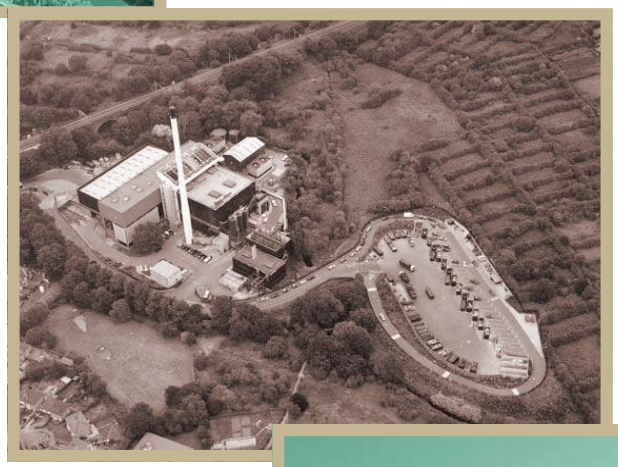
# Project Transform Information Pack

## Number 2 - October 2009



Project Transform

Transforming waste into resources

# Introduction & Background

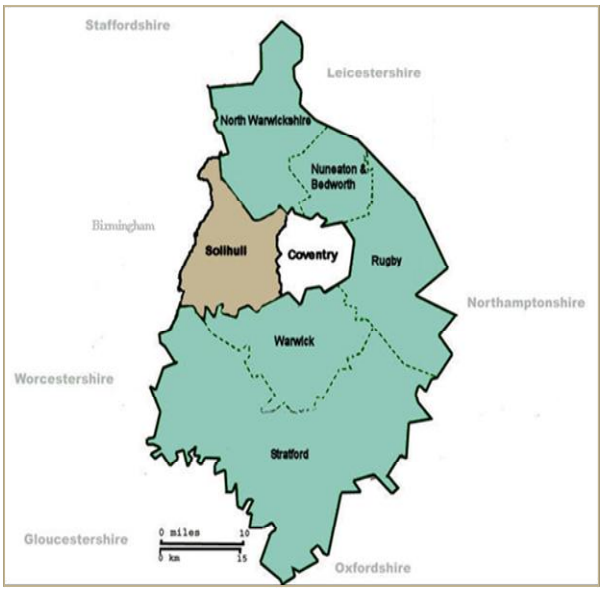
This is the second information booklet that has been produced to support Project Transform. This booklet provides an update on progress since the publication of the last booklet in 2008 and a short overview of different waste treatment technologies.

Throughout the procurement process, which is forecast to last two and half years, we will produce a quarterly information pack to Members detailing the progress of the Project.

Additional supporting information can be found on the Project's dedicated web pages which can be found at **www.projecttransform.info**

# Progress so far

Coventry City Council, Solihull Metropolitan Borough Council and Warwickshire County Council are working together on Project Transform to deliver a new residual waste treatment facility to serve the sub-region.




The facility is required to provide a long-term sustainable solution to our residual waste treatment needs after maximising our waste minimisation, re-use and recycling activities.

The Partners signed a Memorandum of Understanding in 2008 and have an agreed Joint Working Agreement which sets out how the Partners will work together to achieve shared goals and objectives.

The aim of the Partnership is to work collaboratively to develop better waste management services for the sub-region. The first stage in this process is the delivery of the new residual waste treatment facility.

Since 2007, the Partners have been busy preparing the required documents for Defra, which are part of the PFI application process.

In October 2008 the Partners submitted an Outline Business Case (OBC) to Defra. For the OBC the Partners had to develop a reference case. This was used to provide an estimate of the cost of the project on which to base the PFI credits request. A detailed appraisal of the treatment technology options, the capacity requirement and the alternative locations led to the production of the reference case for Project Transform. The key aspects of the reference case are summarised below.

| | |
|---|---|
| **Technology** | **Energy from Waste with Combined Heat and Power** |
| **Processing Capacity** | **305,000 tonnes** |
| **Location** | **Coventry—land adjacent to existing facility** |
| **Recycling rate (collective by 2020)** | **51.4%** |
| **Contract length** | **25 years** |
| **Funding option** | **Private Finance Initiative** |
| **Procurement method** | **Competitive Dialogue** |

The processing capacity requirement was derived from a waste flow model based on the latest available evidence at the time, i.e. waste data from 2006\07, planned improvements in recycling schemes, and the Regional Spatial Strategy housing forecasts. This capacity will be kept under review and the model re-run each time new annual data becomes available.

# Progress so far

After six months of scrutiny by Defra, WRAP and the Treasury, Project Transform was allocated **£129.1 million** of PFI credits towards the capital costs of developing a new treatment facility.

The credits were awarded in June 2009, and this gave the Project the 'green-light' to progress to the procurement stage of the project.

