Biomass-based Bioenergy Investment for Poverty Reduction

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GREATER MEKONG SUBREGION
CORE AGRICULTURE SUPPORT PROGRAM

Outline

- Energy and Food Security
- Energy input in agriculture
- Agriculture and Climate Change
- ADB program on Efficient Utilization of Biomass and Bioenergy and Food Security

Energy and Food Security

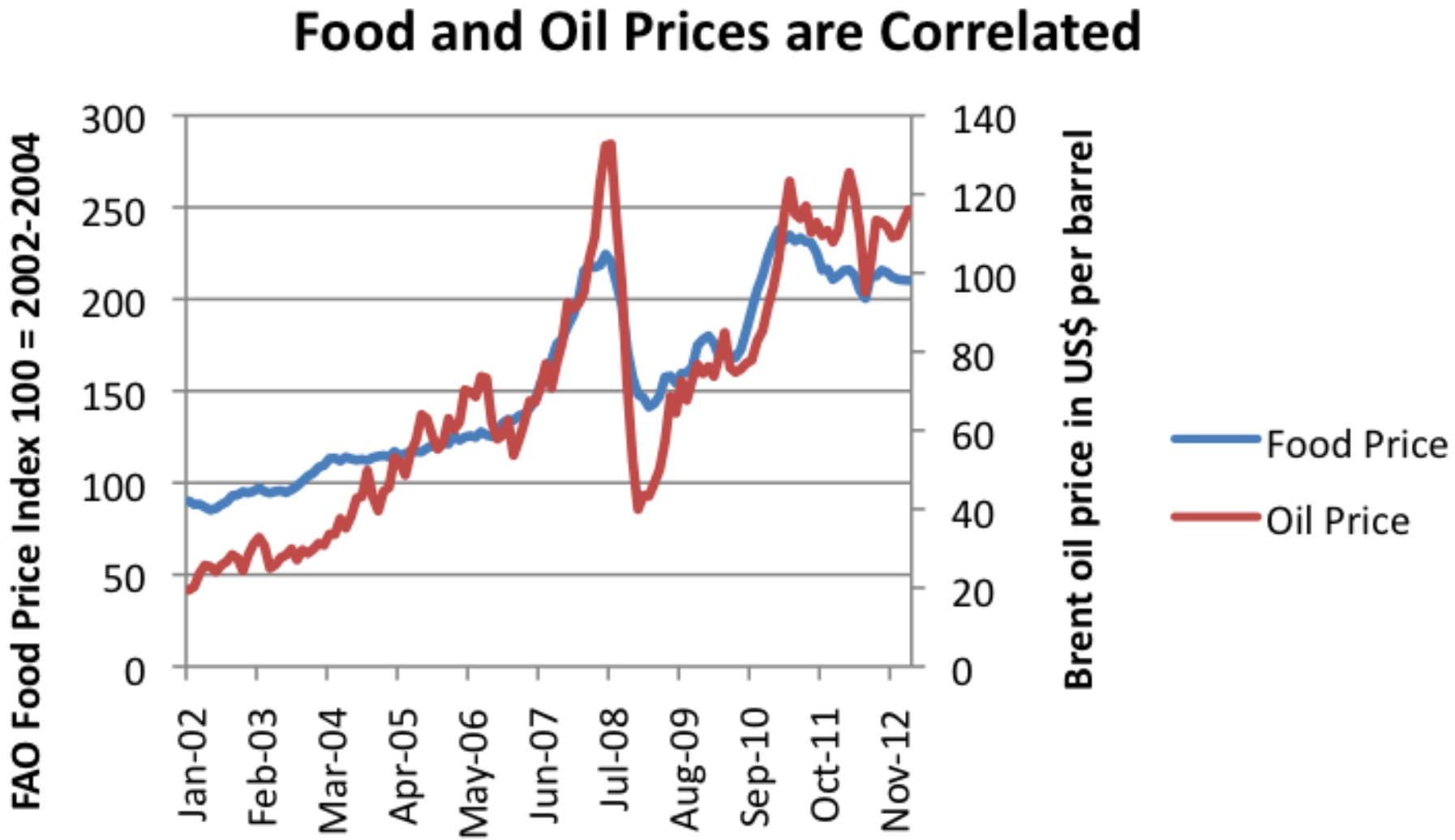
- 1.9 billion poor depend on traditional burning of biomass for energy
- Clean energy is essential for economic growth, particularly inclusive growth
- Over 1 billion poor are food insecure when food is foundation of life
- Rural population face both energy and food insecurity

Traditional Use of Biomass

- Environmental damage
  - deforestation
  - biodiversity reduction
  - damage to watersheds
- Serious air pollution
  - health risks for women and children
- Green house gas emission

