**Presentation 2.6:** Wood waste for energy: lessons learnt from tropical regions

**Paul Vantomme**  
Assistant Director  
International Tropical Timber Organization  
E-mail: vantomme@itto.or.jp

**Abstract**  
ITTO is an intergovernmental organization established in 1986 by the International Tropical Timber Agreement (ITTA, 1983). ITTO contributes to global policy work in tropical forestry by funding studies, activities and field projects in its member countries.

Improving tropical forest logging practices, higher efficiency in processing of forest products with more value adding, and promoting the use of wood waste to increase energy efficiency and reduce fuel costs at the mills are the main components of the policy and project work of the Forest Industry Division.

Examples are given from policy studies and from lessons learnt from field projects on the type and volumes of wood waste generated by the timber processing industry in tropical countries. Major opportunities and challenges are highlighted for introducing appropriate policies and technological innovations to promote the use of wood waste for energy production. Not only the financial viability of the process needs to be guaranteed but also environmental and sustainable forest management criteria need to be met.
WOOD WASTE FOR ENERGY: LESSONS LEARNT FROM TROPICAL REGIONS

by the
INTERNATIONAL TROPICAL TIMBER ORGANIZATION (ITTO)

CONTENT

1) What is ITTO? How does it work? How does ITTO promotes wood waste as a source for energy?

2) Processing tropical timber: What is wasted, how much, where, use?

3) Wood waste for energy: lessons from projects in the tropics

4) Conclusions
What is ITTO?

An intergovernmental organization established (1986) by the International Tropical Timber Agreement (ITTA, 1983), negotiated under the auspices of the United Nations Conference on Trade and Development (UNCTAD) as part of that organization’s Programme for Commodities.

The International Tropical Timber Organization - ITTO

Mandate: Promoting sustainable forestry development through trade, conservation and best-practice forest management

- Global Policy work in tropical forestry
- Secretariat of 35 people based in Yokohama, Japan
- US$290 million grants to projects in member countries (160 ongoing)
Membership

ITTO:
• brings together tropical timber producers and consumers countries as equal partners in decision-making
• currently has 59 members

ITTO membership represents:
• over 90% of world tropical timber trade
• almost 80% of the world’s tropical forests

ITTO – Wood Waste for Energy

Working with member countries, government agencies, NGOs, local communities and private sector for REDUCING waste:

✓ REDUCED IMPACT LOGGING: to harvest forests without destroying them (less waste)

✓ VALUE ADDING and HIGHER EFFICIENCY in processing of forest products by reducing & recycling processing waste

✓ WOOD WASTE for BIOENERGY: to increase efficiency of energy production and reduce fossil fuel consumption at the mill
### Examples of Projects on Bio-Energy

<table>
<thead>
<tr>
<th>Title</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development of energy alternatives for the efficient utilization of wood processing residue for co-generation and briquette production</td>
<td>Ghana</td>
</tr>
<tr>
<td>Processing and utilization of logging residues through collaboration with local communities and forest industries</td>
<td>Ghana</td>
</tr>
<tr>
<td>Research and development in energy alternative from biomass through briquetting</td>
<td>Malaysia</td>
</tr>
<tr>
<td>Increasing the efficiency in the tropical timber conversion and utilization of residues from sustainable sources Increasing utilization efficiency and the reduction of losses and waste throughout the production chain</td>
<td>Brazil Cameroon</td>
</tr>
</tbody>
</table>

### Ongoing Policy Work

- Promoting the recovery of logging and wood-processing waste for recycling and energy


Focus on needs and challenges of timber producers in the tropics
2) Processing tropical timbers: What is wasted, how much, where?

General characteristics wood processing industry in the tropics

- Non-integrated, small, scattered mills, supply from natural forests, reduced log supplies, limited range of products (saw/ply), low technology & investment growth through increase efficiency – no longer by expanding logging area

What is waste?

- FOREST: Logging, road & infrastructure construction
- MILLS: Industrial wood waste from primary processing

Amazon wood waste case study

Logging Residues

- Buttress
- Cross-cutting residues
- Crown/branches

Logs left in the forest

- Logs rejected or left at loading station

- Water way transportation

- Cross-cutting residues

- Damaged log (fungi, insects, checks, etc.)

Primary Processing

- Bark
- Core
- Stubs
- Sawdust

Shorts

- Trimmings
- Veneer waste

- Defective pieces caused by processing
Estimate on Forest Logging Residues in the Amazon Region

- Extracted log: 55%
- Stump: 4%
- Buttress: 4%
- Stem offcuts: 10%
- Crown*: 25%
- Other: 2%

Wood Waste Generation in the Amazon Region by Sawmill and Plywood/veneer Industry

<table>
<thead>
<tr>
<th>Activity</th>
<th>Range of losses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log yard operations</td>
<td>5-10</td>
</tr>
<tr>
<td>Sawing</td>
<td>40-45</td>
</tr>
<tr>
<td>Grading</td>
<td>2-5</td>
</tr>
<tr>
<td>Storage</td>
<td>3-5</td>
</tr>
<tr>
<td>Total</td>
<td>50-65</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity</th>
<th>Losses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log yard operations</td>
<td>4</td>
</tr>
<tr>
<td>Peeling process</td>
<td>30</td>
</tr>
<tr>
<td>Veneer preparation (drying, jointing, gluing, etc.)</td>
<td>7</td>
</tr>
<tr>
<td>Plywood manufacturing process (sanding, trimming, etc.)</td>
<td>8</td>
</tr>
<tr>
<td>Storage</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
</tr>
</tbody>
</table>
Logistic Residues and Wood Waste Generation by Tropical Timber Industry in the Amazon

