Bio-Energy and Rural Renewable Energy Sector in Cambodia

Dr. SAR Chetra

Regional Forum on Bioenergy Sector Development: Challenges, Opportunities, and the Way Forward (23-25 January 2008, Bangkok, Thailand)

Chief of Animal Production Office, Department of Animal Health and Production, Ministry of Agriculture, Forestry, and Fisheries, Kingdom of Cambodia

Outline of Presentation

- Energy Situation
- Use of Biomass
- Biofuels and Rural Renewable Energy
- Barriers of Development of biofuel and rural renewable energy
- National Bio-energy Policy, Organisation, Laws and Action Plan
- Country Assessment Study on Biofuel and Renewable Energy in Cambodia

Energy Situation

Energy Resource

- Conventional energy sources
- Wood: 80% of total national energy consumption
- Importation: fossil fuels (diesel and heavy oil)
- Fossil Fuel Deposit (Under process of study)

Energy Consumption

Table 1. National energy consumption by sector

Type of Fuel	**1995**		**2000**	
	Terajoules (TJ)	percent	Terajoules (TJ)	percent
Households	86,224	83.8	90,106	80.6
Service Sector	1,625	1.6	1,418	1.3
Industry	512	0.5	868	0.8
Transport	14,832	14.4	19,337	17.3
Total	**102,848**	**100**	**111,728**	**100**
Source: MIME (2001)				

Energy Consumption (Cont.)

The proportion of households using firewood for cooking:

- firewood (90% of all households),

- charcoal (5.3%),

- kerosene (1.8%) and

- liquefied petroleum gas (1.7%)

Energy Supply

Table 2: Electricity supplier in Cambodia

Supplier	Areas Supplied
Electricity du Combodge (EDC)	6 Major towns, including Phnom Penh (MIME, 2002)
Independent Power Producers (IPP) selling to EDC	Phnom Penh and Kompong Cham (MIME, 2002)
Provincial Electricity Operators (Provincial offices of MIME)	10 Provincial town
Rural Electricity Enterprises (REE) operating mini-grids	4 Provincial towns and hundreds of smaller towns and villages (estimated 600 REEs)
Battery Charging Services (REEs which do not also operate a mini-grid)	1500 battery charging services (REEs) in hundreds of towns (Hundley, 2003)
Imported Power from Thailand and Vietnam (22kV lines)	7 border towns (Hundley, 2003)
Private stand-by diesel generation (large scale only)	All areas, but mainly Phnom Penh and Siem Reap (Hundley, 2003)

Rural Electricity Enterprises (REE)

- An estimated 600 REEs: small diesel-powered mini-grids (60,000 customers)
- The REEs: small locally-owned businesses (diesel engine and generator)
- REE: Renewable energy technologies in their businesses. (biomass gasifier technology from India)

Energy Policy and Planning

- The Electricity Law of the Kingdom of Cambodia was promulgated by Royal Decree on 2 February 2001.
  - It set forth the principle to govern the operations of electric power industry and the activities of licensees that provide electric power service.
- The Electricity Law consists of a broad regulatory framework for electric power services and supply throughout the country.

Use of Biomass

- **Forestry Resource**
  - Fuelwood: 85% of total national energy consumption
  - Main source of fuelwood: natural forests
- **Agricultural Residues:**
  - Rice, sugar can and maize: three crops to produce energy (NEDO)
- **Main use of biomass:**
  - Rice husk mixed with wood and other bio-residues

Bio-energy and Rural Renewable Energy

❖ Government Policy and Action

- Primarily, RGC policy of promoting alternative energy is linked with reducing poverty by supplying energy and power to the poor, esp. in the remote areas.

- To this end, the use of locally available recoverable energy is considered to be ideal in line with supporting local agricultural activities .

- RGC's motive to develop agro-based recoverable energy is encouraged:
  - local farmer can gain both income and economically reasonable power by producing agricultural crop being convertible into a fuel.