Agriculture and Energy

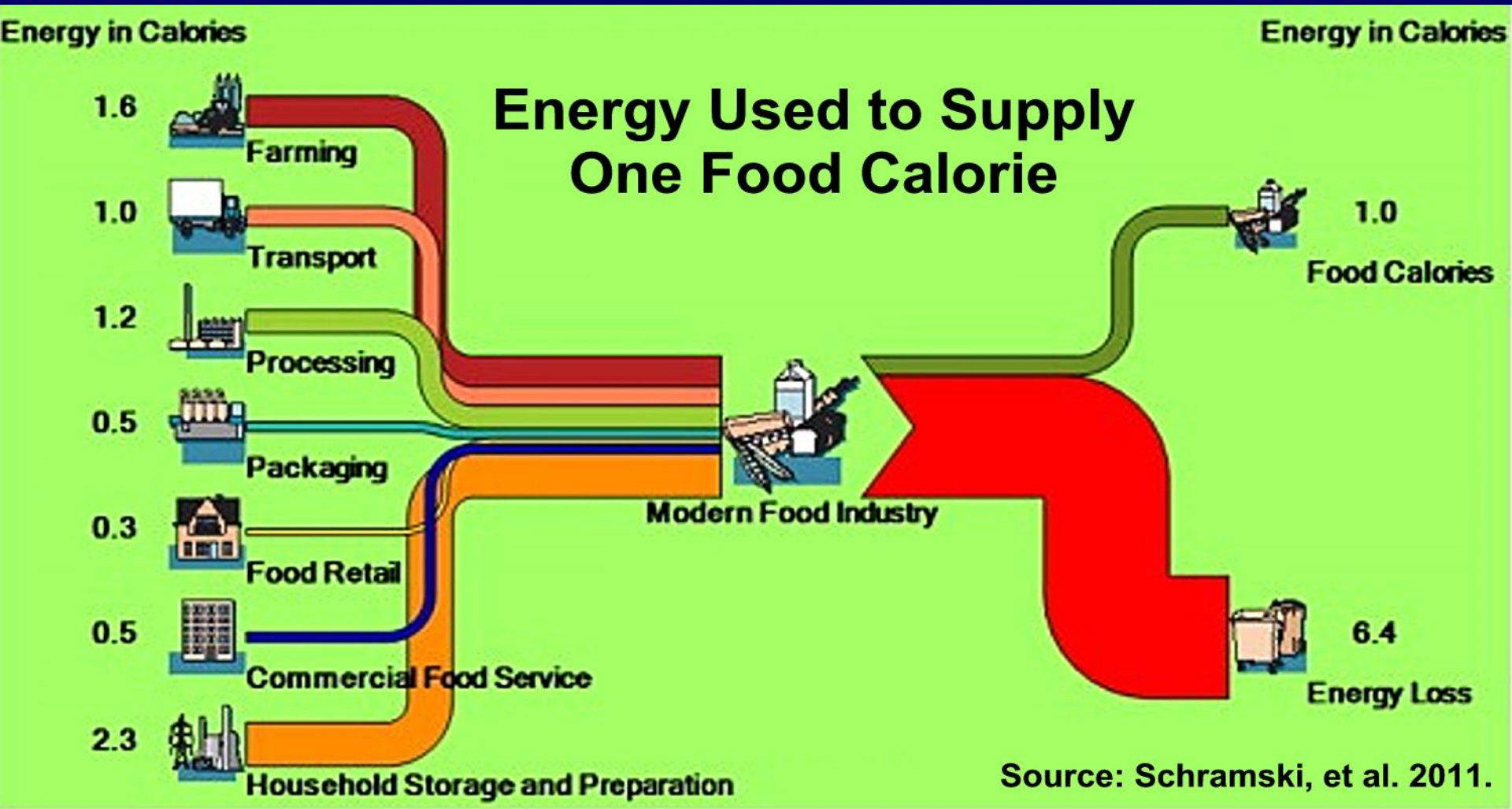
Food and Oil Price



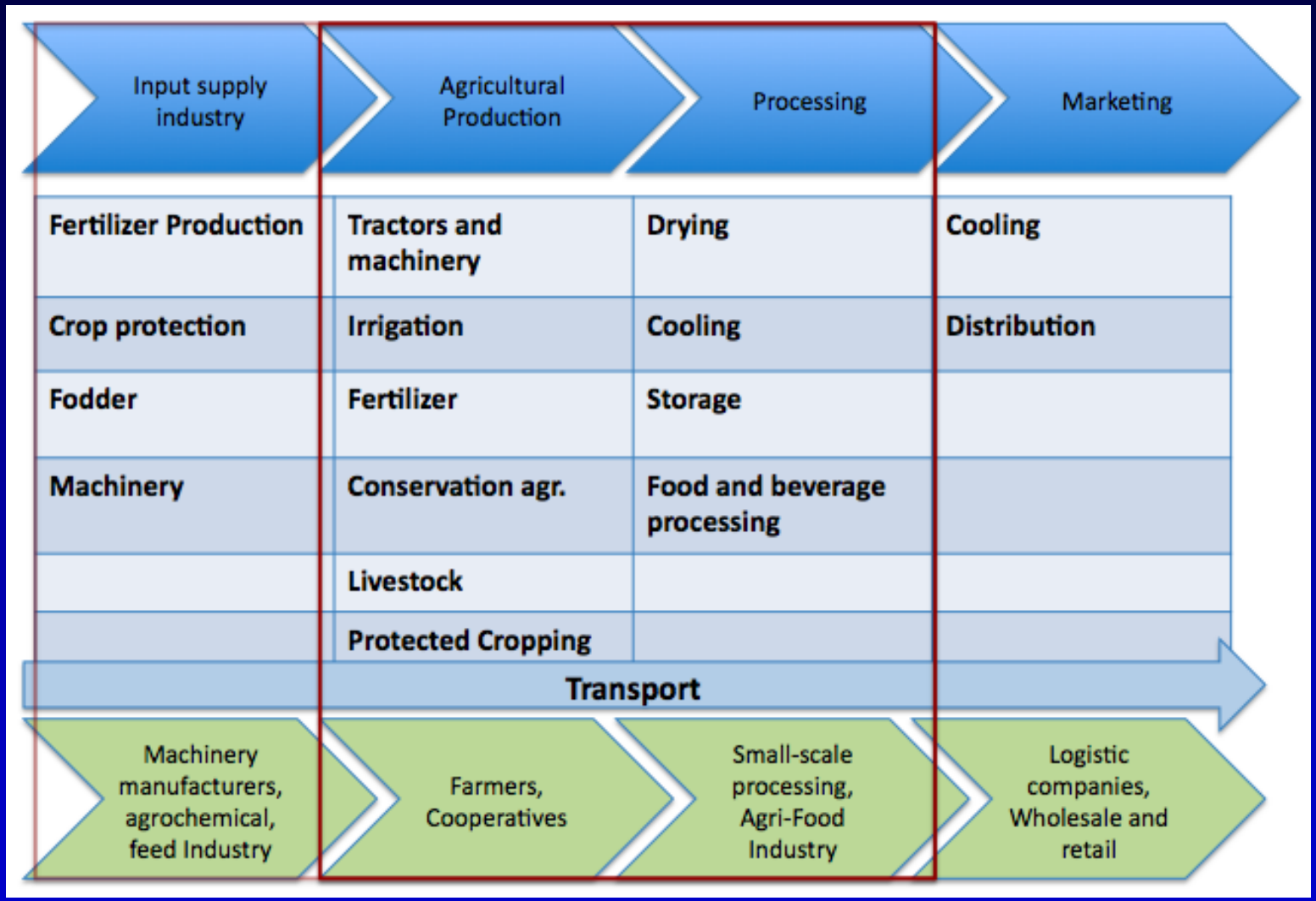
Fossil Fuel Based Agriculture

- Conventional agriculture is fossil fuel based.
- The Green Revolution increased the energy flow to agriculture by an average of **50 to 100 times** the energy input of traditional agriculture.