## Approach to Procurement

The Partners have agreed to adopt a "neutral" procurement strategy. This means that, despite the reference case for the OBC being based on Energy from Waste, the Partners are adopting an 'open' approach to technology and location of the facility.

Our approach is summarised in the following table:

| | |
|---|---|
| **Technology** | **Bidders to propose** |
| **Processing Capacity** | **Bidders to propose** |
| **Location** | **Coventry—land adjacent to existing facility will be made available to all bidders but bidders can propose an alternative site** |
| **Recycling rate** | **5% additional recyclables to be removed from the residual waste delivered to the facility** |
| **Contract length** | **25 years** |
| **Funding option** | **Private Finance Initiative** |
| **Procurement method** | **Competitive Dialogue** |

The partners require the new solution to improve both pre and post– processing recycling rates and have therefore included requirements for this within the contract notice and the Authority's requirements (output specification).

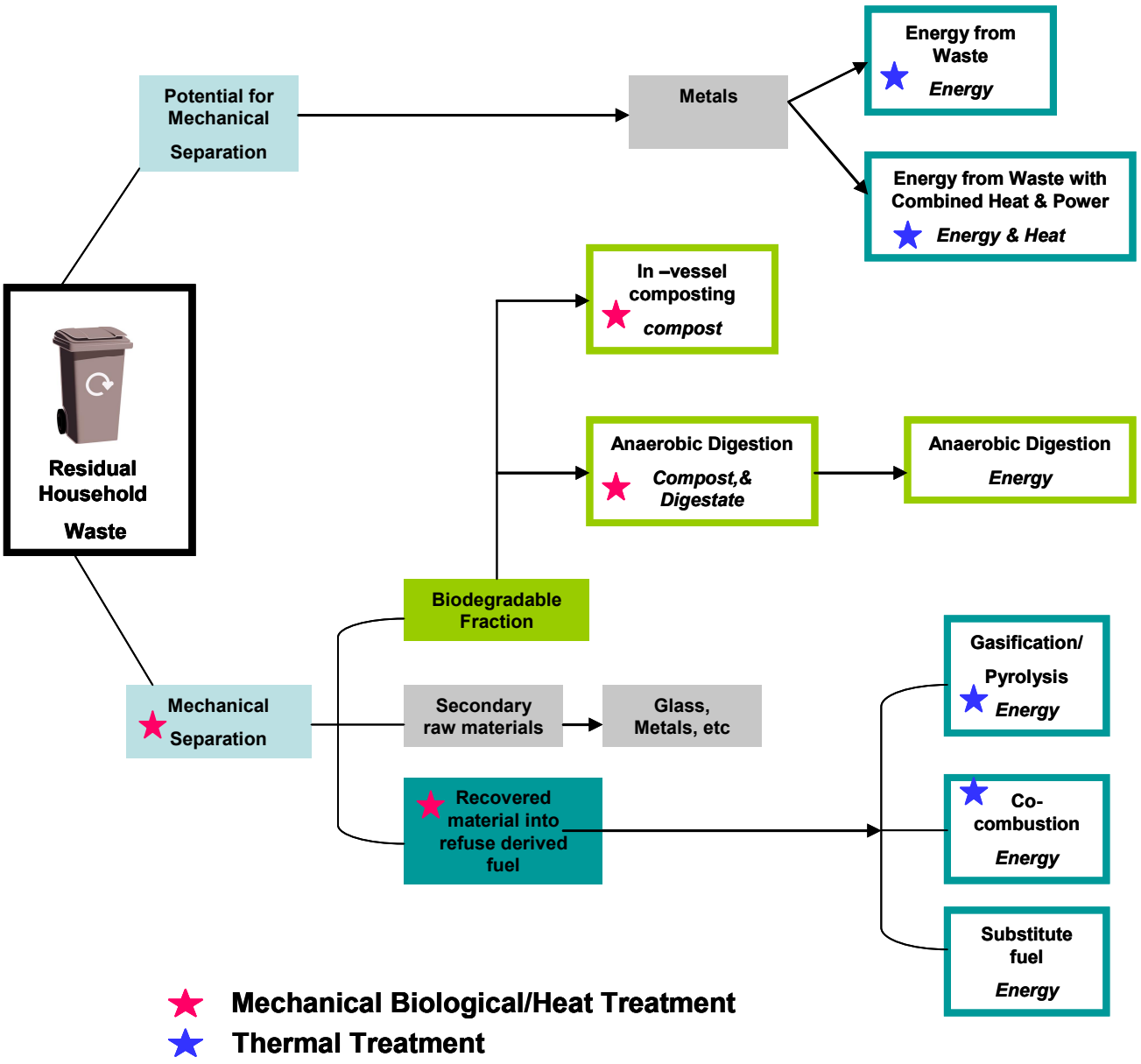
By adopting this approach, we are leaving it up to bidders to propose a suitable treatment solution. All proposals received will be assessed against set evaluation criteria, which will be made available to potential bidders at key stages in the procurement process.

