

Biomass Production and Logistics

TECHNICAL HIGHLIGHTS

■ **PROCESS AND TECHNOLOGY STATUS** – Primary sources of biomass cover energy crops and forest growth (including dedicated plantations and natural forestry), residues from agriculture and forestry activities and organic wastes from households and industries. The biomass production and logistic chain includes production (harvesting, collection), pretreatment and densification, crucial to increase the efficiency of transport and use (storage, chipping, drying, pelleting, torrefaction, pyrolysis and hydro-thermal upgrading), transport (by truck, train, ship, pipelines of bales, chips, pellets, briquettes, firewood logs), as well as conversion to liquid fuels (ethanol, biodiesel, etc.), gaseous energy carriers (syngas, biogas, hydrogen), and electricity and final uses. Moisture and ash contents are two important characteristics for the biomass energy content. The selection of the optimal harvest-to-delivery logistics depends on the type of biomass feedstock (bulk density, energy content, seasonality of availability, moisture content), local conditions and the targeted use. In the coming years, wood pellets and torrefied pellets are expected to play an important role in the bioenergy market. The use of ligno-cellulosic feedstock is a promising avenue, mostly based on agricultural and forest residues, or species which growth requires less water, fertilizers and land-use (e.g. marginal and degraded land), and do not compete with food production.

■ **PERFORMANCE AND COSTS** – Total cost of supplying solid biomass feedstock is highly sensitive to local conditions including opportunity land cost and logistics, and supply-demand balance. Overall cost is expected to reduce by up to 25% between 2010 and 2020 thanks to economies of scale, improved harvesting and process technologies. While long-term bioenergy prices may depend somewhat on fossil fuel prices, short-term biomass prices are driven by the production cost and the cost of the raw material, which represents up to 40% of the production costs. Transportation and preprocessing represent up to 43% each of total cost, and storage up to 9%. In Europe, wood pellets prices range USD 7.5-13/GJ, wood chips range USD 3-9/GJ; firewood USD 4-18/GJ.

■ **POTENTIAL AND BARRIERS** – Biomass is an appealing source of energy in the current climate and energy context. It could supply a much higher share of the energy needs in the future compared to now, what will require important investment in new infrastructure for both biomass transformation and transportation. Global bio-energy potential ranges from 100 to 500 EJ/yr by 2050, depending on assumptions (food production; eating habits; farming practices; etc.). Wood pellets are the dominant solid biofuel commodity on the international market. Europe is currently the major market for woody pellets imported from Canada (British Columbia) and the South-eastern United States. New supplying regions may include Malaysia, Indonesia, Brazil, and stable African countries; new demanding regions may include Japan, Korea, and China. Key barriers for the use of biomass for energy purposes include raw material availability, lack of handling and port infrastructure, lack of quality standards, import/export tariffs, technical certification to ensure sustainability (biodiversity, carbon stocks, water drainage, life-cycle greenhouse gas emissions).