

Could alcohol fuels be cropped?

Mr Barney Foran of CSIRO Sustainable Ecosystems, and colleagues Dr David Crane, of the UK Centre for Human Ecology, and Mr Chris Mardon, a Melbourne-based consultant, have been taking an over-the-horizon view of the potential of bio-alcohols, both methanol and ethanol. And they are talking about a serious long-term national commitment of 12 to 30 million hectares of fuel-producing land.

Using a computer model, known as Ozecco, the researchers have explored scenarios that envisage progressive replacement of large areas of crops and pastures with perennial deep-rooted plantations of trees and woody shrubs. These biomass plantations could be used to supply methanol and/or ethanol that would gradually replace traditional oil-based fuels and manufacturing feedstocks. The time frame is 25 to 100 years.

'Not only will this new industry attract investment and produce employment and prosperity for rural Australia, it will help us prepare in advance for possible constraints to national production and prosperity'

Methanol (CH₃OH) or 'wood alcohol', in particular, shows promise for four reasons. It appears to be the fuel of choice for the next generation of vehicles powered by methanol fuel cells. The industrial process for methanol is relatively simple and has a high 'energy – profit ratio' compared to ethanol. It can use a wide variety and quality of feedstocks – from wood to waste. Finally 'green methanol' made from wood would be carbon neutral and bring environmental credentials to a large number of production chains for which it is a key input.

'Australia's farmed landscapes are in big trouble due to rising water tables,' says Foran. 'The industries and people that depend on them need deep-rooted perennial crops to help mimic the function of natural ecosystems that are now struggling. This will help to rehabilitate vast areas affected by dryland salinity and related problems.'

'Not only will this new industry attract investment and produce employment and prosperity for rural Australia, it will help us prepare in advance for possible constraints to national production and prosperity posed by a run-down in Australia's domestic stocks of oil,' says Foran.

The researchers point out that many developed economies in Europe and North America are investing in R&D to underpin a transition to renewable forms of energy, including biomass fuels like methanol and ethanol. Here, simulations by the Ozecco 'embodied energy modelling framework' show that a transition to a methanol transport fuels system is generally feasible, given reasonable assumptions.

However, the researchers admit that current economic assessments based on price alone 'do not make a compelling case for a transition to a biomass fuelled economy', especially given the hidden subsidies in the current energy systems. They say much of the rationale for a transition to a carbohydrate economy will rest instead on such issues as: new industries for the 21st century; jobs for rural Australia, refurbishment of degraded farmed landscapes, carbon-neutral fuel cycles and import replacement of transport fuels.

Also, the ecological sustainability of biomass-based alcohol fuel systems of this type has yet to be fully proved. Four issues arise in considering short-rotation woody cropping systems. Some retention of branches and leaves is probably necessary



Could native tree plantations rehabilitate areas, alleviate salinity, and provide a bio-fuel crop?

Robert Kerton



to ensure nutrient recycling. Broad-scale tree and shrub plantings may dry up overland water flow from some catchments, further affecting inland river systems and restricting water supplies for irrigated agriculture. And plantations of exotic species, if used, could further depress biodiversity. Finally, more investigations are needed to fill out the detail in this optimistic vision of a biomass-based energy supply.

However, at the end of the day, Australia's farmed landscapes will still require deep-rooted, water-pumping crop systems to help redress the problem of landscape damage caused by land clearing and by annual cropping systems that are fundamentally flawed in the Australian environment. Marginal changes to the current system will not be enough.

● Steve Davidson

More information:

About bio-fuels: <http://www.australianbiofuel-sassociation.org.au/Biofuels/indexBiofuels.htm>
Contact: Mr Barney Foran, 02 6242 1710