IEA Bioenergy, ExCo65

“Sustainable Biomass Utilisation in East Asia”

WORK SHOP: Developing Sustainable Trade in Bioenergy
12 May 2010, Nara City, Japan

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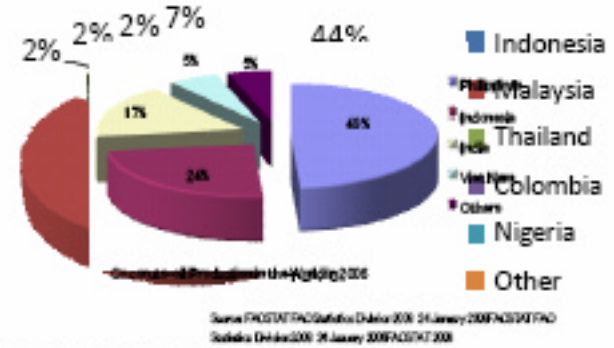
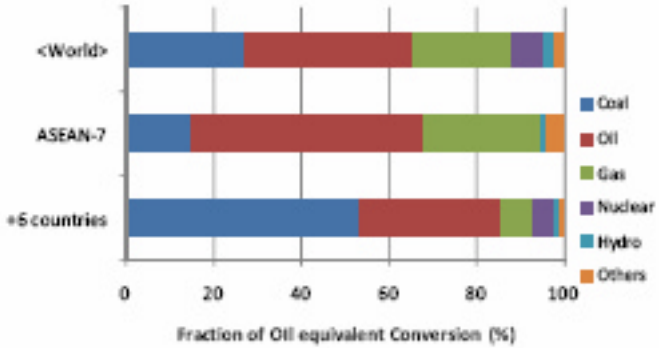
- Background in East Asia
- ERIA WG
- Discussion Concept
- WG History
- WG Progress 2008/09
- WG Progress 2009/10

