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Woody biomass potential of abandoned agricultural lands

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34 partners from different European countries

Utilization of forest biomass for energy production in Latvia:

- **gross energy use in Latvia – 190 PJ;**
  - energy import,
    natural gas – 30%,
    heavy fuel oil – 2.4%,
    other oil products – 27%,
    coal – 1,7%,
    imported electricity – 5.1%,
    other sources of energy – 2.2%,
  - local sources,
    wood – 28% (0.6-0.7 mill.tdry yearly),
    hydro and wind – 4.5%.
- Land balance (total area 6.5 mill.ha):

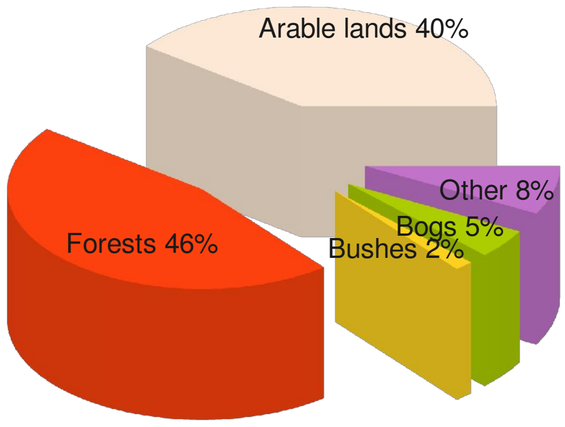

Figure 1: Land balance in Latvia

Naturally afforested arable lands:

- total area 353 th.ha, growing stock 3.6 mill.m^3, basal area 789 th.m^2;
- characteristic indicators;
  - high variability of species and density,
  - different size and form of separate fields.

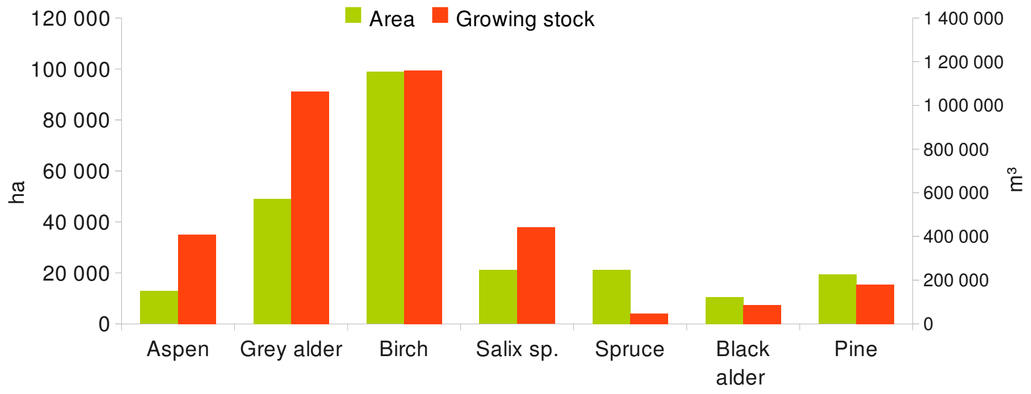

Figure 2: Area and distribution of growing stock by specie

Materials and methods:

- motor-manual thinning;
  - stand characteristics (80% birch, 20% aspen and Salix sp. in undergrowth, density 18.3 th.ha, average H 5.4 m, DBH 2.8 cm, growing stock 29.4 t_{dry} ha^{-1}),
  - motor-manual thinning and manual collecting of the small trees at the strip-road sides, thinning to the density 3.4 th.ha, 20% of the stand area under strip-roads, forwarding, crushing and road transport using ordinary forest machinery,
- mechanized removal of vegetation;
  - stand characteristics – natural willow bush, density 15 th.ha, average H 4.0 m, DBH 1.8 cm, growing stock 13.6 t_{dry} ha^{-1},
  - mechanized harvesting using AHWI AM 600 crusher on the base of CLAAS Xerion tractor.

Results:

- motor-manual thinning;
  - cost of biofuel production 11.8 € LV m^{-3},
  - 64% of costs are harvesting and moving of trees,
  - production of biofuel didn't affect productivity of thinning, actual cost of thinning is 223 € ha^{-1},
- mechanized removal of vegetation;
  - cost of biofuel production 13.7 € LV m^{-3},
  - size and density of trees doesn't affect productivity significantly at a speed 0.8 km h^{-1},
  - actual cost of harvesting is 496 € ha^{-1}.

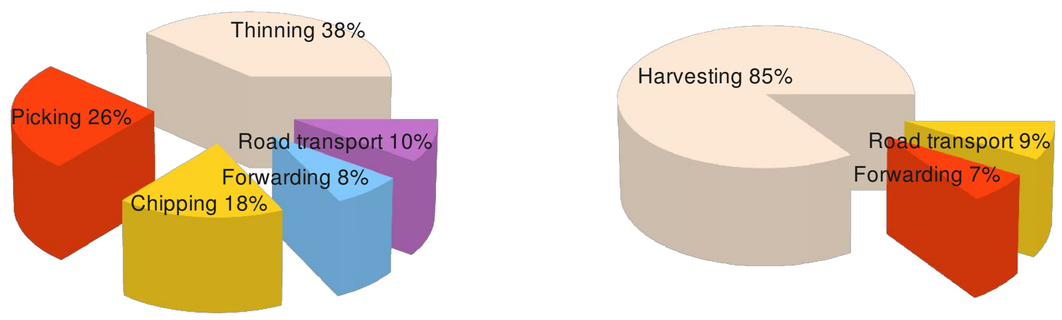

Figure 3: Prime costs of motor-manual thinning (left) and mechanized removal of woody vegetation

Conclusions:

- thinning of stands, especially in the birch dominant areas, would provide at least 3 mill.LV m^3 of biofuel in short term and 25 mill.LVm^3 – in long term;
- grey alder may be used as a coppice crop with AHWI AM 600 or relevant harvesters for direct biofuel production, but knowledge about this kind of forest management is limited;
- complete removal of vegetation for biofuel production and reconstruction of the forest using AHWI AM 600 or relevant harvesters is competitive, if growing stock is at least 30 t_{dry} ha^{-1}, but still a lot of development should be done to improve the machine to harvest natural bushes.

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