Managing Supply Chain Emissions to Gain Competitive Advantage

Topics covered

• Background: Nelson Forests Ltd

• Why carbon footprinting is important to Nelson Forests.

• Log emissions

• Lumber emissions

• Using information for competitive advantages
Nelson Forests Ltd

Owns forests and sawmill in Nelson / Marlborough

- 63,000ha of forest
  - Harvest ~ 1,000,000 m³
  - 65:35 domestic : export

- Kaituna sawmill
- log input ~ 75,000 m³
  - Customers: NZ, Aus, Europe, Asia, US

Project Drivers

Market / commercial
- A low carbon economy is an emerging strategic advantage for wood.
- Proactive engagement with customers helps promote our wood.

Business improvement
- Continuous improvement culture - Analysing supply chain emissions helps identify cost reduction opportunities
- A carbon footprint helps verify “green” credentials - an emerging forest certification requirement

Industry good
- The work further verifies the Forest Industry sustainability credentials.
Methodology

Supply Chain Analysis: Cradle to Market

- Follows International Standards:
  - ISO 14040:2006
  - ISO 14044:2006
  - PAS 2050:2008

Results: Log Products

Embodied GHG emissions of log products

<table>
<thead>
<tr>
<th></th>
<th>Domestic Log</th>
<th>Export Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean distribution</td>
<td></td>
<td>46.4</td>
</tr>
<tr>
<td>Road distribution</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Harvesting operations</td>
<td>8.8</td>
<td>8.8</td>
</tr>
<tr>
<td>Roading operations</td>
<td>3.1</td>
<td>3.1</td>
</tr>
<tr>
<td>Forest operations</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Management activities</td>
<td>0.2</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Kg CO₂e/m³
Components: log emissions

Management Activities
- 26% Staff Air Travel
- 74% Staff Vehicle Travel
- 0% Waste
- 0% Energy Use

Forestry Operations

- 0% Nursery
- 22% Mechanical Land Preparation
- 2% Planting
- 13% Thinning and Pruning
- 24% Herbicide
- 20% Fertilizer
- 4% Inventory
- 7% Other

Log Transport

- 83% Machine Diesel
- 4% Operator Transport
- 4% Machine Transport

- 36% Road Transport
- 64% Ocean Freight

Harvesting Operations

- 83% Machine Diesel
- 6% Oil and Lube
- 6% Crew Transport
- 4% Chainsaw use
- 1% Machine Transport

Sawmill Emissions

Total Emissions - 21,577 t CO₂ eq
- 83% Biomass
- 4% Diesel
- 10% Electricity
- 6% Fuel Oil

Biomass Emissions - 17,949 t CO₂ eq
- 18% In House Shavings
- 41% Imported Shavings
- 37% In House Saw Dust
- 4% Imported Saw Dust

To Be Included
- Land Fill Waste
- Packaging Materials

Electricity Emissions - 2,144 t CO₂ eq
- 63% Kilns
- 4% Treatment
- 31% Green Mill
- 2% Planer
Wood Supply Chain Optimisation 2010

Lumber Product Emissions

Biomass
Waste Oil
Electricity
Logs

Biomass is Carbon Neutral

Structural Lumber 100 kg CO₂e/m³
Wood Chips 25 kg CO₂e/m³
Lumber products: Mill gate

Embodied GHG emissions in our lumber products

Products and Treatments

- Waste Oil
- Cleaning
- Heat
- Embodied emissions Boiler Fuel
- Non CO2 boiler emissions
- Timber Treatment Chemicals
- Sawdust
- Boiler Fuel Transport
- Waste
- Packaging
- Sawdust

Lumber products: Market

Emissions associated with distribution to markets
Carbon storage in lumber gives a negative footprint, even in Spain

Treatments

- Australia
- USA
- Spain
- Invercargill
- Christchurch
- Nelson
Uses: Business improvement

Combined **carbon emissions reduction of 16-25%** could be made across both the log and lumber supply chains with the following initiatives:

