

# Policy Approaches to Sustainable Bio-energy Development in Myanmar

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# Country Profile of Myanmar



Neighbors	Border (km)	Population (mil)*	Border Trading Posts
Bangladesh	272	154	2
India	1453	1148	2
China	2227	1330	4
Laos	235	7	-
Thailand	2099	65	4
	6285	2704	12

\*Encarta 2009

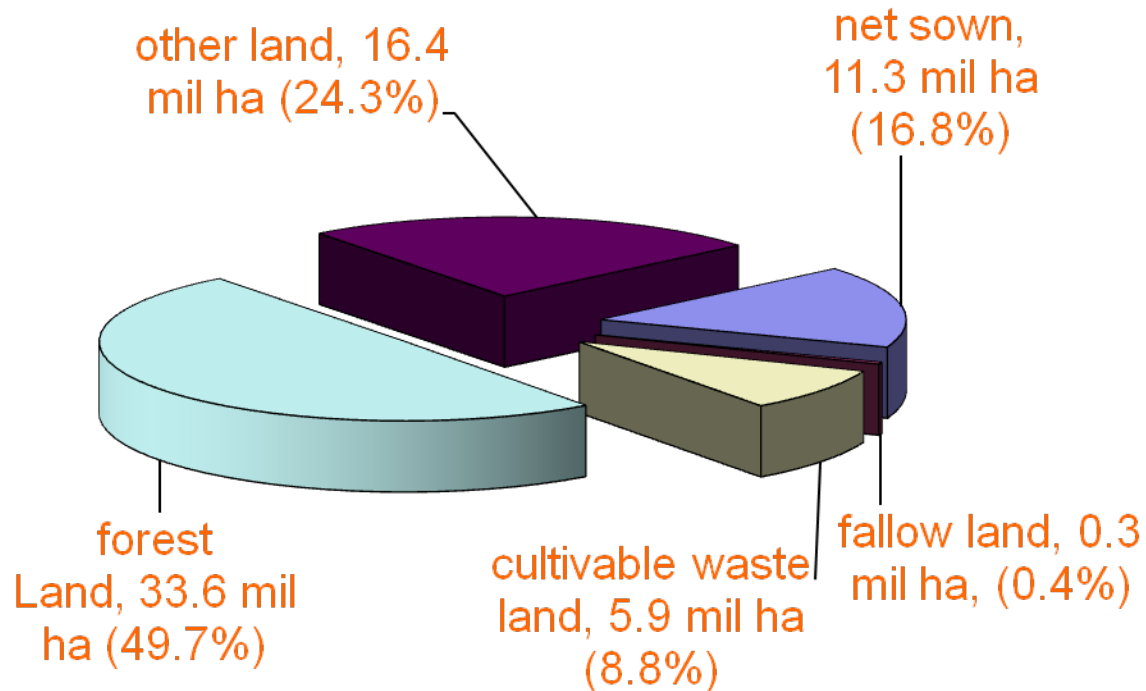
# Basic Country Data

- Land Area: 676,577 sq. km.
- Population: 57.50 million
- Export: US\$ 6.8 billion\*
- Import: US\$ 4.5 billion\*
- Main Exports: Agriculture, livestock and forestry products, natural gas
- Main Imports: Machinery, transportation, construction material, industrial raw materials, consumer goods



