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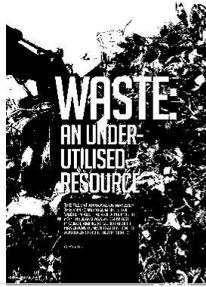
Australia's biomass resource could deliver about 106,000 MWh of electricity generation, from nearly 2GW of installed capacity to 2020. The project, by the **New Energy Corporation** of Perth will convert about 100,000 tonnes of waste per annum, which would otherwise go to landfill, into a clean and renewable energy source. It could produce enough energy to power 21,000 homes in the Pilbara.

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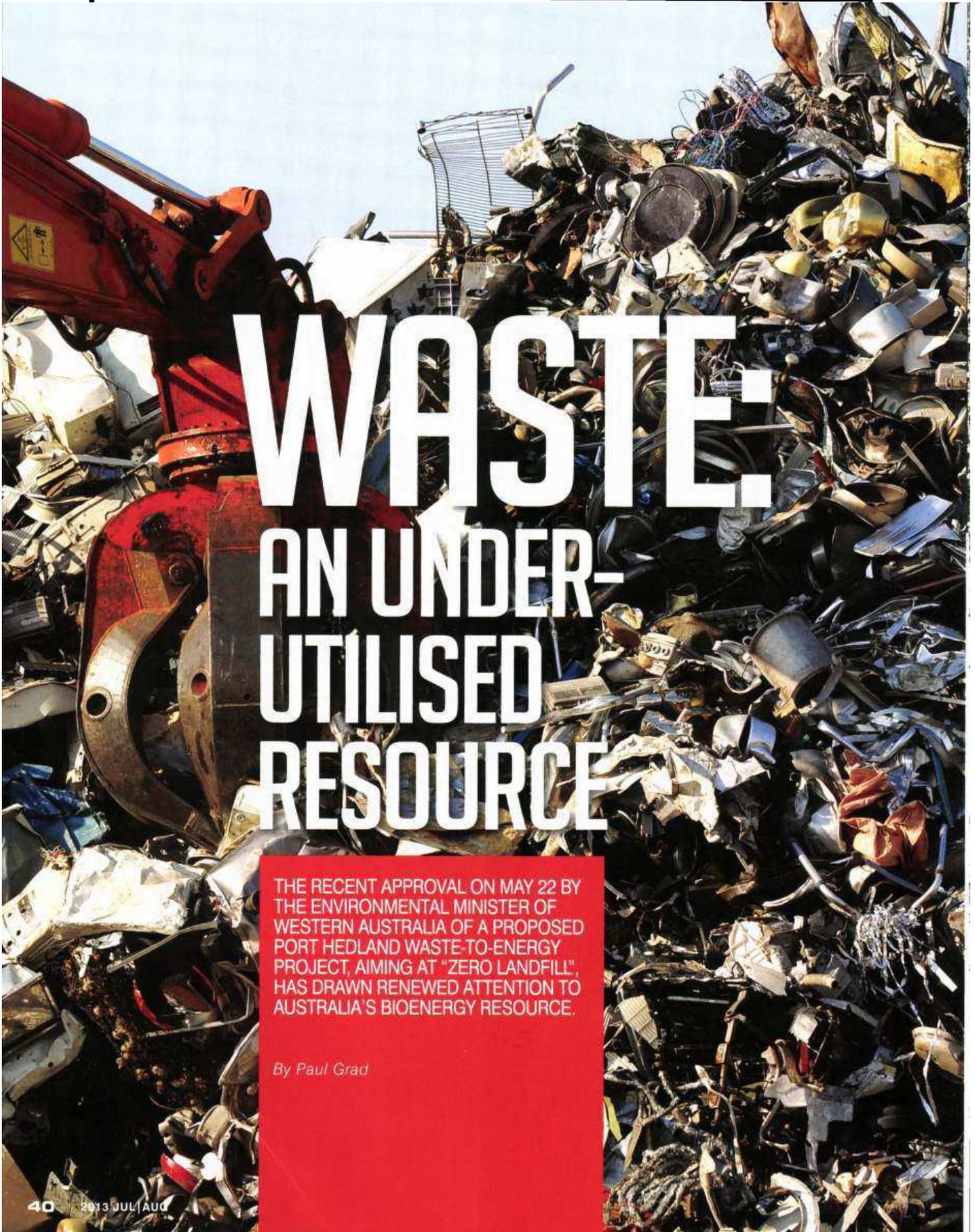
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WASTE: AN UNDER- UTILISED RESOURCE

