission reductions or removals from developed countries in a quantitative manner
- To contribute to the ultimate objective by facilitating global actions for emission reductions or removals
- **MOE** and **METI** are now promoting JCM in Japan
- **COP21** (Paris Agreement; US and China)
- Conversion **from coal to biomass** (power generation)
- **Thailand-Japan JCM project on Torrefaction** (industry and research organization)

Entrance Strategy

Development of high-yield energy crops and plants



Pongamia pinnata plantation in Indonesia (Dr. Hideo Samura, EAJ)

Cascade utilization of oil seeds

Rubber seeds ➡ Bioethanol, Vitamine E,
Chemicals (Metal soap),
and BDF

Seminar on Biomass in VNU Hanoi (Prof. Maeda, Osaka Prefecture Univ.)

Basic Concept of Biomass Asia Project at EAJ

(Multilateral Collaboration on Biomass Utilization
in East Asia towards Low Carbon Society)

1. East Asia is an Engine of global economy.
2. East Asian countries share many common issues such as shortage of energy and environmental problems.
3. East Asia region is rich in biomass resources.
4. Biomass utilization is one of the most feasible approach toward sustainable development of the region.
5. While no single country can address these common issue alone.
6. So, bilateral and region wide collaboration on biomass utilization is essential for our sustainable development.
7. Human development of young researchers (engineers)
8. Policy proposal for international collaboration (2016)

Akio Nishijima, EAJ, Biomass-Asia Project Team



Asia needs collaboration and innovation

(International policy dialogue, Biomass open Innovation forum)

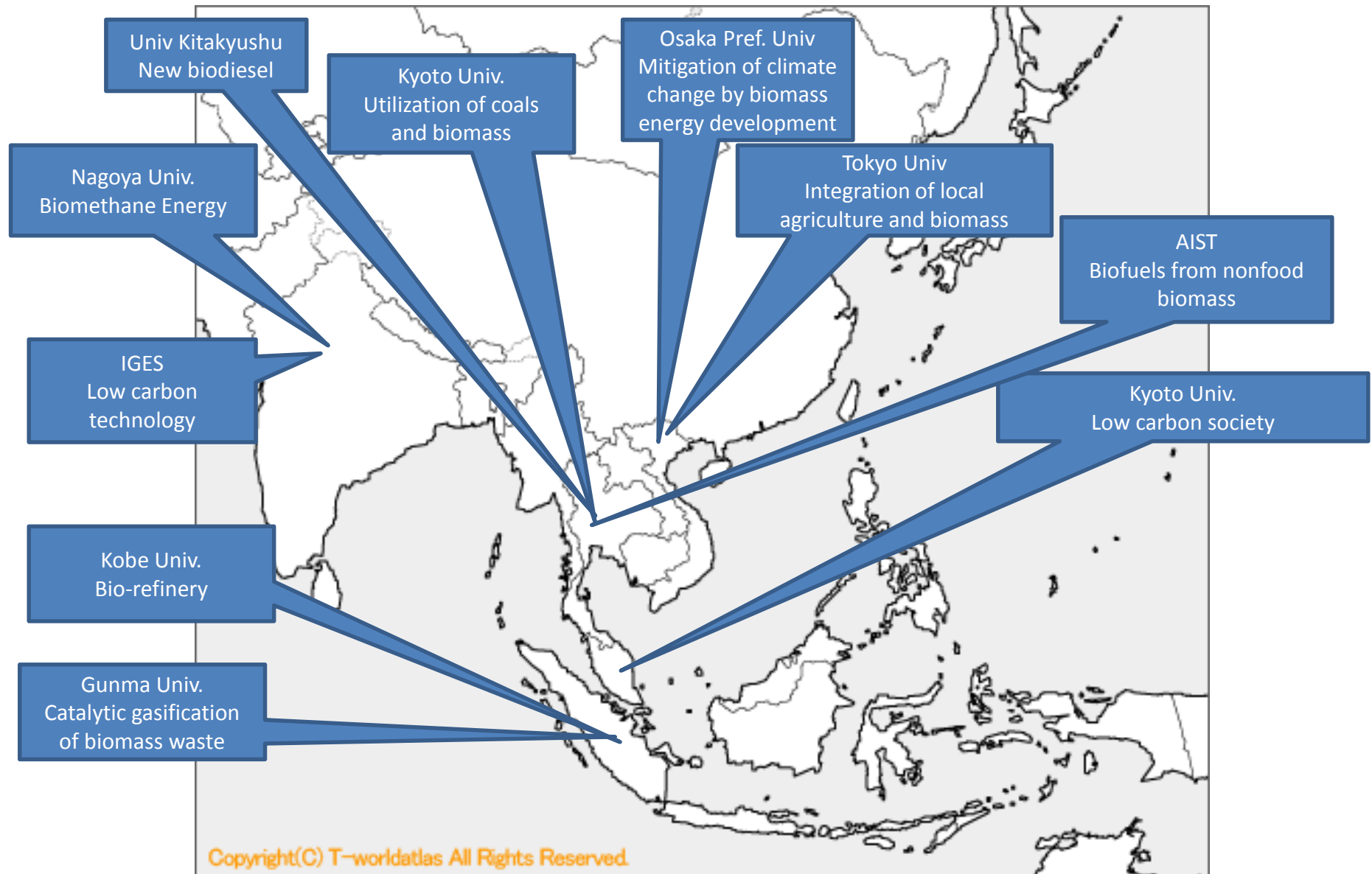
(Background)

- S&T investment in ASEAN is ca. one tenth of Germany
- S&T investment in all Asia is almost equal to the US or EU.
- Researchers in ASEAN is ca. one eighth of Japan
- Researchers in all Asia is much more than the US or EU.