\*2008-09

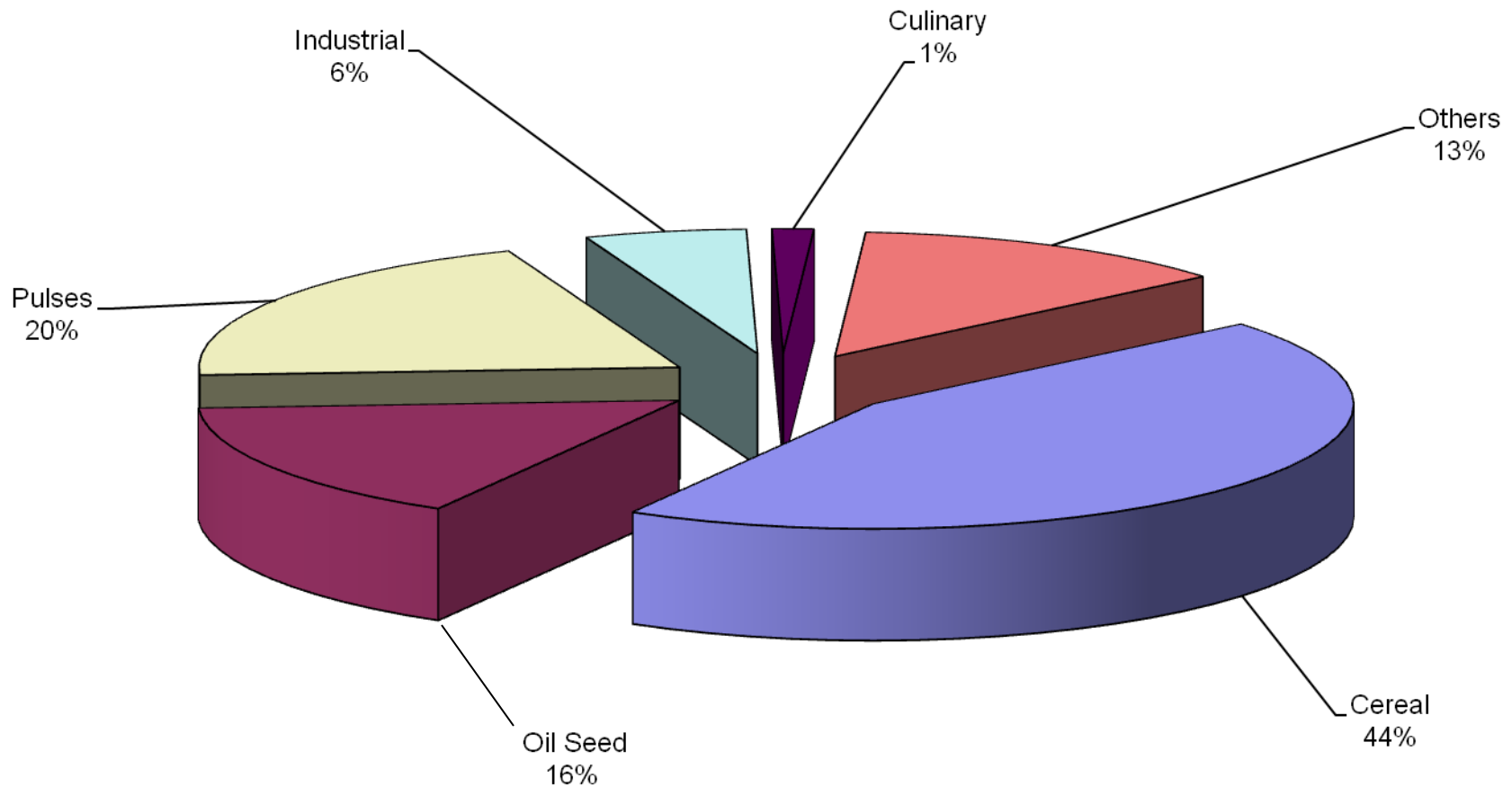
# Land Use in Myanmar



Total Land Area : 67.66 mil ha

Source: Ministry of Agriculture and Irrigation (2008)

