FAEM Nepal

ARTES/SESAM Alumni Regional Level Workshop

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Entrepreneurship Development in Solar Energy Sector for Rural Area in Myanmar

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Country profile

The Union of Myanmar (Burma)

Area	- 676,578sq kilometers
Latitude	- 10°N and 28°N
Longitude	- 90°E and 100°E
Total Population	- 46 millions people
Population density	- 70 persons/sq km
Population in Rural Area	- 65% of Total Population (37.95 millions)

50%of the population lack access to electricity.

Myanmar Energy Policy

Controlling energy Imports

Preventing Deforestation

+

Economic Development

1. Increase energy self-sufficiency
2. Promote the utilization of renewable energy
3. Enhance energy efficiency and promote energy conservation
4. Prevent deforestation caused by excessive use of fuel wood and charcoal
5. Promote use of alternative fuels in household
6. Develop hydroelectric power as a core power source

Energy sources in Myanmar

Current sources

- Petroleum
- Natural gas
- Compressed natural gas (CNG)
- Hydroelectricity (renewable)
- Coal

Potential sources

- Wind energy (Renewable)
- Solar energy (Renewable)
- Geothermal (Renewable)
- Bio-energy (Renewable)
  - Ethanol
  - Bio-diesel
  - Gasification
  - Biogas

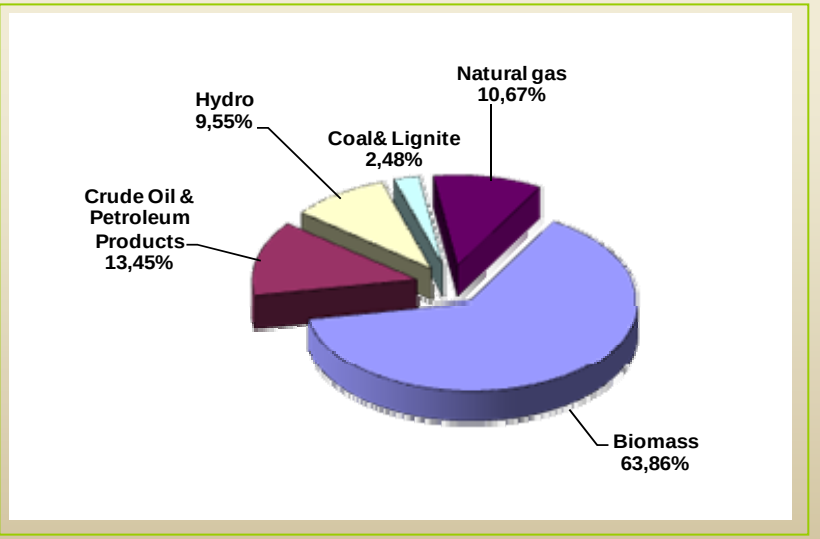
Status of energy consumption

- **Energy utilization in Myanmar mainly depends upon traditional energy;**
  - **Fuel wood,**
  - **Charcoal and**
  - **Biomass.**

  } 63.86 % of total energy consumption

- **35 % of the total energy consumption is contributed by commercial energy;**
  - **Crude Oil and Petroleum Products (13.45 %),**
  - **natural gas (10.67 %),**
  - **coal and Lignite (2.48%) and**
  - **hydropower (9.55 %).**

(2006-2007)



Availability of energy resources in Myanmar

Crude oil (Offshore & On-shore) (Proven + Probable)	648.59 MMBBL
Natural gas (Offshore & Onshore) (Proven + Probable)	122.5391 TSCF
Hydro power	108, 000 MW
Coal	711 Million Metric Tons
Biomass	1. 52.5% of total land area covered with forest . 2. Potential available annual yield of wood-fuel 19.12 million cubic ton
Wind	365.1 TWH per year
Solar power	51973.8 TWH per year

