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THE POTENTIAL OF USING WOOD RESIDUE FOR ENERGY GENERATION IN GHANA

By

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INTRODUCTION

- About 49% of total wood volume is left as residue.
- Hence, the industry does not make its full potential of its economic contribution.
- Options for efficient utilization of wood residue include: briquette production, co-generation, fuelwood for energy, etc.

Introduction cont'd

- Briquette production for household energy can substantially reduce 90% of firewood harvested from the forest.
- If firewood consumption continues, Ghana is likely to consume more than 25 million tonnes of wood fuel by year 2020.
- Co-generation for energy supply is yet to be adopted.

CO-GENERATION CONT'D

- The level of hydro–power generated in Ghana is low.
- There has been power curtailment and rationing due to drought situations that has affected the water levels.
- Electricity tariffs have therefore gone up considerably.

CO-GENERATION CONT'D

- Energy through co-generation could be used to produce steam for
  - steaming peeler blocks for plywood manufacture.
  - drying of lumber

    And electrical power
  - to reduce the mills dependency on the national grid.

CO-GENERATION CONT'D

- The co-generation is more attractive than the conventional power and heat generating options due to:
  - ❖Its relatively lower capital investment.
  - ❖Reduced fuel consumption.
  - ❖Reduced environmental pollution
- Currently, Ghana's total energy generating capacity is about 65% of the national peak demand, which is growing at a rate of 15% per annum.

WOODFUEL

- It exists in three main forms: firewood, charcoal (termed fuelwood) and briquette.
- Gross national woodfuel consumption is estimated at 18 million tonnes per annum.
- 90% of the woodfuel supply in Ghana is obtained directly from the natural forest.
- Woodfuel accounts for about 71% of total energy demand.
- Petroleum accounts for about 20% and electricity accounts for about 9%.

A. Briquette

- Briquette is the preferred fuel by bakers and brick and tile factories in Ghana.
- Its introduction was characterized by suspicion, lack of confidence and unfair comparison with fuelwood (charcoal and firewood) in price and charcoal in quality.
- However, the product is not in the market.
- Demand in the capital city by the bakery industry is high.
- There is a need for a pilot plant.

B. Firewood

- This is the cheapest of the three (Firewood, Charcoal and briquette).
- It is used mostly in the rural and peri-urban areas where income levels are low.
- It is bulky to transport over long distance which makes delivery cost very high.
- Not convenient to use due to the smoke and sparks.

C. Charcoal cont'd

- Most of the charcoal producers use earth kiln method.
- Wood residues are converted to charcoal in the vicinity of mills (rural areas).
- Charcoal is easy to transport.
- It is used mostly for domestic purposes in the urban and wood deficient areas.
- It is also used in boarding institutions, hospitals, restaurants, chop bars, in forges by blacksmiths, gold-and silversmiths, etc.

Policy considerations on woodfuel use in Ghana

- Support for the forestry sector to ensure sustainable management of the country's natural forests and woodlands.
- Ensure the design and implementation of a regulatory framework for commercial transportation and marketing of woodfuel.
- Regulate charcoal exports to ensure that only charcoal from wood waste and planted forest are exported.

Policy considerations cont'd

- Establish the needed institutional framework to ensure and co-ordinate woodfuel related activities as an integral part of national energy development.
- Promote improved technologies and higher levels of efficiency in the production of charcoal and use of woodfuels.
- Support the development , promotion and introduction of alternative fuels for the substitution of woodfuels.

Characteristics of different types of wood processing residues

Table 1: Moisture content (Wet basis) of some selected wood species sawdust and bark

Species	Mean Moisture content (%) (Wet basis)	
	Sawdust	***Bark***
Triplochiton scleroxylon	43.90	53.39
Antiaris toxicaria	41.76	59.19
Ceiba pentandra	60.00	40.02
Pterygota macrocarpa	42.72	40.30
Guibourtia ehie	48.76	32.04
Pycnanthus angolensis	47.75	56.83

Table 2: Ash content of some selected wood species.