# Sown Area by Crop Groups



# Present Energy Resources and Utilization in Myanmar

# Energy Profile of Myanmar

Sr.	Particulars	1990	2005
1	World—Total Primary Energy Supply (TPES)(Mtoe)*	8758	11434
2	Myanmar—Total Primary Energy Supply (TPES)(Mtoe)*	10.7	14.7
3	Share of TPES in Myanmar (percent)		
	✓ Fossil Fuel		
	1) Coal	0.6%	0.6%
	2) Oil	6.9%	13.7%
	3) Natural Gas	7.1%	14.4%
	✓ Renewable Fuel in Myanmar (percent)		
	1) Hydro, Solar, Wind and Geothermal	1.0%	1.8%
	2) Biomass and Waste	84.4%	69.6%
4	Others		
	✓ Nuclear	0%	0%

\*Mtoe: Megatonnes of oil equivalent

Source: Human Development Report (2007/2008)



# Energy Resources (Myanmar)

Sr.	Primary Energy Resources	Capacity
1	Crude oil (Offshore + Onshore) (Proven + Probable)	648.59 MMBBL
2	Natural Gas (Offshore + Onshore) (Proven + Probable)	122.5931 TSCF
3	Hydro	108,000 MW
4	Coal	711 MMT
5	Biomass	<ul style="list-style-type: none"> <li>• 50 % forest coverage</li> <li>• Potential Annual Wood Fuel 19.12 MCT</li> <li>• Residues, byproducts and direct feedstock from 19 mil acres of land</li> <li>• Animal waste from 103 mil heads of livestock</li> </ul>
6	Wind	365.1 TWH per hour
7	Solar	51,973.8 TWH per hour