❖Private Sector

- NGOs, academics, and private enterprises conducted:
  - the promotion of pilot biodiesel projects
  - commercialied energy technology
  - formulation of energy supply chain
  - dissemination for plantation
  - use of biodiesel

- However, the scale of project is still small, and large scale private enterprise has yet fully motivated to implement tangible biodiesel development project.

Biofuel production

- **Potential Fuel Crops:**
  - Jatropha is potentially used for energy production due to its oil is not editable and does not compete with food security.

- **Biofuel Application:**
  - Jatropha Oil biofuel can be used for older diesel engines to generate electricity, power, and water pump

Biofuel Experience in Cambodia

Project Title	Biofuel for Sustainable Development and Poverty Alleviation in rural Cambodia
Project Objective	To trail a business model based on Jatropha oil production in a small rural village setting.
Project Location	4 villages of Ponley District, Kompong Chhnang Province, Cambodia
Project Duration	17 months (start Nov. 2004 to end March 2006)
Project Funding	The Canada Fund plus Private Donor
Lead Organization	Development and Appropriate Technology (DATe) (Locally registered Cambodian NGO)
Partner Organization	GERES Cambodia (Locally registered French NGO)

Biogas Energy

- Energy produced from digestion of animal waste

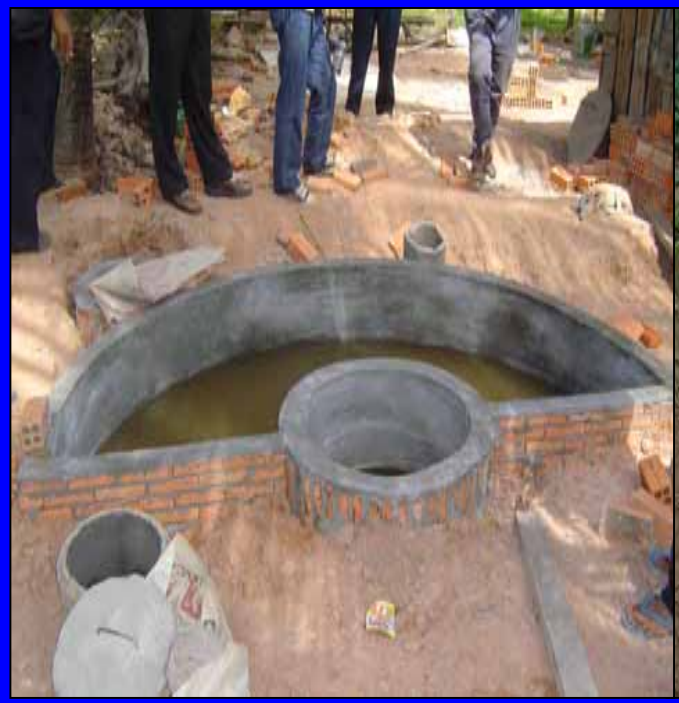
Benefits to the rural household

Small Scale Form

- *1990-1995: Plastic-made household biodigester (NGOs)*

Plastic biodigester

- *2005-2006: Chinese-modeled biodigester*



This project was not included with the quality control programme

- *2005-Present: - Indian (Deen Bundhu) -modeled biodigester (Netherlands-based SNV)*
  - "National Biodigester Program (NBP)

Year 2007: 1150 biodigester

NBP includes:

- Monitoring and Evaluation
- Quality management
- Subsidy handling
- Financial Support
- Technical Support
- Promotion Support
- Training Support
- Extension Support
- Research and Development
- Biodigester Micro Credit Programme

Large Scale Form

Demonstrative Research Project on Combined Power Generation Systems (Photovoltaic and Biogas) in Monrithy Cattle Husbandry Station, Sihanouk Ville (NEDO. Japan, 2004)

Hydro-energy

- Kirirom, Kompongspeu provice: 13 MWs of hydro electrical generation capacity
- Banlung district of Rattanakiri Province: 1 MW capacity Ochum hydropower station

Solar Energy

- Not very recognized and common use, and high cost
- Few NGOs use solar energy where the places are not covered by electric supply.