Species	Ash content (%)	
	wood	Bark
Triplochiton scleroxylon (ts)	4.00	8.00
Antiaris toxicaria (at)	2.00	14.00
Ceiba pentandra (cp)	4.00	6.00
Cordia alliodora (ca)	2.26	2.54
Pterygota macrocarpa (pm)	3.98	10.12
Guibourtia ehie (ge)	1.35	9.58
Pycnanthus angolensis (pa)	2.93	10.00

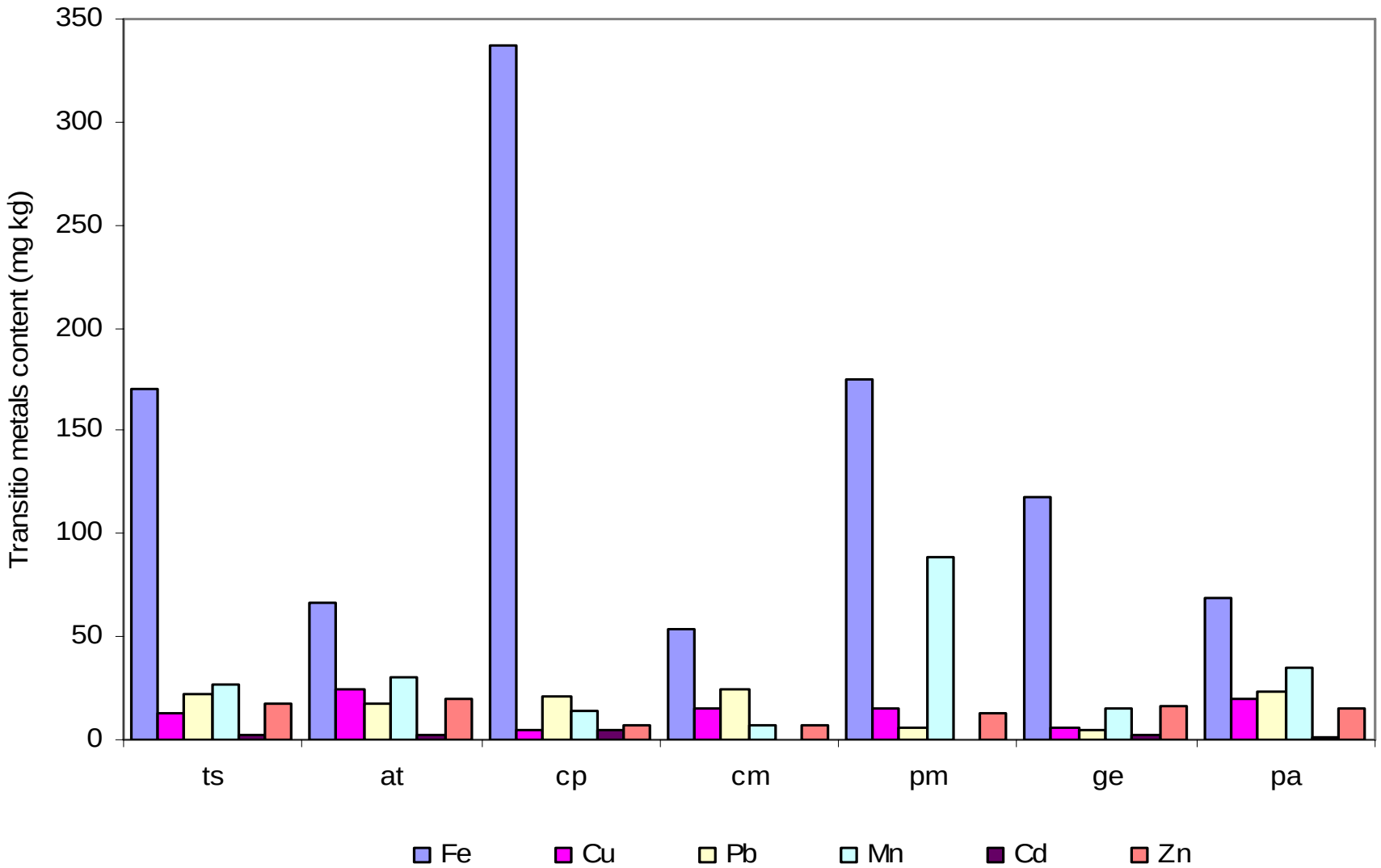

