



**Friends of
the Earth**

Alternatives to incineration

Creating a resource in Moray instead of waste

A report to The Moray Council from Moray Friends of the Earth
August 2007

SUMMARY

In the past almost all of Moray's residual municipal waste was landfilled untreated. The European Landfill Directive now means we must reduce the biodegradable fraction of the waste we send to landfill. It appears that the only alternative to landfill which The Moray Council is considering is mass-burn incineration. Friends of the Earth has long opposed incineration of residual waste because it destroys natural resources; undermines recycling by demanding a steady stream of waste; it adds to climate change; and it causes pollution from air emissions and toxic ash.

A number of other options are available for dealing with residual waste. One of which is Mechanical and Biological Treatment (MBT). This paper seeks to encourage The Moray Council into adopting alternatives to incineration technologies by looking at case studies of other plants and highlighting other resources on this subject.

CURRENT SITUATION

A rising proportion of Moray's waste is being diverted for recycling. Although Moray has one of the highest percentages in Scotland, this is considerably less than other countries and certainly less than its full potential. The remaining waste, often classed as residual, will still consist of a large proportion of recyclable or biodegradable materials. In 2004 of the 41,314 tonnes landfilled at Dallachy 28,874 tonnes were classed as biodegradable (TMC Waste Plan 2006).

The Council have rolled out kerbside collection of recyclables to the larger settlements in Moray and provide a number of 'bring' sites. Improvements to the range of dry materials collected from the kerbside for recycling could be put in place (plastics etc); further information campaigns enacted; and greater use of bring sites to enable repair and resale of household goods could be rolled out. However, it is unlikely that these will significantly reduce the biodegradable proportion of residual waste and the expansion of kerbside collection to include more biodegradable waste may currently be problematic so soon after the introduction of the kerbside collection of other recyclables. .

There are a number of initiatives in the voluntary sector which complement the existing Council services. Almost all of these could be enlarged if suitable funding was in place. An obvious example would be to roll out and expand the role of the Green Home project in Buckie to other areas in Moray and to include other more local options similar to the Scrap Store in Shetland (www.cope.ltd.uk/businesses/shetland-scrap-store).

There are also a few private initiatives including a proposal for food waste composter at Lochside farm, Elgin. This is primarily to take food waste from local businesses and treat in an enclosed anaerobic and aerobic digester to create compost while tapping the biogas to power the unit (www.northcountryservices.net). There is also a proposal for an incinerator in Elgin going through the planning process.

ALTERNATIVES

A number of documents outlining the case against incineration have already been distributed to the Councillors of this, and previous, administration so there is no intention to repeat these here. However, if further details of the reasons against incineration are required see some of the documents listed at the end of the report.

Our overuse of landfill to dispose of untreated waste is the reason why the European Landfill Directive was put in place. Friends of the Earth believe that landfill is still the most environmentally sound method of disposing of inert treated waste once all recyclable materials have been removed.

Mechanical Biological Treatment (MBT) can be used as a method of treating waste. This is primarily used for dealing with the residues of mixed municipal waste once the dry recyclable proportion (paper, plastics, cans, glass etc) have been reduced through household collections of recyclables. MBT is not a single system but a range of technologies gathered together in one plant. The main objective is to avoid putting toxics, recyclables and organics together into any final disposal option where they can interact and contaminate each other. Instead MBT combine a series of treatment steps to remove as much recyclable, organic and toxic material from the residual as possible – thereby producing an inert ‘stabilised’ final product.

How MBT systems work (from Greenpeace Blueprint)

- 1. Source separate first.** MBTs should receive the residuals left after the maximum front-end source separation has been achieved – thus maximising the economic and environmental benefits from source-separation and minimising the size, cost and complexity of the MBT plant required.
- 2. The mechanical stage.** Residuals are fed into a highly mechanised front-end (to remove the metals, plastics and other materials). This maximises the diversion of recyclable materials, separates the compostable element and ensures the cleanest feedstock possible for the next stage.
- 3. The biological stage** is usually an enclosed, in-vessel composting system which is intended not primarily to produce a saleable compost product, but rather to reduce the weight, and render inert any biologically active organic materials (that is to ‘stabilise’ the residue). The materials broken down and composted at this stage include paper and board, green/kitchen organics and the organic content contained within nappies, packaging, textiles etc).
- 4. The residue** is both greatly reduced in weight, and is stabilised. It can be landfilled, greatly reducing the risk of methane production, leachate difficulties and landfill fires, used as landfill cover or if the contamination is low enough, as low grade compost.

