

Background

Anaerobic digestion (AD) is a process which harnesses natural bacteria to treat biodegradable materials in the absence of oxygen, producing a methane rich biogas which can be captured and used to generate electricity and provide a source of heat. The digestate residue from this process is typically a pumpable material that can be further separated into a fibre and a liquor. Digestates can be beneficially applied to farmland as fertilisers and/or soil conditioners.

The anaerobic process is used throughout the world on a number of scales, from small single vessel for households, up to large industrial process size facilities. In the UK:

- anaerobic digestion is used on farms to treat manure and slurry
- anaerobic digestion is also used for a large range of biodegradable wastes
- Local Authorities are looking towards this technology to address the diversion of biodegradable waste from landfills
- Water companies have been using it to treat sewage sludges and industrial wastes

What are suitable wastes to use in an AD Plant?

Almost any organic material can be processed by Anaerobic Digestion, including waste paper and cardboard, grass clippings, leftover food, industrial effluents, sewage and animal waste.

How can it help on-farm manure management?

The liquid fraction of the digestate from anaerobic digestion contains useful nutrients and can be used as a fertiliser. It has the potential advantage over undigested manures and slurries in that it is consistent in nutrient content and improved availability, provided it is stored and handled carefully. This makes it easier for farmers to calculate the correct fertiliser applications to crop requirements compared with using manures and slurries.

We support the use of AD as one of the ways of diverting biodegradable wastes from landfill, recovering value from them and reducing emissions of greenhouse gases. Where we need to regulate activities involving the recovery of waste we take a risk based approach which reflects both the likely risks and the benefits to the environment.

Permitting implications

Some activities could harm the environment or human health unless they are controlled under some type of authorisation. The Environmental Permitting Regime requires operators to obtain permits for some facilities and the registration of exemptions for other facilities.

The relevant regulations are Environmental Permitting (England and Wales) Regulations 2010 (SI2010 No.675). Many anaerobic digestion activities will be subject to this regime.

Exemptions are for lower risk activities where you can register with us online, normally free of charge and provide some information about who you are, what you will be doing and where it will take place.

You will need to comply with the limitations of the exemptions and ensure that your operations are unlikely to cause pollution.

There are two specific waste exemptions for anaerobic digestion. Exemption number T24 covers treatment of manures and slurries at premises used for agriculture. T25 covers the treatment of a slightly wider range of waste including food waste. The exemptions are for very low risk small scale operations and are limited by quantity of waste (T24 has a limit of 1,250 cubic metres of waste and T25 is 50 cubic metres for storage and treatment) and the appliance must have a net rated thermal input of less than 0.4 MW. Registration of the new exemptions is a very quick process and will be available online free of charge.

Permits are for medium to higher risk activities and contain conditions or rules that you have to comply with. You will have to complete an application form with relevant technical information and also demonstrate that you are competent to operate the activity. There is a charge for applying for your permit and it may take several months before we decide whether to grant or refuse your permit application. A permit for a regulated facility can authorise a number of activities (descriptions of installations and waste operations as in table 1).

Once you have received your permit you have to make sure that you comply with the conditions so that you do not pollute the environment. We also check to see if you are complying and may take enforcement action if you do not. There is an annual charge to cover our costs for carrying out these checks.

If you wish to stop operating then you have to apply to us and show that pollution has not occurred while you have been operating.

Standard Permits

Standard permits are ones where we have already assessed the risks for a defined operation and publish the rules (conditions) under which they have to operate. You still have to apply for the permits but you have to provide less information, it should cost you less and it should be quicker to obtain a permit. You must be able to comply with all of the rules for which you apply and meet the generic risk assessment.

We have produced three new sets of standard rules for anaerobic digestion facilities. One for the digestion of mainly manures and slurries on farms, one for digestion of a wider range of food and biodegradable waste and the third to cover storage of waste digestate at locations away from the AD site.

There are certain restrictions on what they cover, for example CHP units (gas engines and boilers) are restricted to 3 megawatts net rated thermal input and there are distance limits from watercourses and housing/workplaces for any proposed site location. Up to 75,000 tonnes per year waste throughput is allowed.

Table 1 below sets out the main authorisations that are likely to be applicable for AD processes.

Table 1.