- It takes an average of **7 to 10 calories of energy input** to produce **one calorie of food.**



Energy in Agricultural Value Chain



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Agriculture and Climate Change

Green House Gas Contribution of Agriculture Sector

≈ 14%

Production

+

Forestry

+

Burning of biomass

≈ 35%

+

Transport

+

Agro-chemicals

≈ >45%

Heat-Trapping Ability

- Carbon dioxide is baseline GHG
  - One unit of CO_2 = 1
- Methane is 25 times of CO_2*
- Nitrous oxide is 298 times of CO_2*
- Black carbon is 10,000 times of CO_2

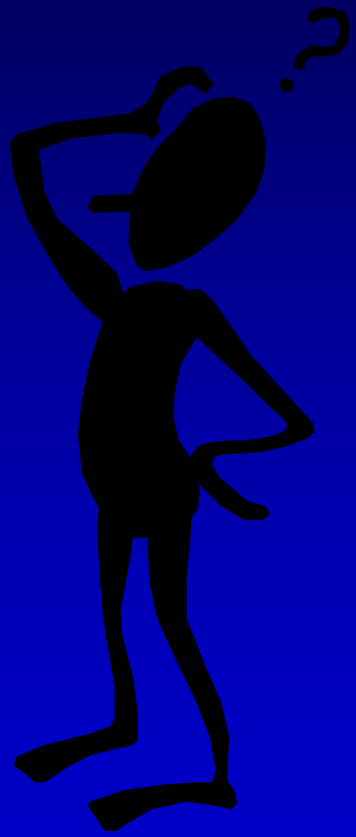
*100-year Global Warming Potential (GWP) based on IPCC Assessment Report 2007 (AR4)

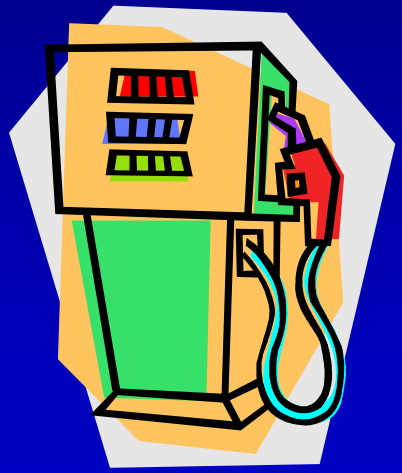
Increased use of Biomass for Energy

- Potential to undermine sustainable agriculture practices and thus food security

Importance of Biomass on Soil Quality

- Restores soil quality: increases soil fertility, improves soil structure and tilth, retains soil moisture, and enhances soil biodiversity
- Enriches soil organic carbon pool
- Reduces susceptibility to soil erosion and degradation





Food or Fuel?

Win-Win Strategies Do Exist !!

Asian Development Bank and Program on Efficient Utilization of Biomass


ASIAN DEVELOPMENT BANK

ADB

- A multilateral development finance institution own by 67 countries
- Active investments in economically sound projects for poverty reduction
- One of the few international financial institutions with “AAA” credit
- Provide long-term loans and guarantees under credit crunch

ADB's Bioenergy-Food Security Policies

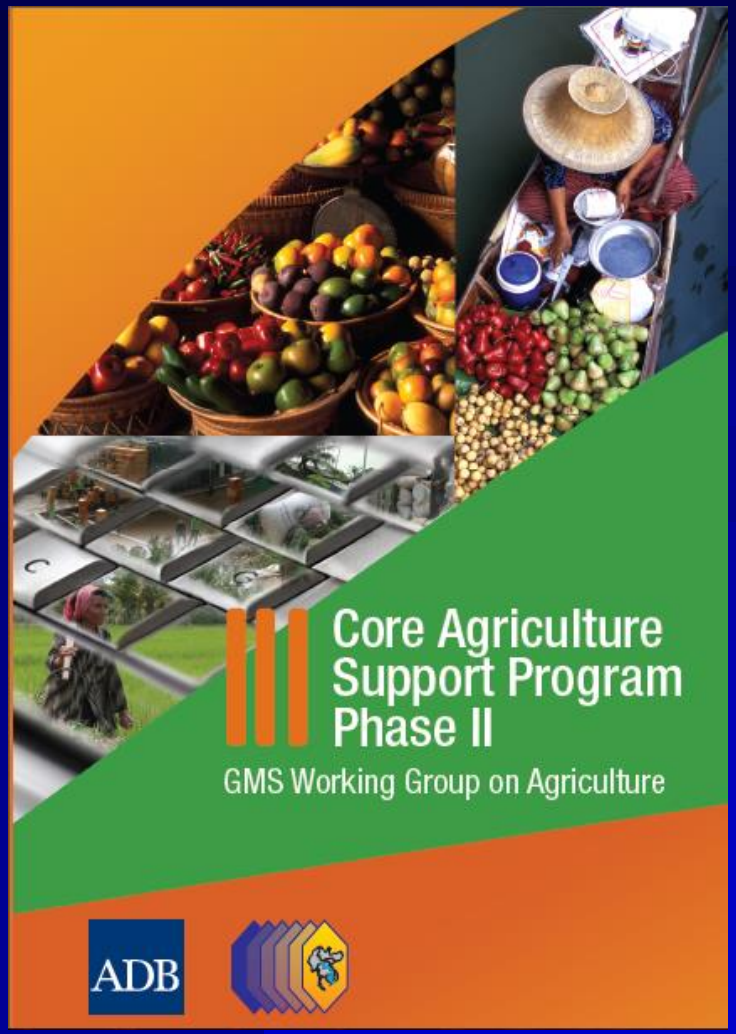
- Feedstock use is not a food crop,
- Land cannot be used for food crops,
- No deforestation is associated with development,
- Net energy balance is positive.

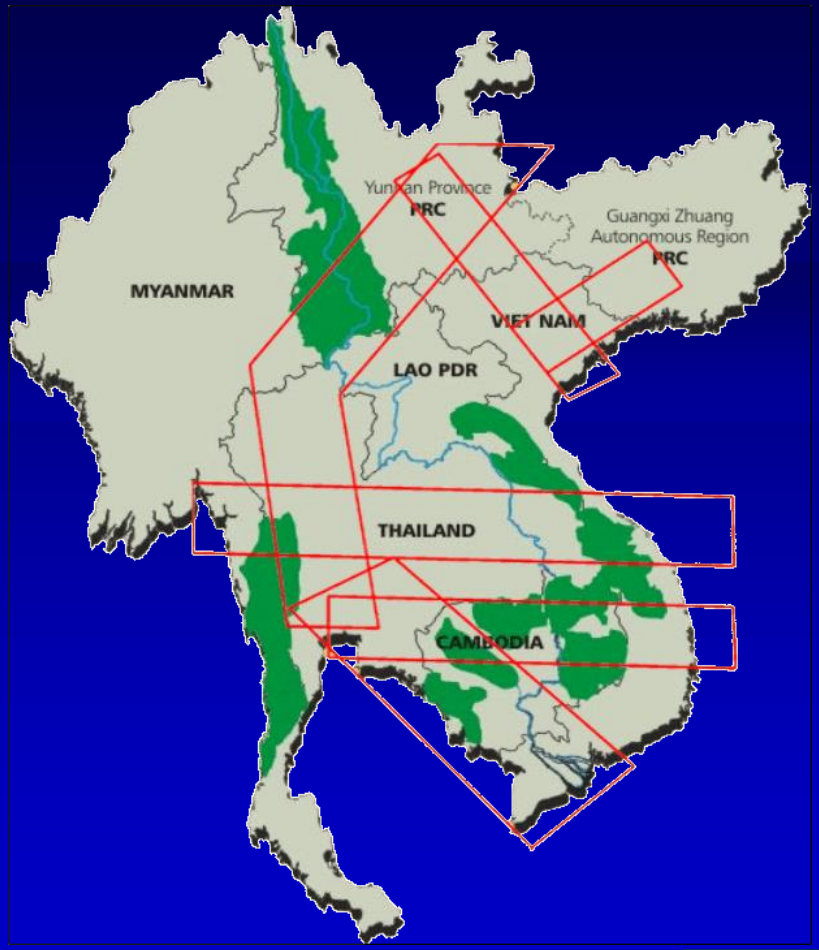
Greater Mekong Subregion Regional Cooperation Program