A MBT plant can be flexible and created on a modular basis to meet the needs of the area and can be cost effectively built on a smaller scale if the desire is for separate plants for rural areas. This would allow recycling to be maximised and could be built to combine community composting facilities in order to allow more biodegradable waste to be segregated from the waste stream at source.

CASE STUDY ONE

CIVIC Environmental Systems Ltd

New Street, Holbrook Industrial Estate, Sheffield S20 3GH

www.civicalenvironmental.co.uk

The ciVic® process delivers:

- **Production of soil improver material**
- **Separation of ferrous material**
- **Separation of aluminium cans**
- **Separation of plastics for recycling**
- **Separation of glass**
- **>80% diversion from landfill**

The ciVic® process starts with the delivery of municipal solid waste, which is deposited from the refuse collection vehicle into the reception hall. Waste is then fed by a mobile loading shovel into a shredder, which breaks up bags of waste and reduces the size of the waste material. The shredded waste is then conveyed into the top section of the ciVic® digestion tower.

Each batch of material is processed in a closely controlled environment with all critical parameters being constantly monitored and used to control the agitation of the material and addition/extraction of air as required.

The waste is kept under these tightly controlled conditions for 6-10 days, during which time the biodegradable content (paper, food waste, grass cuttings etc) is rapidly digested to form compost, water vapour and carbon dioxide. The system is completely closed, allowing total control of the carbon dioxide produced - this is passed through a bio-filter to ensure that no odours escape.

A major advantage of the ciVic® system is that every element important in the process is constantly monitored and controlled all the time. All elements and operations are recorded by the bespoke Supervisory Control And Data Acquisition SCADA system and logged for each individual batch. This provides a complete history showing the batch identity, batch size, water additions residence time/temperature achieved and any other significant details. All of which can be formatted to the operators requirements to enable full compliance with both the Animal By Products Regulations and the operators own quality control system.

Following digestion, the materials are automatically separated to the various fractions for recycling and/or use. Only a small proportion of residual materials are required to be disposed of to landfill.



A new bio-processing plant in County Durham which offers local authorities an environmentally sustainable way for disposing of unsorted domestic waste will become one of the first fully operational projects developed under the Defra New Technologies Demonstrator Programme. Developed by Premier Waste Management and CiVic Environmental Systems, the Premier

Advanced Recycling Centre (Parc) is an integrated system which uses a proven rapid bio-processing technology to process Municipal Solid Waste (MSW). The innovative system recycles metals, glass, plastic and aerobically-digesting biodegradable materials into a compost product which is used to manufacture high quality topsoil.

A five-year operational trial and research conducted in association with Durham University has shown the Parc system releases substantially less carbon dioxide into the atmosphere than either of the two current methods of waste disposal - incineration (or Energy from Waste) and landfill – over both the short and long-term.

It has also recycled, composted and diverted from landfill more than 70 per cent of the 37,000 tonnes of MSW processed annually by Premier's two established Parc towers, a figure which would go a significant distance towards meeting local authorities' increasingly demanding recycling and waste management performance targets.

A new, larger Parc tower is to be commissioned at Premier's Thornley site in County Durham in mid-May, taking the site's annual processing capacity up to 62,000 tonnes of MSW.

The Defra New Technologies Programme aims to make a contribution to the planned EU's huge reduction of waste going to landfill by removing barriers to the development and application of appropriate new technologies.

During 2006 DEFRA launched its New Technology Demonstrator Programme, inviting companies to bid for grants to allow them to set up new waste treatment technology demonstrator projects throughout the UK.

The Government has concentrated its attention on waste treatment to investigate using waste treatment as a means to meeting the Waste Hierarchy and helping to achieve the targets set in the Waste Strategy 2000 document and the recently introduced Landfill Allowance Trading Scheme.

The programme will provide nine demonstration projects covering at least four different waste treatment technologies, with the aim to prove the economic, social and environmental viability of each selected technology.



Through this programme Premier successfully bid for a grant to build a three chamber digester processing biodegradable waste, using pre-cast concrete towers as opposed to the usual steel fabrication. This was in collaboration with civic. See www.recyclingre-invented.com for more details.

CIVIC has been up and gave a presentation to The Moray Council two years ago and invited representatives to come and look at the plant. This was not taken up – apparently because it was too far to travel. Since then The Moray Council have been involved in visits to Shetland and Denmark to look at incinerators.