In the following sections of this booklet, we have provided an overview of the main waste treatment technologies which bidders may propose as their solution to Project Transform's requirements.

# Short guide—Treatment technologies

## Overview of Treatment Technologies

The Partners have adopted a neutral approach to technology and are asking 'the market' to propose technological solutions for processing residual waste.




The following figure provides a summary of the various treatment technologies that could be proposed by the bidders.

# Mechanical Biological Treatment

**Definition**: MBT is a generic term that includes forms of waste processing that combine a materials sorting facility with a form of biological treatment.

## What Materials can be processed?

MBT plants can accept mixed household (black bag) waste as an input material.

## How are they processed?

The mechanical treatment phase is used to remove 'dry' recyclable materials, such as metals, glass and plastic, from the waste stream. The process may involve conveyors, magnets, separators, screens, shredders or the sorting may be achieved by hand. This is similar to what happens in a materials recovery facility (MRF).

The biological phase will generally consist of Anaerobic Digestion (AD), which involves processing material in an enclosed container in the absence of oxygen or In-vessel composting which involves processing material in controlled conditions in the presence of oxygen. In-vessel composting produces a soil improver only, whereas anaerobic digestion also produces a biogas that can be burnt to generate electricity.

## Is energy used in the process?

Energy is used to operate the process

## What products are produced and what are the markets?

From the dry phase— potentially recyclable materials such as glass and metal may be extracted.

Depending on the configuration of the process, it will produce either a:

Compost-like output — can be used in landfill restoration but it's use is dependent on the quality of the material produced; or
Refuse derived fuel — can be used as a fuel source in secondary processing such as gasification or as a substitute fuel e.g in a cement kiln.

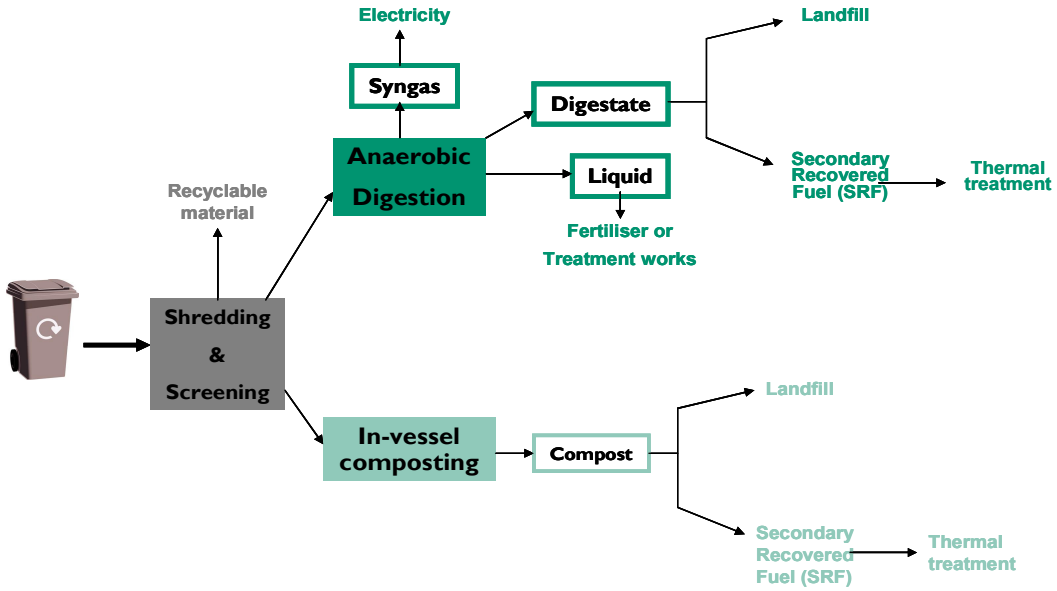
If AD is incorporated into the MBT system, biogas will be produced which can be converted into electricity or fuel.

**Pros**

- Can remove some additional recyclables from the waste stream that have been missed by separation at source.
- If anaerobic digestion technology is used, biogas is produced which can be used to generate electricity.

**Cons**

- Recyclables extracted may be of poor quality and it may be difficult to secure markets for them.
- Compost/digestate produced may only be suitable for landfill due to being contaminated with materials such as glass, zinc, lead and mercury.



# Mechanical Heat Treatment

**Definition**: MHT is a generic term, the most recognisable form is autoclaving, which combines a mechanical sorting stage with a form of thermal (heat) treatment. Unlike MBT, there is no biological treatment or composting stage involved with MHT.

## What Materials can be processed?

MHT plants can accept mixed household (black bag) waste for processing.