Fig. 2: Transition metals content of ash (wood) of some selected wood species

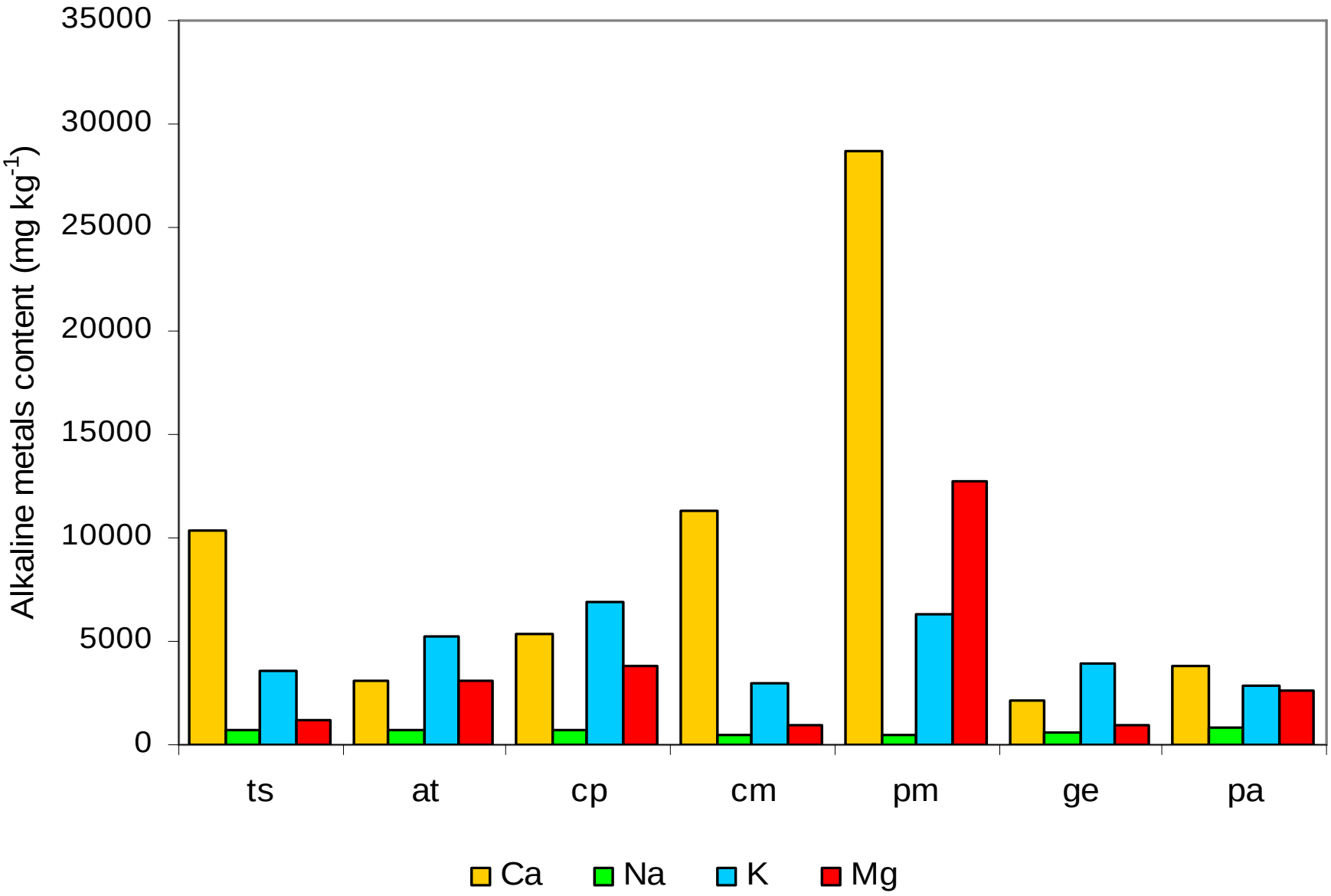

Fig. 4: Alkaline metals content of ash (wood) of some selected wood species

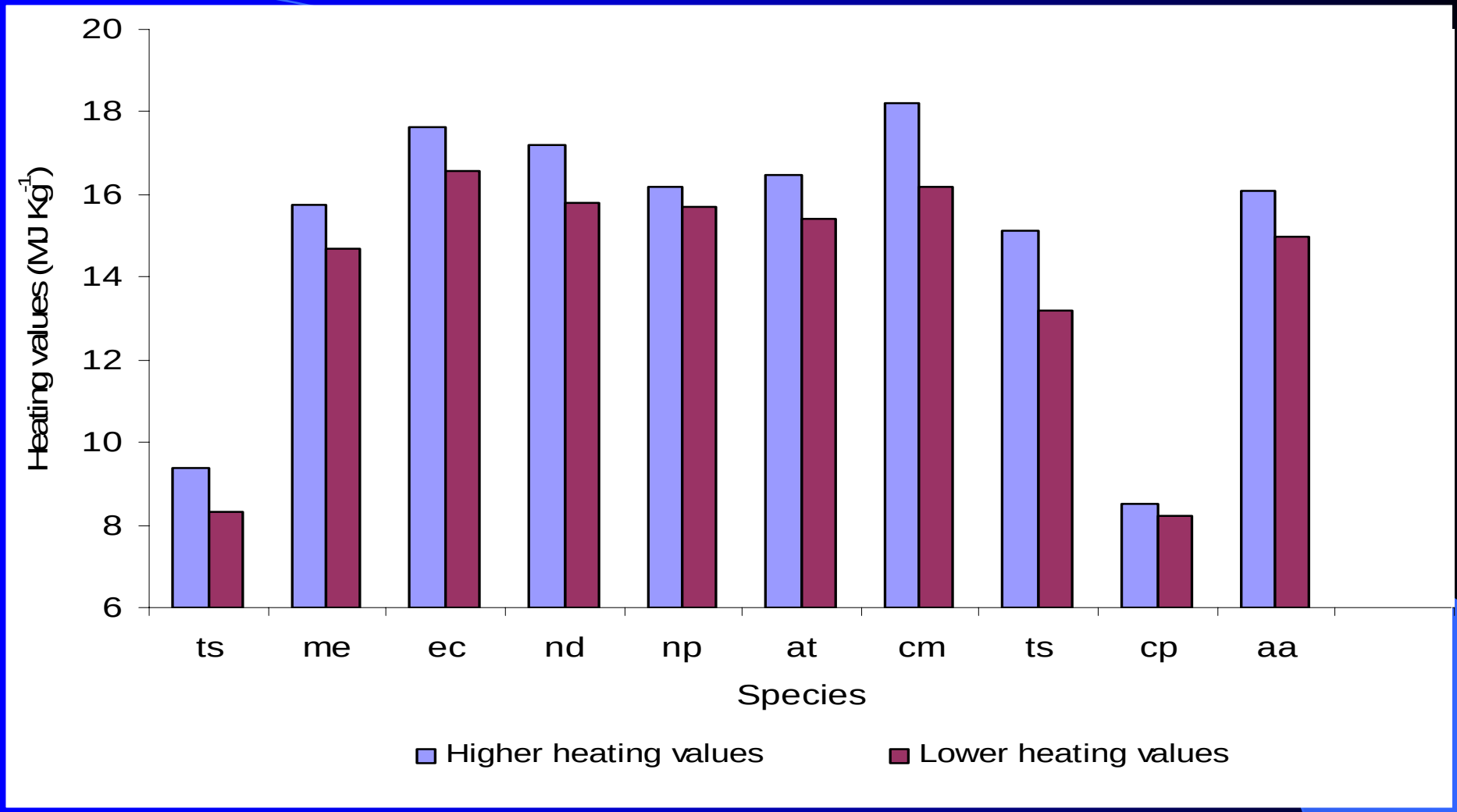

Figure 6: Higher and lower heating values for 10 hardwood species at oven-dried and at 12% moisture content

ts-Triplochiton scleroxylon, me-Milicia excelsa, ec-*Entandrophragma cylindricum*, nd-*Nauclea diderrichii*, np-*Nesogordonia papaverifera*, ti-*Terminalia ivorensis*, cm-*Celtis mildbraedii*, ts-*Terminalia superba*, pa-*Pycanthus angolensis*, cz-*Celtis zenkeri* cp-*Ceiba pentandra*, aa-*Afzelia africana,* at-*Antiaris toxicaria*

