Biomass Availability and Identification of Feedstock Potensial in Indonesia

Bio-energy, CCS and BECCS : Options for Indonesia
UKP4 jakarta 21 – 22 september 2012

Bambang Prastowo
bprastowo@gmail.com
Indonesian Center for Estate Crops Research and Development
Ministry of Agriculture
2012

INTRODUCTION

- Biomass → solid and liquid biomass
- important biomass → agric. residues and used in traditional/modern application
- biomass from rural and urban resources
- it is important to define source of biomass before calculating the potency → criteria is needed

INTRODUCTION

- rural sector solid biomass :

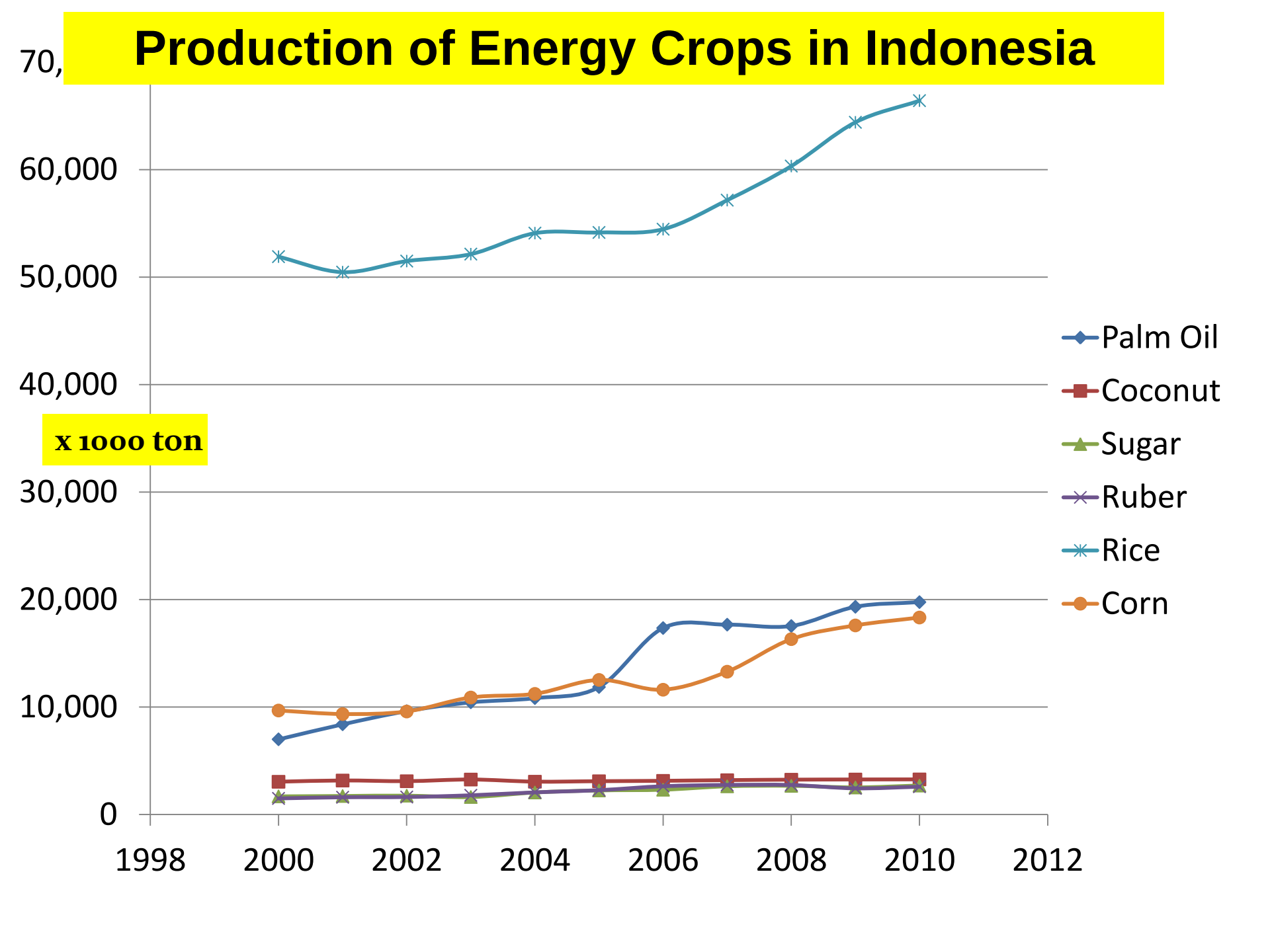
  only → crops residues → agric/forest residues