## How are they processed?

The heat treatment involves sealing the waste in an enclosed container and treating it with pressurised steam at 140-160°C. The pressure is maintained for 30-40 minutes, which sterilises the waste. When this treatment is complete, the residue is discharged and subjected to screening/processing.

Fine materials are separated from the larger materials, such as metal and plastic. The fine materials are then further separated resulting in a lighter fraction (organic fibre) and a heavier fraction (glass and grit).

## Is energy used in the process?

Energy is used to operate the process to generate the steam required for processing.

## What products are produced and what are the markets?

Potentially recyclable materials such as metal and plastic may be recovered.

Glass and grit may be recovered for use as a secondary aggregate material.

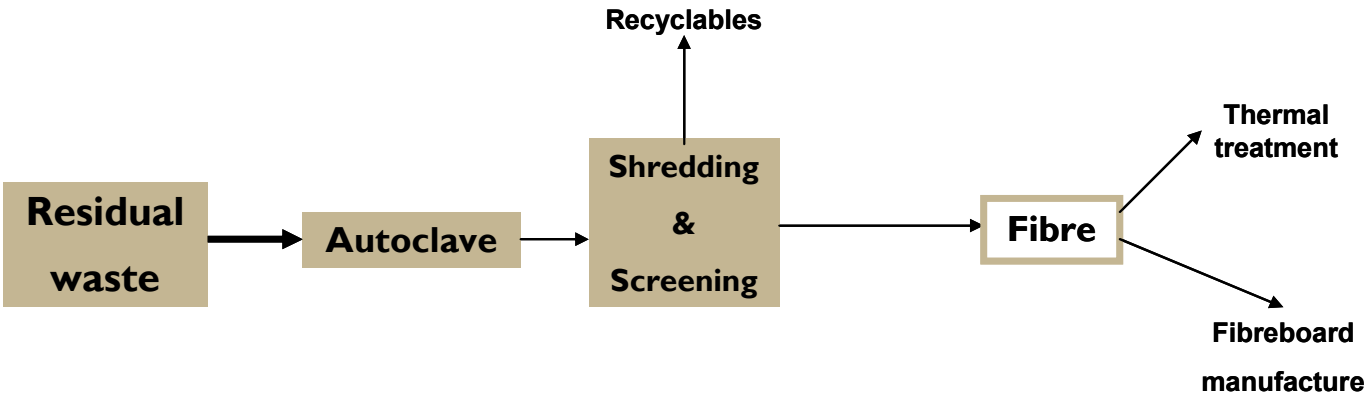
Fibre/floc like material can be used as an RDF if there is a market for the end product.

**Pros**

- Can remove additional recyclables

**Cons**

- Relatively unproven in the UK for processing municipal solid waste
- Energy intensive process
- Uncertain markets for products



# Gasification

**Definition**: Gasification involves processing waste in the presence of limited amounts of oxygen to produce a gas, which in turn is combusted to produce heat and power.

## What Materials can be processed?

Historically gasification plants have accepted biomass (e.g. wood and straw) and single streams of material. They can also be used to process mixed household (black bag) waste.

## How are they processed?

The material is processed in a container adding a limited amount of oxygen, but the amounts are not sufficient to allow full combustion to occur. The temperatures employed are typically above 750ºC. This produces a synthetic gas, also known as syngas and a solid residue (described as a char). The gasification of solid materials is not a new concept. These techniques have been used extensively to produce fuels such as charcoal, coke and town gas.

## Is energy used in the process?

Energy is used to operate the facility

## What products are produced and what are the markets?

There are two major uses for the syngas:

- Combusted within the plant to heat water to produce steam and therefore has electricity and district heating potential, or
- "cleaned" syngas could be exported into national grid gas network.

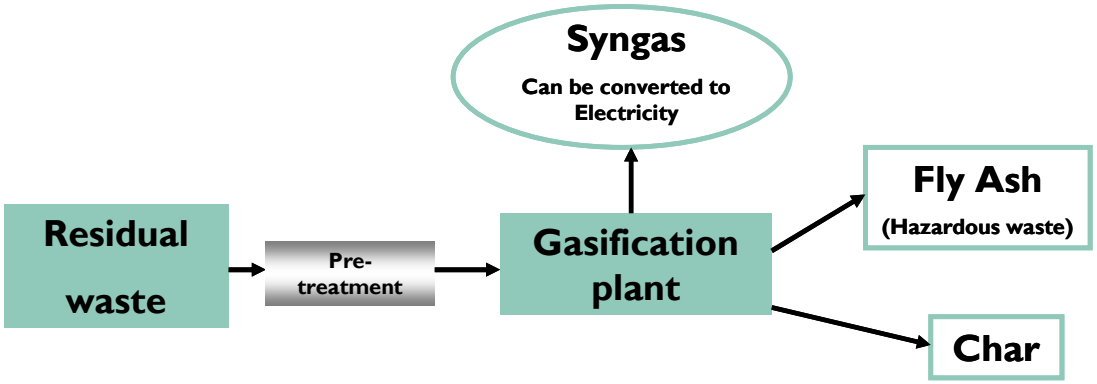
The solid residue (sometimes described as a char) has the potential for use if a market can be found

