Energy wood resources in forest management cycle
Valentīns Lazdāns¹, Andis Lazdiņš¹, Magnus Thor²
¹ Latvian State Forest Research Institute “Silava”, ² Skogforsk, the Forestry Research Institute of Sweden

Results:

Table 1: Resources and costs of biofuel

<table>
<thead>
<tr>
<th>Management stage</th>
<th>Potential of biofuel</th>
<th>Prime costs, LVL LV m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-commercial thinning</td>
<td>30-70</td>
<td>90-210</td>
</tr>
<tr>
<td>(H = 4-9 m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial thinning</td>
<td>50-90</td>
<td>150-270</td>
</tr>
<tr>
<td>(age = 20-60 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear-cuts (final use)</td>
<td>100-130</td>
<td>300-390</td>
</tr>
<tr>
<td>Stump extraction (final use)</td>
<td></td>
<td>150-300</td>
</tr>
<tr>
<td>Totals</td>
<td>230-390</td>
<td>690-1170</td>
</tr>
<tr>
<td>Forest drainage systems</td>
<td>30-80</td>
<td>90-240</td>
</tr>
</tbody>
</table>

Table 1: Harvesting technologies

<table>
<thead>
<tr>
<th>Management stage</th>
<th>Extraction technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-commercial thinning</td>
<td>Light harvesters and harvesters with accumulating cutting heads (Bracke C16, Ponsse EH25)</td>
</tr>
<tr>
<td>Commercial thinning</td>
<td>Light harvesters and harvesters</td>
</tr>
<tr>
<td>(age = 20-60 years)</td>
<td>Harvester and harvesters with accumulating cutting heads</td>
</tr>
<tr>
<td>Stump extraction (final use)</td>
<td>Harvester and harvesters</td>
</tr>
<tr>
<td>Forest drainage systems</td>
<td>Harvesters, harvesters and agricultural tractors with accumulating cutting heads</td>
</tr>
</tbody>
</table>

Definition of the problem:
Implementation on the national and European energy policy causes significant raise of consumption of forest biofuel in local and international markets. Latvia is consuming locally and exporting 3-4 mill.tons of biofuel yearly. To secure increasing demand of raw materials, it is necessary to increase efficiency of use of already utilized forest resources by production of wood pellets and briquettes from residues as well as by evaluation and more intensive utilization of potential of non-conventional forest biomass resources available in the forest management cycle.

Objectives of the studies:
- To evaluate different technologies of production of biofuel from small dimension trees, which are extracted during pre-commercial thinning and in older stands – during commercial thinning.
- To elaborate working methods for extraction of harvesting residues for biofuel production in clearcuts in different forest site types.
- To evaluate potential and technologies of stump extraction for biofuel production in clearcuts and to estimate quality characteristics of stump biofuel. To calculate prime costs of biofuel production using different technologies and types of resources.

Subjects of the studies:
- Harvesting residues for energy – resources and technologies, as well as economic and environmental impacts.
- Biofuel from forest thinning – mechanization, costs and efficiency of production.
- Mechanized production of biofuel from harvesting residues (in cooperation with Skogforsk).
- Forest energy from small dimension stands, "infrastructure objects" and stumps (in cooperation with Skogforsk).
- Elaboration of methodology for simple estimation of biomass resources in forest infrastructure.
- Sustainability analysis of forest biofuel (reduction of emissions and land use based restrictions).