- criteria : direct+indirectly do not disturb food security and environment

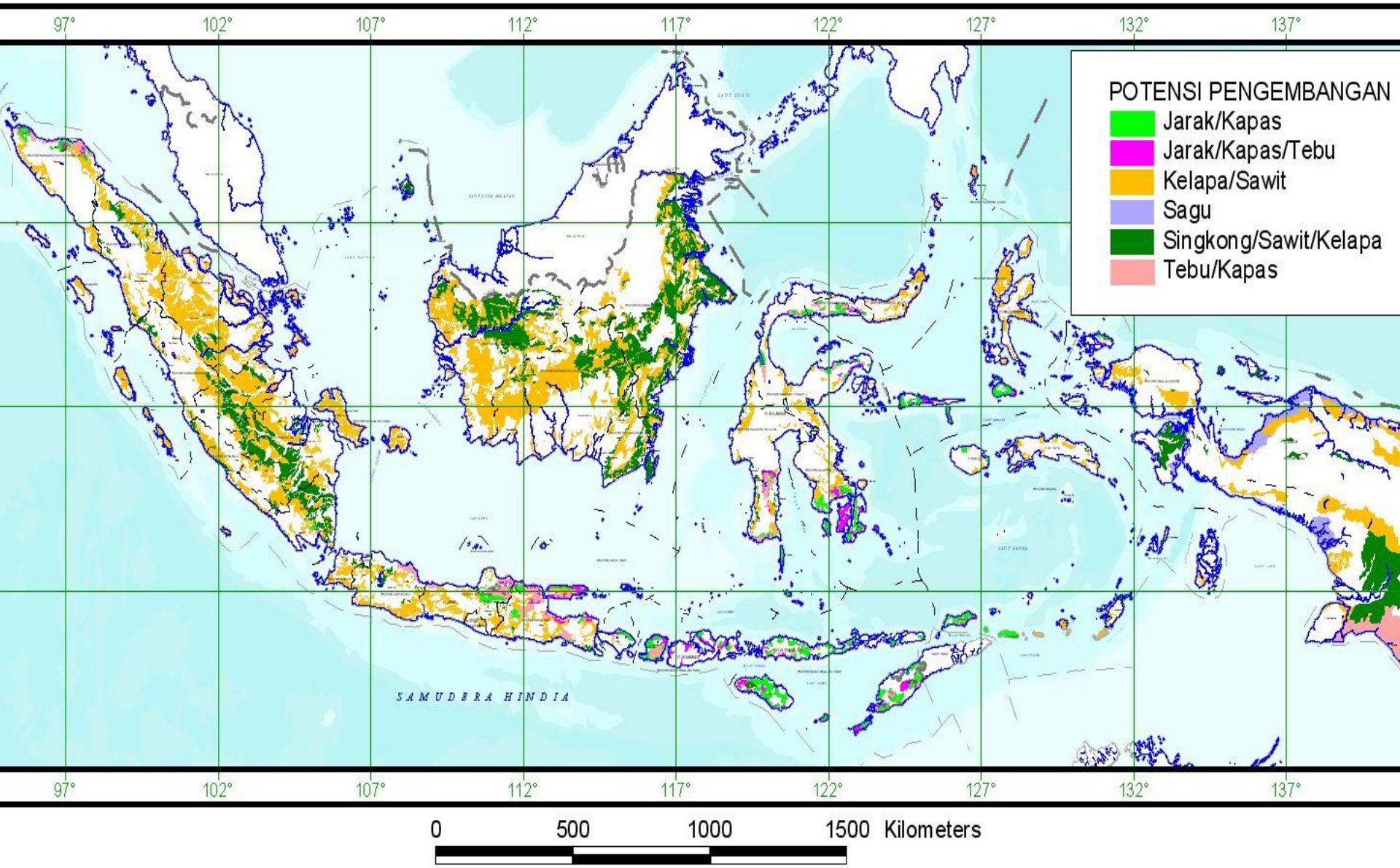
POTENSIAL SOLID BIOMASS

- Food crops : → food security
  - > rice : only the husk, straw are for animal feed
  - > corn : only corncob, leaves are for animal feed
  - > sugar cane : only bagasse, cane top are for animal feed
- Estate crops : → environment consideration
  - > ruber : only small log from replanting
  - > palm oil : only EFB (half for compost/organic fertilzer), shells bark are for animal feed
- Forest : → waste only, log cutting, saw timber, wood industry

Production of Energy Crops in Indonesia



Land Suitability Map for Energy Crops in Indonesia



Land Suitability Map for Jaropha Curcas in Indonesia (1 : 1.000.000)

Technical Energy Potensial of Efective Solid Agriculture Biomass 2010

Efective Residues		Planted Area***) (x 1000 Ha)	Potency Energy X 100 MJ/Ha/Year *)	Technical Energy Potensial mill GJ/year
Palm Oil	Fruit empty bunches	8,430	32,8****)	138.3
	Palm shell		6,5	54.8
Coconut	Shell	3,808	9,6	17.5
	Fibre		12,7	23.2
Ruber	Small log	3,445		36.3 **)
Sugar	Bagasse	448	288,8	129.8