**Pros**

- Relatively energy efficient compared to coal fired power stations

**Cons**

- Lack of track record (in the UK) for processing significant quantities of municipal solid waste
- Waste typically requires pre-treating prior to processing



# Pyrolysis

**Definition**: Pyrolysis is the heat treatment of a substance in the absence of oxygen

## What Materials can be processed?

Pyrolysis plants accept biomass (e.g. coppiced willow and straw), industrial wastes and tyres as single streams of material. There are a few examples, in Europe, of facilities taking mixed residual wastes such as municipal solid waste.

## How are they processed?

Pyrolysis requires an external heat source to maintain the temperature required. Typically, temperatures of between 300ºC to 800ºC are used. The products produced from pyrolysing materials are a solid residue and a synthetic gas (syngas).

## Is energy used in the process?

Energy is used to operate the facility

## What products are produced and what are the markets?

As with gasification, the syngas produced can be used to generate electricity or can be fed directly into the gas grid.

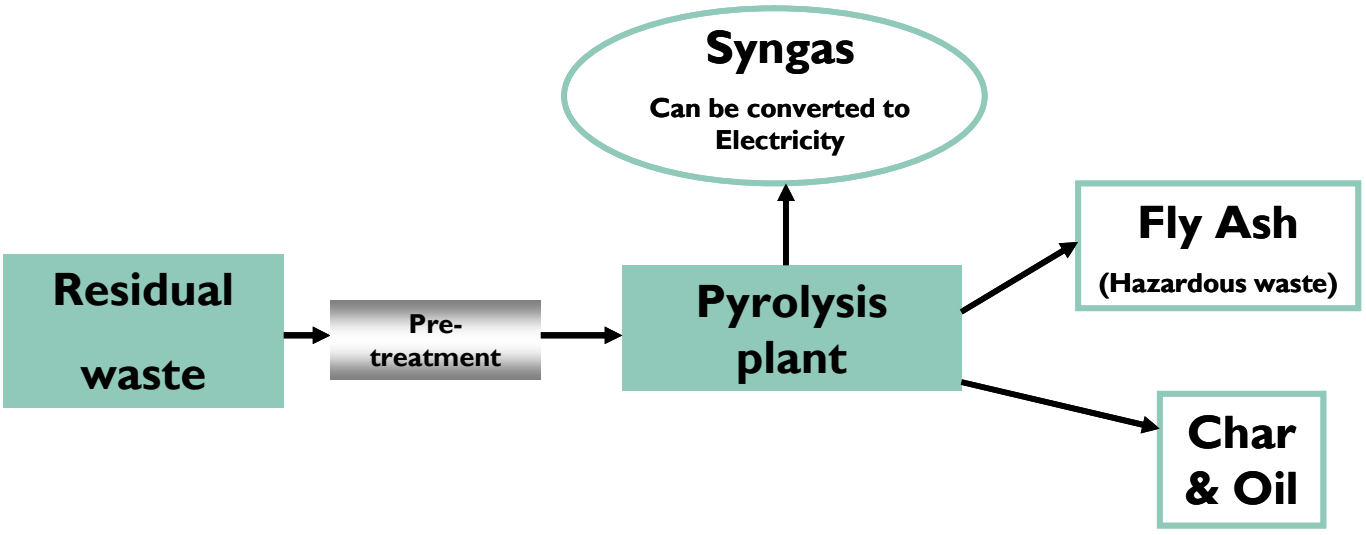
A char and oil are also produced—these can potentially be used if markets can be found for the materials

**Pros**

- Energy efficient process

**Cons**

- Lack of track record in the UK for processing municipal solid waste—tends be used to treat single stream waste
- Waste usually needs pre-treating prior to processing



# Energy from Waste

**Definition**: EfW involves the burning of residual waste under controlled conditions inside a combustion chamber at very high temperatures (exceeding 850°C) to produce electricity and/or hot water / steam.

## What Materials can be processed?

EfW plants can accept residual waste – i.e. the materials that are left after recycling operations are complete, with no need for further sorting or treatment.

## How are they processed?

Residual waste is fed into a hopper and down into a combustion chamber where it is burned at very high temperatures under controlled conditions. The heat is fed into a boiler to produce steam, which in turn is used to drive a turbine to generate electricity. In addition, heat in the form of hot water and/or steam can be supplied to local businesses or homes through a district heating scheme.

