GASIFICATION & PYROLYSIS

Gasification plant, Castellon, Spain (25 ktpa, 7MWe)

Note - This leaflet is based upon information contained within a research report undertaken for the Office of the Depute Prime Minister (see information sources at foot of leaflet) and is intended to provide general guidance only. Minor amendments have been made to reflect the Scottish context. In Scotland SEPA's Thermal Treatment Guidelines apply and require to be referred to.

What is it?

Pyrolysis and gasification technologies form part of a group of processes and techniques collectively known as advanced or novel thermal treatment. In reality most of the processes are neither advanced nor novel. Pyrolysis and gasification, like normal combustion, involve a chemical reaction which takes place at high temperature. This generally generates energy from organic or hydrocarbon containing materials but can also be used to provide chemical feed-stocks for other processes.

Pyrolysis takes place either in the complete absence of oxygen or with limited oxygen. Although the application and equipment might be new the process is not. The production of charcoal from wood is an example of pyrolysis/gasification, where the wood is prevented from combusting in the usual way due to air starvation.

Gasification, like pyrolysis, is a process that has had previous applications using feedstocks other than waste. For example, so called "town gas" produced from coal using gasification was a very common process prior to the widespread availability of natural gas.

These technologies tend to be smaller than traditional thermal treatment plant and are often modular in design.

General Siting Criteria

Existing Landuse: Unlike large thermal treatment facilities pyrolysis/gasification proposals are likely to offer the opportunity to consider wider locational options in mixed use areas. Preference should be given to areas allocated for business use or traditional

commercial/industrial urban area. Compatible with more intensive class 4 & 5 activities under the Use Classes Order. Existing waste sites should also be considered.

Proximity to Sensitive Receptors: Sites closer than 250 m of housing etc should generally be avoided where possible. However scale and improved environmental performance standards should enable a reasonable case for such plants to be located closer to sensitive receptors, particularly when part of a Combined Heat and & Power/district heating scheme.

Transport Infrastructure: Assuming stand alone facilities receiving mixed household waste, access routes require capacity to meet input rates. Usually good quality A/B class roads or primary road network free from restrictions on HGVs. Other forms of transport such as rail unlikely to be economically viable if input rates are less than 100,000 tonnes per year, unless infrastructure already in place.

Typical Physical & Operational Characteristics

Life time of facility:	20-25 years
Operational Hours:	Potentially 24 hours 7 days (potentially less, subject to plant set up and nature of waste generation).
Typical site area:	1 – 2 ha
Building Footprint:	60 m – 60 m (to house main thermal treatment components. if pre-processing then other buildings of differing sizes will be required).
Building Height:	15 m – 25 m
Stack Height:	30 m – 70 m[1]
Vehicle Movements:	20 waste collection vehicles or equivalent/day. Less if bulk transport vehicles used.
Employment:	2 – 3 workers at any one time, shift system if 24 hour operation. Site Manager
Waste Storage:	Waste generally delivered to single waste reception pit within main building. Conveyors can be used if part of an integrated facility. If very small facility, a containerised loading system can be used.
Chemical Storage:	Small quantities of lime and activated carbon or urea (solid form) used as part of air pollution control (APC).
Ash Storage:	Generally removed daily or weekly with shovel loader into bulk vehicle or in covered containers.

[1] *Stack height determined by process characteristics and air dispersion modelling*

Key Planning Considerations & Mitigation

Planning Considerations	Standard Design Features	Additional Options
Traffic	Deliveries of waste to the facility	Section 75 agreements can be

	will normally be linked to waste collection rounds. These usually peak at certain times of the day. Mitigation measures normally used should ensure that vehicles are re-routed away from inappropriate routes and sensitive residential areas such as schools.	used to secure agreement on traffic routing and input rates. They can also be used to secure planning gain for the local.. community
Air Emissions	All new thermal treatment plants, including pyrolysis/gasification plants, are required to meet the emission limits prescribed by the EC Waste Incineration Directive 2000 and Scotland's Regulations (see table in Key Issues section . of ODPM report). Control of the main pollutants is limited by careful ground control of temperatures and residence times. Pyrolysis processes normally enable the effective removal of metals from the combustion air or syngas. Like traditional thermal treatment Pyrolysis/gasification techniques will generally require use of proprietary air pollution control (APC) systems.	The effect of air emissions on receptors on the ground is greatly influenced by dispersion of pollutants in the atmosphere. Air dispersion modelling will be undertaken as a part of any EIA process. Air dispersion and the location of maximum ground concentrations of pollutants is influenced by the release rate of pollutants, and effective stack height. One option for providing satisfactory levels of air quality is to identify an optimum stack height, often using a cost-benefit evaluation. A trade off in terms of the overall visua impacts of the facility will need to be made.
Dust	Not likely to be a significant problem if standard waste handling and storage procedures are followed.	Dust and mud or roadways can be further reduced by good site management practices, which would include periodic road cleaning/sweeping of all vehicle manoeuvring areas and site access roads.
Odour	Odour generated from the waste prior to treatment is generally contained in the same way as dust. Odour is not normally a significant issues at modern well run facilities.	In period of high waste input, when large amounts of waste are retained in the waste reception pit, odour levels can rise. This may also occur following bank holiday periods and during plant maintenance periods.
Noise	The standard design of the main buildings and noise reduction featured on specific plant components should ensure that noise levels can be kept to acceptable levels. Appropriate site layout design and siting of particularly noisy pieces of plant such as the air cooled condenser is recommended. In particularly sensitive locations close to housing, such pieces of plant should be	Additional noise reduction options might include noise attenuation features within the roof and walls of the main building to reduce break out of noise. It may be possible to modify induced draft (ID) fans with proprietary silencing systems.

	located as far as practicably possible from the sensitive site boundaries. If noise from vehicles is likely to be an issue, for example, due to reversing alarms, the operator can be required to fit smart systems which reduce the potential for nuisance.	
Litter	See comments relating to dust and odour.	N/A
Visual Intrusion	Normally constructed of standard steel portal frame and concrete. Often limited architectural enhancement and detail applied such as colour treatment.	If the site is prominent and visually sensitive, the applicant should consider the overall design concept as a landmark building, and be sensitive to the local vernacular and local architectural and cultural styles.

Info Sources

Extracts from Section 5 of "Planning for Waste Management Facilities: A Research Study" undertaken by Enviros Consulting for the Office of the Depute Prime Minister August 2004.

Additional Information Sources of Interest

SEPA Guidelines for Thermal Treatment and Municipal Waste (August 2004).