Source: Ministry of Energy

Distribution of Electricity

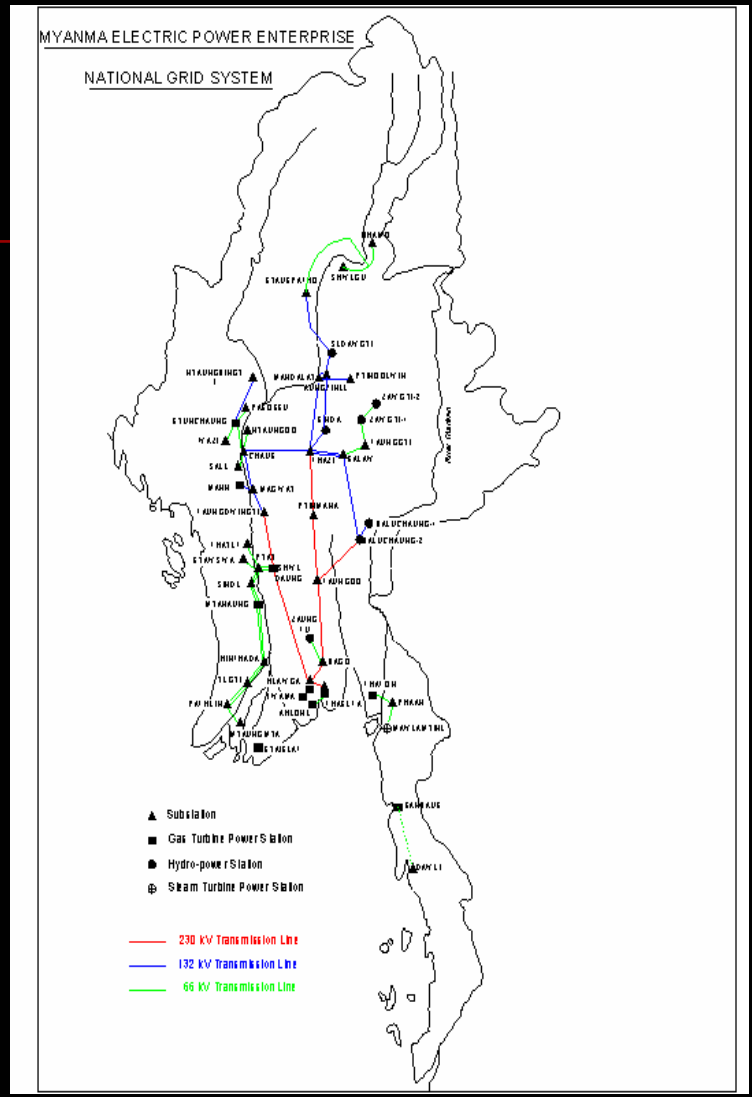
Ministry of Electric Power (MPE)

Myanma Electric Power Enterprise (MEPE)

Total generated electricity – 4508 MW
(2007-2008)