The exhaust gases are then treated to neutralise acidity and pollutants, filters then remove more than 99% of particulates. The by-products from this process (bottom ash, fly ash and scrap metal) can be recovered for other uses.

## Is energy used in the process?

Energy is used to operate the facility

## What products are produced and what are the markets?

The steam generated by the process can be used to generate electricity. If combined heat and power is in place then the heat can be used in district heating schemes.

Bottom ash can be used to make secondary aggregate and metals can also be extracted from the bottom ash.

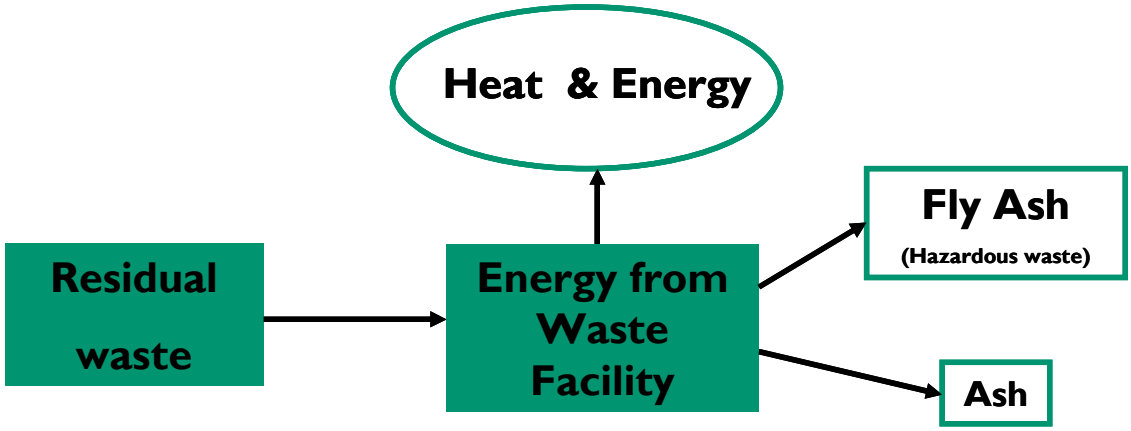
Fly ash typically has to be sent to hazardous waste landfill for disposal.

**Pros**

- Proven treatment technology
- Suitable for processing a wide range of waste without pre-treatment
- Energy efficiency improved with CHP

**Cons**

- Less modular than other technologies
- Heat networks difficult to obtain



# Anaerobic Digestion

**Definition**: Anaerobic Digestion (AD) involves the breakdown of organic waste by bacteria in an oxygen-free environment.

## What Materials can be processed?

AD is particularly suited to wet, organic material. It has historically been used to treat sewage sludge and is now being applied to the treatment of other biodegradable materials like food waste. When combined with a mechanical, front-end sorting process – AD can treat household (black bag) waste.

## How are they processed?

The pre-heated organic waste is pumped into a closed vessel which is populated with specialised bacteria. Oxygen-free conditions are then created in the vessel and a set temperature is maintained (typically 37°C).

The breakdown of the waste in these conditions leads to the production of biogas, which is drawn off and burned to generate electricity. The residue, can be separated into a liquid and a fibre. The liquid can be returned to the land as a fertiliser and the solid fibre used as a soil conditioner.

## Is energy used in the process?

Energy is used to operate the facility

## What products are produced and what are the markets?

Biogas is produced which can be used to generate electricity or has the potential to used as a gas fed directly into the gas network (though this adaptation is in its infancy).

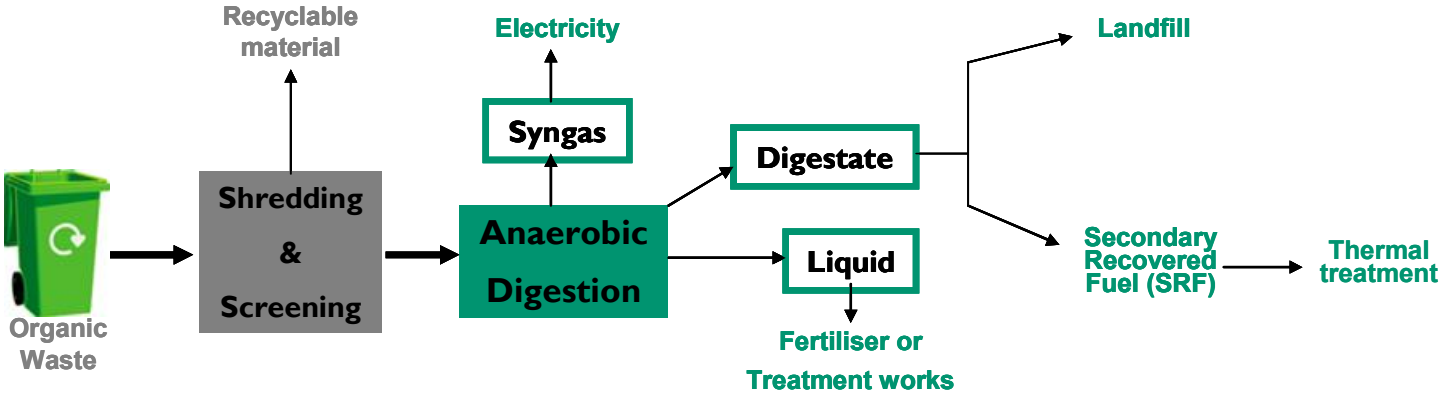
A compost like material is produced that has the potential to be used if a market can be found however this will be dependent on the quality of the material produced.
The liquid produced can be used as a fertilizer subject to quality and markets for the product.