Sectors

1. Agriculture
2. Energy
3. Environment
4. Human Resource Development
5. Tourism
6. Trade and Transport Facilitat

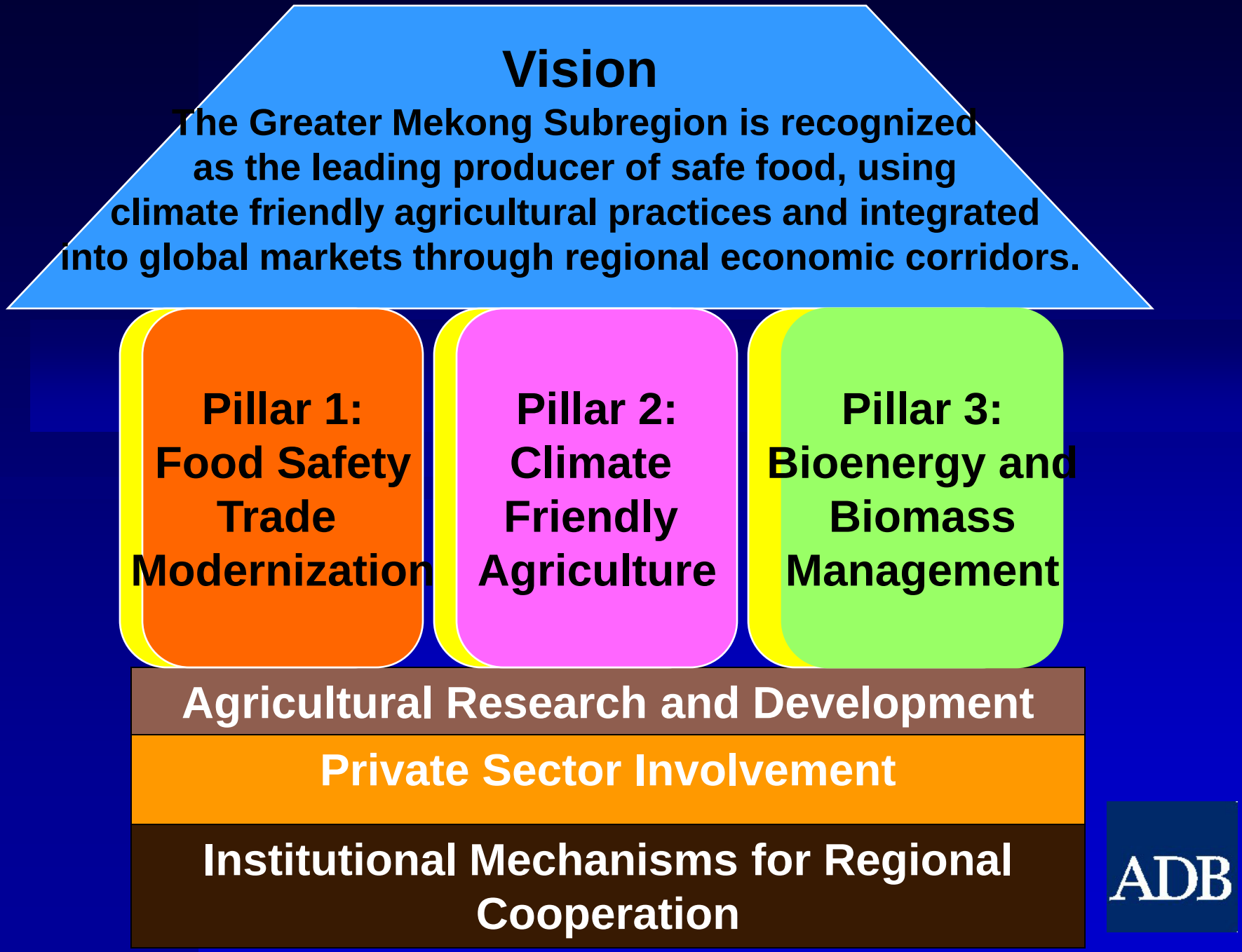
Core Agriculture Support Program (CASP)





(2011-2020)

ADB


Vision
The Greater Mekong Subregion is recognized as the leading producer of safe food, using climate friendly agricultural practices and integrated into global markets through regional economic corridors.
Pillar 1: Food Safety Trade Modernization
Pillar 2: Climate Friendly Agriculture
Pillar 3: Bioenergy and Biomass Management
Agricultural Research and Development
Private Sector Involvement
Institutional Mechanisms for Regional Cooperation
ADB

Pillar 3: Promote Agriculture as Leader in Providing Rural Renewable Energy

- Regional bioenergy related standards e.g. biodigester, biochar, ICS…
- Promote biomass management for bioenergy and food security
- Promote FDI of eco-friendly supply chain for 3Ps: People, Planet, Profit

Biomass residues

Abundant biomass residues in the GMS include: rice husk and rice straw, sugarcane and maize crop residues, crude palm oil waste, wood waste, and animal manure are currently underutilized.

