

BIOENERGY IN FINLAND

Bioenergy accounts for 20% of primary energy consumption in Finland and 10% of electricity demand. These figures are already the highest for any industrialised country, but more opportunities have been identified to increase the use of bioenergy by 35% over the next decade.

Most important source of renewable energy

Bioenergy accounts for 85% of Finland's renewable energy production. Biomass-based fuels have traditionally included residues from the chemical and mechanical forest industry, and firewood used to heat homes. Over the last decade, these fuels have been complemented by forest chips from logging residues, biogas, biodegradable fractions of recycled waste, straw, and perennial energy crops such as reed canary grass.

Reducing greenhouse gas emissions

The exploitation of renewable energy sources was boosted in the 1990s by efforts to mitigate climate change. Reducing greenhouse gas emissions became a political objective as early as 1990, when Finland pioneered carbon taxes on fossil fuels. Other factors favouring the increasing use of renewable energy sources in Finland include the need to guarantee the energy supply from local sources where possible, and the desire to increase employment opportunities in rural areas and find new uses for set-aside farmland.

Increasing the use of renewable energy by at least 25% by 2015 and 40% by 2025 is a key objective of Finland's energy policy. If these targets can be accomplished, renewables could account for as much as

one-third of primary energy consumption across Finland, compared to 23% in 2003.

Forest chips here to stay

The large-scale production of forest chips from smaller trees and logging residues is increasing faster in Finland than in any other country. An ambitious goal was set in 2004 to double the annual use of forest chips to 5 million cubic meters (36 PJ) of chips by 2010. Forestry machines, vehicles, methods and entire procurement systems have been designed to reduce the cost of forest chip fuels produced mechanically from forest biomass. These processes have been effectively integrated into the existing efficient procurement of industrial timber in Finland.

Earlier, forest chips were mainly used for heat production, but they are now increasingly being used in efficient modern combined heat and power (CHP) schemes in industrial and municipal plants. Using biomass in CHP plants can provide an energy efficiency of over 80%, which is significantly higher than in conventional condensing power plants. The use of forest chips is growing most rapidly in the CHP sector.

Energy crops

Energy crops, mainly reed canary grass, are already being cultivated in 9,000 hectares of fields around



BIOMASS HEAT ENTREPRENEURSHIP IN FINLAND

A new form of business was born in the Finnish countryside during the 1990s, when farmers started to produce heat from wood fuels, first supplying heat for schools and old people's homes and later expanding into municipal district heating and the provision of heat for industrial processes. This 'heat entrepreneurship' has boosted rural employment while also reducing carbon dioxide emissions.

By the end of 2004 there were 254 such small-scale heating plants around Finland, with a total heat output of 129 MWh and an annual turnover of 10 million. The number of plants is expected to double by 2010.

There were about 150 individual heat entrepreneurs in Finland by the end of 2005. About half of the plants are run by individuals, while the rest function as limited companies and co-operatives. Usually the heat entrepreneur purchases the fuel, operates and maintains the heating plant, and earns income based on the amount of heat generated. In many cases the heat entrepreneur is also the investor and owner of the heating plant. The growth of heat entrepreneurship has been widely supported through investment grants for heating plants and training for entrepreneurs and energy advisors.

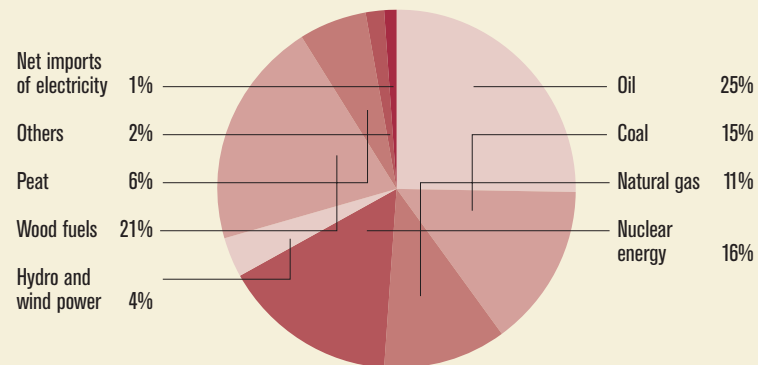
Finland. Reed canary grass is a perennial, which can be harvested up to 15 years after sowing, so it can be a particularly promising crop for part-time farmers. Yields of delayed harvest in spring can be up to 8 tonnes per hectare, and only limited quantities of fertilisers are needed. Crushed bales or loose reed canary grass can be co-fired in the existing boilers of heating and power plants together with peat and other biomass-based fuels. Reed canary grass can be used to meet as much as 10% of the annual energy demand of existing boilers. It is estimated that reed canary grass could be cultivated on more than 200,000 hectares across Finland, about one tenth of the country's farmland.

Bioenergy for heating, electricity and transport

Wood pellets are increasingly being used to heat homes and other buildings instead of oil or electricity. Pellets can also be used in place of oil in the peak boilers of district heating networks.

The power-to-heat ratio of bioenergy CHP is being further improved thanks to new technologies, while smaller plant capacities can make bioenergy a more feasible option for distributed energy systems. Biomass is also rapidly gaining importance as raw material for liquid biofuels in transport.

TOTAL ENERGY CONSUMPTION BY ENERGY SOURCE



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