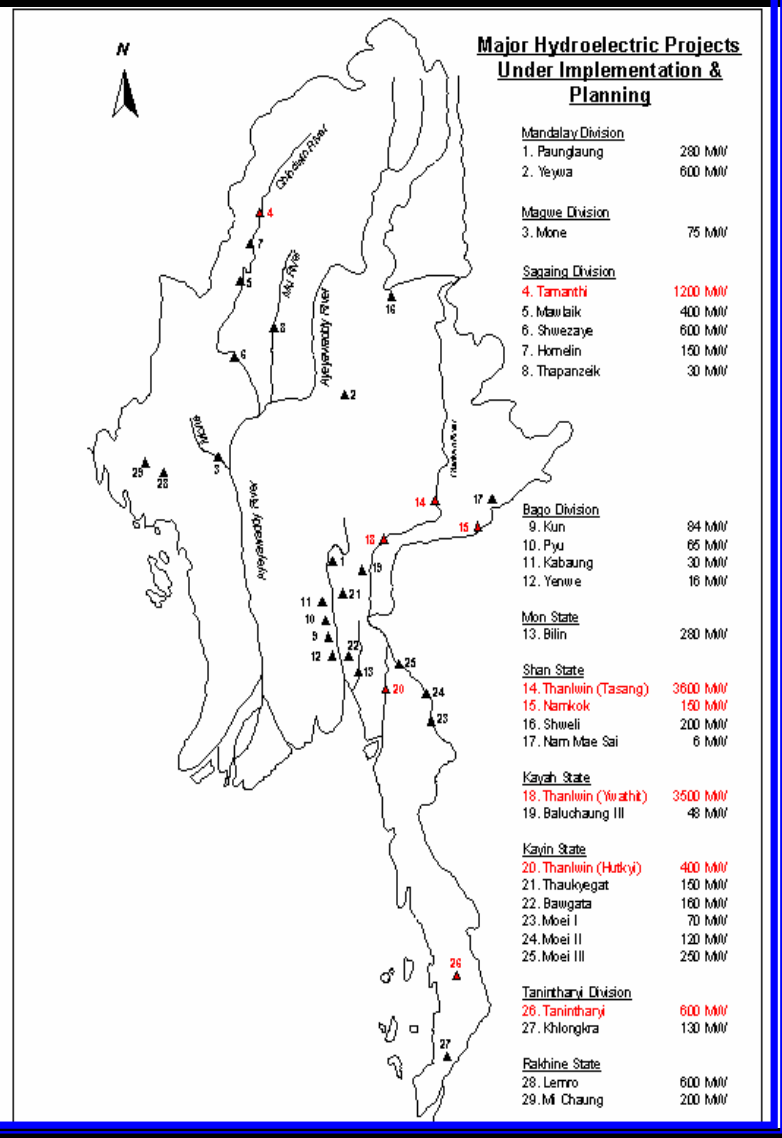
By

(1) gas turbines	2840 MW
(2) hydroelectricity	1171 MW
(3) Diesel	430 MW
(4) Coal	67 MW



Hydropower

- Estimated hydropower potential 100,000.00 MW
- Installed 268 Sites' potential 38,000.00 MW
- Installed power capacity 1,171.80 MW
- MEPE has developed 26 mini and 9 medium size hydropower projects whose capacities are between 24 KW and 5,000 KW mostly in remote border areas.
- it is estimated that the present hydropower installed capacity of 1,171.80 MW will increased to 2672.5 MW in Year 2008 - 2009.



Wind Energy

- At the very initial stage.
- Potential of wind energy → 365.1 Terra Watt hour / year.
- Available Location for wind energy
  - Hilly regions of Northern States
  - Coastal region and
  - Central Myanmar regions
- Currently available data on wind energy sources are not enough to evaluate suitable sites for construction of wind turbines.

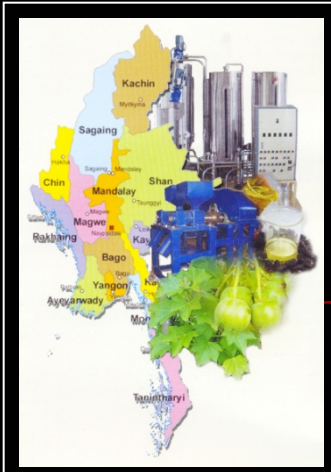
Solar Energy

- As electrification employing solar energy is of renewable and environmentally friendly nature, top consideration has been given to utilize solar energy as an option to be used in rural areas.

- Presently, solar energy is being introduced in rural area and is used through Photovoltaic cells to generate electricity for charging of batteries and for driving motors to pump water for irrigation, but only on an small individual scale.

- Potential of solar energy → 51973.8 Terra Watt hour / year.

- Solar energy is abundantly available in Central Dry Zone Area of Myanmar (radiation intensity > 5 KWh / Sq. m. / day during the dry season).



Biomass Energy

Bio-energy policy and strategy

- Energy self sufficiency with particular emphasis on rural area
- Efficient utilization of land and water resources for bio-mass production balancing food and fuel production
- Income generation and poverty alleviation for rural population through employment opportunity
- Increasing national income through exporting surplus bio-fuel
- Promoting private sector participation: small to small and medium enterprise, both in biomass production and bio-fuel processing
- Development of bio-fuel industry and appropriate regulatory measures
- Government support
  - Loans, credit
- Promoting private sector including foreign direct investment
- Providing improved technology through research and development

1. Current production

Jetropha was cultivated from 2006/07

- Total sown areas - 3.15 million acres
- Expected biodiesel production-

  1 million gallons

  from 1.38 million baskets.

