Wood Fuel from Forest Landings

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Thanks to: Shaun Bowler and Amber Uren

‘Wood Fuel’: we know its out there...

- Approx 1 million tons of ‘residues’ generated per year

Possible increase due to:
- More harvesting
- Declining wood fibre markets
- Mechanised felling and processing
So how can we get it?

NZ

‘Wood Fuel’ Contractors

Energy Market (demand)

Forestry Companies (supply)
UC research project 2009/10

• Study Wood Fuel Contractors
  – System productivity
  – Delivered wood fuel cost

• Final common elements for success
Careful in looking overseas.. i.e. Austria, Italy

Price, cost, conditions...much different

Italy = 180 Mtoe/year

11% renewable (2.7 % biomass)

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2009</th>
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<tbody>
<tr>
<td>Hydro</td>
<td>9.7 Mtoe</td>
<td>10.8 Mtoe</td>
</tr>
<tr>
<td>Wood</td>
<td>2.3 Mtoe</td>
<td>4.1 Mtoe</td>
</tr>
</tbody>
</table>

Estimated potential 25-30 Mtoe!

Pellets  Chips  Firewood
1.2 Mt   2.2 Mt  18.8 Mt!

131 DHP = 370 MWe
26 PP    = 286 MWe
NZ Biomass Recovery Strategy

1. Combined roundwood and energy wood optimisation of revenues and processing costs.
2. Integration of the biomass recovery system into the harvesting operation.
3. Payment (or at least evaluation) by energy content of product.
4. Harvesting and landing configuration impact residues quality and quantity.
5. Drying effect – optimise quality of fuel for transportation.

Case Study 1: Canterbury

John Taylor, Burnside Contractors, Canterbury
- Larger scale wood fuel recovery from super-skids
- Diamond Z Tub-Grinder, Excavator, Front-end loader

→ Hog fuel to local large industrial plant
Case Study 1: Canterbury - Results

2000 – 6000 tonnes of ‘residue’ at landings

Study: ‘old’ versus ‘fresh’ residue
→ %MC stayed the same
→ Old = 8% fines <1mm

Operational Study
→ 75t / day average
→ 4.5 hours shovelling = 1 hour grinder
→ low utilisation of machinery

Case Study 1: Canterbury - Results

• Large volumes = continuous work
• High cost system & operational efficiency low
• Work opportunistic: Clearing dairy farm shelter belts
  → hogging ‘trees’ clearly increased productivity
  + farmers pay for tree removal
Case Study 2: BOP
Shane Hooker, Rotorua

- Extracting residue logs from wind-throw area.

→ Chipwood and or firewood to regional customers

Case Study 2: BOP - Results

Bulk of the volume is in the few largest pieces

Production Study
- Shovel / sort = 65%
- Low mech. and op. delay
→ High equipment utilisation

Simple business model...
→ be equipment opportunistic!
Case Study 3: Dunedin

City Forests, Dunedin
Large scale recovery of wood fuel logs for centralised processing...

→ high quality wood chip for district heat market

Case Study 3: Dunedin - Results

Study: drying trial
- Small diameter versus large, covered and split
**Case Study 3: Dunedin - Results**

Study: Splitting using excavator with ripping tine = $15/tonne

The ‘Italian Job’...

→ 32 t/hr
→ $6/tonne

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**Case Study 4: Oamaru**

Gillion Logging Ltd, Oamaru

• Integrated firewood production

→ Firewood to local customers
Case Study 4: Oamaru - Results

- Productivity Study: Firewood machine

![Graph showing relationship between LED Dia (cm) and Prod (m³/hr)]

Case Study 4: Oamaru - Results

- Integrate into harvesting operation

- High quality
  → satisfied customers
Delivery cost of Wood Fuel Energy

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Canterbury</th>
<th>BOP</th>
<th>Dunedin</th>
<th>Oamaru</th>
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</thead>
<tbody>
<tr>
<td>Daily Cost</td>
<td>$3,025</td>
<td>$2,050</td>
<td>$2,125</td>
<td>$1,240</td>
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<tr>
<td>Daily Production</td>
<td>75 t</td>
<td>62.5 t</td>
<td>125 t</td>
<td>15 t</td>
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<tr>
<td>Cost per ton</td>
<td>$45</td>
<td>$29</td>
<td>$17</td>
<td>$42</td>
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<tr>
<td>Cost per GJ</td>
<td>$6.50</td>
<td>$3.55*</td>
<td>$2.20*</td>
<td>$5.54</td>
</tr>
</tbody>
</table>

* Not comminuted

Conclusion – supply chain focus!

Ideal Consumer Situation
- Supply of consistent, quality, suitable, high value product
- Payment that correlates to quality and energy content of product

Ideal Contractor Situation
- Large volumes of uncontaminated material for comminution
- Integrated into forest management
- Revenue incentives to produce high quality fuel

Ideal Forest Owner Situation
- Well organised wood fuel recovery integrated forest mgmt activity
- Consistent revenue from wood fuel recovery from forest
- Maximise positive benefits (improved planting, reduced fire risk)
Project Outputs

+ Research Publications
+ Technical Report
+ Workshops

Guidelines