Activity	Type of authorisation needed
Anaerobic Digestion (excluding Sewage Treatment Works)	
<p>Anaerobic digestion at premises used for agriculture and burning of resultant biogas</p> <ul style="list-style-type: none"> • Waste types are plant tissue, manures and slurries • The biogas burner on the AD plant must have a <u>net rated thermal input</u> of less than 0.4 MW • The waste must remain in the AD plant for a minimum of 28 days • You can store or treat up to 1,250 cubic metres of waste at any one time. This storage limit does not include on-farm manure and slurry pits used to store waste prior to treatment. 	<p>Registered non-chargeable exemption from permitting under paragraph T24 of schedule 3 of the EP Regulations</p>
<p>Anaerobic digestion at premises not used for agriculture and burning of resultant biogas</p> <ul style="list-style-type: none"> • Waste types include manures, plant tissue, animal tissue and biodegradable kitchen and canteen waste • The biogas burner on the AD plant must have a <u>net rated thermal input</u> of less than 0.4 MW • The waste must remain in the AD plant for a minimum of 28 days • You can store or treat up to 50 cubic metres of waste at any one time. 	<p>Registered non-chargeable exemption from permitting under paragraph T25 of schedule 3 of the EP Regulations</p>
<p>Anaerobic digestion of waste for the purpose of recovery at premises used for agriculture. Storage and treatment of more than 1,250 cubic metres of manures, slurries and plant waste for the purpose of recovery. Includes on-site storage of <u>waste</u> digestate.</p>	<p>Environmental permit for a waste operation Standard rules environmental permit SR2010 No. 16 subject to certain limitations.</p>
<p>Anaerobic digestion of waste for the purpose of recovery. Storage and treatment of more than 50 cubic metres of biodegradable waste for the purpose of recovery . Includes on-site storage of</p>	<p>Environmental permit for a waste operation Standard rules environmental permit SR2010 No. 15 subject to certain limitations.</p>

<u>waste</u> digestate. (Not including >10 tonnes per day of animal waste)	
Anaerobic digestion of waste for the purpose of disposal <50 tonnes per day (Not including >10 tonnes per day of animal waste)	Environmental permit for a waste operation
Anaerobic digestion of waste for the purpose of disposal >50 tonnes per day	Environmental permit for an installation
Anaerobic digestion of animal waste for the purpose of recovery or disposal >10 tonnes per day	Environmental permit for an installation
Manufacture of solid fuel from digestate using heat	Environmental permit for an installation
Biogas Combustion	
Burning biogas as a fuel in any appliance with a rated thermal input of 3 megawatts or more	Environmental permit for an installation
Combustion of biogas as a fuel in any appliance with a net rated thermal input of between 0.4 and 3 megawatts	Environmental permit for a waste operation
Combustion of biogas as a fuel in engines at a sewage treatment works with a net rated thermal input between 0.4 and 3 megawatts	Environmental permit for a waste operation Standard rules environmental permit SR2009 No.4 subject to certain limitations
Storage and Spreading of Digestate	
Storage of <u>waste</u> digestate prior to recovery	Environmental permit for a waste operation. Standard rules environmental permit SR2010 No. 17 subject to certain limitations would apply if storing away from AD plant.
Storage and spreading of <u>waste</u> digestate on agricultural land for agricultural benefit at a rate of up to 250 tonne/hectare/year.	Environmental permit for a waste operation. Standard rules environmental permit SR2010 No 4 mobile plant for landspreading subject to certain limitations.

* 'recovery' would normally mean recovery of digestate to land for agricultural benefit or ecological improvement

** 'Animal waste' is 'any waste consisting of animal matter that has not been processed into food for human consumption'.

***'rated thermal input' means the rate at which fuel can be burned at the maximum continuous rating of the appliance multiplied by the net calorific value of the fuel and expressed as megawatts thermal

The permit, permit conditions or exemption for the AD plant will depend not only on its scale or other risks but significantly on the type of feedstock used and whether it is a waste or a non-waste.

Digestion of crops grown specifically for energy production

Any crop which is grown specifically for digestion in an AD plant, to produce energy, is not a waste. If the input materials to an AD plant are non-wastes, the status of each of the output materials as a waste or non-waste will depend on the circumstances. Assuming that the main purpose of the plant is to recover energy from the biogas produced, the biogas will always be a non-waste. In order to be considered as a non-waste the other output material must meet three tests. These are that it must be i) certain to be used, ii) without any prior processing, and iii) as part of a continuing process of production. In those circumstances a permit or exemption would not be required.