Background

Hope for Biomass in East Asia

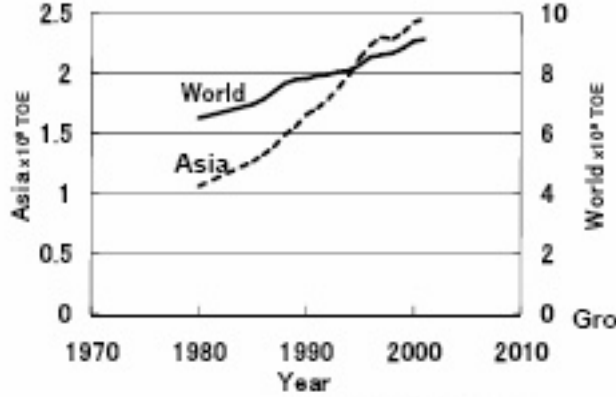


Palm Oil Production

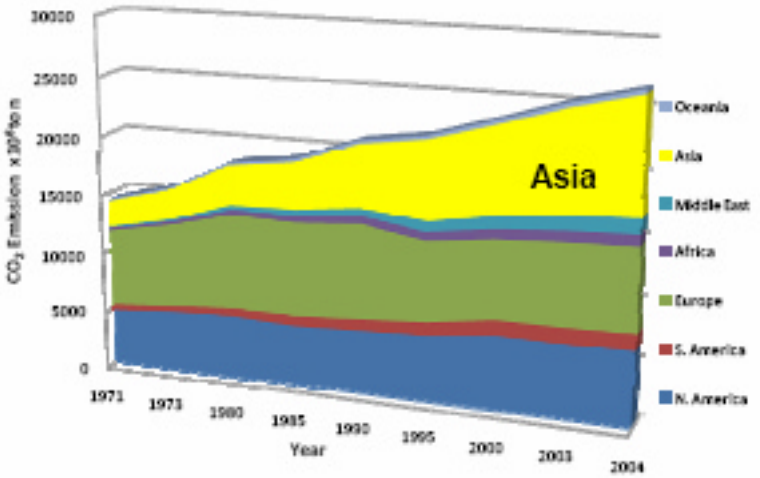


Primary Energy Share by Source

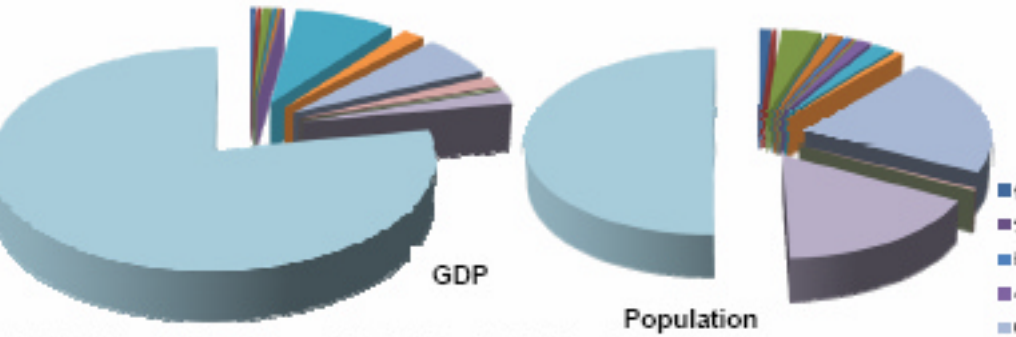
Source : EDMC Energy- Economic Data Book 2007



Growth of Primary Energy Supply



CO_2 Emission by Region



GDP & Population Share of East Asia in the World

Potential for Biomass Utilisation in EA

Jatropha

Pongamia

Diverse biomass resources

Sugarcane

Cassava

Coconut

ERIA Working Group

the East Asia Summit (EAS)
Energy Cooperation Task Force (ECTF)
Biofuels for Transport and Other Purposes Work Stream

Economic Research Institute for ASEAN & East Asia (ERIA)

Working Group on (July 2007-)

"Benchmarking of Biodiesel Fuel Standardization in EA"
(Dr.Goto, WG leader)

"Sustainable Biomass Utilisation in EA"
(Dr.Sagisaka, WG leader)

Discussion Concept

Triple Bottom Lines for Sustainable Development

Social Performance

Domestic/Regional Gap Abatement
Food vs. Energy (Culture, Education, Poverty, Health, Peace, Human Rights ..)
by HDI (Human Development Index) or similar index

Economic Sustainability, Energy Security (Economic Development)
by Gross Value Added

GHG Emission Reduction (Global & Regional Environment...)
by LCA

INDEX

Economic Performance

Environmental Performance

Overall of WG history since 2007

2007 - 08	**"Sustainable Biomass Utilisation Vision in East Asia"** *scientific backup for adoption of **"Asia Biomass Energy Principles"** by Energy Minister Meeting, EAS.*	WG1 Bangkok WG2 Cheng Mai WG3 Bangkok WG4 Singapore
2008 - 09	**"Guidelines to Assess Sustainability of Biomass Utilisation in East Asia"**	WG1 Jakarta WG2 Bangkok WG3 Tsukuba
2009 - 10	**" Sustainability Assessment of Biomass Energy Utilisation Development in East Asia"** *Environmental Economic and Social Indicator*	WG1 Lampung WG2 Quezon WG3 Khon Kaen WG4 Hyderabad

WG History (1) Policy Recommendations

- 2007 ERIA WG for **"Sustainable Biomass Utilisation Vision in East Asia"**

Addressing Macro and Micro Levels Needs to Reap Maximum Economic Benefits

Mitigating Negative & Enhancing Positive Environmental Impacts

Realising Direct & Indirect Monetary Returns for Societal Benefit

Developing Sustainability Indicators to Enhance the Decision Making Process

Standardising Tools to Generate Quantifiable & Verifiable Informatio

Considering Country-Specific Needs & Available Biomass Resource

Promoting Regional & International Cooperation

WG History (2) Asia Biomass Energy Principles

- The WG also provided **scientific backup** for adopting of "**Asia Biomass Energy Principles**" by Energy Minister Meeting, EAS.

