STATUS OF BIOMASS RESOURCE ASSESSMENT IN GHANA

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FAO HEADQUARTERS
PRESENTATION OUTLINE

• Country Background

• Overview of Ghana’s Energy Situation

• Bioenergy Production

• Woodfuel Supply and Consumption

• Main Cooking Fuels in Ghana

• Cookstoves (Traditional and Improved stoves)

• Activities Initiated

• Relevant individuals, groups and agencies in Ghana in bioenergy resource assessment effort

• Gaps

• Next Steps
COUNTRY BACKGROUND

• **Location**
  Latitudes 4° 44’N and 11° 11’N and
  Longitude 3° 15W and 1° 2’E.

• **Area (Land: Water)**
  238,539 km² (235264 km²: 3,275 km²)

• **Climate (Average Temperature: Average Rainfall)**
  Tropical with 2 major seasons dry and wet (30°C: 807mm)


• **Type of Government:** Democracy

• **Economy**
  – Real GDP growth rate (2011): 14.6%.
  – Inflation (August 2012): 9.5%
OVERVIEW OF GHANA’S ENERGY SITUATION

- Electricity Access (Sept 2012) 74%
- Electricity Installed capacity (2011) 2,170MW
- Electricity generation (2011) 10,166GWh
- Crude oil production (2011 av.) 80,000b/day

- Energy Resources:
  - Solar energy 4.5-6.0kWh/m²/day
  - Wind energy (along coast) 5.0 m/s at 12 metres height
  - Hydro 2,500MW (1,580 exploited)
  - Bui hydro power 400MW (Under construction)
PRIMARY ENERGY SUPPLY IN GHANA

- Biomass: 72.0%, 6,600toe
- Crude oil: 22.0%, 2,015.3toe
- Hydro: 6.00%, 532.8toe
BIOENERGY RESOURCES

Woodfuel supply 18 million tonnes /annum
Municipal waste 2 million tonnes/annum;
Wood residue 2 million tonnes/annum
Crop residue 13 million tonnes/annum
Animal waste 11 million tonnes/annum.

Entire land cover has potential for energy crop / biofuel cultivation.
## BIOENERGY PRODUCTION

<table>
<thead>
<tr>
<th>BIOENERGY TYPE</th>
<th>TJ/YR</th>
<th>NATIONAL PRODUCTION (TOE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL BIOENERGY</strong></td>
<td>104.0</td>
<td>6,617,510.5</td>
</tr>
<tr>
<td>LIQUID FUELS</td>
<td>0.04</td>
<td>0.9</td>
</tr>
<tr>
<td>GASEOUS FUELS</td>
<td>0.3</td>
<td>33.3</td>
</tr>
<tr>
<td>SOLID FUELS</td>
<td></td>
<td>6,615,000.0</td>
</tr>
<tr>
<td>• Firewood</td>
<td></td>
<td>2,870,000.0</td>
</tr>
<tr>
<td>• Charcoal</td>
<td></td>
<td>3,745,000.0</td>
</tr>
<tr>
<td>ELECTRICITY, HEATING AND COOLING</td>
<td>103.7</td>
<td>2,476.3</td>
</tr>
<tr>
<td>• Co-generation (Timber Firms)</td>
<td>57.0</td>
<td>1,358.6</td>
</tr>
<tr>
<td>• Co-generation (Oil palm Firms)</td>
<td>46.7</td>
<td>1,117.8</td>
</tr>
</tbody>
</table>

*Source: Institute of Industrial Research, Council for Scientific and Industrial Research*
## WOODFUEL SUPPLY AND CONSUMPTION IN GHANA

### WOODFUEL SUPPLY (kilotonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood</td>
<td>7,100</td>
<td>8,000</td>
<td>8,300</td>
<td>8,600</td>
<td>8,700</td>
<td>8,800</td>
<td>8,900</td>
<td>9,000</td>
<td>9,100</td>
<td>9,200</td>
<td>9,400</td>
<td>9,500</td>
</tr>
<tr>
<td>Charcoal</td>
<td>6,250</td>
<td>6,500</td>
<td>6,750</td>
<td>7,000</td>
<td>7,150</td>
<td>7,300</td>
<td>7,700</td>
<td>8,000</td>
<td>8,500</td>
<td>8,700</td>
<td>8,900</td>
<td>9,100</td>
</tr>
<tr>
<td>Total</td>
<td>13,350</td>
<td>14,500</td>
<td>15,050</td>
<td>15,600</td>
<td>15,850</td>
<td>16,100</td>
<td>16,600</td>
<td>17,000</td>
<td>17,600</td>
<td>17,900</td>
<td>18,300</td>
<td>18,600</td>
</tr>
</tbody>
</table>

### WOODFUEL CONSUMPTION (kilotonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood</td>
<td>7,100</td>
<td>8,000</td>
<td>8,300</td>
<td>8,600</td>
<td>8,700</td>
<td>8,900</td>
<td>10,050</td>
<td>10,200</td>
<td>10,300</td>
<td>10,500</td>
<td>11,205</td>
<td>11,355</td>
</tr>
<tr>
<td>Charcoal</td>
<td>1,563</td>
<td>1,625</td>
<td>1,688</td>
<td>1,750</td>
<td>1,788</td>
<td>1,825</td>
<td>1,925</td>
<td>2,000</td>
<td>2,125</td>
<td>2,175</td>
<td>2,262</td>
<td>2,275</td>
</tr>
<tr>
<td>Total</td>
<td>8,663</td>
<td>9,625</td>
<td>9,988</td>
<td>10,350</td>
<td>10,488</td>
<td>10,725</td>
<td>11,975</td>
<td>12,200</td>
<td>12,425</td>
<td>12,675</td>
<td>13,287</td>
<td>13,630</td>
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</tbody>
</table>

*Source: Energy Commission*

*2005 onwards are projection*
MAIN COOKING FUELS IN GHANA 2010

- Charcoal: 33.7%
- Wood: 40.1%
- LPGas: 18.2%
- No Cooking: 5.6%
- Crop residue & Others: 1.2%
- Kerosene: 0.7%
- Electricity: 0.5%

Source: GSSD: 2010 Pop. Census
The increase in LPG and charcoal can be attributed to the improving standard of living and the subsidy on LPG fuel. Kerosene and electricity as clean fuel option is declining.