Rice	Husk	12,147	11,8	143.3
Corn	Cob	4,131	17,3	71.5
Technical Energy Potensial of Solid Agr. Biomass				614.6

Note : *) ITB
**) Rostiwati Silvi, Ministry of Forestry, 2011, calculated based on ZREU (2000)
***) Ministry of Agriculture (2011)
****) Assumed that 50% of empty fruit bunches is for organic fertilizer (compost)

Technical Energy Potensial of Efective Solid Forest Biomass 2010

Efective Biomass Residues	Year Period	Residues (Mill Ton/Year)	Techinical Energy Potensial (mill GJ/year)
Log cutting Residues	Managed Forest 1998 – 2004 2005 – 2010 People Forest 2000 – 2010	 2.3 1.91 Average 2.105 1.6 Total 3.705	15.643
Saw timber	2006 – 2010	4.2	42
Wood industry	2006 – 2010	7.86	83.84
Technical Energy Potensial of Solid Forest Biomass			141.483

Technical Energy Potensial of Solid Biomass In Indonesia 2010

No	Solid Biomass Residues	Technical Energy Potensial of Solid Biomass (Mill GJ/Year)
1	Agriculture	614.6
2	Forestry	141.483
Total Energy Potensial of Solid Biomass		756.083 (470 in 2000 !!)

Potensial Liquid Biomass

1. Biodiesel

   Palm Oil (more than enough for supporting national target)