Asia Biomass Energy Principles *Aug. 2008 in Bangkok*

1. **Ensuring Quality**
2. **Respect for Natural Diversity**
3. **Compatibility with Food Supply**
4. **Compatibility with Environment**
5. **Stable Supply of Biomass Energy**
6. **Cost Efficiency**

WG Progress 2008/9 (1) Background

GBEP launched "Task Force on Sustainability"

- **1st meeting June 2008 … 7th meeting March 2010**
- **It has been discussed "Sustainability Criteria".**
- **Sustainability index was summarized in the 7th meeting.**
- **ERIA WG on "Biomass Sustainability" presented its achievements at the GBEP Task Force Meting as a prior study.**

ISO is about to start discussion on "Sustainability Criteria for Biofuel"

Proposal for a new field of technical activity was submitted by Brazil and Germany. The proposal was approved by ISO members in 2008.

For those international frameworks, the ERIA WG intends to keep dispatching its activities and principles to represent opinions of East Asia based on scientific background.

What is GBEP?

Gleneagles Plan of Action(2005) ; "Partnership to support wider, cost effective, biomass & biofuels deployment, particularly in developing countries where biomas use is prevalent".

Members: G8 + 5 (Brazil, Mexico, India, China & S. Africa)

Activities: *Task Force on Sustainability, *, Task Force on GHG Methodologies, etc

GBEP
bal Bioenergy Partnership

? ? ? 3 ? ? ? , 27/02/2008

WG Progress 2008/9 (2) WG Meetings

WG Meetings

- **WG1 27, 28 and 29 Nov. 2008** in Jakarta
- **WG2 9 and 10 March 2009** in Bangkok
- **WG3 5, 6 June 2009** in Tsukuba (Japan)

Discussion Points

- **Indices of "Sustainability"**
  HDI, LCA, Gross Value Added and/or similar indices
- **Management of Studies for Developing Guidelines of the Indices**

WG Progress 2008/9 (3) Studies

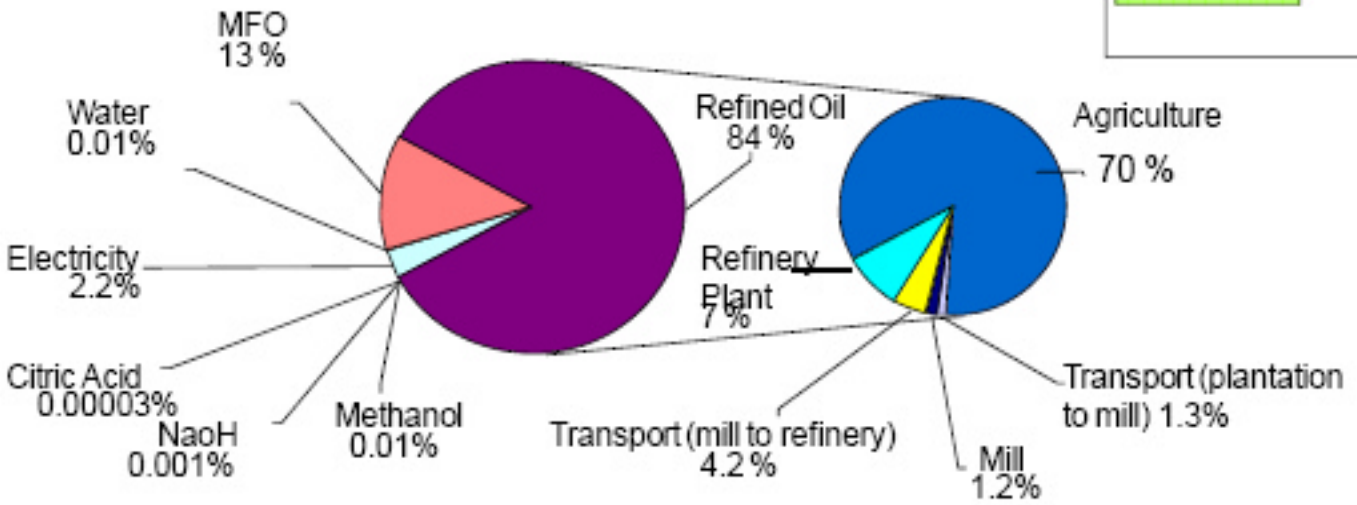
Individual Studies for Guideline Development