Opportunities

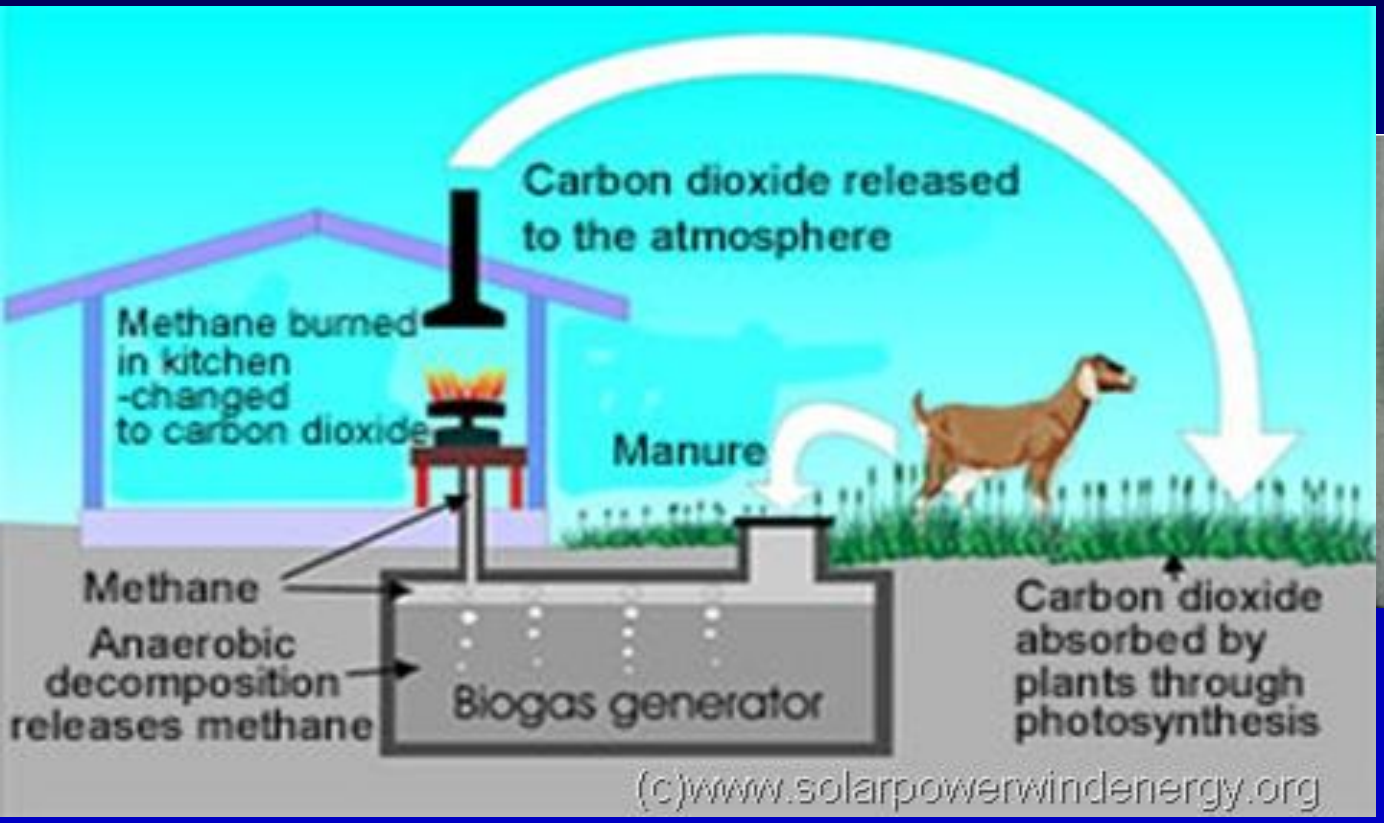
- Reduce emission of Green House Gas(GHG) : N2O, methane, black carbon
- Absorb atmospheric carbon in soil
- Lower import bill for fossil fuel
- Lower cost of external inputs
- New employment opportunity
- …

Improved Utilization of Biomass can address several problems

Pathways

- Converting agricultural and forestry residues to energy and organic fertilizers, including biochar;
- Use of improved cook stoves to reduce fuel demand and reduce black carbon emissions

Biogas- Fuel for Cooking



http://www.inverter-china.com/blog/articles/green-energy/what-is-biogas.html

cook stove using biogas

http://www.nbp.org.kh/gallery.

Biogas – Electricity for Lighting

Aussie Andrew Williamson from the Dutch SNV, and Bounthavy Sengtakoun, his Laotian compatriot, examine a biogas lamp in Laos. This house has electricity but biogas is cheaper. A biogas lamp, similar to an LPG camping lantern, can cost anywhere from US$3 to US$15 depending on quality.

http://www.michaelyon-online.com/gobar-gas-ii/page-3.htm

Bioslurry – as Organic Fertilizer

Extension worker monitor experimental plot

Farmer showing the effect of slurry

http://www.nbp.org.kh/page.php?id=9

Biochar for Energy and for Carbon Sequestration

- Biochar (charcoal from biomass) is produced by baking biomass at about 320-500ºC under low or no oxygen (pyrolysis)
- The combustion process releases gas or oil as clean renewable energy.
- Biochar remains stable in soils for hundreds to thousands of years.

FAO (2009)

Effects of Biochar

Improved Cook Stoves

GERES Programme in Cambodia – earning carbon credit from

New Lao stoves

- 2 million improved cook stoves were distributed between 2003-2013, corresponding to savings of over 1,200,000 tons of fuelwood

