# Bio energy

Coal, oil and natural gas are the mineralised products of ancient forests and swamps. It took geology a long time and many complicated processes to produce these materials. We can by-pass this process by growing the stuff ourselves. We won’t get exactly the same complex molecular structures, but we can get oil, fuel and energy from various crops. Trees are the most obvious.

**Wood**

Harder and heavier woods give more heat than lighter per cubic metre. Below is a list of the most usual kinds of fuelwoods with kW values per loose cubic metre of material.

Rowan 1606

Beech 1528

Oak 1469

Ash 1469

Maple 1417

Birch 1339

Pine 1177

Black alder 1177

Sallow, goat willow 1151

Asp 1014

Spruce 1014

Grey alder 962

The best way to get wood is just to collect it from the woods, fallen trees, thinnings and dead branches. If you have old waste timber from buildings that need renovation or just are falling down, that’s also fine. You need to check for impregnations, though. The stuff they use is mostly a poison based on arsenic, and the timber should be treated as dangerous waste and not burned.

Coppicing is the traditional way to set up a sustainable supply of timber. It’s tried and tested, been going in England for at least a thousand years. The idea is that the tree will establish a root system, and all you need to do is to cut off the tops, and the stock will shoot out new growth very quickly. If you allow ten years for regrowth, you need to take out just a tenth of your coppice every year. Establish a good mix of trees, deciduous are the best, and plan to take out a selected few from various parts of the coppice. That way you keep the character of the wood intact.

**Manure**

Methane from manures and sewage seems to be a good way to get the most from this material, but it does require quite a large amount to make it worth while. There seem to be various points of view on this. In India the Go Bar Gas system became very widespread, a real alternative technology, using old oil barrels for the digester and old tractor inner tubes for the gas containers, with bits of piping connecting the thing together. In China similar digesters were constructed out of concrete, but based on the same idea. Small scale and relatively easy to construct and run, they supplied gas for cooking or heating on a domestic level. They converted animal and human manure into a slurry that could be used on the land, and took out the methane which in any case would be given off in a less controlled form. In New Zealand, a country with many more farm animals than human beings, this became very widespread and the agricultural department encouraged it by sending advisors round to help farmers set up and run.

Instead of converting vegetable residues (bio-mass) into methane in a digester, the material can be heated in a controlled atmosphere and will produce a gas not unlike propane. This was used during the Second World War to run cars, it was pretty inefficient but worked nonetheless, and with today’s improved technology, could be improved on a lot. A really good use for waste bits of wood from a timbering business. Conversion ratios of 70% to 80 % are possible, and very little modification needs to be done to an ordinary petrol engine. It never seems to have been taken up in any widespread way since the Second World War, and there are widely opposing views on the feasibility of this. My guess is that it requires someone who is really committed to making it work. As always, my approach to creativity is to be encouraging and non critical, and let people loose on making it work. And let people know how you did. We can all learn off each other!

**Biogas**

Vegetable oil seeds can be grown, pressed and used as fuel. It does not differ much from diesel in terms of burning characteristics, and it’s not a big technical adjustment to switch your motor from one to the other. Growing crops for oil such as oil seed rape or sunflowers is only possible in certain climates. Up here in Norway I don’t hold out much hope. Pressing can be done using all kinds of other technologies, here both wind and water offer themselves as possibilities. Adding value to your own crops is always a good idea, and the waste from pressing oil can be used as animal food, or even fuel. Either way it can find its way back into the soil, as manure or as ash, or if neither of those two seem to be appropriate, just compost the stuff direct.

Alcohol can also be grown. Any sugar heavy crop can be used, it doesn’t have to be grapes! Sugar beets are probably the most efficient, and grow in cool climates. When we lived in Lincolnshire I spent one autumn and winter harvesting sugar beets in pretty miserably cold weather. There are plenty of other crops which yield sugar for fermentation. Barley springs to mind as the classic for beer and whisky, though it does require quite carefully controlled sprouting and drying. Whatever you grow needs to be put through a process of fermentation and distillation. Again you will end up with waste products which are organic and can be used as animal feed, fuel or direct compost. In the case of alcohol production, there will be other considerations of cleanliness and sterility which might involve chemicals or processes which could be problematical. You can sterilise with heat, steam for example, which is nice and clean, but demands quite high energy. Or you can use chemicals, which might be a problem disposing of afterwards.

In both of these cases, oil or alcohol, you will soon realise how much work is required to get the internal combustion engine ticking over and delivering work for you. This realisation is perhaps the most valuable result of all this. It’s so easy with cheap oil, just fill up your tank, and drive away. You don’t actually pay for the long geological process of forming mineral oil underground from the swamps of the carboniferous period, and you don’t pay for the pollution of the oil spills and the refineries, or the wars over oil resources. All that is hidden and passed on to you in taxes, deaths, ill health and the prospect of running out of oil some time in the near or distant future. Growing and processing your own fuel will bring home to you how much work all this is, and will hopefully put the price per kilometre travelled up to a high and realistic level. Of course the temptation is to go back to good old Esso and Shell, and many of us do this.

However, don’t think that I am dismissing the idea of these home-grown vegetable fuels. They can be stored and used as required, a really important feature. You might want to use a generator to power washing machines or power tools for occasional use. This would be ideal. The oil can be used for cooking, and fuel you direct. And the alcohol can be used for drinking, in moderate quantities, of course!

A word of warning about growing these things if you intend to use machinery on your farm. An energy analysis might be in order here. If you can factor in the cost of transport of materials needed, and the amount of fuel you will use to run your tractors or whatever you are using, you will find out how much energy is required to grow your crop. Now compare that to the expected yield of oil. Clearly, if you are heavily mechanised, you might find yourself using more oil than you are harvesting! Not much point really, is there?