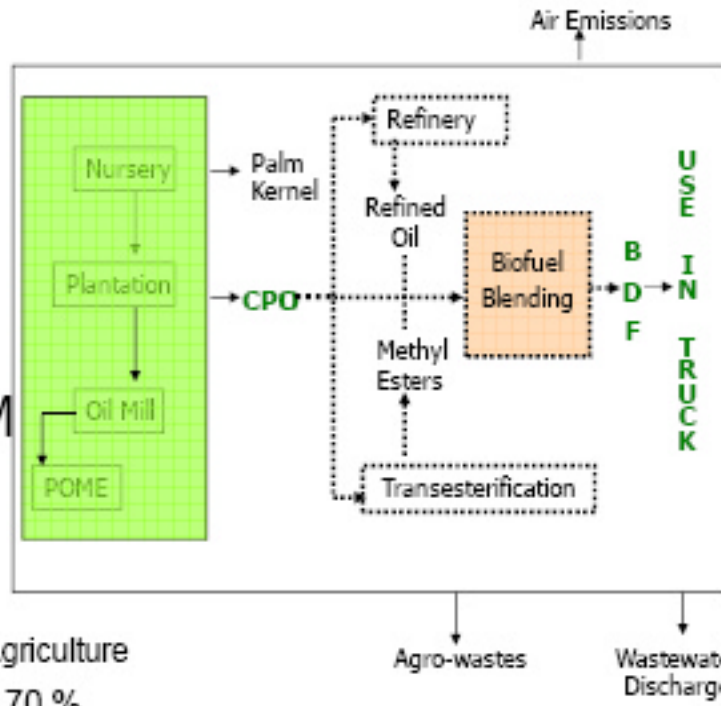
- **Investigation of Guideline for Sustainable Agro-industries Biomass Waste Utilization in Indonesia** (*ULRI, Indonesia*)
- **Investigation of Approaches for Environmental, Economic and Social Assessments for Biomass Utilization** (*JGSEE, Thailand*)
- **Investigation of Guidelines for Life Cycle GHG Calculation in the Utilization of Biomass for Bioenergy** (*SIRIM, Malaysia*)
- **Investigation of Methodologies Used in the Calculation of Indices for Economic Assessment of Biomass Utilization** (*CDSF, Philippines*)
- **Investigation of Guidelines for Indicators of Social Impact of Biomass Utilization** (*NEEF, India*)
- **Investigation of Guideline to Estimate Bioenergy Production in the Northern Thailand as an Example** (*CMU, Thailand*)

WG Progress 2008/9 (4) Study Results (Example1)

- Environmental Index by LCA, especially LCGHG

Example:
LCI(GHG) Study Results conducted by SIRIM (Malaysia) for BDF from Palm Oil





- $CO_{2\ equivalent}$ emission: ~620 – 770 kg/ton biodiesel (dependent on number of co-products)
- Carbon sequestration and landuse change not included.

WG Progress 2008/9 (5) Study Results (Example2)

- Social Index by HDI

HDI = 1/3 (Life expectancy index + Education Index + GDP Index)

Life Expectancy Index = (LE-25)/(85-25)

Education Index = ALI*2/3+GEI*1/3

Adult Literacy Index (ALI) = (ALR-0)/(100-0)

Gross Enrolment Index (GEI) = (CGER-0)/(100-0)

GDP Index = (log(GDPpc)-log(100))/(log(40000)-log(100))

LE: Life expectancy at birth
CGER: Combined gross enrolment ratio
for primary, secondary & tertiary schools
GDPpc: GDP per capita at PPP in USD)

