

Bright prospects for Mallee bioenergy

by Rebecca Rawlings

When farmers in Western Australia's wheatbelt started using oil mallee trees to control salinity, they weren't aware of the massive potential crops' to provide an almost unlimited supply of clean electricity to the state.

AT ANTICIPATED RATES of establishment, there is potentially more energy to be derived from oil mallee biomass than the energy in the amount of coal currently used to supply a large proportion of the Western Australia's energy needs.

Adrian Chegwiddden, sustainable energy business development manager of Verve Energy, which adapted technology to generate electricity from the trees, says the mallee represented an almost unlimited supply of energy biomass. This is a situation almost unique to Western Australia, which may have a major impact on the state's future energy mix.

Pilot plant study demonstrates substantial potential

In 2000, a feasibility study into the bioenergy potential of oil mallees was commissioned by the Oil Mallee Company (OMC) in conjunction with Western Power and Enecon. The study identified that all of the mallee biomass (wood and leaf) could successfully be utilised in a processing plant to deliver energy, activated charcoal and oil and also found that the process was likely to be financially viable.

Following the study, a 1 kilowatt (kW) Integrated Wood Processing (IWP) demonstration plant was completed in Narrogin in 2006. The pilot plant successfully demonstrated the capacity for renewable electricity generation, charcoaling and carbon activation technology. The technology, developed by the Commonwealth Scientific and Industrial Research Organisation and adapted by

Verve Energy, demonstrated that multiple-product processing systems appear viable.

Mr Chegwiddden says that during the pilot plant's trial, 500 kW of energy was generated into the grid. The energy was produced by first dewatering the mallee wood and leaf material and then burning the material at the IWP plant to generate steam, which was then fed into a steam turbine to produce electricity. Oil was also able to be distilled from the leaves.

"As an electricity producer, the combustion of biomass for electricity is important, however, in the longer term production of ethanol or pyrolysis oils could be just as important for other industry players," Mr Chegwiddden notes.

Using oil mallee crops to generate electricity will be one of the only generation systems that will have both upstream and downstream environmental benefits. Specifically, the trees are strategically planted in belts across the landscape rather than in blocks, enabling cropping and grazing of livestock to continue.

"That is the generation of renewable energy on one hand and the landcare benefits on the other," Mr Chegwiddden says.

Towards commercial-scale green energy

Mr Chegwiddden notes that the Narrogin plant is a demonstration facility and that future commercial plants may be built in a number of wheatbelt towns. To this end Verve has commenced a front end engineering and design (FEED) for a commercial plant, the first component of



Integrated Wood Processing demonstration plant at Narrogin, Western Australia.

which is examining all the options ranging from a bioenergy plant to a full scale IWP plant producing advanced carbon products.

OMC plans to continue exploring opportunities with Verve Energy for the IWP project to come on stream and is currently monitoring the status of the several million mallees planted in the immediate region some years ago, with the expectation of this project going ahead at some stage.

"The outcome of the FEED will determine which options will be taken forward and what the potential to build commercial plants will be," Mr Chegwiddden adds. "One would imagine that this resource will be tapped on a large scale sooner or later, it all depends on the future economic environment."

One of the tipping points for development of commercial plants could relate to the carbon trading rules to be discussed later this year.

"But we hope the FEED process will deliver a viable option to get the system started," says Mr Chegwiddden.

Challenges for oil mallee

The major challenge for the industry, like many renewable industries, is to guarantee energy supply and a major component of this involves convincing landowners to plant more trees. Landowners want certainty that planting oil mallees will be profitable, while investment in bioenergy developments need growers to provide a guaranteed feed supply of a consistent quality that is available at a competitive cost.

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Delegates from the BioEnergy Australia Conference at the IWP Narrogin demonstration plant.