THE RECENT APPROVAL ON MAY 22 BY THE ENVIRONMENTAL MINISTER OF WESTERN AUSTRALIA OF A PROPOSED PORT HEDLAND WASTE-TO-ENERGY PROJECT, AIMING AT "ZERO LANDFILL", HAS DRAWN RENEWED ATTENTION TO AUSTRALIA'S BIOENERGY RESOURCE.

By Paul Grad





INDEPTH

The project, by the New Energy Corporation of Perth will convert about 100,000 tonnes of waste per annum, which would otherwise go to landfill, into a clean and renewable energy source. It could produce enough energy to power 21,000 homes in the Pilbara. The project's thermal capacity will be 72MW and its electricity generation capacity will be 15MW. It will employ the "WtGas-RES" low-temperature gasification technology from Entech-Renewable Energy Solutions of Canning Vale, Western Australia. The heart of the WtGas system is the syngas production stage. The Entech pyrolytic gasification chamber receives the waste or biomass and subjects it to low temperature gasification, where the heat converts it to gases such as carbon monoxide, methane and CnHn hydrocarbons, which are referred to as syngas. The feedstock is processed over 16 to 24 hours to ensure complete gasification. The syngas burner receives and fires the syngas. It combines conventional high efficiency/low NOx burner design with staged processes of pre-mixing, ignition and oxidation. The burner's staged process also destroys principal organic pollutants. The resulting off-gas consists primarily of CO₂ and water vapour. The syngas produced is fired to power boilers and similar devices to produce steam and/or electricity.

Bioenergy - renewable energy produced from biomass (organic matter) - can also be obtained from waste, including municipal, commercial and industrial waste, which contains largely organic matter. Waste-to-energy, an important part of bioenergy, can be generated from sewage gas, landfill gas, agricultural-related wastes, urban biomass (such as food-related wastes, paper, and timber from construction sites) and wood-related wastes.

Australia's huge bioenergy resource is underutilised, partly due to uncertainty in policy and a lack of understanding and support from government, according to the Australian Clean Energy Council (CEC) - a government-industry forum formed to foster the development of biomass for energy. Other barriers inhibiting the bioenergy sector in Australia, according to the council, are the effort and cost involved in securing a reliable and long-lasting energy supply due to the small scale of most bioenergy power generation plants. This also means only about half of the current bioenergy plants in Australia are cost-competitive.

To overcome those barriers, the council identified the following initiatives:
Introduction of a carbon price:

augmentation of distribution systems to lower connection cost for multiple projects; improving community and stakeholder understanding of bioenergy; reducing the knowledge gap between R&D, demonstration and deployment of bioenergy generation; and reviewing the resource cost, energy value and network connections by region of competing renewable energy technologies. Bioenergy contributes about 2500GWh/a - less than 1 per cent of electricity generation in Australia, according to the council. This represents about 11 per cent of Australia's renewable energy generation. However, the council says, Australia's biomass resource could deliver about 10,600GWh/a of electricity generation, from nearly 2GW of installed capacity to 2020. This includes both existing and new capacity and is a realistic target for bioenergy in Australia.

This would represent about 18 per cent of the national 2020 target of 60TWh of renewables, making up 20 per cent of Australia's forecast electricity demand of 300TWh by 2020. The target of 10,600GWh/a represents about 4 per cent of Australia's forecast electricity demand of 300TWh by 2020, which is more than four times the current contribution to electricity generation.

According to the council, the bioenergy resource target for electricity generation by 2020 is 3200GWh from sugarcane, 3000GWh from wood-related wastes, 1880GWh from landfill gas, 900GWh from sewage gas, 800GWh from agricultural waste, 720GWh from urban biomass, and 220GWh from energy crops, for a total of about 10,600GWh.