HDI Change Per Ton of Biodiesel Production (Ahmednagar)	
1 (ha.) of Jatropha cultivation produces	1892
1 ton	1267
1 (ha.) of Jatropha cultivation produces	1.493291
1.493291 (ton.) requires	30429
(=)	20377.14
Total Area for Jatropha Cultivation (ha.)	2025.6
Total Income (Rs.)	41275928
GDP/Capita	22.64171
GDP/Capita (Purchasing Power Parity)	21244.64
GDP Index	0.420731
Life Expectancy Index	0.866667
Literacy Index	0.645
Gross Enrolment Index	0.673
Education Index	0.654333
HDI	0.647244
Change in HDI (Due to Oil Production)	+0.038244

Example:

Micro Level HDI Change based upon Biodiesel Production from Jatropha in Adilabad, Andhra Pradesh, India

WG Progress 2008/9 (6) Study Results (Example3)

- Economic Index
  by Gross Value Added (GVA)

$GVA = VA_a + VA_b$; where,

VA_a – value added from main product, VA_b – value added from by-products

$VA_a = GR_a - TC_a$; $VA_b = GR_b - TC_b$;

where, GR – Gross or Total Revenue

TC – Total Cost, a – Main Product, b – By-products

Example:

GVA Estimation for Coconut Methyl Ester (CME) Production in the Philippines

Annual value added (in PhP) by product form produced from a hectare of mature coconut

PRODUCT FORM	SELLING PRICE PER KG	QUANTITY OF OUTPUT	GROSS REVENUE	PRODUCTION COST	PARTIAL VALUE ADDED	VALUE ADDED FROM BY-PRODUCTS				FINAL VALUE ADDED
						Coconut Husk	Coconut Shell	Copra Meal	Glycerin	
Mature Coconut	5.00	5,670	28,350	13,721	14,629	6,180	—	—	—	20,80
Copra	18.00	2,268	40,824	36,921	3,903		1,077	—	—	4,981
Unrefined Oil	32.00	2,041	65,318	53,806	11,512			1,361	—	12,87
Coconut Methyl Ester	46.51	2,041	94,936	83,262	11,674			—	7,144	18,81
TOTAL VALUE ADDED										**P57,481** $1,368.

WG Progress 2008/9 (7) Outlines of the Report

WG Report: "Guidelines to Assess Sustainability of Biomass Utilisation in East Asia"

- The WG have challengingly developed quantitative indices for assessing sustainability of biomass utilisation.
- Human Development Index (HDI) or similar indices can indicate the endpoint impacts of social issues.
- Gross Value Added or similar indices can indicate the economic impacts.
- Life Cycle Assessment (LCA) or similar methods can be used to measure the environmental impacts.
- Substantial questionnaires and measuring variables to get the indices have been developed.
- Since some necessary parameters for the indices are difficult to obtain, more accurate methodologies to estimate them should be developed.

Reports are available from following URLs:

http://www.eria.org/research/no6-3.html http://www.eria.org/research/y2008-no8-2.html

WG Progress 2008/9 (8) Recommendations

Recommendation by the WG

- Piloting Studies to Adopt Discussed Indices

  Some pilot scale studies should be taken up in the region, which would focus on collecting the actual data and information through field surveys of various stakeholders involved in biofuel production.

- Forming Task Team to Cope with Worldwide Standardisation

  EA countries should take into consideration the guidelines of ISO, GBEP, and similar other international organizations while implementing and enforcing their own policy framework developed for biomass utilisation. It is suggested that a Task Team by representatives of standardisation sector of EA countries be formed in EA, which meets regularly to discuss the relevant issues. Outcome of such discussions would be conveyed to their standardisation committees of the member countries at various international forums and support their decision making to enhance EA presence.

WG Progress 2008/9 (9) Recommendations

Recommendation by the WG contd.

- Advancing the Methodologies

  Some parameters of the indices are difficult to prepare at present. Some methodologies to estimate are expected to be developed. Regarding LCA, lack of basic inventory data are fatal situation for implementing LCA in EA. Compilation of common database in this region will contribute to progress environmental management as well as to measure sustainability of biomass utilisation in EA. Land use change including wetland is a key issue for LCA of biomass utilisation, but the evaluation methodology is not matured yet.
  Research projects for developing the methodologies and database should be launched in EA soon.