# Energy Policy of Myanmar

Alleviate dependency on imported fossil fuel

Development  
of alternative  
and  
renewable  
energy

Maintenance  
of emergency  
oil reserve

Exploration  
of new  
energy  
sources

# Energy Strategy of Myanmar

Increase energy  
self-sufficiency

Promote utilization  
of renewable energy

Enhance energy  
efficiency and  
conservation

Prevent  
deforestation by  
reducing use of fuel-  
wood and charcoal

Promote use of  
alternative fuels in  
households

Develop hydro  
power as a core  
power source

**Source: Ministry of Energy, Myanmar**

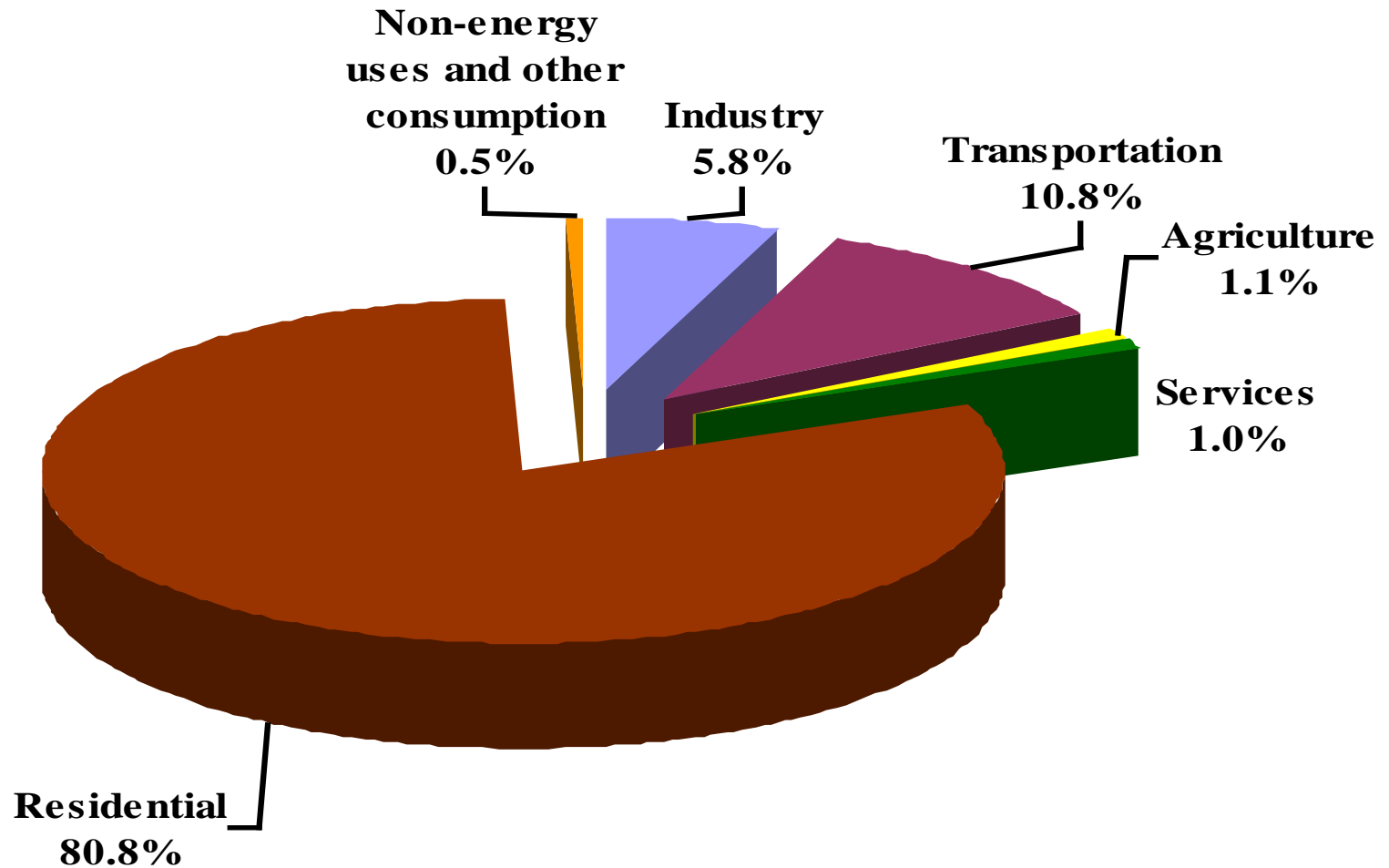
# Major use of energy sources

(KTOE)

Source	Transport	Industrial	Residential
Coal	0	84	0
Petroleum Products	1157	181	10
Gas	1	193	1
Biomass	0	0	8,456
Electricity	0	159	176
Total	1158 (11%)	617 (6%)	8,643 (83%)

Source: Ministry of Energy, Myanmar (2004)