http://www.geres.eu/en/household-energy/34-activ-nrjmenages-cambg-foyers

http://www.geres.eu/en/press-realeses/287-2-millions-de-foyers-nls

Bioenergy Potential

Cambodia: 24 provinces, 2013

- Rice husk = 1,765,279 t
- Rice straw = 26,199,708 t

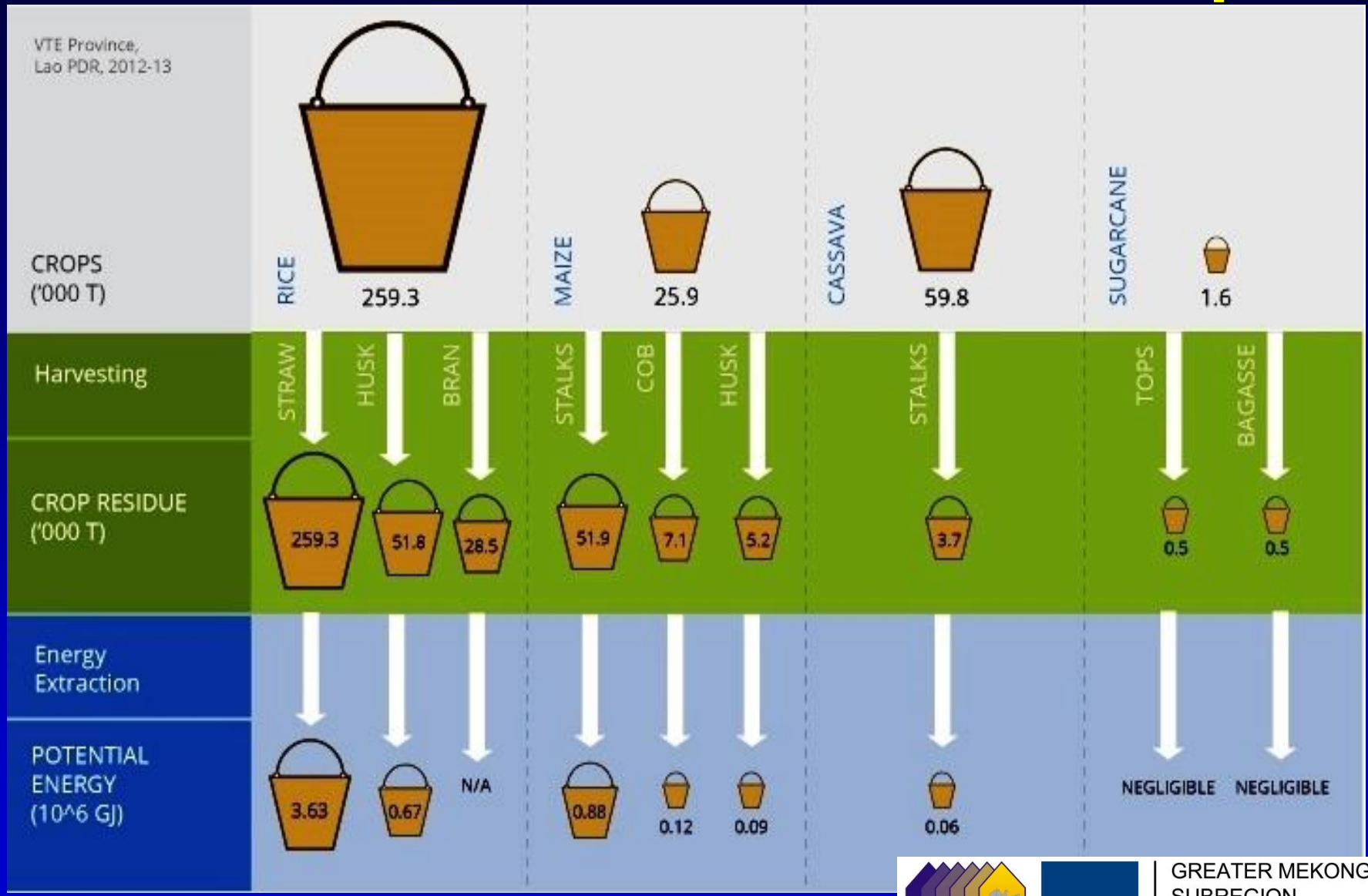
Lao PDR: 18 provinces, 2011

- Rice husk = 545,000 t
- Rice straw = 2,529,000 t

Viet Nam: 2 districts, 2013
(Ung Hoa & Ha Hoa)

- Rice husk = 171,395 t
- Rice straw = 34,279 t

Lao PDR: Bioassessment of Crops



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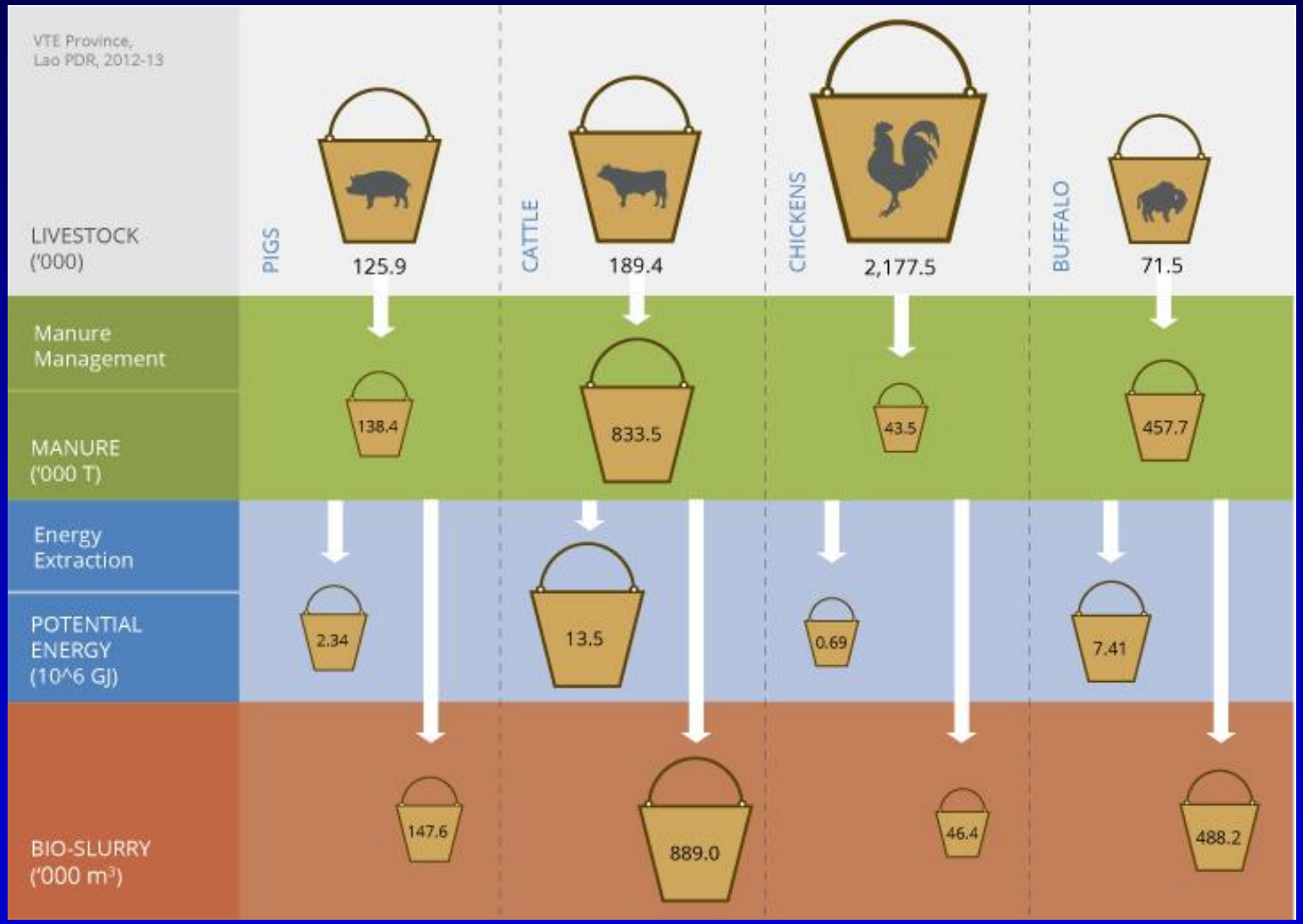
Lao PDR: Bioassessment of Animal Waste



Feasibility Studies on Pilot Investments

- Cambodia: Demonstrating Biochar Production and Use
- Cambodia: Biogas Technology and Efficient Bioslurry Management Practices
- Cambodia: Adoption of Improved Cook Stoves
- Viet Nam: Use of Biochar from Rice Husks in Climate-Friendly Rice Production
- Viet Nam: Efficient Bioslurry Management Practices within the Viet Nam National Biogas Program
- Viet Nam: Improved Cookstove Use




Cambodia: Biochar Production and Use

Provinces covered: Takeo and Kampot

- A minimum of 20% biochar from rice residue can produce 5.6 mt biochar and 3.4 million kWh net electricity
- Pilot demonstration introduced biochar as soil amendment ➔ rice husk biochar increased yields of grain and straw by 30% and 40% respectively

Cambodia: Biogas Technology & Efficient Bioslurry Mgmt

- Provinces covered: Takeo (Tramkak) & Samroang
- Biodigester users can save around $10/month and on chemical fertilizer by reducing 2 bags around $50/month

