

BIOMASS



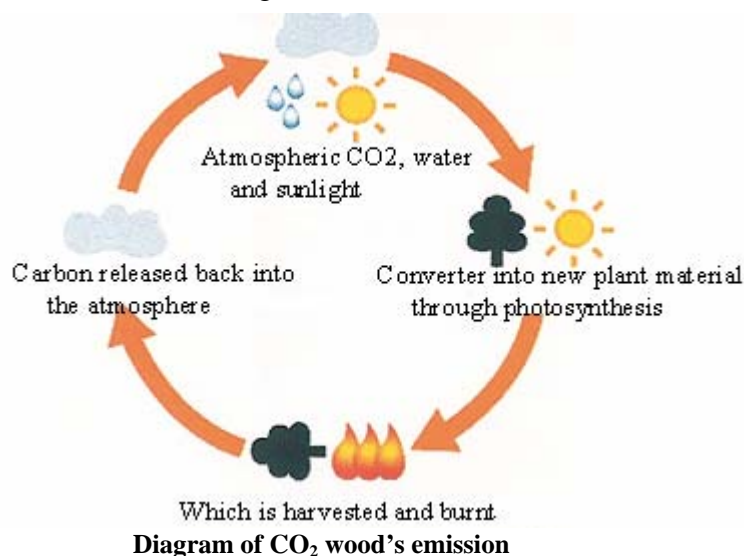
Introduction

Biomass consists of all growing organic solid matter, such as plants, trees, grasses, and peat. The concept of *bio fuel* refers to liquid biomass-derived fuels.

All wood biomass that cannot be utilised by the timber industry is applicable for wood energy production. Energy wood is comprised of branches, crown mass, small-diameter trees and other low-quality trees or parts of trees that are unsuitable for industrial processing. In general, one can speak of forest fuels that are by-products of commercial thinning of young forests. In theory, stumps also form a considerable source of potential wood biomass, but at the present they cannot be utilised economically or technically in an effective manner.

Noise impacts are expected mainly from biomass transportation. Visual intrusion and local emissions exists for environmental utilisation is an important alternative to the problem of agricultural surpluses.

From an environmental perspective, Europe's key motivation for promoting bio fuels is in terms of limiting emissions of CO₂.



Using wood fuel has a number of important benefits but the main ones relate to the environment and sustainability.

- Wood is renewable
- Heating the houses and water accounts for over the 80% of energy use there
- Modern wood fuel systems have a high degree of controllability, require limited re-fuelling and produce minimal amounts of ash, bringing a high degree of convenience to the wood fuel choice.
- Sustainable forestry, where for every tree felled one is planted or where trees are coppiced, makes a positive environmental contribution.
- Using indigenous wood fuel reduces the amount of other fuel that we have to import into the country and therefore increase our self-sufficiency.
- Wood fuel industries create long-term jobs.
- Logs and sticks are the most familiar form of wood, but we can also use wood pellets, which are easier to transport.

European Context.

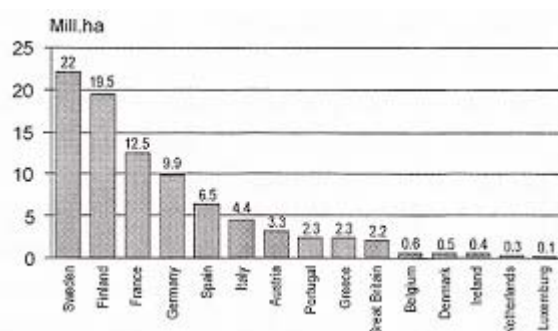
Biomass is the most important renewable energy source in Europe, with bio energy representing about 60 % of the total renewable energy use in Europe.

When Finland, Sweden and Austria joined the EU, forest resources and the production of pulp, paper and other wood based products more than double in the area of EU. The importance of the forest sector, or the forest cluster, to the whole society is seen as more and more important.

By forest cluster we mean a concentration of know-how in forestry, research and education as well as businesses related to wood processing, manufacture of equipment and machinery.

France is the largest wood energy consumer in absolute terms in the EU, followed by Sweden and Finland. Wood energy accounts for about 3 % of the total primary energy supplies in the EU-15, but in Sweden and Finland it is even higher than 16 %. In most of the EU countries, except in Sweden and Finland (where more than 12 % of the energy consumption is based on wood-based energy), wood energy is still mainly consumed in households.

In the present 15 EU countries 50 % of the total wood removed from forest is ultimately used for energy purposes, and almost 60 % of wood energy comes from indirect wood fuels and wood-derived products such as black liquor.



Commercially usable forestland in EU countries (EU total 87 mill. ha)
(Wood Fuels Basic Information Pack)

Irish Context

The wood fuel requirement for a typical family home with 150 m² floor space and a 12 kW heating requirement is approximately 300 kg per week during the heating season, which is about 50 logs of firewood per week. This will vary depending of many factors-the size of the house, how long the house is heated, and the type of wood used.

Regarding to the pellets, which are widely used for home heating in Nordic countries, although the Irish wood industry is considerably less well developed, the Tipperary Energy Agency (TEA), estimates that there would presently be sufficient sawmill residues to produce about 40,000 tonnes of wood pellets every year sufficient to supply up to 7,000 homes. There are already identified six sites in Ireland where domestic wood pellet heating stoves could be installed. There is currently no production of wood pelleting in Ireland.

