Maturing technologies continue to drive change

Ainsley Fraser looks at Waste to Energy and the associated technologies and support infrastructures required for the sector to flourish.

The ways in which we manage waste have changed inexorably over the last decade and with the targets we all have to hit by 2020 and 2030 – or before, the rate of change is only likely to accelerate. Processes and technology which were deemed experimental or revolutionary (or both) a few years ago, have matured and proven themselves and are now permanent features of the industry. Others are evolving all the time, so one may be confident that the range of options will broaden, become significantly more efficient – and generate important energy resources and bi-products in the future.

But what has also changed in recent years is the shift in attitudes and thinking, particularly in the municipal and local authority sector, towards long-term, big picture waste management strategy and planning. There is recognition and a significantly better understanding that providing integrated waste solutions which are fit for purpose over much longer periods, involves serious commitment and major investment. That the need to deliver these strategies is running concurrent with major reductions in government support and funding, increased regulation and enforcement and both change and uncertainty in the markets for waste stream derived materials, only adds to the pressure.

Facilities being built now – or in the relatively recent past, are designed with an operational life expectancy of a minimum of 25, 35 or even 40 years. Not least because of scale and cost, many of these facilities now involve partnerships, joint ventures or committed long-term contracts. But these major waste stream processing plants – whatever their technology, are only part of the solution. Changes in waste collection and handling – be that household or commercial, all demand a parallel support infrastructure in order to operate effectively ... including waste transfer stations, MRFs and other dedicated facilities.

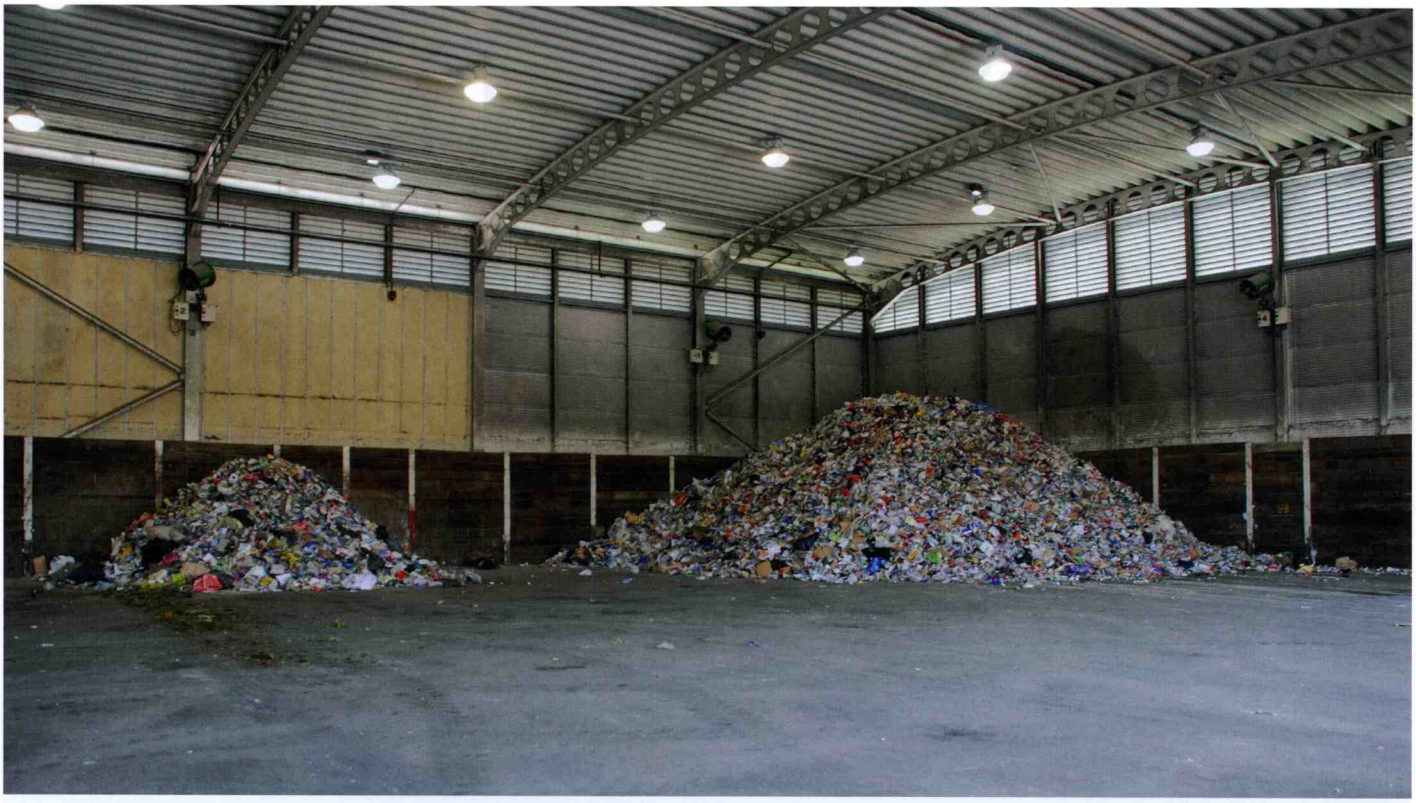
The new large scale plants are hungry – and they require a carefully planned network of feeder facilities – such as waste transfer stations. Typically, these will be the consolidation centres for local collection rounds, prior to transfer in bulk to the ultimate destination. Given the important role which these staging posts have to perform, it is vital that they are optimally located – and built and operated to best practice standards ... we have moved on from the partially open agricultural style buildings of the recent past.