+

Cambodia: Improved Cookstoves

Locations: Kampong Thom and Kandal

District	S'Ang district, Kandal province	Sandan district, Kompong Thom
Population	41,515 households	10,862 households
N of Communes	16	9
No of selected communes	2	2
Name of Selected communes	KrangYov, PreaekKoy	Tumring, Mean Rith
Poverty rate	KrangYov (18.8%), PreaekKoy (10.7%)	Tumring (31.6%), Mean Rith (33.7%)
Population	KrangYov (3,723 hhs) Preaek Koy (2,869 hhs)	Tumring (1,123 hhs), Mean Rith (1,346 hhs)

Source: CDB online 2010

Viet Nam: Use of Biochar from Rice Husks

Cost and Income from Brick Production with Rice Husk (For 120,000 brick) - An Giang Oct 2013

Expenditure	Unit	Quantity	Price unit	Cost and income (VND)
Production cost				
Unheating brick	Individual	120.000	250	30.000.000
Rice husk	Ton	24	500.000	12.000.000
Labour cost for loading brick	Labour day	15	200.000	3.000.000
Labour cost for husk supplying	Labour day	10	200.000	2.000.000
Labour cost for unloading	Labour day	15	200.000	3.000.000
Cost for transportation	Labour day	10	200.000	2.000.000
Tax				2.000.000
Total cost				54.000.000
Income				
Brick selling	Individual	120.000	500	60.000.000
Benefit				6.000.000

Viet Nam: Efficient Bioslurry Management Practices

Location: Tam Xa commune, Dong Anh District, Hanoi

Investment activities

- Research and Analysis for construction of biogas use of bioslurry for compost, fertilizer
- Use of bioslurry for crop
- Use bioslurry for fishponds
- Capacity building and training for enhanced knowledge and technology development and transfer systems

Viet Nam: Improved Cookstove

ESTIMATION OF BIOMASS AVAILABILITY VS COOKING NEEDS IN UNG HOA DISTRICT, HANOI

Biomass source	Heat value (GJ/ton)	Available biomass for cooking & burnt out	Unit	No of residents can cook, 1.3 kg fire wood/person	No of households can cook with additional purposes, 7.7 kg firewood/house
Rice straw	14.6	105,888	ton	210,200	35,488
Rice husk	14.4	21,446	ton	41,989	7,089
Corn stalk & leave	14.7	7,320	ton	14,631	2,470
Corn cob	15.4	3,050	ton	6,386	1,078
Firewood	15.5	704	ton	1,483	250
Total		138,408	ton	274,689	46,376
No of residents and households				198,000	56,788
Coverage				139%	82%

Using the Women's Union to connect consumers to improved technologies in Lao PDR

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Women's Union in Lao PDR

- District level agreement to participate
- Receive training
  - Stove types and benefits, business planning, product demonstration and training on use
  - Stove producer agreement support
  - Sales and marketing training
- Receive initial inventory of stoves
- Undertake sales programs using revenues and margins to restock inventory
- Receive output based payment for achieving minimum sales targets

Stove Producers

- Supply and purchase agreement
- No subsidy price to womens union is negotiated between parties
- Potential to reduce number of buyers sharing some market risk with women's union
- Access to technical production grant for upgrading equipment
- Intensive stove production training for improved stoves

Future ??

- Possible cashflow assistance for transition between stove types

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Vision – Strategy

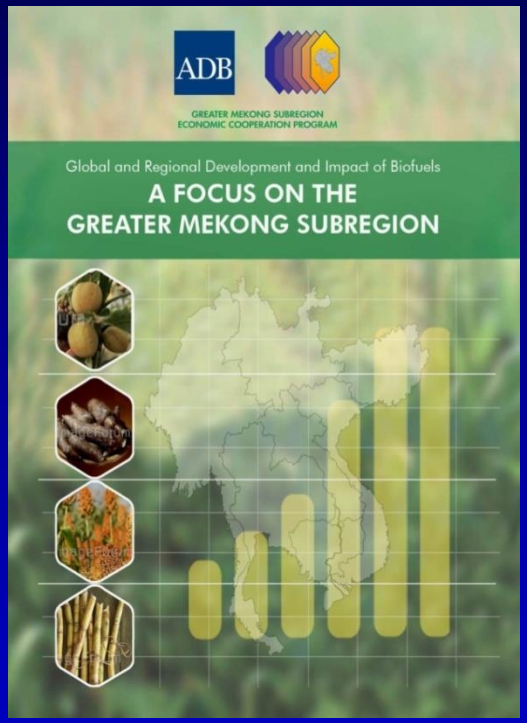
Women's Union to be an IA for future up scaling:

- Provision of technical and business support
- National or Provincial Women's Union provides an output based (sales targets) financial incentive to district to reward participation
- Stove producer support program using a revolving fund available to producers with women's union supply agreements

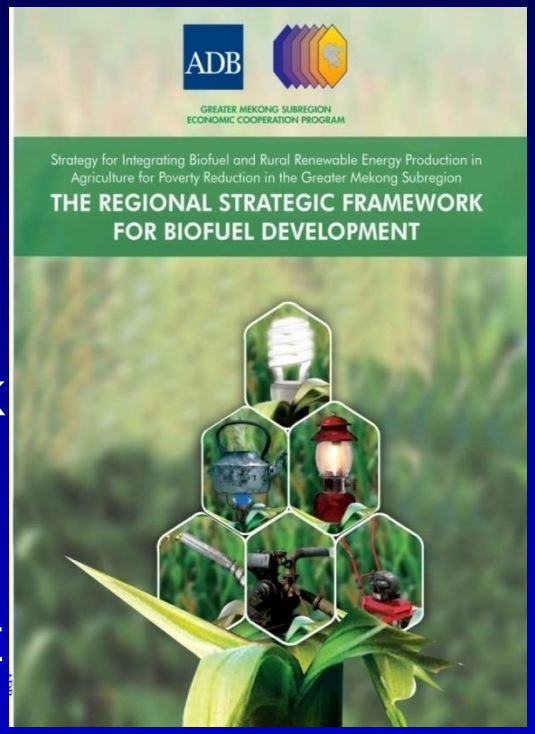
Biomass Conversion Technologies in Cambodia and Viet Nam

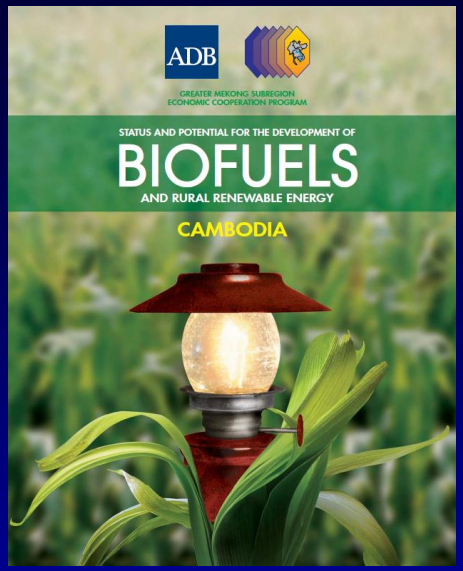
Biomass Conversion Technologies in Lao PDR

