Fill it full of rubbish and 29MW of electricity will come out the other end.

A taste for waste

Landfill may slowly be consigned to the trash heap of history as the waste-to-energy sector gathers pace, with a second project ready to progress in Western Australia.

What do you do with your rubbish? You chuck it out. Where does it go? Not sure. Such has been the level of interest shown by society in the fate of that which is superfluous in our consumer paradise. We could carry on that way forever, if we felt like it, but a funny thing is happening around the world: people are pushing back against a tide of crap that is threatening to engulf them.

It's a nice feeling to want change for the good of the environment, but it's even nicer when collective concern can pay economic dividends. That's what can happen if the stuff we drop in our roadside wheelie bins is used to fuel incinerators, where the heat drives turbines to generate electricity and a use is found for most of what's left over.

This revolution in turning junk into money is finally underway. The hotspot in activity in Australia is about 40km south of Perth, where work has begun on Avertas Energy, a 36MW waste-to-energy plant in Kwinana, and financiers have signed off on the East Rockingham Resource Recovery Facility, which will aim to generate 28.9MW of power. About 50% of output is expected to be eligible for LGCs.

Australia is awash with waste, with 22 million tonnes of the 67 million tonnes reported in the last national waste report going to landfill. "Australia could be doing a lot better with its waste management practices at the moment," says Clean Energy Finance Corporation associate director Mac Irvine, who oversaw debt financing of $57.5 million in the $515 million East Rockingham project. "We could definitely be doing more in terms of reusing, recycling, reprocessing and then recovering energy and recovering other materials where we can."

The easy option of exporting waste hit a wall in early 2018 with China's Green Sword policy. At a smaller level, state governments are sensing the public's growing distaste for waste and taking an overdue look at their waste management practices. This includes the Queensland government reintroducing a waste levy last year and drafting an energy-from-waste policy; Victoria working on a circular economy policy paper; and the two waste-to-energy projects in Western Australia reaching financial close. "There is a lot happening in the waste sector in Australia," Irvine tells EcoGeneration.

WESTERN AUSTRALIA'S ENERGY PROFILE

TECHNOLOGY	GENERATOR CAPACITY (MW)
Gas (OCGT)	2,707
Black coal	1,567
Wind	612
Gas (CCGT)	585
Distillate	104
Bioenergy (biomass)	40
Bioenergy (biogas)	25
Solar (utility)	19
TOTAL	**5,658**

Source: OpenNEM, February 2020

The industrial area south of Perth will soon be Australia's waste-to-energy capital.

Without being able to share much detail on the cost of the technology, Irvine says the maturity of the sector will likely become evident as development cycles are shortened to 2-4 years rather than 6-10 years for the two Perth projects, one under construction.

"You're going to have more sophisticated counterparties coming into projects earlier; you're going to have, hopefully, improved regulatory and policy frameworks allowing approvals processes to happen more quickly," he says.

The CEFC's role when investing is to attract other financiers to clean energy projects by its mere presence, not to muscle other investors out of the action with aggressive bidding tactics. "Our role is to 'crowd-in' investments," Irvine says. The CEFC was a senior lender on Avertas Energy, with $90 million invested in the $700 million project, and is a subordinated lender for East Rockingham, which also attracted $18 million in grant funding from the Australian Renewable Energy Agency.

TICKS ALL THE BOXES

The CEFC's principal three investment criteria are renewable energy, energy efficiency and low-emissions technology. East Rockingham qualifies primarily because most of the feedstock processed by the plant is considered to be renewable under the Clean Energy Regulator's guidelines, in this case organic material sent out by householders in their wheelie bins.

The methane that would otherwise leech into the atmosphere from landfill will be combusted in the furnace at the East Rockingham plant, earning the right to call it a clean energy generator.

"It's not 100% renewable electricity," Irvine says. "The generation that's considered to be renewable is dependent upon the proportion of what's considered to be renewable feedstock or renewable waste going in the front end."

The plant will take about 300,000 tonnes of garbage a year, including industrial and commercial waste, which will produce about 70,000 tonnes of "bottom ash" to be treated on-site and then sold for use as an aggregate material in roads and so forth. A small proportion of materials that make it through the incineration process, such as metals, will be collected and sold or recycled. Some material, about 4%, will go to landfill and flu gases will have as much nasties filtered out as possible.

The process is pretty straight-forward: trash is thrown in the front end, set alight using gas (to get things started) and then shunted slowly downhill by a "moving grate" that allows bottom ash and non-combustibles to drop away for collection somewhere down below.

The raging, constant temperature in the incinerator is piped to nearby turbines that will produce about 29MW of "baseload" generation, "for want of a better word," Irvine says. A deal has been signed with an undisclosed off-taker and the electricity will support the South West Interconnected System. "It can potentially support more intermittent generation, given the nature of this being baseload."

The plant will take about 300,000 tonnes of garbage a year, including industrial waste.

RUBBISH REMOVAL

With Kwinana and East Rockingham given the green light it's doubtful Perth will be able to generate enough waste to support any more waste-to-energy projects for a long while, with expected project lives running out to more than 30 years. "But on the east coast of Australia there is absolutely massive potential," says Irvine, hinting that the CEFC is looking at a number of projects under development "that we hope to get away in the next year to two years". Over the next five to 10 years the sector can expect to see approvals for a project a year, "if not more," he says, depending on the availability of waste. East Rockingham should be finished by 2023.

And so it looks as though landfill may slowly become a thing of the past, its drawn-out death accelerated by a consumer trend for reduced consumption – if that actually ever happens.

"My personal view is there are going to be a number of these sorts of projects delivered in Australia in the next few years — the momentum is gathering," Irvine says. "There is a significant opportunity in this sector and the environmental outcomes are avoiding significant volumes of waste at landfill, and the energy generation component."

Plants that process trash are paid to take it, and waste levies set by the states can be changed at a whim (although swift repercussions are increasingly likely as the electorate bends towards anything that supports the dirty status quo).

The waste levy in Perth is $70 per tonne; in metropolitan NSW about $140 per tonne; in Queensland it is $75 per tonne.

Should a waste levy suddenly drop or be repealed projects such as Kwinana and East Rockingham, which rely on that revenue being earned at the gate, could potentially be killed. Energy company Acciona and Hitachi Zosen Inova are building the plant, which will be operated and maintained by Suez.

Irvine says some feedback from industry says $100 a tonne is a required levy for waste-to-energy projects to be viable, although the Perth projects show it can be done at $70 a tonne. "Levy risk is obviously a key risk," he says. eco