# Energy Consumption by Sector



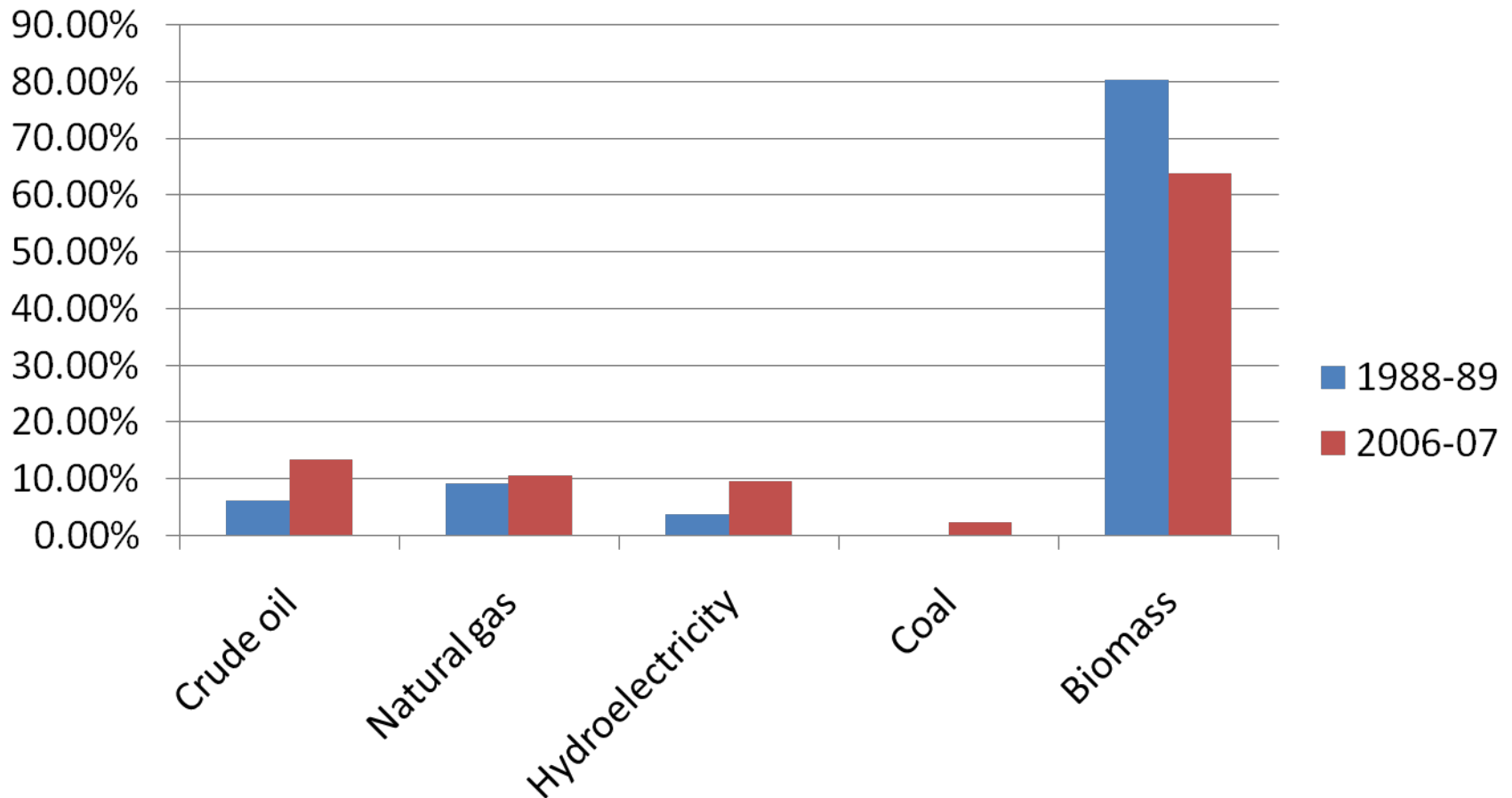
Source: Ministry of Energy, Myanmar (2003)

# Changing Pattern of Energy Use

Sources	1988-89	2006-2007
Crude oil	6.22%	13.45%
Natural gas	9.34%	10.67%
Hydroelectricity	3.80%	9.55%
Coal	0.23%	2.48%
Biomass	80.41%	63.86%
<b>Total</b>	<b>100%</b>	<b>100%</b>

Source: Ministry of Energy, Myanmar

# Changing Pattern of Energy Use



Source: Ministry of Energy, Myanmar

# Fossil Fuel Balance

(Million Gallons)

