

Bio-energy from forests 2007–2011



*A research programme
by the Finnish Forest Research
Institute, Metla*

Metla/Essi Puiranen

METLA forest • knowledge • know-how • well-being

Background and challenges

The price of energy products has increased constantly and the availability of especially oil on global markets is under constant political and economical pressures. The evidence of the effects of the use of fossil fuels on climate change is also obvious, and the needs of greenhouse gas emission reductions increase the value of renewable energy gained from forests. In recent years the use of logging residues and trees harvested in thinnings for energy production has increased rapidly and according to the national forest policy in Finland, even higher annual energy wood harvesting is set as a goal for coming years. The new forestry products need new types of technological solutions and production chains and the new markets need to be analyzed at local, national and global scales. The ecological constraints need to be taken into account in the energy wood production.

The technology and logistics of energy wood harvesting, the economy of production chains and the ecological effects, as well as development of novel fuel products are studied and included within this research program. The analysis of the profitability of different stand treatment methods can be largely based on data available from long term field experiments and models available in Metla, which are now reanalyzed for the needs of bio-energy research.

The studies carried out within the Bioenergy from forests program are merged with the studies to be started within the climate-change program.

Research themes

The programme has four main themes, represented by sub-programmes. Under each sub-programme there are a number of research projects:

Sub-programme 1. Production of forest biomass and forest-based bioenergy resources

- *Management of low-productive drained peatlands for bio-energy* -project produces knowledge for utilization of drained peatland forests that will be left outside production forestry in the future.
- *Yield effects and profitability of integrated energy and round wood harvesting in thinning* -project studies energy wood procurement and aims at increasing the volume of energy wood harvesting from thinnings without endangering site productivity and wood yield.
- *Deciduous trees as energy wood: growing, harvesting and quality* -project aims at finding out the biological, technical and economic possibilities to grow birch, aspen and alder for energy wood.

Sub-programme 2. Impacts of intensive biomass bio-mass harvesting on forests

- *Bioenergy from logging residues – effects on soil and tree stand* -project determines the effects of logging residue removals on the growth of remaining trees and new tree generation, it also studies the use of fertilizers for compensating the nutrient removal.
- *Ecological and silvicultural impacts of stump removal and collecting of logging residue* -project produces information on the impacts of the rapidly growing biomass harvesting on the environment in general and on restocking.
- *Effect of stump harvesting on forest damages and saproxylic species* -project surveys infectious material left on regeneration areas after stump harvesting and makes assessments on potential forest damage risks.

- *Effects of stemwood and whole-tree harvesting in drained peatlands on leaching of nutrients and heavy metals to water courses and nutrient sufficiency for sustainable tree production* -project compares in two sub-projects the effects of the stem only vs. whole-tree harvesting on the nutrients sufficiency and leaching in peatland forests.

Sub-programme 3. Biomass supply, business models and means of energy policy

- *Wood energy resources and markets of energy technology in European Union and international bioenergy trade* -project aims at opening new markets and business opportunities for Finnish bioenergy technology and produces information on the changes of the international bioenergy trade and their expected impacts for domestic markets.
- *Global forest energy resources, certification of supply and markets for energy technology* -project investigates the global markets for Finnish bioenergy technology and also studies the sustainability criterion and certification of energy biomass trade.
- *Bioenergy and forest products markets: Global changes and impacts to Finnish forest sector* -project is under preparation.
- *Measurement of forest biomass* develops and studies the technology, precision and costs of new measurement methods for biomass. It supports also the preparation of legislations related with timber and biomass measurement.

Sub-programme 4. Novel products

- *Use of wood in ethanol and chemical production* -project generates knowledge and techniques for better utilization of forest resources for e.g. traffic fuels, energy and chemical production through extraction and use of wood hemicelluloses, anaerobic fermentation in chemical and energy production, chemical production of wood and use of cellulose for ethanol production.

Expected results

The program provides detailed information on the impacts of energy wood harvesting on forests, new harvesting models and wood supply chains. New energy products will be developed and information for decision making for forest owners, national forestry planning and forest industry is produced.

Resources and cooperation

The approximate extent of the program is estimated as 30–50 scientist years/year of permanent and other staff. Projects of the program will do active (national and international) cooperation with projects and programs at Metla, universities, other research institutes and industry.

Timetable

The program will span years 2007–2011, there will be a mid-term evaluation in 2009.

Please, contact:

Programme Director: Prof. Antti Asikainen
E-mail: antti.asikainen@metla.fi
Tel. +358 10 211 3250, +358 50 391 3250