* Two small scale biodiesel plants were established in Northern Shan State and MICDE (Myanma Industrial Crops Development) respectively.

99.5 % Ethanol Plants in Myanmar

Ethanol Distillery No.2 Sugar mill	(500gal/day)
Kan-ba-lu Distillery	(3,000 gal/day)
Taung-sin-aye Distillery	(3,000 gal/day)
Mat-ta-ya Distillery	(15,000 gal/day)

Bio diesel production by private sector

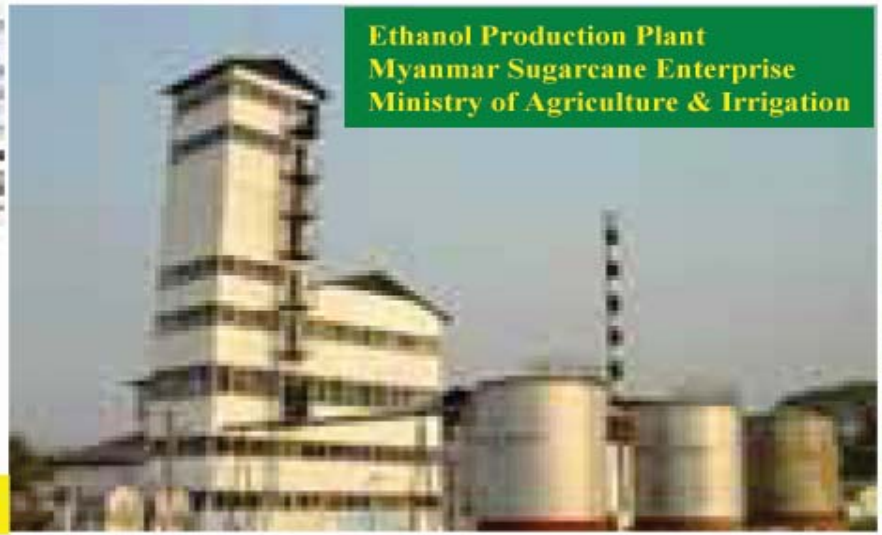
•Agri: Technology Co. Ltd. -10,000 acres at Ayeyarwaddy Division, Ngapudaw TS. to cultivate mainly Jatropha and later cassava and sugarcane.

•MICDE is preparing MOU to carry out biodiesel production project with Korea Company (HAE JOYUB BIO ENERGY MYANMAR Corp.)
Total cultivated areas of 150,000 ha will be provided from MICDE to produce biofuel crops.

•Great wall Company is cultivating 100,000 acres of sugarcane in Northern Shan State (particularly Ba-maw areas) to produce Bio-Ethanol.

Molasses-based Gasohol Production

sugarcane



Ethanol Production Plant
Myanmar Sugarcane Enterprise
Ministry of Agriculture & Irrigation

Sweet sorghum

Distillation Columns

Operator's Control Room

2. Future Plan

*FAO TCP Project on Bio fuel production will be implemented coming year.

*Biofuel villages will be established at potential Township of State and Division where potential biofuel crops can be cultivated.

Community-based Biodiesel Demonstration Project is being carried out .

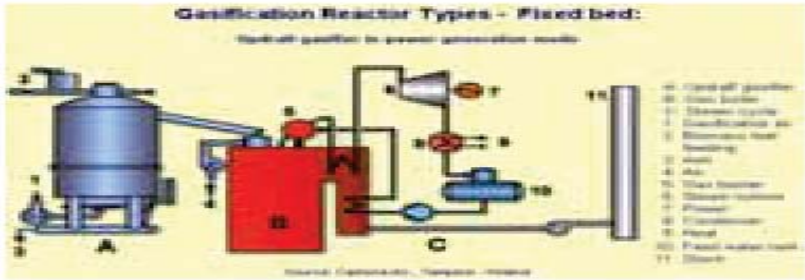
At the Hline-tet canning factory compound with MAS (Myanmar side) and KU Biodiesel of Ka-sesart University and Ministry of Energy (Thailand side) respectively.