Wind Power

The only wind turbines installed: small turbines (400W capacity)

- donated as part of a multi-lateral demonstration project,
- purchased by private households to charge batteries for rural households without grid access

Barriers of Development of Biofuels and Rural Renewable Energy

- Limited Information and low Level of Awareness
- Weak coordination between relevant agencies
- Lack of skilled personnel and training facilities
- Commercial non-viability
- Inadequate Financing Arrangement
- Unfavourable import taxes and tariff systems

National Bio-energy Policy, Organisation, Laws and Action Plan

❖ Basic Bio-energy Policy

- Cambodia has a great opportunity to become a bio-energy producer for not only domestic supply but even for possible bio-energy exporter using large under-utilized or unused land.

- Thus, Government policy support and encourage investors in the context of biofuel investment by providing concession land as possible (Based on Sub-Decree on Concession Land).

❖ Organization for Bio-energy programme

- To set up a Multi-Ministry Bio-Energy Committee to be led by MAFF for coordinating various activities related to the Bio-Energy Programme.

- Ministries should be involved in the Committee:
  - MEF: regarding tax and budget for bio-energy plan
  - MIME: controlling standards of bio-energy, mixing the oil and distribution to final consumers
  - MOE: controlling of emission of bio-energy fuel/oil fuel and application for CDM carbon credit from bio-energy production.
  - MAFF: allocation of land for bio-energy plant and and planting and growing plants related to bio-energy.

❖ Bio-Energy Act or Sub-decree

To achieve the significant results, a legal act or Sub-decree for bio-energy will be produced with the inclusion of the following items:

- Set up a technical standards for bio-energy
- Mandate for all energy to be mixed with bio-energy gradually
- Several Mix and Standards based on the need of each use
- Technical and financial support from government

❖ Short-Term Action Plan

- Setting up of Bio-Energy Committee with concerned Ministry
- Drafting of Bio-Energy Plan and Sub-decree
- Promotion of Bio-Energy Plan immediately especially on planting of Bio-energy plant

Country Assessment Study on Biofuel and Renewable Energy in Cambodia

- Current initiatives of the GMS WGA by ADB: "Country Assessment Study: Strategies and Options for Integrating Biofuel and Rural Renewable Energy Production into Rural Agriculture for Poverty Reduction in the GMS country"
- Cambodia conducted "the Country Assessment Study on Biofuel and Rural Renewable Energy".
- The study focus on: 1-Market outlook, 2- Characterization, 3- Prioritization, 4- Biofuel Business Option, and 5- Policy /Regulatory/Institutional Support

- Country Assessment Team on this study:
  1- Three representatives from SNEC
  2- Two representatives from MAFF

- Termination of the Study: October 2007- June 2008.

- Results of Study:

  To develop a National Biofuel Program in the Country and GMS countries or strengthen existing programs currently being implemented in the countries to institute biofuel systems that would promote greater energy security without endangering food security.

Conclusions

❖ Some 80% of the Cambodia's total energy consumption is covered by biomass sources and the balance by imported fossil fuels.

❖To date, the use of bio-energy has been limited to pilot projects and other small scale application.

❖ "Country Assessment Study on Biofuel and Rural Renewable Energy" is urgently needed to assess the technical feasibility and the economic and social potentials for the adoption of bio-energy technologies as well as to provide a preliminary assessment of the long-run commercial viability of biofuel program in Cambodia.

❖ Poverty reduction remains the principle objective of any adoption of bio-energy technology. Thus, applications and services that use energy productively to improve the livelihoods of people should be favored.

Recommendations

Considering the very high potentiality of bio-energy in Cambodia, the Cambodian Government should take the following actions:

- Formulate a Cambodian Bio-energy Plan and Act as soon as possible.
- Bio-energy Plan should set a clear future target and measure to achieve the goal.
- Both Bio-ethanol and Bio-diesel should start immediately.
- In order to meet the future target for Bio-Energy production, Cambodia should expand planting of Cassava and Jatropha to a few million hectares each by 2020 targeting to become a net exporter of energy.
- In order to manage the Bio-Energy Program, Bio-Energy Committee should be established consisting of several key ministries related to energy