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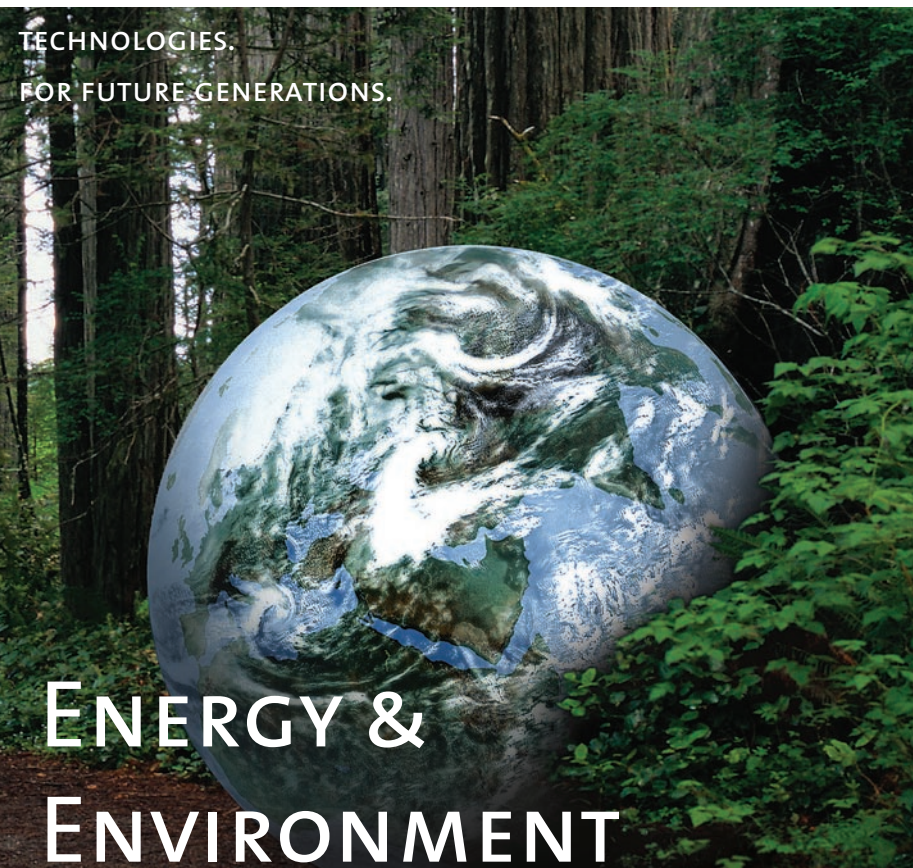
Another major limiting factor is the transport cost of biomass. Different models of utilisation and partial on-site processing may be required in order to ensure the financial viability of the resources.

Life cycle analysis carried out by Curtin University's Hongwei Wu and his associates indicate that with a 75 kilometre transport radius, mallee production in Western Australia can achieve an annual energy productivity of 206.2 gigajoules per hectare, considerably higher than annual or other short-lived agricultural crops, making oil mallee a competitive source of biomass feedstock for bioenergy production.

There are broader benefits of the crop that may well shift the economics and reduce the risks to ramp up oil mallee planting. Along with clean energy, there is also potential to produce charcoal to optimise energy intensive industrial processes like metal extraction or gas purification. Oil production is another benefit of the crop. Like crude oil it has considerable value – without the potential carbon tax implications. Farmers looking to diversify their income may be greatly encouraged to plant oil mallees if returns are made available from both energy and carbon credits.

While the mallee bioenergy industry has been described by many analysts as being in its infancy, the growing consensus about climate change and the significance of carbon trading could provide the catalyst needed to see large-scale tree planting in the wheatbelt and multibillion dollar regional processing industries in rural Western Australia. Indeed we may soon see the establishment of the oil mallee industry as a critical component of both Western Australia and the country's energy mix. ■

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AUSTRIAN ENERGY & ENVIRONMENT (AUSTRALIA) PTY LTD

2 Richardson Place, North Ryde NSW 2113
Tel +61 2 8116 7000 Fax +61 2 8116 7100
info@austrianenergy.com.au

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WWW.AEE-AUSTRALIA.COM.AU



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Verve plans commercial processing plant

Verve Energy has recently announced plans to build a commercial oil mallee processing plant to produce power for up to 5,000 homes.

"Obviously Narrogin has a lot to offer," says Verve's Don Harrison.

Oil Mallee Growers Association's David McFall says it is good news for local growers who have planted more than 10 million trees around Narrogin.

"With the commercial aspect coming on board people are taking a fresh look at the project," he adds.

Verve will make a final decision on the project in December.