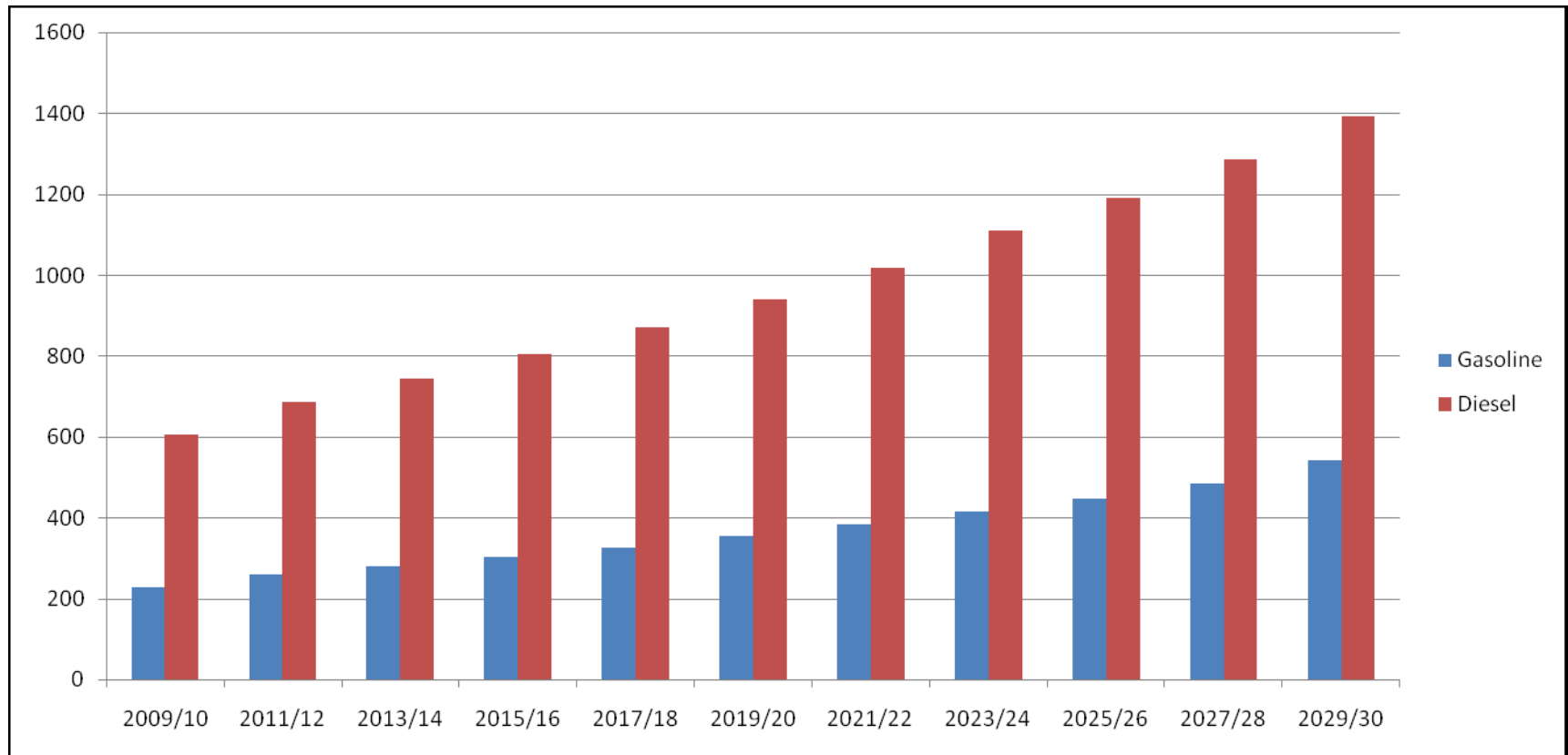
Year	Production		Distribution		Deficit	
	Gasoline	Diesel	Gasoline	Diesel	Gasoline	Diesel
2001/02	70.77	97.15	92.07	334.24	-21.30	-237.09
2002/03	84.32	113.95	97.84	334.71	-13.52	-220.76
2003/04	109.02	77.93	113.26	314.59	-4.24	-236.66
2004/05	109.43	61.59	115.08	303.39	-5.65	-241.80
2005/06	106.70	54.08	113.36	271.51	-6.66	-217.43
2006/07	109.32	72.04	112.28	293.31	-2.96	-221.27

Source: Ministry of Energy, Myanmar



# Future Plan for Fossil Fuel Use

(Million gallons)



Year	2009/10	2011/12	2013/14	2015/16	2017/18	2019/20	2021/22	2023/24	2025/26	2027/28	2029/30
Gasoline	228	259	280	303	327	354	383	414	448	485	524
Diesel	606	687	743	804	870	941	1017	1110	1190	1287	1392