<table>
<thead>
<tr>
<th>Type of residue</th>
<th>Volume</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>million m$^3$</td>
<td>%</td>
</tr>
<tr>
<td>Logging residues</td>
<td>28.0</td>
<td>57</td>
</tr>
<tr>
<td>Industrial residues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sawmills</td>
<td>20.0</td>
<td>40</td>
</tr>
<tr>
<td>Plywood plants</td>
<td>1.2</td>
<td>2</td>
</tr>
<tr>
<td>Other processing plants</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>21.7</td>
<td>43</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>49.7</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Logistic Residues and Wood Waste Generation by Tropical Timber Producers

<table>
<thead>
<tr>
<th>Production (M m3)</th>
<th>Waste%</th>
<th>Waste Volum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>L.Am</td>
<td>Africa</td>
</tr>
<tr>
<td>Logs</td>
<td>74</td>
<td>36</td>
</tr>
<tr>
<td>Sawn</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Plyw</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Ven</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Total</strong> wood waste estimate (million m3)</td>
<td><strong>162</strong></td>
<td></td>
</tr>
</tbody>
</table>
uses for wood waste

CHIPS
CHARCOAL
PELLETS
BRIQUETTES
COMPOSTING, MULCH: event. with CH4 recovery
SAWDUST & flakes: absorbent for accidental chemical spills

MILL: heat, steam (drying) improve boiler efficiency
Electricity cogeneration

POWERPLANT: Energy production

3) Lessons learnt from projects

Brazil: “Increasing the efficiency in the tropical timber conversion and utilization of residues from sustainable sources”
Biomass availability for Energy production studied at 4 sites
Mills:
Financially viable: use of industrial processing waste and logging residues (till 50 km)
harvesting of non-commercial species for energy is NOT (high costs + jeopardizing SFM)

Power plants: (2 MWH) (2-10 MWH)
NOT VAILABLE: industrial waste (>50 Km) and logging waste (all)
- Subsidies for fuel oil (hydro power)
- Legal impediment for use of forest harvest residues (taxes,?)
- Seasonality of raw material supply + ? Sustainability > 15 year

(Viable if developed jointly with the expanding agri-business (for ex. drying soybeans, or by using agri-business waste)
3) Lessons learnt from projects

Malaysia: “Research and development in energy alternative from biomass through briquetting”

legal environmental restrictions on dumping / burning sawdust (Klang municipality)

• Financial viability
  Incentives (reductions in taxes, import duties,....)
• Technology transfer and marketing support package (FRIM + ITTO project)
3) Lessons learnt from projects

**Ghana:** “Processing and utilization of logging residues through collaboration with local communities and forest industries”

- Social constraints: availability of wood waste for energy is limited due to recovery by local communities (logging & mill waste)
- Developing Public - Private - Local community’s partnerships & enabling policy framework
Conclusions

Major constraints for waste recycling

Uncertainty in log supply from natural forests
- Smaller diameter logs, SFM, legality, ....

High waste throughout the entire supply chain
- for ex. Log export bans – low price of logs for local market

- Narrow range of products (saw, ply, veneer) in a non-integrated, fragmented industry structure, and with a distant location to reconstituted panels/products manufacturing (lack of vertical and horizontal integration)

- Heterogeneity of waste and long transport distances

- Lack of data on availability on wood waste limits investors’ interest in waste recycling

- Lacking Policy, Institutional & Incentive support
  - insufficient investment in Human resources & equipment,
  - inadequate enforcement of environmental, labor regulations..
Recommendations for Actions by tropical producers

- **Policy Development**: Detect & Remove conflicting taxation - forest policies; more stringent standards for reducing waste into C&I of SFM, certification and processing; incentives for reducing waste – lower CO2 emissions; tighter integration of industry;

- **Market Development**: identify and expand market opportunities for engineered products made from recycling wood waste;

- **Technological Development**: Improved efficiencies in wood processing and wood combustion technologies

- **Skill Development**: upgrading and capacity building; facilitate dissemination of information and consultations; technology transfer; R&D; enhance consciousness for reducing waste

Thank you
### Producer member countries

<table>
<thead>
<tr>
<th>Africa</th>
<th>Asia</th>
<th>Latin America</th>
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</thead>
<tbody>
<tr>
<td>Cameroon</td>
<td>Cambodia</td>
<td>Bolivia</td>
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<tr>
<td>Central African Rep.</td>
<td>Fiji</td>
<td>Brazil</td>
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<tr>
<td>Congo</td>
<td>India</td>
<td>Colombia</td>
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<td>Cote d’Ivoire</td>
<td>Indonesia</td>
<td>Ecuador</td>
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<tr>
<td>Dem. Rep. of Congo</td>
<td>Malaysia</td>
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<td>Gabon</td>
<td>Myanmar</td>
<td>Guyana</td>
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<td>Ghana</td>
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<td>Nigeria</td>
<td>Thailand</td>
<td>Panama</td>
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<tr>
<td>Togo</td>
<td>Vanuatu</td>
<td>Peru</td>
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<tr>
<td></td>
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<td>Suriname</td>
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<tr>
<td></td>
<td></td>
<td>Trinidad &amp; Tobago</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Venezuela</td>
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