24. WASTE 2002 CONFERENCE, COFFS HARBOUR, NEW SOUTH WALES

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The purpose of this report is to inform the Committee of the Waste 2002 Conference, held at Coffs Harbour, New South Wales.

The conference was held 16 to 18 October 2002. A two-day technical tour preceded it.

SITE VISITS

The first call on this tour was at the Brightstar SWERF (Solid Waste Energy Recovery Facility) at Woolongong. This is the third time I have visited this facility, and it has been interesting to see how it has developed on each occasion. Current statistics:

- Processing 40 tonnes per day.
- 50,000 tonnes per year capacity.
- All materials first go through an autoclave after which ferrous and nonferrous metals and some rigid plastics are removed as byproducts (but these are highly contaminated, and the plastics would only be fit for landfill) - a dirty MRF - glass (also not for recycling) and grit is also removed at this stage.
- Reciprocating engines are used to burn the system gas produced, plus landfill gas (the facility is located on a landfill).
- After the autoclave, the system produces a material which looks like cornflakes, and these go into the gasifier for conversion into gas, which is then cooled and used to run the engines for electricity generation.
- A residual material called 'char' (highly toxic) is left and it is about ten percent by volume of the original waste feedstock.
- A new development is secondary gasification of the char which reduces it to about 5% by volume of the regional waste feedstock (but this process has not yet been proved).
- This system is a promising one, but would likely neither be economic nor environmentally acceptable in New Zealand.

The next stop on the technical tour was at the new, New South Wales waste facility (a new landfill north of Sydney). It is owned and operated by a state-owned company. Current statistics:

- Charges are on the waster pays system and include A$18.20 per tonne government levy.
- Total charge A$72 per tonne.
- Lower charges for recyclables: $17 per tonne for concrete pavers, $45 per tonne for green waste.
- Landfill gas generates 25 MW.
- Capacity is 1.2 million tonnes per year.
- Services a population of 650,000 people in Sydney West.
- There is a recyclables and reuse centre on the site (very limited range of products).
- The public has direct access to a pit on site - the driver takes off recyclables first and then has this as waste, weighed for charging.
- Tyres deposited are taken offside for shredding before landfilling.
- Consented capacity is 3 million tonnes per year but this is planned to increase to 7.5 million tonnes per year.
- The landfill is on flat terrain, permeable geology, high groundwater (and a sizeable stream runs through the site).
- The landfill is constructed by excavating down by 22m, and the waste goes up another 22m (a shallow landfill of 44m depth).
- There is 150 mm of daily cover.
- The only protection is a compacted clay liner (no geomembrane or geotextile).
- Leachate control is by way of collection through sumps at low points in the site pumped out by vertical pipes - the leachate is then 'sampled' and if acceptable, is spray irrigated on site or recirculated into the landfill.
- The company is experimenting with ammonia stripping of the leachate so that sewers can be used for leachate disposal in the future.
- In the future, gas will be reticulated and used for electricity generation using onsite engines.
- The green waste collection area features open storage, shredding and screening - it is then exported from the site - there are two classes of compost produced (A type includes nontreated timber, B type has treated timber and other undesirables in it).
- The raw compost has value added elsewhere - seven final products produced.

- 54,000 tonnes per year of compost produced.
- There is no windrowing - static piles only, for 16 weeks - water added - turned every four weeks.
- Neighbours are very close to this landfill - an egg farm, and a concrete pavers factory, were observed about 400m from the landfill boundary.

Overall this landfill is extremely substandard compared to our proposed Kate Valley landfill which features a site with much better geology, hydrogeology, multiple artificial liners, and much greater distance from other land uses. Our composting system, utilising windrowing, also appeared to be superior. In addition, our recycling centres withdraw a much greater range of reusables and recyclables than this facility does.

The next day, a visit was made to one of the Bedminster facilities at Port Stevens. In the whole of Australia, Bedminster compost's 500,000 tonnes of green waste. The Port Stevens facility is three years old. Current statistics:

- 86,000 tonnes composted since inception, plus 9,000 tonnes of biosolids.
- The facility has avoided 65,000 tonnes of waste going to landfill.
- Field trials were conducted with the compost products, to match local needs - local farmers now find the product highly successful for cropping purposes.
- Grape marque is blended into the compost, and some bed-ash from local power stations is also blended into some compost products.
- The Bedminster technology is 30 years old and was developed for green waste and biosolids composting - development continued until the process was fully developed by the 1990's.
- The company sells all of the compost it produces (but the economics were not revealed).