Source: Ministry of Energy, Myanmar

# Development and utilization of biomass energy in Myanmar

# Biomass consumption in rural area

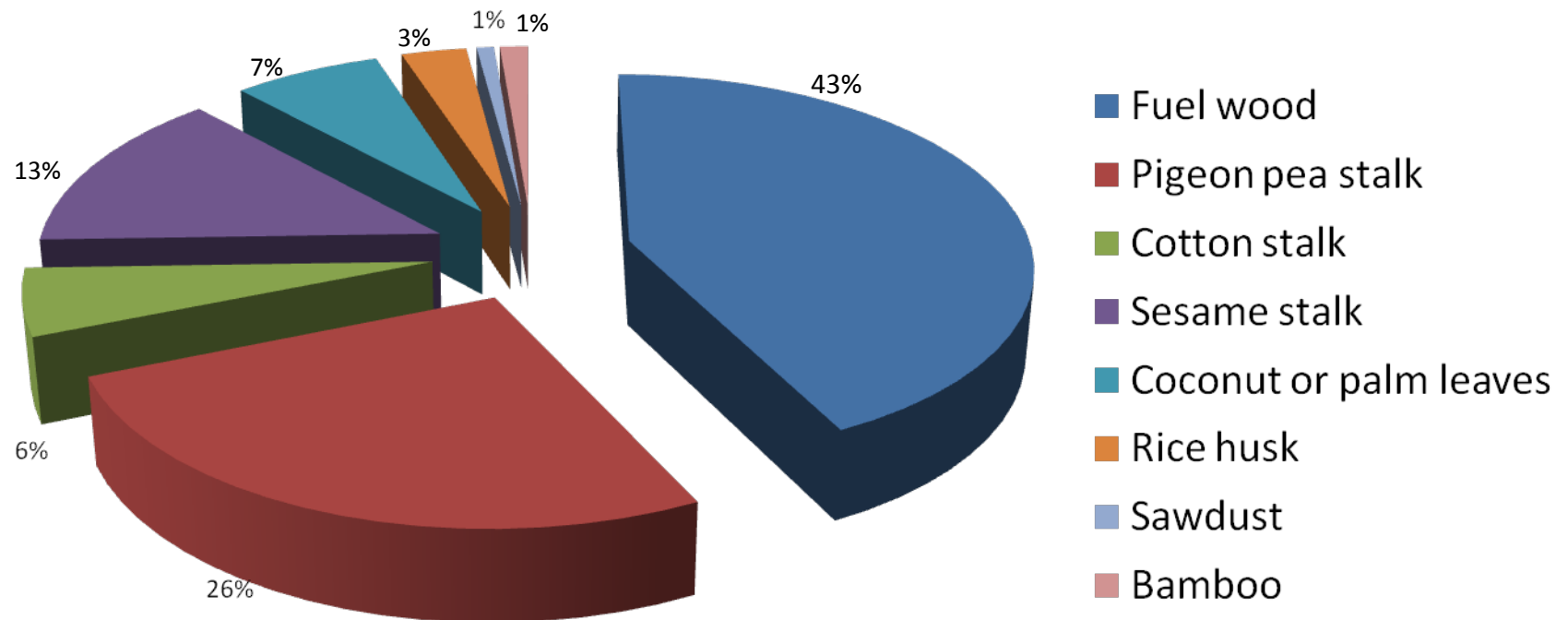
(per household per annum)

Sr.	Biomass Sources	Dry Ton	Percent
1	Fuel wood	3.76	42.7 %
2	Pigeon pea stalk	2.3	26.2 %
3	Cotton stalk	0.5	5.6 %
4	Sesame stalk	1.2	13.6 %
5	Coconut or palm leaves	0.6	6.8 %
6	Rice husk	0.3	3.0 %
7	Sawdust	0.07	0.8 %
8	Bamboo	0.12	1.3 %

