Visit to Pyrolysis Plant – Hamm, Germany

Date of visit

Friday 28th January 2005

Officers' names

- Steve Waight, Cabinet Member for Strategic Planning and Environment
- Phillip Russell, Head of Wastes Management Services
- Tracey Flitcroft, Planning Officer
- Kate Stacey, Project Officer, MRMC, Wastes Management Services
- Sam Horne, Hampshire County Council
- Accompanied by Franz-Eicke von Christen, Technical Director, WasteGen (UK) and owner of TechTrade GmbH and Dr Stadtmuller (Tech Trade)

Site

Hamm Uentrop Power Station nr Dortmund, Germany

Observations

The power station is located in a rural area. The pyrolysis plant utilises exiting vacant buildings spread over the power station complex rather than a purpose built complex. The result is that the process takes up a great deal of space. This would not be the case on a purpose built site. As well as buildings housing the power station, the site contains the waste preparation areas and pyrolysis equipment. The waste storage buildings were reused from the previous development, which was an experimental nuclear power station (this was closed for political reasons). Therefore, the facilities are not purpose built which means that the pre-treatment area is 250 m away from the pyrolysis plant. The pre treated waste in the form of a floc fuel is transported from the two separate pre-treatment buildings to the pyrolysis plant by a series of conveyors, which reach 30 m high.

The stack for the power plant, which produces 600 MW of electricity, is 200 m high, whilst the second stack associated with the pyrolysis plant for emergency burning of fuel gas is nearly 70 m high.

The size of the area for pre-processing is 90 m x 70 m and that for the pyrolysis and solid residue separation area is 60 m x 30 m. (However it was difficult to calculate how much space would actually be required if space was at a premium).

Description of facility

The power station is owned and operated by RWE Energie, the waste and power generation company that owns Thames Water and Innogy in the UK. The pyrolysis plant has a capacity of 100,000 tpa and cost £50m. It started operating 4 years ago and serves as a processing

unit for high calorific municipal waste and the generated fuels, pyrolysis gas (pygas) and pyrolysis char provide supplementary fuel to the coal-fired power station. These fuels replace approx 10% of the combustion heat performance. The pyrolysis plant produces approx 75 MW of gas energy, which is around 15 MWe at a normal steam turbine conversion efficiency.

RWE are also collection contractors and they accept material from a variety of sources including their own recycling centres. At the time of the visit there were bales of plastic transported from Holland and also the 'light' non metallic fraction produced from a car fragmentation process (often referred to as 'frag-fluff') .

Input waste = 13.000 kg/h

Output = Pygas – quantity 10.300 kg/h, energy 55,3 MW
Pyrolysis char – quantity 2.500 kg/h, energy 8,3 MW

Process

Pre-treatment

The waste fractions are delivered as bulk material or in bales to the first pre-treatment building. The waste gets shredded to 200 mm and goes to an intermediate storage area, any oversize material goes back through the shredder. The waste is transported by conveyor to the second pre-treatment building, which is a closed system that works automatically. From here the prepared waste is transported by conveyor to the pyrolysis plant.

Waste pyrolysis in two rotary kilns

The waste material passes a sluice (which serves to prevent heat and gas escape from the pyrolysis chamber) and enters into one of the rotary pyrolysis kilns by a screw feeder. The rotary pyrolysis unit runs at negative pressure and is heated by natural gas burners. The process uses natural gas to heat the pyrolysis chamber as this is considered to be more efficient. However the process can use pygas as heat source. In the absence of air/oxygen the waste is heated and decomposed at a waste temp of approx 500^{o}C, with a residence time of approx 1 hour.

The products of the process are pygas, pyrolysis char, metals and other inerts (stone, glass). The pygas is extracted and is blown into the power plant boiler. The pyrolysis char is milled in the existing coal mills and charged to the firing of the boiler together with the coal.

Residue treatment

The ferrous and non-ferrous/sand/grit residues are separated by a magnetic separator and eddy current and fed to containers by belt feeders. The aluminium residue (2%) goes to another company for further recycling.

Emergency incineration unit

In the event of an emergency boiler shut down the pygas is incinerated in a burning chamber, which has a stack.

Comments

- Security of the site was strict and no photographs were allowed to be taken.
- The pyrolysis plant is sited within the confines of the power plant and as such does not give a true picture of how a pyrolysis plant could be in West Sussex.
- The area around the pyrolysis plant was very dirty and in some areas there was a very distinctive smell associated with pyrolysis systems.

Note:-

The promoters of the scheme recognised that this reference site is not ideal as:-

1. It is not very clean
2. It is operated outside their control

However, this is the latest 'pyrolysis chamber' and is operating at 95% availability. Also, as RWE have linked this operation with a full-scale power plant it does demonstrate the reliability of the process. The promoters of the system operate an older plant at Burgau which, despite its age, is still operating at 90% availability.

The promoters afforded the opportunity for a full and frank discussion about the site operations and the following points were noted:

- The process is good for high CV waste and can accommodate a wide range of CV
- They would like to be in a position to improve the standard of operations at the Hamm site but are very much in the hands of RWE.