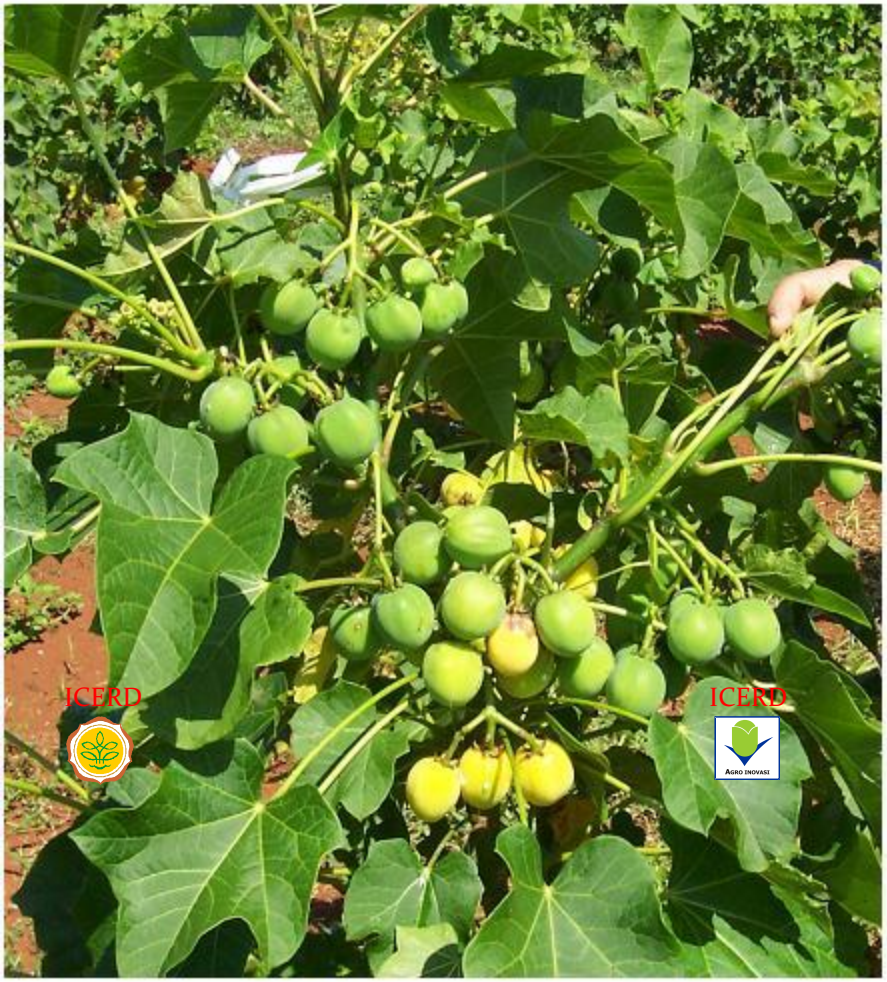
2. Bioetanol

   sugarcane and cassava (not enough feedstock for supporting national target) . . . dedicated area ?

Potensial Crops for Liquid Biomass

- **Jatropha curcas** … new variety available
- **Candle nut** … new variety available
- **Sugar Palm** 47,763 ha … new variety available
- **Sago** 1,5 juta ha … food competition

New jatropha curcas high yielding seed



Jatropha Curcas High Yielding Seed have been Released in 2006, 2007, 2008 (4-6 t/ha & 6-8 t/ha & 10 t/ha)

- IP-1 A , IP2-A , IP-3 A for dry area,
- IP–1M ,IP-2M, IP-3 for medium dry area,
- IP-1 P, IP-2P, IP-3 for wet area

CONCLUSION (1)

Potensial Solid Biomass :

- Palm oil : Empty fruit bunches and palm shells
- Coconut : Shell and fibre
- Ruber : Small log
- Sugar : Bagasse
- Rice : Husk
- Corn : Corncob
- Forest waste : log cutting, saw timber wood industry

CONCLUSION (2)

Technical Solid Biomass Energy

- Agriculture residues is 614.6 mill GJ/year
- Forest waste is around 141.483 mill GJ/year or
- Totally is around 756.083 mill GJ per year
- Solid biomass energy potensial are increasing along with production of energy crops in the last ten year, unfortunately its utilization is still very limited, that is around 3.25 %.

CONCLUSION (3)

Liquid Biomass Energy

- The actual readily feedstock (for liquid biofuel) from agriculture are mainly palm oil for biodiesel, sugarcane and cassava for bioetanol
- The nantional palm oil production recently is able to support the national target of biodiesel
- Otherwise, due to the lack of feedstocks, so the production of sugarcane and cassava are not able to support the national target of bioetanol usage

CONCLUSION (4)

There are other potensial crops that usually produce non solid biomass energy in Indonesia and grow scatterly with not so large planted areas such as :

- physic nut or jatropha curcas,
- “nyamplung” (*Calophyllum Inophyllum*),
- candle nut, and also sugar palm,
- cassava, sago and sorgum