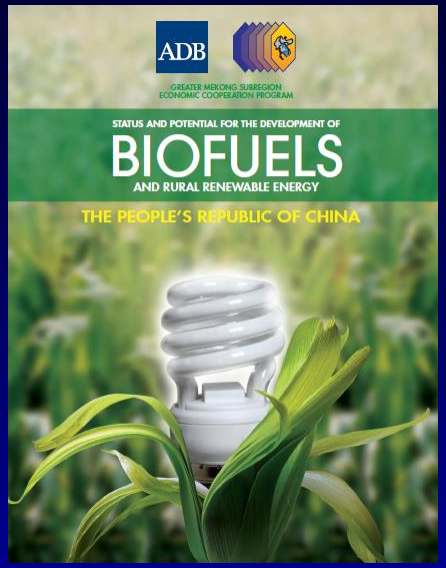
Studies on GMS Biofuels and Rural Renewable Energy

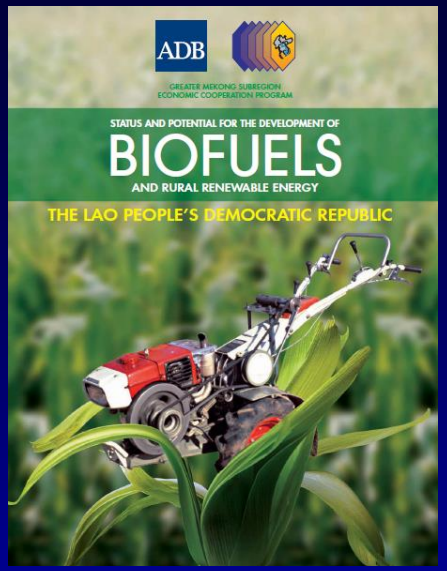


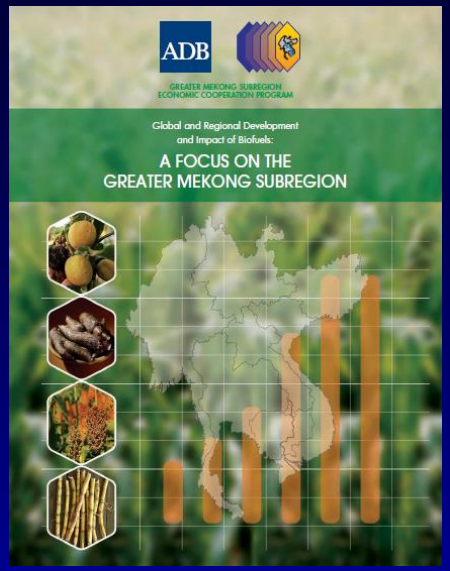
- Integrating Biofuel and Rural renewable Energy Production in Agriculture for Poverty Reduction in the GMS: An Overview and Strategic Framework for Biofuel Development
- Global and Regional Development and Impact of Biofuels: A Focus on the GMS

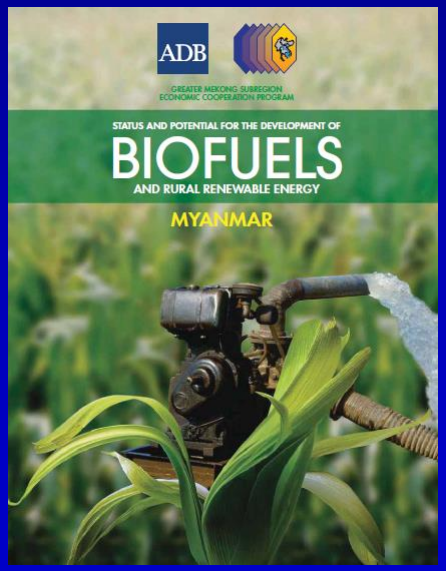


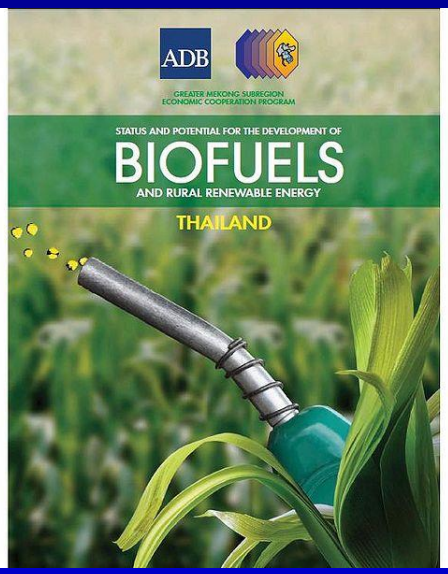


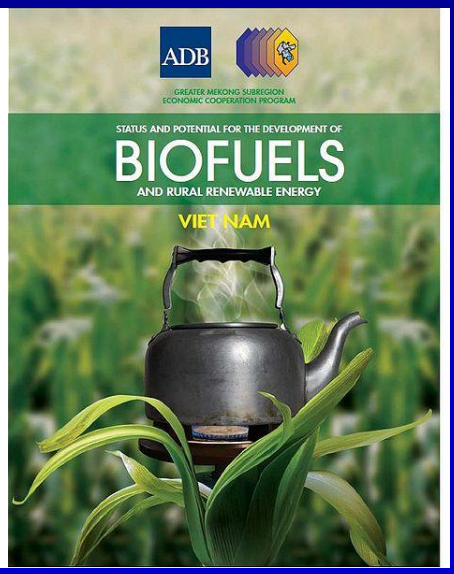


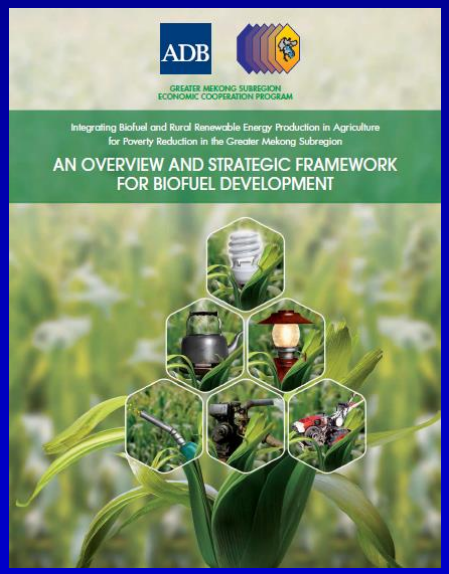












Available at:
http://www2.adb.org/Documents/Reports/Biofuels/

ADB Bank-wide Activity to Support Investment in Energy Access

ADB's investment in energy access increased year to year with a goal to connect modern energy to **100 million households by 2015.**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Thank You!