

# Waste not, want not

## Technical pointers

- Rising landfill tax and environmental legislation are forcing new thinking
- Recycling, composting and incineration plant all have key parts to play
- Plastics sorting at source remains essential
- AWS Ecoplastics is increasing recycled plastics output to 100,000 tonnes per annum
- Problems with the fluidised bed furnaces and lubrication at the Allington waste-to-power plant are being resolved

Municipal waste presents particular problems for plants designed to take over, as landfill comes under the cosh. Dr Tom Shelley investigates the problems and recent developments

With legislation, under EC pressure, now forcing reductions in the quantity of municipal and industrial waste that goes to landfill, the relatively simple processes of collecting rubbish and tipping it into holes are having to be replaced by increasingly complex, automated plant-based operations.

There's a significant fiscal incentive, too – in the form of the landfill tax, currently £32 per tonne, making overall cost about £55 per tonne. Next year, the tax increases by £8 per tonne and, in 2010, by a further £8. Hence current interest in the three main alternatives – recycling, composting and incineration – all of which are being worked on by Kent County Council (KCC), among others.

None of these, on its own, is a panacea. Not all material can be recycled at a remotely economical cost; nor can non-organic materials be composted. Incineration seems to be favoured by UK government, but the prospect of incinerators in urban or suburban locations is guaranteed to generate an outcry. This is particularly so when the

scale becomes clear: sticking with Kent, that county produces about 800,000 tonnes of municipal waste per annum, 40% of which is recycled, leaving 480,000 tonnes to get rid of.

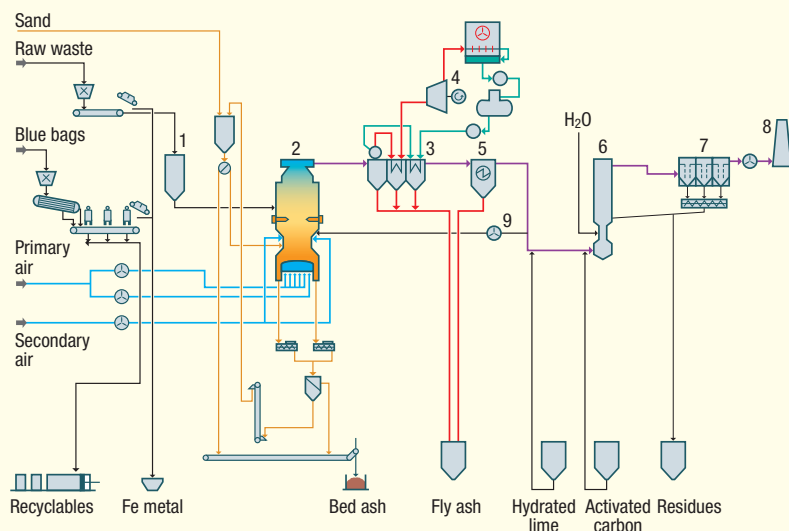
Recycling in Kent is a mix of kerbside collection schemes that collect paper, cans and plastic bottles, followed by sorting at recycling centres. The more the materials are mixed, the less cost effective recycling becomes. Steel can be recovered using magnets. But plastic, even if separated from everything else, presents intractable problems, mostly arising from the fact that most polymers do not mix in the molten state.

Julian Wood, of plastics recycling specialist John Wood and Associates, says that, if plastics are not sorted, the material can only be used in products as fillers, either with virgin materials or as a core – and, even then, opportunities to do so are limited. On a more general note, he also says that recycling plant and energy consumption are simply not economic where plastics are concerned, although he concedes that could change. "If you incentivise, solutions will come up; and you have to find end products that can use the material," he says, citing the floor covering industry, which intends to recover granulate for use as backing material.

## Centrifugal recycling

Wood's business represents companies that build machines for plastic recycling. He mentions 'dry cleaning' plant, made by Austrian company MAS (Maschinen und Anlagenbau Schulz), which can handle contaminated film waste. This plant first shreds the plastic, and then applies centrifugal force in hot air to dry the material and remove particulates, which are then captured by screening. Similar plant is available for recycling PVC, foam and waste from, for example, carpet manufacture.

Meanwhile, a number of authorities in the UK collect plastic drinks bottles, because, since they are all PET-based, the problems of mixed plastics don't arise. Problems remaining, however, relate to colour: a mix, even of the same type, has little value – which is where optical sorting machines, from



companies such as Sortex, part of Buhler, come in. Sortex Z+, developed and made in East London, uses a 0.3mm resolution camera to process 1.5 tonnes of PET flakes per hour, ejecting coloured flakes and foreign matter from a stream flowing down a 300mm wide chute, using air jets.

AWS Ecoplastics at Hemswell in Lincolnshire is one user. It purchased a Sortex Z+4 to sort PET flakes for food grade plastic recycling. Managing director Jonathan Short reckons the firm is "on course to increase production from 25,000 tonnes per annum to 100,000". The machines can also process plastics such as PP, HDPE, LDPE, PVB, PS, PA (nylon), PVC and ABS – the latter at 3tph.

## Controlled compost

Returning to Kent, among its bigger development projects is the building of composting plant – not just of garden waste, but biodegradable waste, including cardboard and food, using a process developed by New Earth Solutions in Dorset. Peter Horn, KCC's waste operations manager, describes it as "composting in a sealed environment".

The challenge is to do so, such that no pathogens find their way back into the food chain. New Earth's approach starts with piling the material into windrows 4m wide by 3m high in sealed buildings. Air is drawn in through pipework in the floor and the windrows are sprayed with water, under computer-controlled temperature and humidity. After two phases and four weeks, the resulting material is subject to maturation in open rows, before sieving and grading.

KCC's plant began operations in September and commissioning is ongoing, using material collected in green bins by contractors working for Tonbridge and Malling Borough Council. A full licence is likely to be granted in February 2009, after which collection will be extended. Horn says that costs are around £50 to £60 per tonne.


Lastly, waste incineration is proving the most problematic, if the waste-to-power plant at Allington in Kent is anything to go by. The plant has been accepting waste for two years and is only now undergoing the final stage of its performance endurance test. After each of its three lines had processed 20 tonnes per hour for 600 hours, the plant was cooled and subjected to detailed mechanical inspection. Horn explains that earlier problems with the three fluidised bed furnaces and the lubrication system for its turbogenerator meant that the expected nine to 12 months' commissioning period had to be extended to two years – although the



plant will shortly be handed over.

That said, design capacity is 500,000 tonnes per year and the plant has been contracted to process 325,000 tonnes of Kent's waste per year for 25 years. With its generator producing 43MW, only 9MW of which is consumed by the plant, Horn expects it soon to be cheaper than landfill.

However, while this and similar plants produce an energy surplus – in this case, 34MW for the grid – operating costs are high, because of the need to scrub effluent gases. The requirement is to remove the usual SO<sub>x</sub> and NO<sub>x</sub>, but also hydrogen chloride (from burning PVC), heavy metals and particulates.

At Allington, that's done by piping the flue gas from the boiler to an electrostatic precipitator, and then on to a reactor, equipped for water injection, where the gases pass through hydrated lime and active carbon. Pollutants are then removed as solids via a bag filter house. Interestingly, pollutant level data is published on the web to reassure the public. 

**Far left and left: waste recycling and incineration at the Allington waste-to-power plant are shortly to be restarted**  
**Above: Sortex plastic handling machine**

