Lectures KWS

Topic 1. Outlook and needs of wood biomass resources

Session lectures [PDF]

This topic aims at reviewing different sources of ligno-cellulosic biomass, mainly from forest systems, and the different technologies associated to each of them and their characteristics. The concept of supply chains is presented, and the most common supply chains for each raw materials is discussed and analysed, including a review of the different machines used in the Nordic countries to facilitate a cost-efficient transportation of the biomass resources. The concept of bioenergy is introduced, as well as the development of modern bioenergy, including some of the main factors contributing to its successful implementation.

The main objectives of this session are:

- To review of the most common forest operations for the procurement of forest biomass.
- To understand the links between the raw material characteristics and the forest operations associated
- Rationale and pre-conditions for modern bioenergy development.
- To see examples of modern use of wood for energy

Topic 2. Biomass plantation systems

Session lectures [PDF]

The use of wood from plantations are an important feedstock for energy and other uses that can help meeting renewable energy targets in several countries. These systems can also play an important role for alternative uses concerning soil protection, water quality and biodiversity. In recent years it has been underlined that an increasing amount of dedicated land for fast growing species will be needed in order to fulfill the ambitious objectives of energy policy and the growing demand of biomass for traditional and alternative uses. Fast growing plantations offer several advantages concerning production levels, rural development, wood logistics, etc... At the same time, they present important challenges, and due to their nature on agricultural land, they compete with food production. Finally, it must be taken into account that many fast growing plantation systems are new to farmers, and eventually need to be accepted and embraced by individuals, which has important socio-economic dimensions. In this context, this topic reviews their present role, advantages and disadvantages from different points of view.

The main objectives of this session are:

- To review the concept of fast growing plantations for biomass.
- To review the most common management operations for tending fast growing plantations in Northern Europe.
- To review the yield levels from different short rotation management systems for energy.
- To review the uses of plantations for several simultaneous objectives concerning different ecosystem services.

Topic 3. Methods for assessing and managing wood biomass resources

Session lectures [PDF]

The development of successful bioenergy systems require a detailed plan and estimation of available biomass resources. At the same time, it is important to understand the basics of heat and power generation, and methods to estimate the heat needed for a given area. This session will introduce the students with methodological aspects related to the estimate and quantification of woob biomass resources at different levels (biomass supply) as well as methods to estimate the energy needed for a given region or area (biomass demand).

The main objectives of this session are:

- To discuss methodologies to estimate bioenergy potentials at different scales.
- To review the keys of heat generation from biomass and methods to assess heat demand.
- To review the main energy production technologies from biomass.

Tools

Forest Heat v2.0 [xls]

Forest Heat is a simple planning and decision support tool for wood-based heating systems created by the Finnish Forest Research Institute (Metla). This supporting tool enables users to calculate the most crucial decision factors which are:

- the scaling of your wood-based heating system
- estimating costs of the fuel and investment
- identification of crucial factors needed to consider when making decisions

- The session will introduce concepts of risk and disturbances in forest management