*Source: GSSD, 2010 Pop. Census*
TRADITIONAL COOKSTOVES USED IN GHANA

3-Stone Stove

- Main Construction Material is 3-stones

Advantages
- No construction cost
- No professional skill required for construction.
- No Kitchen or Shed Required against stove damage by rain
- No maintenance required - very durable
- Stove position is changeable
- Cooks fast
- Suitable for preparation of all kinds of local food (banku)

Disadvantage
- Very low fire safety against children
- Emits smoke in cooking environment
- High fuel consumption
Automobile Rim Stove

Advantages
- Main Construction Material - Rim of vehicle tyre
- Low construction cost - $6-10
- Professional skill required for fabrication.
- Purchased off the shelf at main market centres.
- No Kitchen or Shed Required against stove damage by rain
- No maintenance required - very durable
- Stove position is changeable
- Cooks fast
- Suitable for preparation of all kinds of local food (banku)
- Stable for pots

Disadvantage
- Emits smoke in cooking environment
- High fuel consumption
IMPROVED COOKSTOVES AVAILABLE IN GHANA

• AHIBENSO

• GYAPA
PREVIOUS WORK ON BIOMASS RESOURCE ASSESSMENT IN GHANA

• Biomass Resource Assessment in Nuhaley and Jana – by KITE (February 2011)
  – Total available residue in Nuhaley and environs from maize and cassava are 52 and 131 metric tonnes respectively per annum.
  – The energy potential of maize residue from Nuhaley alone was estimated at 140,892 MJ (141GJ) of energy with translates into 4.6kW of power.
  – Residue from cassava on the other hand has the potential to generate 92,111 MJ (92GJ) which is equivalent to 3kW of power.
The following dataset was collected:

- Data on crops
- Data on agriculture tractors
- Data on abattoirs and slaughter houses
- Data on liquid and solid municipal waste
- Data on saw mills
- Data on woodfuel and charcoal
BIOENERGY POLICY DEVELOPED

• The Environmental Protection Agency of Ghana is conducting a Strategic Environmental Assessment on Ghana’s Bioenergy policy.
Consultants have been shortlisted to submit RFPs for bioenergy resource assessment.
GHANA SE4ALL ACTION PLAN DEVELOPED

- Promote the use of LPG as substitute for fuelwood and charcoal to increase the access of households to LPG as main cooking fuels to 50% by 2020

- Promote the production and use of improved and more efficient woodfuel utilization technologies (e.g. improved cookstoves).

- Support the sustained regeneration of woody biomass resources through legislation and fiscal incentive.

- Promote the establishment of dedicated woodlots for woodfuel production.

- Promote the production and use of other wood fuel energy resources (waste, biofuels).
## RELEVANT MINISTRIES, AGENCIES AND GROUPS IN GHANA THAT CONTRIBUTE TO THE BIOMASS RESOURCE ASSESSMENT EFFORT

<table>
<thead>
<tr>
<th>MINISTRIES</th>
<th>AGENCIES</th>
<th>GROUPS (PRIVATE SECTOR/NGO’S/CSO ETC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Energy</td>
<td>Energy Commission</td>
<td>The Energy Center</td>
</tr>
<tr>
<td>Ministry of Environment Science &amp;</td>
<td>Environmental Protection Agency</td>
<td>Kwame Nkrumah University of Science and Technology</td>
</tr>
<tr>
<td>Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ministry of Food and Agriculture</td>
<td>National Development Planning Commission</td>
<td>University of Ghana</td>
</tr>
<tr>
<td>Ministry of Local Government and Rural</td>
<td>Council for Scientific and Industrial Research</td>
<td>Abantu for Development</td>
</tr>
<tr>
<td>Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ministry of Lands and Natural Resources</td>
<td>Forestry Commission</td>
<td>Kumasi Institute of Technology and Environment (KITE)</td>
</tr>
<tr>
<td>Ministry of Women and Children's Affairs</td>
<td>Ghana Statistics Service</td>
<td>Centre Energy Environment and Social Development</td>
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<tr>
<td></td>
<td></td>
<td>EnterpriseWorks Ghana</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Toyola Energy Limited</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New Energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jeavco Ltd</td>
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<tr>
<td></td>
<td></td>
<td>GRATIS Foundation</td>
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<tr>
<td></td>
<td></td>
<td>Energy Foundation</td>
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</tbody>
</table>
NEXT STEPS

• Comprehensive biomass resource assessment should be conducted at the District, Regional and National level to establish the actual biomass potential in Ghana.

• A well-equipped energy database centre should be set up preferably at Energy Commission to collate all energy data for storage and analysis.
CONCLUSION

• Even though some work has been done in this field, most of the bioenergy resource assessments have been conducted on pilot basis and there is therefore not enough data available at the national level.

• Also resource assessments that have been conducted by different institutions and organisations have not been put together to obtain a comprehensive report. There is therefore the need to ensure that the relevant agencies mandated to conduct such assessments are well equipped and resourced to perform their function.
THANK YOU ALL