WG Progress 2009/10 (1) Study Results in 2008/09: Guideline

- Environmental Index by Life Cycle Assessment(LCA), especially LC GHG
- Social Index by HDI

HDI = 1/3 (Life expectancy index + Education Index + GDP Index)

Life Expectancy Index = (LE-25)/(85-25)

Education Index = ALI*2/3+GEI*1/3

Adult Literacy Index (ALI) = (ALR-0)/(100-0)

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GDP Index = (log(GDPpc)-log(100))/(log(40000)-log(100))

- Economic Index by Gross Value Added (GVA)

GVA = $VA_a + VA_b$; where,

VA_a – value added from main product, VA_b – value added from by-products

$VA_a = GR_a - TC_a$; $VA_b = GR_b - TC_b$;

where, GR – Gross or Total Revenue TC – Total Cost,

a – Main Product, b – By-products

WG Progress (2) WG Members 2009/10

Japan	*WG Leader* Masayuki SAGISAKA	Institute of Science for Safety & Sustainability, National Institute of Advanced Industrial Science & Technology (AIST)
Japan	*Tentative WG Leader* Yuki KUDO	AIST
hePhilippines	Jessie C. ELAURIA	College of Engineering and Agro-Industrial Technology University of the Philippines
India	Vinod K. SHARMA	Indira Gandhi Institute of Development Research (IGIDR
Malaysia	Chen Sau SOON	SIRIM Berhad, Environment & Bioprocess Technology Centre
Indonesia	Udin HASANUDIN	Department of Agroindustrial Technology, Faculty of Agriculture,The University of Lampung
Thailand	Shabbir H.GHEEWALA	The Joint Graduate School of Energy and Environment King Mongkut's University of Technology Thonburi
Singapore	Hsien Hui KHOO	Agency for Science, Technology and Research (A*STAR
Japan /The Philippines	Jane ROMERO	Institute for Global Environmental Strategies (IGES)
Thailand	Yucho SADAMICHI	Department of Mechanical Engineering, Faculty of Engineering, Chiang Mai University
Japan	Tomoko KONISHI	AIST

WG Progress 2009/10 (3) Objectives of WG in 2009

- To **adopt/ adjust sustainability indicators for assessing environmental, economic** and **social impacts** in productions and utilisations of biomass in specific regional circumstances in EAS countries.
- To **improve "Guidelines to Assess Sustainability of Biomass Utilisation in East Asia" (**published in July, 2009).

The WG ……

- exchange **methodologies of assessing** and **Investigation** with local team members
- proposes the **best scenario** of biomass utilisation system