Source: U San Thein, Ministry of Agriculture and Irrigation, Myanmar

# Biomass consumption in rural area

(% per household per annum)



Source: U San Thein, Ministry of Agriculture and Irrigation, Myanmar

# Justification for Bio-fuel in Myanmar

- Alleviating longer term fossil fuel deficit
- Biomass is a largest contributing energy source in Myanmar (low cost Vs. environmental consequences)
- Almost 6 mil ha still available for biofuel crops without displacing 11 mil ha food and industrial crops
- Jatropha planted area more than 1 mil ha
- Ensuring rural energy security and employment generation
- Myanmar at present has no serious competition between food and fuel crops

# Potential Biomass Energy Sources available in Myanmar

- Bio-ethanol
  - Sugarcane, maize, cassava, sorghum, sweet sorghum, potato, toddy palm, nipa palm, root crops
- Bio-diesel
  - Palm oil, rapeseed, jatropha, coconut, niger, neem seed, cotton seed, soy bean, sesame, peanuts
- Gasification
  - Rice husk, sawdust, waste of forest products, agricultural waste, urban waste
- Biogas
  - Livestock wastes

# Area and Production of Ethanol Producing Crops in Myanmar (2008-09)

Crops	Growing Area (000 ha.)	Production (000 MT)	Potential Ethanol Supply (m gal)
Sugarcane	308	17,157	309
Cassava	22	296	30
Sorghum	210	241	2
Maize	347	1,519	81
Potato	37	553	n.A
Sweet Potato	7	45	n.a

Source: Ministry of Agriculture and Irrigation, Myanmar

# Development of Bio-ethanol Plants in Myanmar



Sugarcane



150,000 GPY (2003)



900,000GPY (2007)



900,000 GPY (2005)



9,000,000 GPY (2008)



# Area and Production of Bio-diesel Producing Crops in Myanmar (2008-09)

Crops	Growing Area (000 ha.)	Production (000 MT)	Potential Oil Supply (000 MT)
Oil palm	105	261*	52**
Niger	145	83	30
Rape seed	87	71	22
Sunflower	857	773	218
Sesame	1552	833	334
Groundnut	813	1,243	358
Soybean	165	243	29
Coconut	53	350 (copra)	350 (copra)
Jatropha	2,722	6	3

\* Fresh fruit bunch \*\* Crude Oil

Source: Ministry of Agriculture and Irrigation, Myanmar

# Development of Bio-diesel Production in Myanmar



Jatropha Plantation



Jatropha Fruits



Jatropha Seeds



Crude Oil Expeller



Demonstration Unit  
(Continuous Type)



Demonstration Unit  
(Batch Type)

# Gasification



Saw Dust



Gas Generator



Gasifier Units (Saw Dust)



Gasifier (Rice Husk)



Gasifier (Rice Husk)



# Bio-gas



Almost completed biogas tank in a village



Final finishing



Erecting the lighting posts



Generator utilizing biogas

# Potential and Options for Future Strategy

# Prospects for Myanmar on Biomass Energy Development

## Opportunities

- Uncultivated Land (5.9 mil ha) no competition with present food crop areas
- Low labor cost and low-cost feedstocks
- Diverse agro-ecological conditions
- Strategic geographic locations
- CDM

## Constraints

- R & D and technology
- Human Resource Development (HRD)
- Facilitation of trade and investment (local+FDI)
- Public-Private partnership
- Supportive policies favorable for all the stakeholders in biofuel value chains

# Future Policy Options for Myanmar

- Formulation of **pro-poor based land use policy** for biofuel crops in cultivable waste land
- **Institutional capacity building** in terms of R&D and advanced technology for **SME** for the whole value chain
- Appropriate **trade and investment environment** for both locals and **FDI**
- **Supportive policies** of the new government

Thank you for your  
kind attention!