**Pros**

- Produces electricity
- Technology is being used in the UK, it is well proven in the waste water treatment industry.

**Cons**

- Can only process pre-sorted municipal solid waste with high organic waste content



# What is PFI?

The Project is being procured as a Private Finance Initiative (PFI) project.

PFI is a type of Public Private Partnership (PPP) and is one of the mechanisms through which the public sector can improve value for money in partnership with the private sector. It does this by involving the private sector more directly in asset provision and operation and allocating risk to the party best placed to manage that risk. PFI was launched in 1992.

The principle of PFI is that a public sector body obtains a service for a fixed price rather than an asset. A private sector contractor funds any asset required and is then paid for the services actually provided by reference to pre-agreed standards. Value for money for the public sector is achieved by transferring the risk of providing the services on time and on budget to the private sector.

### Do PFI Credits cover the whole cost of the facility?

PFI credits are available for residual waste treatment projects and will support 50 per cent of the capital value of the infrastructure to be procured within the current funding rounds.

### Is PFI the only funding mechanism?

Procuring authorities are encouraged to consider all possible options that may be suitable for the procurement contemplated, including PPPs and Prudential Borrowing.

**Advantages of PFI**

The key advantages of PFI include:

- Desired service standards are maintained – since private sector capital, not just its profit, is at risk, there is a strong incentive for the private sector to maintain high and reliable service standards over the life of the contract;
- New services are more likely to start on time – since the private sector contractor does not get paid until it delivers (it is worth noting that the record of conventional procurement is comparatively poor in this respect);
- Contractors are given an incentive to deliver the required service under the whole life of the asset – the private sector partner gets paid only if it maintains standards over the length of the contract;
- A better understanding of the total costs of providing the required service is demonstrated up-front – in PFI procurement, the public sector client can clearly define the service it requires and the private sector partner gives a price for the total cost of that service; and
- New ways of working and new approaches to service delivery – the public sector defines the service to be delivered, but it is for the private sector partner to decide how to deliver it.