(What is open innovation)

- Uses of inflows and outflows of knowledge to accelerate innovation
- In order to effectively use the open innovation strategy, we need to build a networks of various R&D entities and platforms of various technologies.
- We also need roadmaps for the implementation of biomass technology to recognize technology gaps.

Biomass related SATREPS Projects in ASEAN

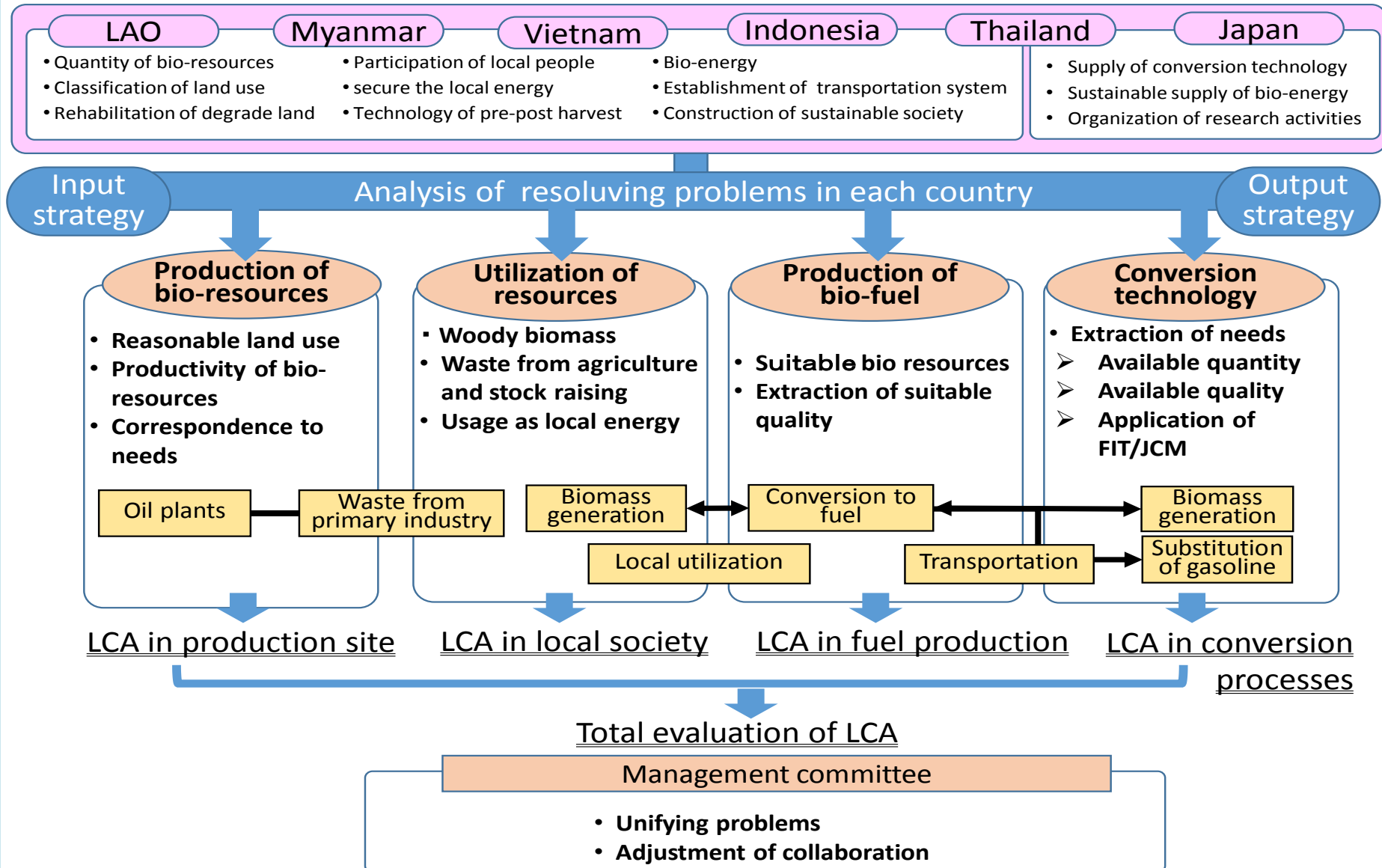


Possible collaboration projects in East Asia

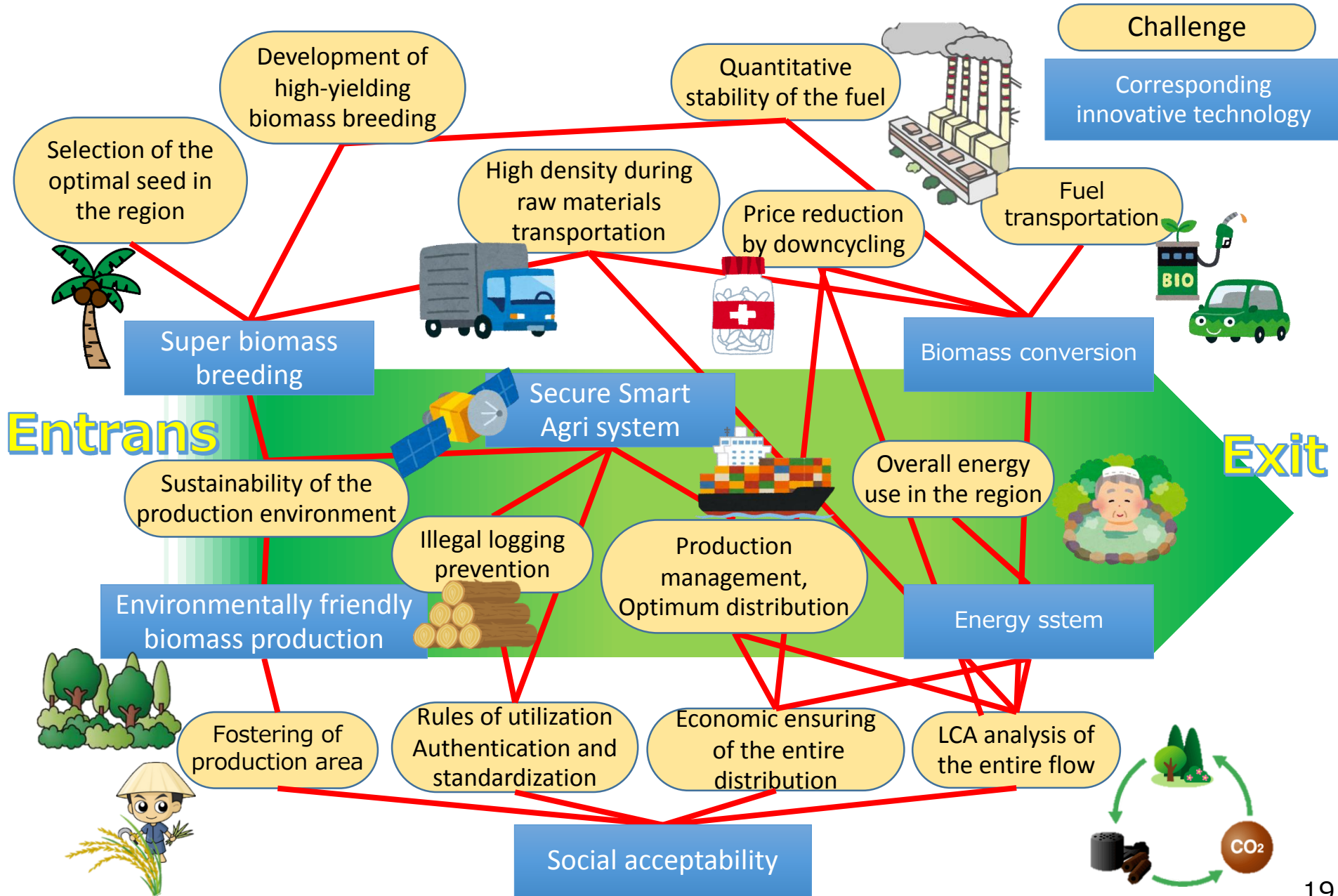
1. Fertilizer and Feed, Breeding and Plantation, On-site Power and Heat, Biofuels (gas, liquid and solid), Materials for Bio-refinery
2. Priority setting of Research and Development → Solid and Liquid Biofuels, Power generation and Transportation
3. Establishing Equal Partnership
4. Human Development of young engineers (researchers)
5. Low cost production technology, Quality and standard
6. First, second and third generation biofuels (Market, Value Added, Time development)
7. Integrated process from the inlet (biomass feedstock) to the outlet (end product)
8. Asian biomass consortium → Biomass open innovation research centers in East Asia (BORC in Thailand, Indonesia and Vietnam)

Akio Nishijima, EAJ, Biomass-Asia Project Team

ASEAN Region Wide Collaboration (e-ASIA)



Composite industry cooperation image



Asia Biomass Community (ABC) for Sustainable Development Goals (SDGs)

Industry–Academia–Government collaboration

■ **Governmental level**

- **Governmental scheme such as ODA, JCM, JICA, JST, NEDO, JBIC etc.**

■ **Universities and research institutions level**

■ **Private sectors level**

- **Raw material production and manufacturing**

Finance

Technology

Market

International industry-
university-government
cooperation among ASEAN
countries and Japan

Feedstock

Production

Regional
Needs

Biomass refinery
Sustainable industry
Low carbon society