



## Energy wood resources in forest management cycle

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### Project contributors:

Joint stock company “Latvijas valsts meži”,  
Forest development fund

### Duration:

2004 – 2009

### Partners:

Skogforsk, the Forestry Research Institute of Sweden

### Results:

Table 1: Resources and costs of biofuel

Management stage	Potential of biofuel		Prime costs, LVL LV ₮
	m <sup>3</sup> ha <sup>-1</sup>	LV m <sup>3</sup> ha <sup>-1</sup>	
Pre-commercial thinning (H = 4-9 m)	30-70	90-210	6-7
Commercial thinning (age = 20-60 years)	50-90	150-270	7-8
Clear-cuts (final use)	100-130	300-390	4-5
Stump extraction (final use)		150-300	5-6
Totals	230-390	690-1170	-
Forest drainage systems	30-80	90-240	6-7

Table 1: Harvesting technologies

Management stage	Extraction technologies
Pre-commercial thinning (H = 4-9 m)	light harvesters and harwarders with accumulating cutting heads (Bracke C16, Ponsse EH25)
Commercial thinning (age = 20-60 years)	Light harvesters and forwarders
Clear-cuts (final use)	Harvesters and forwarders
Stump extraction (final use)	Excavator mounted stump extraction heads
Forest drainage systems	Harvesters, forwarders and agricultural tractors with accumulating cutting heads

### 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.

### Targets 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 clear-cuts in different forest site types.
- To evaluate potential and technologies of stump extraction for biofuel production in clear-cuts 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).



Figure 1: Stump extraction technology

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