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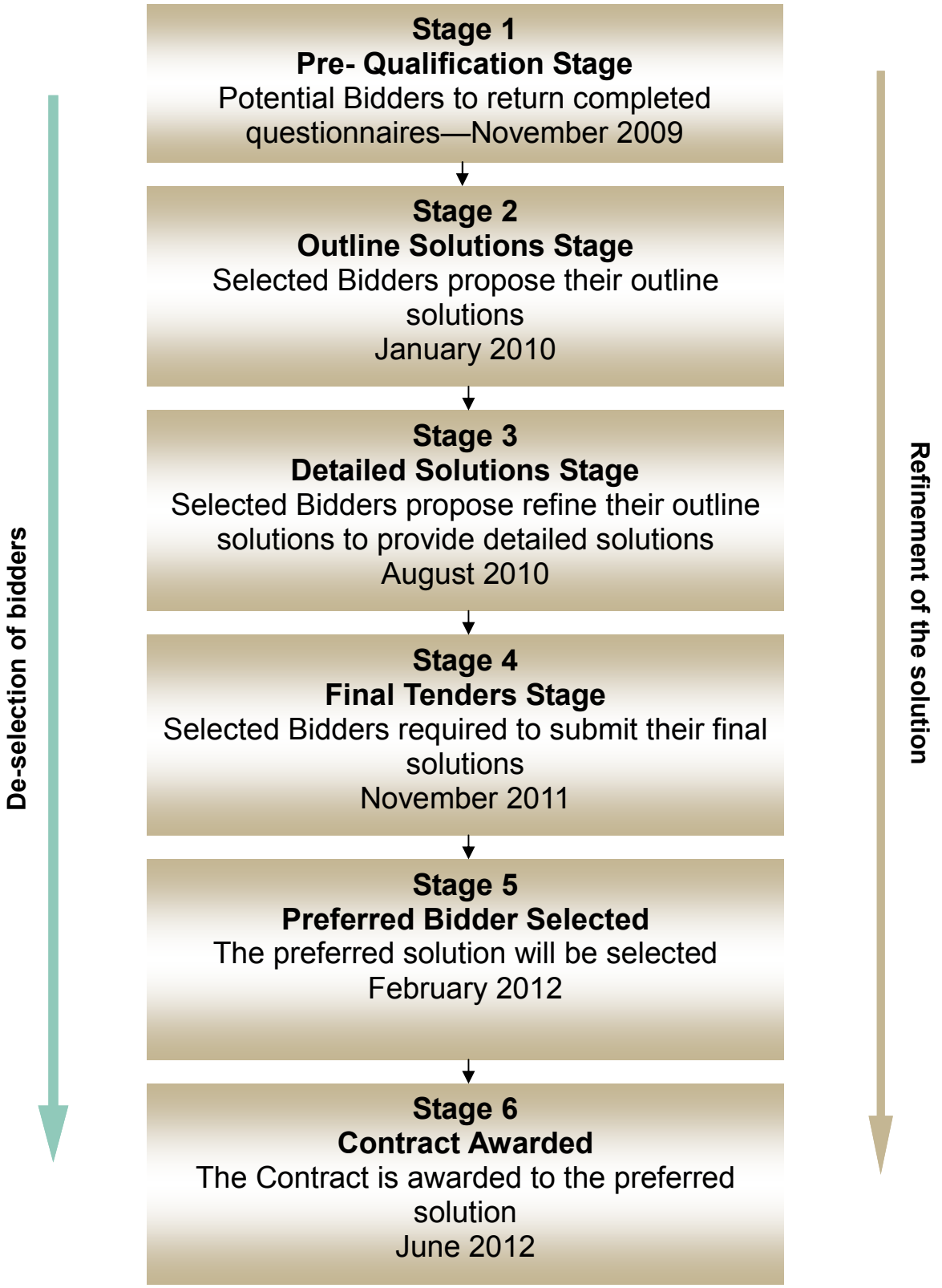
# Key Next Steps—Procurement

The Contract Notice was published in the Official Journal of the European Union in September 2009. The notice informs Industry that the Project has started. There are six distinct stages in the procurement process, which are summarised in the following figure.




At each stage of the process the number of bidders will be reduced and the bidders going through to each stage will refine their solutions.

# Evaluation Criteria

Setting the Evaluation Criteria is a key part of the procurement preparation process as it drives how the bidders proposals will be assessed from Stage 2 onwards.

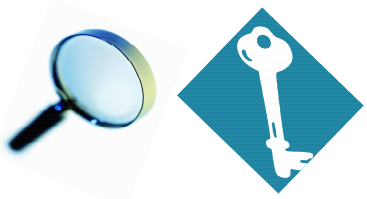
Once it has been published, the Evaluation Criteria cannot be changed, therefore it is important that it is robust and can be used to effectively assess the bidders' proposed solutions.

The Evaluation Criteria is split into three levels which consider the assessment criteria in different amounts of detail.

## Criteria Levels

**Level 1 – Covers the key areas**

**Level 2 – Splits out each key area into more detail**



**Level 3 – Considers the detailed areas more thoroughly**

The Level 1 Criteria that we are focusing on for this project are:

- **Financial** — cost and quality of funding
- **Legal** — adherence to the standard PFI Contract
- **Technical** - sustainability, environmental, technology and site

Once finalised the Evaluation Criteria will require the approval of the respective Cabinets of each of the Partners.

# Other sources of information

## Information on the Project

| | | |
|---|---|---|
| John Daly | Director | johndaly@warwickshire.gov.uk |
| Kalen Wood | Programme Manager | kalenwood@warwickshire.gov.uk |

Telephone: 01926 412628

## Information on PFI and waste treatment technologies

Frequently asked questions PFI

http://www.defra.gov.uk/environment/waste/localauth/funding/pfi/pdf/faq-pfi.pdf

Other Waste PFI Projects

http://www.defra.gov.uk/environment/waste/localauth/funding/pfi/projects.htm

Waste treatment technologies—defra new technologies programme

http://www.defra.gov.uk/environment/waste/residual/newtech/index.htm

## Information on Defra support to Waste projects & Waste Policy

Background on Waste Infrastructure Delivery Programme (WIDP)

http://www.defra.gov.uk/environment/waste/wip/widp/index.htm

Information on the Waste Strategy for England 2007

http://www.defra.gov.uk/environment/waste/strategy/index.htm

## Information relating to the three Partner Authorities

Coventry

http://www.coventry.gov.uk/ccm/navigation/environment/rubbish--waste-and-recycling/

Solihull

http://www.solihull.gov.uk/environment/refuse.htm

Warwickshire

http://www.warwickshire.gov.uk/waste