Livestock waste biomass

- Ministry of Science and Technology is providing services for installing biogas plants designed for small village electrification
- Small scale biogas digesters available in the market for household use in rural areas
- Animal waste available as farmers still depend on animal draught power for farming and rural transport

Potential of rice husks for gasification in Myanmar

- 20% of the paddy is husk (Annual paddy production: 22 million tons.)
- Currently small and medium scale rice mills use rice husk as fuel to generate steam for steam engines
- Rice mills using rice husks for gasification gaining popularity
- Government of Myanmar studying development of improved rice husk gasification technologies



Estimated rice husk production and usage

		No. of rice mill	Capacity (ton/24hrs)	Estimated paddy production ('000 ton/year)	Estimated Husk volume ('000 ton/year)	Rice husk for power plant ('000 ton/year)
Large scale rice mills	State	**68**	**5,113**	**1,637**	**307**	**32**
	Private	**1,158**	**26,626**	**8,002**	**1,600**	**320**
	Total	**1,226**	**31,738**	**9,539**	**1,907**	**352**
Small scale rice mill		**10,469**	**41,341**	**12,424**	**2,485**	**-**
Total		**11,695**	**73,079**	**21,963**	**4,392**	**352**

Source: Myanmar Rice Millers' Association

Estimated number of livestock and amount of dung 2006-2007

Livestock	Buffalo	Cattle	Sheep/ Goat	Pig	Chicken
Number (‘000)	2,649	11,911	2,189	5,207	71,274
Dung per head (ton/year)	1.80	1.80	0.63	0.90	0.03
Amount of dung (‘000 ton/year)	4,768	21,440	1,379	4,686	2,138

Source: Ministry of Livestock and Fishery, Yangon Technological University

Biogas: Community size biogas plant

State/Division	Nos. of Biogas plant	Total installed (kw)
Mandalay	89	801
Sagaing	12	108
Magwe	3	27
Northern Shan State	1	9
Total	105	945

Source: Ministry of science and technology

EcoDev

Manufacturing & Commercializing A 1 Stove

Mass Production

Consistant Supply

Quality Assurance

Affordable Price

Extensive Adoption

Cost Effective Conservation

Why SHS is in need in Rural Area of Myanmar?

- Inaccessibility to national grid line.
- The cost of installing power transmission lines to border areas and rural areas are not cost effective.
- Nationwide power transmission is very costly.
- Shortage portion of the power demand by hydropower.

Project Description of Solar Home System in Myanmar

Solar system designed to be economical and affordable

- 50 WP PV module
- 6 A charge controller
- 70 Ah car battery
- 3 Nos. 10 W F/Lamps
- power cables (pre-engineered)
- mounting stand

PV module and charge regulator are imported.

Typical price of SHS 50 System is 650 US$.

Common Barriers to the development of SMEs in Rural Area of Myanmar

1. Distribution and Marketing of SHS to rural areas

- Customers who have sizeable amount of savings but unable to purchase SHS due to lack of information.
- Customers who could not afford to install SHS.

2. Tactics for Distribution and Marketing for Customers

- Information barriers
- Purchasing barriers
- Importation barriers
- Technical barriers

Barriers of Myanma's SMEs Development

- The majority of SMEs (80 percent) lack capital for production and trade.
- Most have obsolete equipment and machinery.
- They lack adequate physical and human resources.
- They lack current information on technical, market and legal issues.
- They lack support from the state, especially in technology transfer, credit guarantees and loans.

Strategies for SMEs Development

- Focus on…….

(1) Access to finance
(by bank s' service, can't effort to expend capital)
(2) Access to technology and use of information Technology
(poor technological management skills, low quality of local products and lack of political provide for advance)
(3) Access to market information
(lack of technology centers, no institutionalized market research activities, lack of networking)
(4) Human capital deficiencies
(low skills and qualification, lack of environmental issue, red tape and Bureaucracy in the Government)

Thank You