

Making "the closed loop" deliver true sustainability

In the 'food versus fuel debate' many commentators lose sight of the potential for agricultural systems to become energy independent - reducing emissions and maintaining food production. In the first of a series of articles for Enagri, Bill Butterworth looks at a practical example of on-farm sustainability.

A farm in northern Lincolnshire is taking "wastes" to land, composting them and using them as fertiliser while eliminating the use of mineral fertilisers. They grow oil seed rape (osr) and harvest it, crush the seed to extract the oil and process the oil to produce biodiesel to EN14214 all on the same farm. They also grow food crops. The integration of energy crops with food crops is fundamental to sustainability.

THE PRODUCTION FIGURES

Phil and Mick Bates head up three generations farming around 350 ha of strong clay in the northern part of Lincolnshire in the East of the UK. The farm uses land in the ratio of 1: 9 of energy crop land to food land. In rounded figures; 1000 ha of farm land, with 100 ha planted to osr which actually does provide all the energy needs of the farm, including the energy needs of 6 families working on the farm, and the remaining 900 ha produces harvestable food crops. (Equivalent, on this farm, to 8000 to 9,000 tonnes of wheat). The argument about chopping down rainforests and causing starvation in other parts of the world is just negative, ignorant, political correctness. The reality of the ratio of 1 : 9 is staggering important to sustainable life in the 21st century.

SUSTAINABILITY

Not all biofuels are the same. They are all, by definition, substitutes for fossilised fuels but some are strongly "green" because of the way they are produced, and some, perhaps, a paler shade of green. However, what will really matter in the very near future is price per litre and security of supply.

Negatives first: some biofuels may be regarded as not green, or not sustainable, because, for example, their production involves chopping down rainforest. Some also observe a problem with substitution of crops for food; this is not a question of sustainability, but one of humanitarianism. In developed countries, there is another example. If an "energy crop", one that produces a biofuel, is grown with mineral fertiliser, then it may not be sustainable (probably isn't, in

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fact) because mineral Nitrogen fertiliser was used to grow that crop. The starting point for mineral Nitrogen fertiliser production is to pass air through an enormous electric arc, commonly 2m in diameter. The temperature of the arc is enough to fuse the Nitrogen in the air (Nitrogen is inert at ambient temperatures) with Oxygen to make Nitrogen oxides. Guess where the electricity in the arc comes from: burning fossilised fuels in the power station.

There is an alternative. Crops grown using composts made from "wastes" use the Nitrogen in the wastes. This is sustainable in itself, and it makes the human race sustainable because we, inevitably, produce wastes and by this route we can grow food and energy crops in a way that is truly sustainable.

This is not just science, it is good science in action or what is called "technology". There is a quotation which explains the difference between science and technology: "An academic is concerned with pushing knowledge to the limit of knowing." (That is about science and we really do need scientists to tell us the facts about how things work.) "A technologist is concerned with pushing knowledge to the limit of doing." (That is about science in the mind of someone who is hands-on, making it happen and happen right.)

The photographs are about a group of people making it happen. The tractor is operating on an "ordinary" farm near Grantham in Lincolnshire. Mick and Phil Bates with remarkable vision, drive and hands-on technical ability to "make it happen", are Members of a farmer-owned consortium called Land Network. The bit in the middle is known as Central Support which provides legal advice, technology-based Codes of Practice and supervision to see things are "done right". Land Network Limited in the middle is owned by the farmers (one share each however big or small they are) and it is a not-for-profit organization.

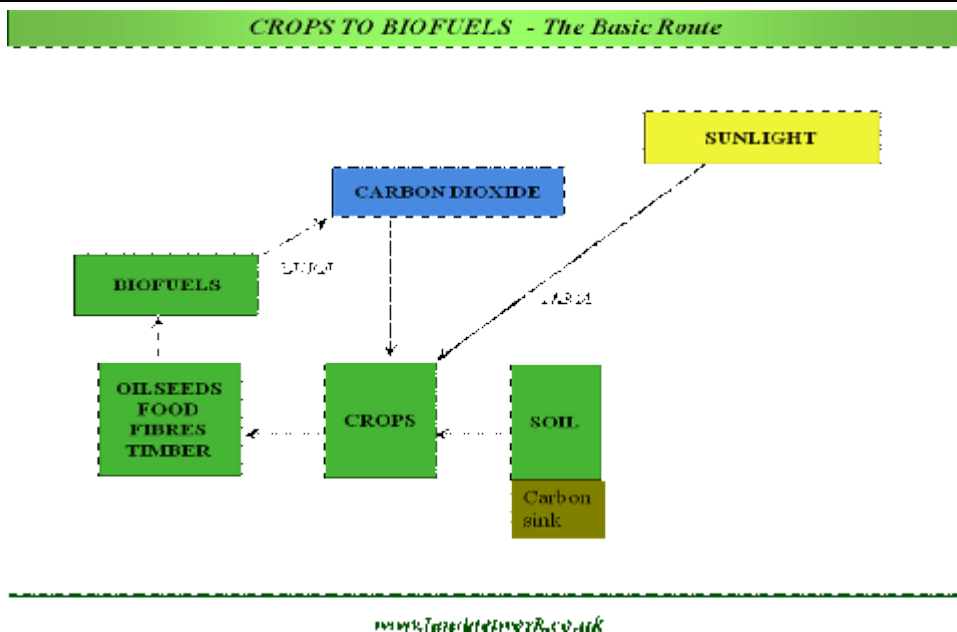


Figure 1: The basic crop production route by which farmers harvest sunlight energy with the green leaf. Note the size of the blue Carbon Dioxide box. .
Source: Landnetwork.co.uk

Are the numbers in the Figures 1,2 and 3 (which were produced by Land Network) strictly accurate? There are approximations and omissions (both negative and positive – which means each approximation has another which is approximated the other way and probably levels the first out). What is believed by the principal technologist in Central Support is that the figures are not misleading. If these conclusions and figures are multiplied up, what could it mean globally in terms of Carbon emissions and developing a Carbon sink to remove Carbon dioxide and use cropping to pump Oxygen back into the atmosphere? Well, maybe this route could account for a quarter of global Carbon dioxide emissions. Maybe a third. Unlikely more. No, it is not a 100% complete answer, but it would make a hole in the problem. The rest has to come from two other important brakes on what we do globally. Firstly, we must cut burning things (which produces Carbon dioxide) including cutting the use of fossilised fuels (before they get cut off and cut us off) and developing other renewable fuels. Secondly, we have to limit population growth before nature does it for us and far more cruelly.

The truth is that using the green leaf to fix sunlight energy, fertilising the crops with "wastes" and producing biodiesel and PPO (Pure Plant oil – rapeseed oil for example) is a sustainable route to solving the world's liquid fuel dilemma.

Land Network

In Land Network, as a national, farmer-owned consortium, the Central Support function is operated by Land Network International Ltd which started out as what many would call a consultancy company; the one which worked for the DTI at the start of the project. That company is also being structured so that it is progressively owned by its staff. Central Support provides Codes of Practice based on common sense, farmer-members own knowledge, technology, regulation and, perhaps most important of all, the developing pool of experience which the organisation has as a whole, i.e. all of its Members. The central operation also provides supervision, advice, commercial assistance and whatever Members need to develop their businesses.