The technical wood biomass resource is quantified in the table below. Over 97% of this resource is from short rotation forestry with wood industry residues contributing approximately 1.5% each.

Wood Biomass Resource	Electrical Energy Resource (GWh/y)	
	2000	2020
Short Rotation Forestry	69,004	136,680
Forest Residue	675	1,778
Wood industry Residues	924	2,348
Total	70,604	140,807

(Total Renewable Energy Resource in Ireland)

In the practicable wood biomass resource there is a decrease of over 70% in the potential resource between the feasible and practicable resource; this is due mainly to the perceived unwillingness of farmers to change from their current agricultural system to the production of a novel crop like Short Rotation Forestry.



Pellets

The Irish agriculture sector is in the middle of immense change, with increased levels of competition and market forces requiring farmers and the sector as a whole to examine alternative practices and enterprises for the future.

Biogas can be used to supplement farm energy requirements or to generate electricity through a Combined Heat and Power or Cogeneration Plant.

Mr. Michael McBennet, IrBEA (Irish Bio energy Association) President, said “With only 2% of our energy coming from renewable sources and the liberalisation of the energy market bio energy has presented itself as a potential alternative which farmers can exploit. Traditional farm enterprise provided food, fuel and fibre including wood and flax. Agriculture in recent times has become focused on only food and fodder production. It is now time to consider if farmers should once again become involved in energy production”

“The December 2000 Directive from the EU Council of Ministers for Energy set a target of 13.2% for Ireland for the contribution of electricity from renewable energy resources to be reached by 2010. Through the processes of short rotation coppice and anaerobic digestion the Irish agricultural sector has huge potential to contribute to this target through the development of bio energy”, he added. (*Environment & energy Management, Sep/Oct 2001*)

Mayo Context

The table below shows the wood's technical electrical energy resource:

Wood Biomass Resource	Electrical Energy Resource (GWh/y)	
	2000	2020
Short Rotation Forestry	2,516	4,624
Forest Residue	58	153
Wood industry Residues	0	104
Total	2,574	4,881

(Total Renewable Energy Resource in Ireland)

Bio fuels

At the moment bio fuels are being used in Ireland. The company Sure Engineering is working on bio ethanol, used in a 7 per cent blend with conventional diesel and water co-solvent. This has been successfully tested in four commercial trucks, running for 26,000 miles over a period of 2 to 3 months.

Environmentally, the bio fuel slightly reduces sulphur content but substantially reduces particulate emissions. Further testing is required to ensure that it doesn't increase the burden of micron-size particulate matter in the exhaust emissions – a problem that has increasingly come to the fore with conventional fuels, as they have become progressively cleaner in other respect.

This product is well proven internationally, in the US last year, almost 20 new ethanol plants began construction and annual production reached 1.77 billion gallons. Elsewhere, Australia is exempting bio fuels from excise duty and China, Thailand and India have also to take steps to produce ethanol fuel from renewable resources.



Crops which can be used to produce bio fuels

Fuels produced from biomass have lower potential to cause global warming than conventional mineral diesel and petrol, because the amount of CO₂ emitted during their combustion is equal to the amount absorbed by the plants during their growth. Even when energy – currently in the form of fossil fuels – used during sowing, harvesting and processing is accounted for, CO₂ saving still average at around 2 to 2.5 tonnes per litre, the European Commission estimates.

Cogeneration

Cogeneration or combined heat and power means production of heat and electricity simultaneously in a single power plant. Heat is used in district heating or industrial processes or both. Paper mills, mechanical wood processing industries and chemical industries are common branches that need a lot of heat.

From the energy resource point of view, cogeneration is beneficial only if it saves primary energy when compared with separate generation of electricity and heat. In the plant producing heat only the efficiency can be even 90 %. The modern power plants operate typically on efficiency under 50 %. It is easy to understand that cogeneration plant with 85 % efficiency is more economical compared to separate production.

In Europe, the use of combined heat and power is a well-established energy supply option. Within the current energy market, it supplies around 10 % of the European electricity production, 10 % of the European heat market, and a small amount of the cooling demand.

Today, the use of cogeneration saves Europe around 350 million tonnes of CO₂ and reduces the dependence on energy resources.

Cogeneration optimises the energy supply of energy supply to all types of consumer with the following benefits to both user and society at large:

- Increased efficiency of energy conversion and use.
- Lower emission to the environment the main greenhouse gas.
- Large cost savings, providing additional competitiveness for industrial and commercial users.
- An opportunity to move towards more decentralized forms of electricity generation, where plant is designed to meet the needs of local consumers, providing high efficiency, avoiding transmission and increasing flexibility in system use.
- Improved local and general security of supply-local generation can reduce the risk that consumers are left without supplies of electricity and/or heating.

In Ireland cogeneration supplies 2% of electricity, mainly in industrial sector. There is no district heating. Falls in electricity prices and gas price rises have recently decreased the viability of cogeneration. On the positive front, the government set out definite CO₂ emission targets attributable to cogeneration in October 2000. Electricity market regulations are currently a market barrier, but cogeneration is still expected to grow through a doubling of demand by 2020. Growth about 800% in the post-Kyoto scenario is possible, albeit from a low base. This growth is expected in the large-scale industrial and commercial sectors.

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