AVAILABILITY OF WOOD RESIDUE FROM THREE TIMBER MILLS

Production lines of the Timber mills

1. **Asuo Bomosadu Timbers and Sawmills Ltd (ABTS)**
   - ***Sawmill & Moulding***
   - ***Plymill***
2. **Logs and Lumber Ltd (LLL)**
   - ***Silcer Veneer***
   - ***Rotary veneer and Plywood***
   - ***Sawmill***
3. **Omega Wood Processing Mill Ltd (OWPL)**
   - Plymill
   - Sawmill

A) Asuo Bomosadu Timbers and Sawmills Ltd (ABTS

- Ply mill section
- Rotary cutting veneer core = 20%
- Defective sheets total = 20% of the log input.
- Sawdust = 12%.
- 20% of the residues (solids) ☞ secondary processing of which 10% comes off as sawdust.
- Residues that are not re-processed include slabs, bark, sapwood edgings and defective material.
- Altogether these constitute 38% of the initial log input

B) Logs and Lumber Ltd

Ply mill section

- One month total logs for sliced veneer production yielded the volume of 1,933.353 m^3
- The residues generated from the slicer veneer section are:
- The off-cuts were 20.2%
- Slabs and edgings were 7.2%.
- Slicer rejects (defective veneer) were 55.9% during processing.

Omega Wood Processing Co. Ltd

Ply mill section

- The total volume of wood residue from the total log input was 2586.708m^3 (64.54%).
- The total monthly average volume of bark, sawdust and off-cuts were 966.730m^3 (24.12%).
- The total monthly average volume of residue (veneer core, trimmings and defective veneer and plywood) was 1617.979m^3 (40.37%)

Plate 1: Mixed residue being burnt in the open air

Plate 2: Veneer core at dumping site

Table 6: Daily input & output volumes and % wood residue generation

Species	Input vol. (m^3/)	Export vol. (m^3)	Lumber rejects	Offcuts, slabs & Sawdust (%)	Recovery (%export)
Pterygota macrocarpa	77.984	23.736	9.544	57.34%	30.43%
Entandrophragma angolense	35.832	11.507	11.451	35.93%	32.11%
Triplochiton scleroxylon	76.916	27.673	3.602	59.34%	35.97%
Milicia excelsa	39.062	6.907	7.653	53.15%	27.26%

Table:9 the monthly log input for veneer and plywood production and residue generation for 7 months

Month	Total log vol. m^3	Total vol. of bolts and flitches from log inputs	Total vol. Of veneer and plywood	Total vol. of residue from production line	Total vol. of bark, Offcuts and sawdust	Vol. of wood residue from total input	% of total residue of log input
Jan	5198.97	2838.97	1745.95	2150.53	1302.31	3453.03	66.54
Feb	4056.28	3028.08	1442.64	1562.11	1052.21	2613.64	64.43
March	3307.03	3896.48	1138.98	1415.84	752.22	2168.05	65.61
April	3925.09	3004.72	1557.21	1452.53	915.45	2367.88	60.33
May	4623.17	2554.82	1630.91	1921.24	1071.41	2992.27	64.72
June	3204.67	3009.72	1024.42	1417.32	762.90	2180.25	68.01
July	3708.48	3552.14	1364.14	1474.83	869.51	2344.33	63.20

Plate 3: Mixture of wood residues

Conclusions

1. The wood residues generated from mills include sawdust, shavings, trimmings, slabs, veneer core, defective veneer, edgings, Offcuts and barks.
2. Recoveries of export products are still very low.
3. Most mills in Ghana generate an average annual wood residue of 33.3%.
4. Wood is still the largest and the dominant source of energy and it will remain the largest single resource for the foreseeable future.
5. There is the trend towards the increased use of sawdust as a boiler feed for energy generation.
6. Wood residue is suitable for energy generation.

Thank you for your attention