Gasification & Pyrolysis: The Year of the Build

Lisa Jordan
Air Products
Waste types and treatment solutions

- **Food waste**, **Plant debris**
  - **Biological Processing**
    - e.g. Anaerobic Digestion
    - Closed loop agricultural nutrient management, producing energy (e.g. biogas or electricity) as a by-product

- **Wood**, **Paper**, **Textiles**, **Plastics**
  - **Thermal Processing**
    - e.g. Advanced Thermal Technologies
    - Resource management designed to maximise useful energy recovery from indigestible, unrecyclable wastes

- **Metals**, **Glass**
  - **Recycling**


Typical scale

- 0.5MWe
- 10-50MWe
Thermal technology overview

Gasification
> Partial oxidation of carbonaceous material producing syngas, and char/ash or slag

Pyrolysis
> Thermal treatment of carbonaceous materials in the absence of air to form pyrolysis gas, oils and char/ash products

Incineration
> The burning of waste materials producing heat and ash
Energy recovery process & purpose

Feedstock

ATT (Gasification / Pyrolysis)

Fluids processing

Upgrading

Power

Heat

Fuels

Chemicals

Now

Future
ATT technology benefits

Highly flexible technology

- Ability to produce renewable power, steam, fuels, hydrogen, or chemical intermediates
- Ability to process a wide range of feedstocks
- Deployable in a wide range of scales, for example footprint/throughput

Potential for higher electrical efficiency

Environmental profile

- Enhanced resource efficiency (therefore potential for lower greenhouse gas emissions)
- Low dioxin formation potential
- Inert or non hazardous residue
Case Studies
Advanced Plasma Power Ltd

Project 1: 170,000 tonnes per annum in Scotland with secure waste supply

Gasplasma® 2 stage gasifier and plasma thermal process; 20 MWe output; CHPQA qualified

Project 2: 45k tpa England; 6 MWe
Due On-Stream in Summer 2014: 350,000 tpa will generate 49.9 MW/h gross
Biossence Gasification Plant in Rainham, East London
Chinook have built 16 plants worldwide with the first plant in the UK built in Congleton Cheshire in 2005 and the second in Nottingham in 2011

With a further 4 plants being built or in the pipeline
• Small scale technology
• Onsite waste destruction & heat recovery
• 1,500 tonnes per annum
• 6 military units
• One land based demonstrator
• Ideal for clinical and industrial waste streams
Ecocycle (Group) Ltd

45,000t pa of wood generating
7MWe/h
Under Construction,
commissioning 2\textsuperscript{nd} half 2103
**Glasgow**

- Energos 3 line Gasification plant
  - 144,000 te/y and 13.4 MW of ROCable electricity
- Notice to Proceed May 2013
- Commissioning 4Q 2015/1Q 2016
- Situated on an energy park containing AD and sorting/recycling

**Derby**

- Energos 3 line Gasification plant
  - 144,000 te/y 12.5 MW of ROCable electricity
- EA permit 2009 and planning granted in 2013 after two Planning Inquires but protest groups still challenging
- Potential for Notice to Proceed in 1Q 2014 with commissioning in 2017

**Milton Keynes**

- Energos 2 line Gasification plant
  - 96,000 te/y and 7.0 MW of ROCable electricity
- Contract award June 2013, and expected Notice to Proceed 1Q 2014
- Commissioning 4Q 2016

**Knowsley**

- Energos 2 line plant
  - 96,000 te/y and 8.0 MW of ROCable electricity
- Planning and EA permit
- Merchant plant to process commercial waste residues
- Unable to achieve financial close due to uncertainty/risk caused by multiple waste supply contracts
Enviroparks - Hirwaun

Integrated Resource Recovery in South Wales for 240,000 tonnes per annum Commercial, Industrial and Municipal Wastes.

20 acre site with full Planning Permission and 15MW Grid Connection.

Phase 1: Fuel Preparation Plant in procurement now

Phase 2: Gasification procurement from Q4 2013
The project which is under construction will be built in 2 phases

Phase 1  1.7MW net output capacity.
       1 Gasifiers + 1 Engines
       Commissioning completion July 2013

Phase 2  11.4MW net output capacity.
       6 Gasifiers + 5 Engines
       Construction commencing Sept 2013

The site for both Phase 1 and 2 is a fully consented and permitted site with grid connection in place.

The feedstock is RDF/SRF and long term supply contracts are in place.

The client has already secured 100% of the finance for the project.

6 Gasifier 11.4 Mwe Nottingham Site
Two UK MILENA-OLGA IGCC plants in preparation

- MILENA gasification (pyrolysis) technology for both plants
- OLGA tar removal technology is key for both plants
- Plant 1: Waste to energy; 40,000 tpa RDF to 7 MWe (net)
- Plant 2: Biomass to energy; 45,000 tpa to 7.6 MWe (net)
New Earth
Avonmore Energy Recovery Facility

Integrated waste treatment and renewable energy facility
NEAT technology
6.5MW plant operating (Phase 1)
Additional 6.5MW (Phase 2) commissioning end 2013
Steam cycle generation
Modular configuration
Where are we doing it?
Electricity Market Reform

• Industry need for confidence, certainty, transparency and simplicity

• Positive progress on single counterparty and two-stage allocation process but issues remain:
  > Contract length: Extend from 15 to 20 years, to cover economic life of projects and remain consistent with RO
  > Independent generators: Seek viable solution for route-to-market issues, potentially a ‘buyer of last resort’ or a review of PPAs
  > Strike price: Timetable for publishing details must be kept to (draft prices by Aug 2013 and final prices by Dec 2013)
  > Reference price: Needs to be reconciled with the fact that independent generators have to sign long term PPAs
  > RO: Possible extension if there are any further delays
REA’s Gasification and Pyrolysis Group
Renewable Energy Association
Gasification & Pyrolysis Parliamentary Reception
Tuesday, 4th June 2013

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