WASTE TO ENERGY – A HOT TOPIC

Dr Dominic Hogg from Eunomia UK and **Duncan Wilson** from Eunomia NZ analyse the pros and cons of burning waste to generate energy.

WASTE TO ENERGY (WtE) has been coming in for a lot of attention of late. Renew Energy on the West Coast recently announced that they have secured backing worth $300 million to build a WtE plant (resource consents and supply of input waste dependent).

China has effectively stopped taking a lot of our recyclables (or at least, the materials we deemed were recyclable). All that paper and plastic has a lot of embodied energy. Rather than bury it in the ground or let it litter our waterways and oceans, couldn't we burn it and at least capture some value from the waste through the energy?

In the course of our work, we talk to lots of council members, stakeholders and members of the public. The topic comes up regularly.

WtE is common in many places overseas, such as the UK, parts of Europe, and Japan, and it is becoming more common in China, with the USA also developing capacity. But New Zealand doesn't have any WtE facilities that process municipal waste. Isn't it time we had a good look at this option? Couldn't it work here?

Do the purported benefits stack up?

Putting aside the issue of cost for the moment, the proponents of WtE suggest it has a positive environmental impact. So, let's have a look at the arguments.

The main argument for WtE is that you can generate energy from the waste. Although this is a benefit, it doesn't come without impact. From an environmental perspective, an important question is whether this a better way of generating energy than the alternatives. If you are generating energy from waste, you are at some point displacing energy generation from another source.

So, what is that source? If we were replacing coal, then WtE can make sense from a carbon perspective. But no one serious about climate change believes we should be burning coal any more, and some erstwhile coal-reliant countries are phasing out coal, while investors are looking to divest themselves of such assets.

Further, in New Zealand, 85 per cent of our electricity is already from renewable sources like hydro and wind. If we were displacing existing sources, then we would most likely be replacing energy that is 85 per cent carbon neutral.

However, if we are effectively replacing new generation capacity – which more accurately reflects the reality at the margin – then we might be replacing the new sources of energy, and in New Zealand, they are most likely to be wind, geothermal and solar.

The other main argument is that WtE releases less CO_2 equivalent per tonne than landfilling. This, it is argued, is because landfills generate methane, which is in effect 25 times more powerful as a greenhouse gas than CO_2 (depending on how you calculate it – but that is another story), whereas WtE just releases plain old CO_2.

This is, of course, true. However, not only are landfills able to mitigate some of their methane generation by capturing it, often using much of it

for the generation of energy, but they also release their emissions over a relatively extended period of time.

WtE, on the other hand, releases the CO_2 immediately. When accounting for CO_2 equivalent generation, time may well matter since reducing emissions now is considered more beneficial than reducing them in the future (it effectively buys us more time to develop mitigations).

The other aspect to this is that while organic material will degrade in a landfill and release methane (eventually), materials like plastic will take centuries to break down and can in effect almost be considered to be sequestered in the landfill. WtE releases all of the carbon, whereas landfill stores the fossil carbon element.

Cost factors

Which brings us to the question of cost. Supposing New Zealand was to develop such capacity: what would be the balance of costs and benefits relative to landfill?

We have never seen an analysis where the costs of switching from landfill to incineration (when the energy is not subsidised either explicitly or implicitly) are justified by the benefits. Indeed, monetised external costs tend to be somewhat similar.

None of this is to make apologies for landfilling: we have argued elsewhere the case for an effective landfill levy regime. It would be a mistake, for reasons briefly set out above, to introduce such a levy without pre-empting the switch to incineration that could take place as a result.

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New Zealand would be wise to levy both landfill and incineration with a view to stimulating waste prevention and more recycling. One of landfill's advantages is that it acts like a 'stock' facility rather than one that – as most incinerators do – seeks to command a specific annual throughput: this allows for flexing of inputs as recycling develops further.

Other options may be better

Other treatment options such as mechanical biological treatment (MBT) – which combines mixed waste sorting and biological treatment to stabilise biodegradable waste prior to landfilling – may reveal themselves to be interesting options for addressing the remaining climate change impacts of managing residual waste.

In some European cities, where climate targets are set at the most challenging levels, it is acknowledged that targets will not be met if materials containing fossil carbon are not removed from residual waste. Systems like MBT are no substitute for source segregation of a number of materials (notably, organic wastes, paper and card), but they can make very effective contributions to recycling of plastics and metals even after a 'first go' through source separation.

On a superficial glance, WtE can look attractive as a possible solution to issues we are facing in New Zealand with respect to waste. When the issues are considered a little more carefully, however, it is hard to see WtE having a strong role to play.

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Duncan Wilson has over 20 years' experience working as an environmental consultant in New Zealand and the UK. He has delivered a wide range of projects including waste management and minimisation plans, waste contract procurement, development and evaluation of service delivery options, collection systems modelling and cost-benefit analysis. Duncan has extensive experience with waste data and waste composition analysis.