Route of International Trade of Biomass Energy

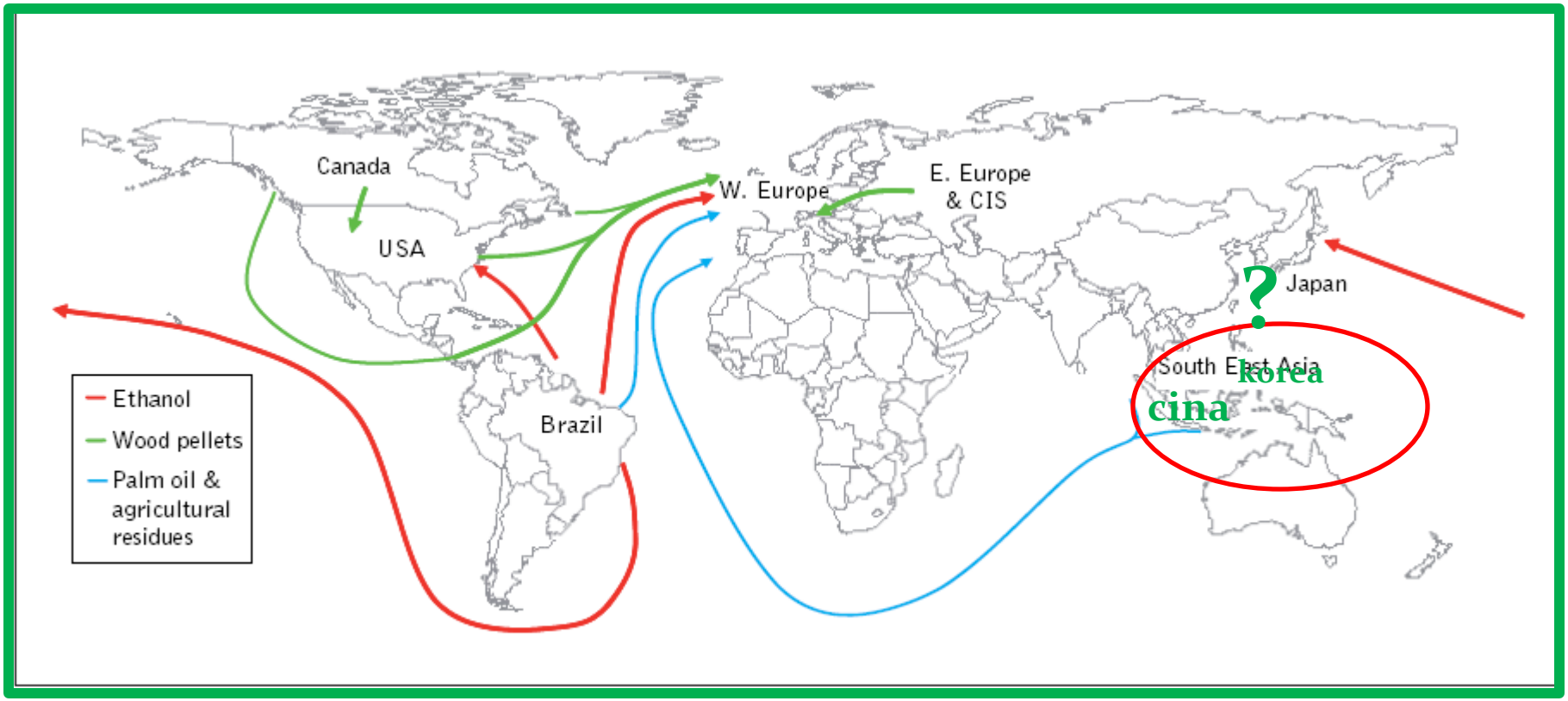


Figure 7: Main international biomass for energy trade routes. Intra-European trade is not displayed for clarity. Source: Junginger and Faaij, 2008.

Bahan presentasi PT Solar Park Indonesia / Badan Litbang Kehutanan di Kemen Perekonomian, 22 Desember 2009

world will absorb biomass from Indonesia ???

SUGGESTION

- The solid biomass energy should be utilized in the country where the biomass were taken, that mean, solid biomass export have to be stopped or at least minimized
- In the future, second generation biofuel have to be developed from the biomass to omit competition with food while this technology is being developed by researchers in Indonesia

thank you