The plant was inspected: the process begins with a rough sort of MSW on an undercover open floor - the waste (which appeared to contain a lot of recyclables) then enters a rotating digester (aerobic - pumped air) - dwell time only two hours - this produces compost plus inert waste materials which are then screened and matured in bays - the screened inerts are landfilled - the compost then goes to final screening (a trommel screen) - a biofilter is used for odour control - the whole process is undercover. The local council manager said that the plant had achieved council objectives, there was a good relationship with the Bedminster company, there was a 20 year contract; also a partnering charter, together with a public statement of intent, arrived at through public consultation. A split bin system was used for collection (recyclables and general refuse). Putrescible waste is included in the general refuse along with green waste. The council is moving to a two-bin system. There are strong sales of compost products back to the community. The plant produces 650 tonnes per week of saleable compost, and 20 percent of the total volume goes back to landfill. The end result from my observation is a very highly contaminated compost which would be unsaleable Christchurch. This is not an acceptable technology for Christchurch.

The final visit on the technical tour was to a Rethman plant. This plant services a community of 60,000 people. It has two lines: Organics only (green waste and bio solids) and a mixed solid waste line. The local council has the three bin system (refuse, recyclables, green waste). Contamination of green waste has been reduced to only 1%. Rethmans has provided the plant via a BOOT system for the Council and holds a separate collection contract also. The Council uses a waster pays system: A$300 per year for a large 240 litre green waste container and two smaller bins at A$235 and A$200 (80 litre) per year. The Council charges A$89 per year per household for refuse collection. It operates a separate waste minimisation fund to provide funding for recycling. The recyclables are source separated and do not reach this plant. However an attempt is made to take more plastic out of refuse in this plant, but from my observation this plastic would be too contaminated to be recycled successfully. The plant also accepts commercial waste (40,000 tonnes per year). Domestic refuse is only 10,000 tonnes per year.

Fresh green waste is sorted undercover to remove any contamination. A Brentwood shredder is then used and bio solids are added together with dried green waste - one third of each mixed together. This is all carried out in an open shed (no odour control). The mix then goes into large composting bins (300 cubic metres) for two weeks with air pumped up from under the floor, and water sprinkled on top of the waste pile (temperature controlled to 48 degrees C). Tests are carried out for pathogen control. The product is then given final screening before maturation outside.

The second line (general refuse) is shredded via a 'trimalene' (three screws shred the material) - the organic fraction (35 percent) falls out and is composted. The remainder goes into a trommel from which plastic is removed (but this is highly contaminated). Metals are removed with magnets. The residual waste is landfilled. The compost from this line is only suitable for landfill cover and is not sold.

All water used in the plant is treated and recirculated. Air from the compost bins is treated through a biofilter.

The performance of the system would be substandard for Christchurch's purposes.

SESSIONS

The first session at the conference looked at alternative technologies.

The Brightstar system was considered first. It was defined as being fundamentally an organic pulp fed system, relying on synthetic polymers, proteins and carbohydrates taken from MSW sources. These are used to produce a gas by a high-temperature gasification process, similar to landfill gas, with which electricity is produced through ordinary landfill gas engines (70 litre V16 reciprocating engines). A carburetted gas turbine is being developed for a more efficient gas-burn and to take a wider range of gases. This gasification system burns all of the Nox, and no oxygen is added (air only used). An autoclave preconditions and sterilises the waste, and (so-called) recyclables are removed. The resultant waste is then pulped and dried into the material resembling cornflakes in appearance. High-temperature pyrolysis then gasifies this material, and the gas is used to run the generator engines. A residual char will go through a secondary gasifier to reduce the original volume to 5 percent (which it is claimed is suitable for a nonhazardous landfill). Little information was given about air emissions. A substance described as bio-oil is also separated out, for uses in the petrochemicals industry - claimed to be in development. Biosolids cannot be used in the primary system, but it is claimed that these can be introduced into the secondary gasifier. This is a promising, though very expensive, technology which we should continue to monitor as it is developed further.

Another conference session described the creation of dioxins which are formed when carbon plus chlorine are heated together. Dioxins are created at temperatures between 250 degrees C to 850 degrees C. Temperatures of over 1,000 degrees C are required to destroy dioxins (therefore an energy inefficient method). Dioxins are the world's most dangerous carcinogenic substance, usually produced in significant quantities during incineration of MSW. Gas scrubbers to remove dioxins from emissions result in dioxin impregnated absorbents, which are difficult to safely dispose of.