<table>
<thead>
<tr>
<th>Priority</th>
<th>Description</th>
<th>CO₂ Reduction</th>
<th>Supply Chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Replace waste oil, with biomass as source of heat for drying saw dust.</td>
<td>10-13%</td>
<td>Lumber</td>
</tr>
<tr>
<td>2</td>
<td>Lobby for an increase in the allowable gross vehicle mass (GMV) of a log truck to at least 50 tonne.</td>
<td>2-3%</td>
<td>Log</td>
</tr>
<tr>
<td>3</td>
<td>Inform log truck drivers on impacts of driver behaviour on fuel consumption.</td>
<td>2-4%</td>
<td>Log</td>
</tr>
<tr>
<td>4</td>
<td>Inform harvesting crews on how machine operators can affect fuel consumption.</td>
<td>&lt;2%</td>
<td>Log</td>
</tr>
<tr>
<td>5</td>
<td>Continue mechanisation and higher utilisation rates.</td>
<td>&lt;1%</td>
<td>Log</td>
</tr>
<tr>
<td>6</td>
<td>Implement material energy audit recommendations related to kiln fans.</td>
<td>&lt;2%</td>
<td>Lumber</td>
</tr>
<tr>
<td>7</td>
<td>Investigate trans-coastal shipping and rail to Christchurch lumber markets.</td>
<td>&lt;1%</td>
<td>Lumber</td>
</tr>
</tbody>
</table>

Uses: Product verification

- **Global retailers**
  - Driving awareness of carbon footprinting

- **Construction industry**
  - “Sustainability and environment” a first priority medium term information need for architects, educators and manufacturers.
  - Global market for green building materials expected to have 5% CAGR reaching US$571b in 2013
  
  Nextgen research June 2009

- **Forest Certification**
  - Carbon footprinting is an emerging criteria in FSC
Uses: Business footprint

<table>
<thead>
<tr>
<th>Carbon Sequestration/storage</th>
<th>2008 (t CO\textsubscript{2}e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre 1990 Forest</td>
<td>-1,371,054</td>
</tr>
<tr>
<td>Post 1989 Forest</td>
<td>-96,090</td>
</tr>
<tr>
<td>Stored carbon in Lumber products</td>
<td>-9,429</td>
</tr>
<tr>
<td></td>
<td>-1,476,573</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emissions</th>
<th>2008 (t CO\textsubscript{2}e)</th>
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</thead>
<tbody>
<tr>
<td>Round Wood Removals</td>
<td>1,040,326</td>
</tr>
<tr>
<td>Forest Operations</td>
<td>1,040,326</td>
</tr>
<tr>
<td>Management Activities</td>
<td>226</td>
</tr>
<tr>
<td>Forestry Operations</td>
<td>697</td>
</tr>
<tr>
<td>Road Building Operations</td>
<td>3,388</td>
</tr>
<tr>
<td>Harvesting Operations</td>
<td>13,644</td>
</tr>
<tr>
<td>Transport Operations</td>
<td>26,606</td>
</tr>
<tr>
<td></td>
<td>44,561</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sawmill Operations</th>
<th>2008 (t CO\textsubscript{2}e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Energy</td>
<td>70</td>
</tr>
<tr>
<td>Electricity</td>
<td>2,158</td>
</tr>
<tr>
<td>Diesel</td>
<td>216</td>
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<tr>
<td>Fuel Oil</td>
<td>1,295</td>
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<tr>
<td>Landfill Waste</td>
<td>998</td>
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<tr>
<td>Petrol</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>4,749</td>
</tr>
</tbody>
</table>

| Total                       | -386,937                    |

Uses: Distribution footprint

Distribution footprint of our products and Australian products in Sydney / Melbourne and Brisbane.
Uses: Green Building

Wood credentials best in class for common structural building materials

CO₂ emissions for a selection of common building materials

Reference: Alcorn, Andrew
Embodied energy and CO₂ co-efficients for New Zealand Building Materials
Centre for Building Performance Research, Victoria University 2003