CASE STUDY TWO

OAKTECH – Operate the ArrowBio Process

The Flint Glass Works, 64 Jersey Street, Ancoats Urban Village, Manchester M4 6JW
www.oaktech-environmental.com

ArrowBio Mechanical-Biological Waste Treatment Plant to be Developed at Avondale Landfill Site, Falkirk, Scotland



Oaktech Limited, owners of the ArrowBio MBT-Anaerobic Digestion technology in the UK and Eire, have signed a contract with Avondale Environmental Limited to commence the Design Development of a 70,000 tonnes per annum capacity MSW treatment facility at the Avondale Landfill Site in Falkirk, Scotland.

The ArrowBio process is a unique, water-based mechanical-biological treatment for solid waste. ArrowBio's strengths lie in its unique ability to reclaim resources for recycling and produce green energy from the

biodegradable residues through simple, flexible and effective design.

Avondale Environmental, who own and operate the Avondale landfill in the Falkirk area just off junction 4 of the M9 motorway, have chosen ArrowBio as their preferred technology partner for the development of a processing facility for treating mixed waste from both household and commercial sources. Waste will be diverted from landfill with recyclable materials recovered and renewable electricity generated for supply to the national grid.

Upon completion of the Design Development phase, the construction of the Plant will take 16 months, subject to receiving the necessary consent. This will provide nearby Local Authorities with the opportunity of moving some way towards landfill diversion targets required by the EU Landfill Directive.

Rated as one of the most consistent and among the highest for landfill diversion rates as well as methane-yielding processes, the ArrowBio technology, was featured in the Juniper MBT Report published in March 2005 (www.juniper.co.uk). The process was first developed by Arrow Ecology Ltd with a commercial-scale facility operating since January 2003 in Tel-Aviv. WSN Environmental Ltd has since commissioned a 90,000 tpa installation at Jacks Gully, Sydney, Australia to be completed by mid-2008.

ArrowBio can take unsorted or part-sorted waste straight from the waste collection vehicle. Using a series of water-based processes, including settling and washing; the system is able to recover cleaned metals, plastics and glass. The hydromechanical sorting system prepares the biodegradable fraction of the waste for anaerobic digestion by shredding with high-pressure water jets then removing sand and grit through sedimentation. The resulting 'soup' is pumped into the anaerobic digesters where high levels of methane-rich (~70-80% methane content) biogas is produced prior to use in gas engine to produce green electricity. The UK and Eire patents holders, Oaktech, also confirm that other orders are in the pipeline.

In addition to the already hugely successful existing landfill gas energy centre at the Avondale Landfill Site, the Avondale ArrowBio project is expected to produce biogas capable of generating approximately 2MW renewable electricity, which will be available for supply to the national grid, as well as all of the power requirements for the facility itself.

Statistics of an average ArrowBio plant: The following facts and figures are provided to give an overall impression of the system capabilities and performance. They are by no means static and the system can be adapted to meet a range of different customer requirements and waste streams.

- Proven in commercial & operational conditions
- Can be engineered to recover up to 90% of waste resources
- No need for pre-sorting of waste
- Modular plant. Basic module, consisting of two hydromechanical sorting lines treats about 200 tonnes/day
- Produces biogas (~70-80% CH₄) used for electricity generation and municipal transportation
- Can recover and clean plastics, metals and glass
- Lower costs than other new methods
- No odour nuisance or other air, water and ground pollutions
- No need for high temperatures or pressures; ArrowBio is a benign, environmentally synergistic process
- Produces high quality stabilised compost (fertiliser) and treated water

Plant treatment rate: 200 tonnes per day increasing in 100 tonne modular units

Footprint: ~8,000 square metres (based on 70,000 tonne double module)

Environmental impact:

- No smell
- Treatment of excess water to the municipal standards
- High standard organic soil improver
- Uses all methane, preventing emission into atmosphere
- Estimated man power: 7 workers (including manager and technician)



FURTHER READING

Friends of the Earth Briefing: Mechanical and Biological Treatment (MBT)

http://www.foe.co.uk/resource/briefings/mchnical_biolo_treatmnt.pdf

How to comply with the Landfill Directive without incineration: a Greenpeace blueprint

<http://www.greenpeace.org.uk/files/pdfs/migrated/MultimediaFiles/Live/FullReport/4478.pdf>

ASSURRE – A Guide to MTB

http://www.assurre.eu/uploads/documents/pub-38_en-a_guide_to_mbt_-_the_biological_treatment_of_waste.pdf