Much of the bioenergy in Australia is obtained from landfill, but the use of landfill has been controversial, mainly due to the possibility of pollution generated by the landfill.

However, there are companies that believe, with modern pollution control measures, landfill is a good option. LMS Energy of Adelaide, for example, says the landfill gas industry is a quiet achiever in Australia's renewable energy sector, based on more than 50 grid-connected, distributed energy generators operating around the country and with many innovative projects under construction or development. The landfill gas power generation industry has built 850GWh/a of generating capacity and associated infrastructure.

"The world-leading technology developed by Australian companies provides the most effective means of capturing the energy potential from organic waste, while achieving real

environmental outcomes at low cost to the community," the company says. LMS Energy operates projects throughout Australia, including in Perth, Brisbane, Darwin, and Launceston, generating more than 330GWh/a of base-load renewable electricity. The company believes modern landfill sites involve advanced engineering and pollution control features, making them safe and environmentally benign. Energy Developments Limited, of Eight Mile Plains, Queensland, operates 21 landfill projects with 83MW of generation capacity. A great variety of wastes is used in Australia to generate electricity. In Queensland the fruit growers' group Growcom has developed a prototype using bio-digester technology to convert

eucalypt trees will be grown across ten participating farms. The trees will be harvested and processed into renewable fuel pellets that can readily substitute for coal in the existing based-load coal fired power station. The trial aims to show that the trees can provide for co-firing Wallerawang Power Station with 20 per cent biomass. The power station comprises 2 x 500MW-generating units located near Lithgow. This then equates to 100MW of biomass per unit. There are several industries and businesses in Australia, converting their own waste to heat and electricity, often supplying electricity to the local grid. For example, Goulburn Valley Water Tatura Wastewater Management Facility,

... Australia's biomass resource could deliver about 10,600GWh/a of electricity generation, from nearly 2GW of installed capacity to 2020.

banana waste into electricity or fuel. About 20 per cent of the Australian banana crop gets wasted every year, either through harvesting or transport to the packing sheds, to a total of about 60,000 tonnes. In the face of this untapped resource, the Australian Banana Growers Council, in collaboration with Ergon Energy, looked into the possibility of using bananas as a feedstock to generate electricity.

The process works by taking damaged bananas or their stalks and using anaerobic digestion to produce methane and carbon dioxide. Growcom built a 460,000-litre anaerobic digester with the capacity to process 2500 tonnes of bananas per year, producing 85,000 cubic metres of methane. Growcom estimated that with this level of output the biogas could continuously generate 35kW of power.

Due to extreme weather events including cyclones, the project was put on hold for several years, but now Growcom is ready to proceed with the project. The aim is to refine the engineering and technology with a view to commercialising the process. A somewhat unusual waste product is being used to generate electricity by one of Australia's largest utilities, Delta Electricity: the utility plans to grow oil mallee eucalypts as an energy crop in central New South Wales. It plans on producing energy pellets from coppiced mallee, then cofire at 20 per cent rates at Wallerawang Power Station. During a trial project, some 200,000 native mallee

200km north of Melbourne, is also the site of the Tatura Biogas Power Station. The biogas from high-rate anaerobic lagoons in the facility is captured and converted to electricity. The plant is expected to produce 5GWh/a of electricity, which will be supplied to the National Electricity Grid through the Powercor distribution network. The Visy Pulp and Paper Tumut Mill, at Tumut, New South Wales, produces about 300,000 tonnes of pulp and paper per year. The mill will process 800,000 tonnes per year of local plantation timber sawmill residues and pulp wood materials from softwood plantations, supplemented by 80,000 tonnes of domestic and commercial waste paper. Bark, wood waste and the liquid residue from the pulping process are used in specially designed boilers to produce steam for the mill. The steam is generated at high pressure and passed through a steam turbine to produce 20MW of renewable power for the mill.

According to the CEC: "Existing waste-to-energy technologies are already cost-competitive in the long run, and upfront costs are lessened due to a reduction in transportation costs, the use of existing industries and infrastructures to facilitate waste-to-energy production and the value of Renewable Energy Certificates". With the need to reduce greenhouse gas emissions now a policy reality, Australia's waste resources must play a vital role as part of Australia's clean energy future, the council said. ☺