

# Fact Sheet No. 10

## BIOMASS ENERGY

Biomass is any recent plant or animal organic matter. Coal and oil fossil fuels are fossilised biomass. Biomass energy can be produced from plants, wood, residues (for example sawdust and bagasse, or sugar cane residue, after crushing) and animal wastes.

During photosynthesis, solar energy and carbon dioxide are stored in plants. When biomass is burned carbon dioxide and energy are released, which is the reverse of photosynthesis.

If biomass is not used to produce energy in power plants, it naturally decomposes into simple substances and produces heat. Using biomass for energy production is just speeding up a natural process and does not add extra carbon dioxide to the environment. So biomass is a form of renewable energy.

Biomass can be used directly (for example, burning wood for heating and cooking). It can be used indirectly by converting it to a liquid or gas fuel (for example, producing ethanol from sugar crops or producing methane, or natural gas, from animal manures).

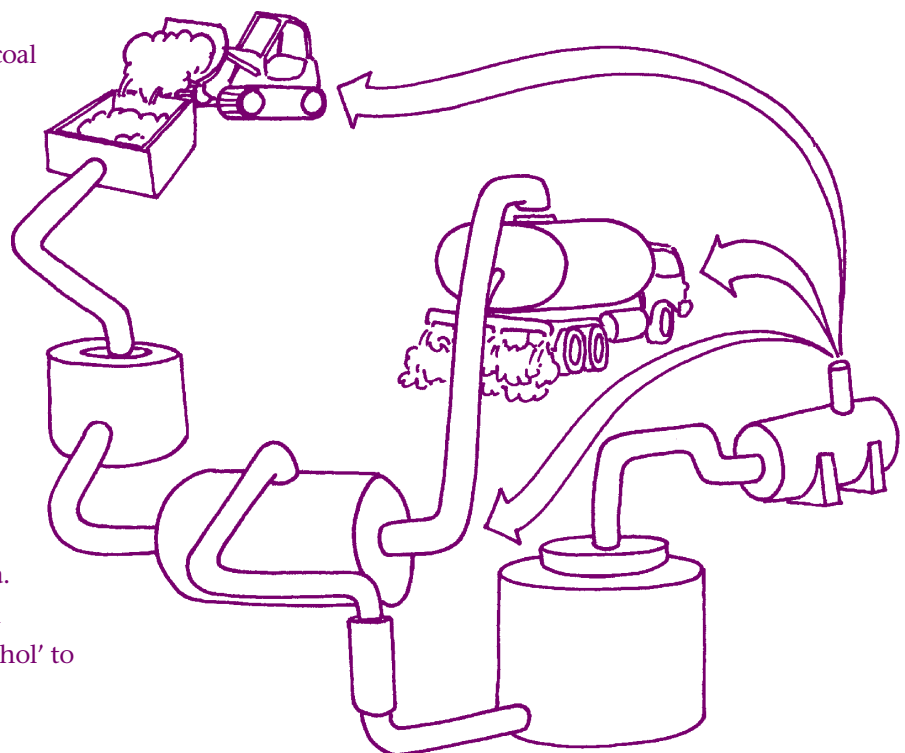
Traditional biomass use includes wood and charcoal for fuel. Modern biomass use is concerned with finding substitutes for fossil fuels. Agricultural crops, such as sugar cane, corn, sunflower seeds and soya beans, can be grown for use as energy sources called biofuels, which can be used in motor vehicles. These plants are used to make ethanol (an alcohol) in the same way that ethanol is made for alcoholic drinks. The plants are crushed and mixed with yeast, which converts starches to ethanol. This is done commercially in Brazil, the USA and Europe and experimentally in Australia. So far, biofuels have not proved economical in Australia. In the USA, corn (maize) is used to make ethanol and then blended with gasoline to produce 'gasohol' to

run cars. Some engine modifications are required to use this petrol substitute.

In Australia there is growing interest in producing bioenergy by burning residues in power stations (for example, sugar cane bagasse, wood offcuts, sawdust and wood chips). Most sugar cane mills use bagasse to produce electricity for their own needs and some send large quantities of electricity to the grid. Some release of greenhouse gases and pollutants such as nitrogen dioxides (NO<sub>x</sub>) and particulates occurs when biomass is burned.

Manures from pigs, chickens and cattle in feed lots are used as biomass because these animals produce large quantities of manure in the small areas where they are kept. Previously, these manures were used as a fertiliser, but new environmental controls on odour and water pollution have produced more interest in the conversion of wastes to energy.

When animal manure is mixed with water and put in an airtight container called a digester, methane gas (or biogas) is produced by bacteria. The biogas can be burned directly





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for cooking or heating, or used as fuel in electricity generators. The effluent (unused wastes) from the digester must be taken away and used or disposed of safely because it may contain harmful substances and bacteria.

Food industry wastes and abattoir wastes can also be used to produce biogas in digesters.

In Queensland, the Luggage Point Treatment Works produces methane gas from sewage. The gas is burned in the power station to produce 3,200kW of electrical power.

A cogeneration system uses the biomass to produce both heat and electricity when both are needed. Some power stations at sugar mills burn bagasse, producing heat and electricity using steam turbine generators. Excess electricity may be sent to the grid.

Energy production from biomass is an effective use of waste products and it also reduces the significant problem of waste disposal. Biomass is a domestic resource that can reduce the amount of coal needed for electricity production. However, biomass has relatively low energy density, so transport and handling costs may make it uneconomical in Australia unless the energy conversion process is close to a concentrated source of biomass, such as a sawmill, sugar mill or pulp mill. There are other problems of odour, disease and controlling wastes when digesters are used.

The present installed electricity-generating capacity of all the sugar mills in Australia is about 250 megawatts, of which some is sold to the electricity grid. More energy could be generated using more efficient systems and cogeneration. Similarly, the electricity generation capacity of sewage farms could be increased.

## Use of bagasse in some steam turbine power stations

Operating plant	Installed capacity	Use of supplementary fuels to increase capacity
Arriga	7000kW	
Babinda	6000kW	Oil supplementary, 0.5-2.0MW to grid
Bingera	5000kW	
Burdekin River	4900kW	
Condong, NSW	3000kW	Cogeneration
Fairymead	6750kW	
Farleigh	1500kW	Coal supplementary, cogeneration
Inkerman	1200kW	Oil supplementary, 2MW to grid
Invicta	50,300kW	38.8MW to grid
Isis, Bundaberg	10,700kW	Woodchip supplementary
Macknade	3000kW	3MW to grid
Maryborough	4750kW	Wood chip supplementary, cogeneration
Mossman	11,000kW	
Mourilyan	4250kW	Oil supplementary, cogeneration
Mulgrave	10,500kW	
Plane Creek	2000kW	
Proserpine	1000kW	Oil, coal, woodchip supplementary
Rocky Point	4600kW	Woodchip supplementary, cogeneration
Rocky Point New	30,000kW	Wood waste, cogeneration
Tully	2000kW	Coal supplementary