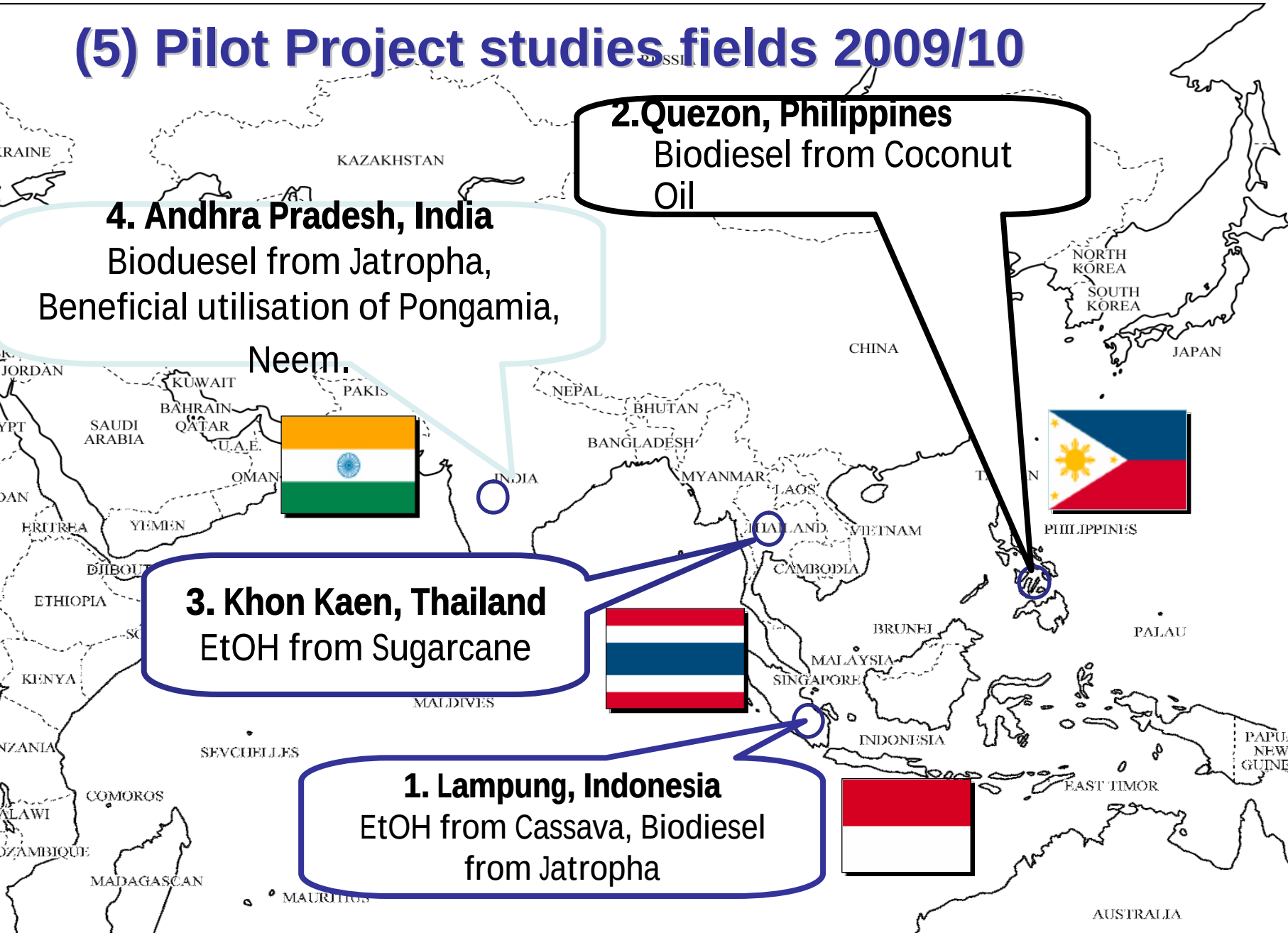
WG Progress 2009/10 (4) Pilot Project Studies

The WG started studying the pilot projects to adopt assessment guidelines developed by the WG

Pilot study fields, subjects and schedule;

1. **Lampung, Indonesia / 27Feb-2March 2010**
   EtOH from Cassava, Biodiesel from Jatropha
2. **Quezon, Philippines / 22-24 March 2010**
   Biodiesel from Coconut Oil
3. **Khon Kaen, Thailand / 26-30 April 2010**
   EtOH from Sugarcane.
4. **Andhra Pradesh, India / 20-26May 2010**
   Biofuel from Jatropha, Beneficial utilisation of Pongamia, Neem.

(5) Pilot Project studies fields 2009/10



WG Progress 2009/10 (7) Results

2009 -10	**“ Sustainability Assessment of Biomass Energy Utilisation Development in East Asia”** *Environmental Economic and Social IndicatorS* *The report will be published in **September 2010***

International Workshop on
"Sustainable Biomass Utilisation in EA"
to be hosted
by the ERIA WG in 2010

The outcome of the studies,
East Asian opinions will be presented at the workshop to worldwide participants.

Working Group on "Sustainability Assessment of Biomass Utilisation in East Asia"

WG Members *(2 March 2010,Lampung)*

Thank you for your attention!