A presentation was given by Jack Macy describing how organics were composted in San Francisco. In that city a food diversion programme distributes surplus food to food banks, to animal feed destinations, and to cosmetics industries. 10,000 tonnes are diverted from landfill in this way. Home composting is also encouraged. Following trials, food scraps are now collected at the kerbside. There is a three bin system: food scraps and green waste, recyclables, refuse. Split trucks are used for the collection. One collects recyclables and refuse, and the other collects food scraps and green waste. A small kitchen pail is used inside the household for daily collection of food scraps. This is similar to the system recently tested in Christchurch. No bag is used as a liner. People use supermarket bags made of paper. Businesses are also asked to contribute food surpluses and scraps and these are collected by small business operators using large containers. These operators collect food scraps, bottles and cans, especially from restaurants, hotels, and supermarkets (90% diversion). The diversion rate for domestic collection is 50%. It has been possible to persuade restaurants and hoteliers to co-operate by showing them large savings in waste fees avoided. Green waste charges (domestic) are discounted 25% over refuse charges. There is a 75 percent discount for commercial green waste and putrescible waste charges.

Compost is produced using large perforated plastic bags (like long plastic sausages) with air pumped in. The dwell time is 60 days at a temperature of 55 degrees C. The compost is then windrowed for thirty days. The nitrogen content is two percent. The ratio of putrescibles (including paper) to green waste is 1:1. Most of the product is sold to organic farmers.

An interesting description of anaerobic digestion was given by Andreas Pichler. He described four stages in the process:

1) Solid substrates turned into solution.

2) Dissolved substrates turned into gasses by fermentation.

3) Acid conversion.

4) Carbon and methane production.

He described the one stage and two stage types. The one stage type mixes the waste for liquid and solid separation and utilises a dry fermentation reactor. The two stage type uses hydrolysis (percolation) and a methane reactor - this is the system utilised by Global Renewables with whom Christchurch has signed a heads of agreement for investigation purposes.

Literature has been collected which describes this address in greater detail.

A presentation was then given by a New Zealand company which produces VCUs (vertical composting units). These are modular units of 25 cubic metres capacity each, which can be clustered together. The system was described as follows: Green waste and putrescibles (not bio solids so far) are added to the top of the unit where high-temperature composting occurs (70 degrees C to 85 degrees C) which provides pathogen kill. In the centre zone, the temperature drops to between 55 degrees C and 65 degrees C for degradation of the organic material into compost. In the bottom section fungal activity occurs at a lower temperature (35 degrees C to 45 degrees C), and at this point the compost is withdrawn from the bottom of the unit. This compost is 4% nitrogen rich. The unit supplied to Mackenzie District Council has resulted in a 74 percent reduction of volume to landfill. The production cycle is typically 14 to 21 days. The system currently takes green waste and putrescible waste but not bio solids so far. There are no odours. A fan at the top of the unit provides positive aeration. This appears to be a simple cheap and effective system of producing good quality compost for both green waste and putrescible waste. While the units are too small for the volume required by Christchurch, and bio solids cannot (so far) be used, we should consider this system for satellite plants in parts of the city which are distant from Bromley.

I also attended the session on the Tryton Vermiculture system. The system used by the Lismore City Council in Australia was described. It takes 15 tonnes of green waste per day and produces 400 kilograms of compost and vermicast from it. Vermicast was described as a very high-quality compost product.

On the second day of the conference Dr Kwesi Sagoe-Crentsil of Nolan University, gave an address on 'Deciding on Alternative Technologies'. He said that the objectives should be studied under the headings of environmental protection, increased landfill life, lower costs, and reduced community concerns. He also described why it is important that chosen technologies must be capable of being integrated into the whole waste strategy. Nolan University has developed a decision support system as a tool all for local communities and Councils to use in their decision-making processes. It incorporates local views, financial and technical information and indicates environmental results. The assessment criteria are inputted by the client. The methodology defines systems, provides technical assessment criteria, and provides environmental assessment under four main headings (air emissions, water emissions, greenhouse gases, and resource recovery). Social assessment, and financial assessment is also incorporated with appropriate weightings provided for. The model comes with a handbook. He made the point that the value and length of contracts for waste management requirements justifies a rigorous systematic process such as that developed by Nolan University.

CONCLUSION

Both the conference and technical tour in particular were very worthwhile. A range of literature has been collected and is available for future reference. A number of photographs were also taken of the plants visited during technical tour.

Chairman's
Recommendation: That the information be received.