WTS Best Practice should include keeping the doors shut

One of the best and most comprehensive report documents on the whole issue of the location and design of waste management facilities was produced by Cambridgeshire County Council in 2011. There are some elements which could be challenged – notably what planners regard as being acceptable proximity between waste facilities and residential areas. The document has the benefit of being able to use 'artists' impressions', but in reality, sites and particularly, access to major infrastructure for bulk transfer, will continue to support the business case for these facilities to be at remote locations adjacent to major roads and rail. To view the document, go to www.cambridgeshire.gov.uk/info/20099/planning_and_development/49/water_minerals_and_waste/5 and click on The Location and Design of Waste Management Facilities SPD July 2011.pdf

One of the other key issues with the development of modern waste transfer stations is on-site management and operating discipline. A smart, architecturally pleasing building may blend in with its general surroundings ... it may have negative air pressure and control systems ... but if all the doors are left open, or a truck has hit the door operating mechanism and damaged it, the issues of noise, odour and dust will not be controlled.

Monitoring and enforcement is crucial – and nearby businesses and communities need to be part of that process. Problems often arise after the local authority has seen through the planning, build and commissioning process – and then, due to escalating pressures on budgets, has been forced to outsource the operation to a third-party contractor, probably based on price. Lowest prices are not conducive to the maintenance of best practice. >



Waste to Energy ... or Energy from Waste?

Both generic terms 'Waste to Energy' and 'Energy from Waste' are used by different people to describe what is basically the same thing. But I wonder if there is actually a difference. Waste to energy seems to be the term preferred by the municipal sector – and the public and private sector organisations which support them. Their baseline focus starts with waste and how you handle it. Energy from waste is maybe perceived as a more entrepreneurial power generating activity, which holds energy as its primary focus – rather than waste. No doubt different people will have different opinions.

As energy from waste is still an evolving sector, it is important to understand the underlying government objective and policy issues. There are four basic principles – summarised by DEFRA. Firstly, Energy from Waste must support the management of waste in line with the waste hierarchy. Secondly, Energy from Waste should seek to reduce or mitigate the environmental impacts of waste management and then seek to maximise the benefits of energy generation. Thirdly, government support for energy from waste should provide value for money and make a cost effective contribution to UK environmental objectives in the context of overall waste management and energy goals. Fourthly, government will remain technology neutral, except where there is a market failure preventing a technology competing on a level footing.

For a fuller overview and understanding of the energy from waste debate, go to the DEFRA document, available online at www.gov.uk/government/uploads/system/uploads/attachment_data/file/284612/pb14130-energy-waste-201402.pdf .

The process of deriving energy from waste assumes that all recyclable materials will have been separated and removed first ... and that energy is 'recovered' from residual material that remains. Inevitably, this is not always the case as for instance, some incinerators use co-mingled waste streams. Clearly, incineration is the most well established of the technologies – where waste is burned and energy is recovered as electricity or heat – or both. According to the WRAP database, there were around fifty major energy from waste plants in the UK in 2013 – and that figure will have risen by now.

Pyrolysis and gasification processes are still in their comparative infancy – although emerging as an effective option as technology matures. This involves material being heated with little or no oxygen to produce 'syngas', which can be used to generate energy – or as a source material for producing methane, chemicals, bio-fuels or hydrogen.

A third alternative is anaerobic digestion, which currently seems to be gathering pace. Typical installations are 2.5 Mw – although smaller and larger plants are coming on stream. The process basically uses micro-organisms to convert organic waste into a methane-rich bio-gas, which is then burned to generate power and heat – or can be converted into bio-methane. The technology is appropriate particularly for food waste and wet organic material and a co-product of the process can be used as a fertiliser.

However, AD plants can be quite sensitive to the material with which they are being fed – a bit like a giant mechanical stomach, which is what they are. If the material mix is wrong and the process stops working, there have been some horror stories about the costs associated with 'digging out' and recovery.

For a better understanding of the subject, there is a really excellent document entitled 'Energy from Waste, A Guide for Decision Makers' produced by the Renewable Energy Association and available online at www.r-e-a.net/pdf/energy-from-waste-guide-for-decision-makers.pdf

If the sector and the technologies it supports are to develop to their full potential – including fulfilling their contribution towards the achievement of both energy and environmental goals, then the one thing that is required is consistent, long-term commitment and support through government policy. Uncertainty and continuous political interference on the edges of the policy framework – or changes in direction, agendas or incentives (or all three), can undermine the ambition of commercial interests and companies across the industry to commit to and invest for their futures.

There is a raft of financial incentives for which the range of energy from waste technologies qualify – but it is complex and needs close scrutiny and understanding. There are also obstacles to overcome in the planning process. It is for the industry and government to work together to establish a workable and sustainable framework for the future.