Digestion of agricultural manures and slurries

We consider manure and slurry used as feedstock materials for AD to be wastes. The processing of manure and slurry (whether on its own or in admixture with food waste) at an AD plant therefore must be carried out at fully authorised sites, that is, at sites which hold an Environmental Permit or are registered as exempt waste operations. This will also be true if the manure and slurry is digested together with energy crops i.e. crops specifically grown for energy production via AD. The type of authorisation required will depend on the scale and nature of the processing carried out at a particular plant, but will typically cover both the digestion process itself and the burning of the resultant biogas.

If the feedstock materials contain any food waste or any other waste which is covered by the Animal By-Products Regulations then the facility will be subject to the full requirements of those regulations. The regulations also require the 'Competent Authority' to approve treatment of animal by products. This approval is issued by Animal Health and enforced by the relevant Local Authority.

Where the only waste feedstock to an AD plant is agricultural manure and slurry or where non - waste feedstocks such as crops grown specifically for AD are used with the manure or slurry, the digestate output is not waste if it is used in the same way that undigested manure and slurry would normally be used, ie spread as a fertiliser on agricultural land, and would not need to be authorised by us. If other wastes such as food wastes are digested on their own or with manure, slurry or crops grown for AD, then the storage and spreading of the digestate on land will require authorisation (i.e. permit or exemption).

Please note that spreading of digestate (even where an authorisation is not required) should, of course, be used in accordance with existing codes of good agricultural practice, nitrate vulnerable zone (NVZ) requirements etc. to prevent nutrient overload and pollution.

Digestion of other wastes such as food and other organic materials

These materials are considered wastes and the use at an AD plant, use of the resultant biogas and the storage and spreading digestate would require authorisation (environmental permit or exemption).

Digestion of other animal wastes

The recovery or disposal of > 10 tonnes of animal wastes (not manures or slurries) is an activity covered by the IPPC Directive and would require an environmental permit for an installation.

Digestion of waste at sewage treatment works

The anaerobic digestion of sewage sludge produced from within the works would not normally require an authorisation from us unless it was for disposal; in which case it would need a permit for an installation. If sewage sludge or other wastes are transported to the works for digestion then they would be considered as wastes and an authorisation would be required (exemption or environmental permit). There is an exemption, number T21, for the treatment up to 100,000 cubic metres of imported sewage sludge and associated waste types over any 12-month period. In all cases combustion of the biogas would need an authorisation; <3MW net rated thermal input would be a waste operation and >3MW net rated thermal input would be an installation.

Intensive Farming

If you are a pig or poultry farmer and you already have an environmental permit for your farm then you may be able to vary your environmental permit to include the AD plant if you intend to operate it yourself. In some circumstances the anaerobic digestion facility would be considered a Directly Associated Activity (DAA) to the existing permitted installation. The AD plant could only be considered to be a DAA if it meets all of the following criteria:

1. It is directly associated with the Stationary Technical Unit (STU), namely;
 - (i) it must be on the same site as the STU;
 - (ii) it must serve the STU; and
 - (iii) where the activity also serves another industrial unit or units, the STU must be the principal user of the activity.
2. It has a technical connection with the STU; and
3. It is capable of having an effect on pollution and emissions

An example of a technical connection with a farm would be if a large proportion of the heat from the gas engine was used to heat the animal housing or if the farm will rely solely on the electricity the engines generate serving the STU.

You should however discuss your individual details and proposals with your local Environment Agency officer.

Production of Biomethane

Biogas generated from anaerobic digestion of agricultural waste and sewage sludge typically comprises 60% methane and 40% carbon dioxide with some trace components. Other gases produced from biological treatment of organic wastes may have comparable compositions.

Carbon dioxide and other contaminants can be removed from the biogas to produce a biomethane (a gas produced from biological treatment of wastes with a very high methane content) with the same specification as natural gas for injection into the gas network. Compressed biomethane can also be used as a direct substitute for compressed natural gas as a transport fuel. For biomethane to cease being a waste, the producer currently has to apply for our end of waste test. An application form template is available from our website.

<http://www.environment-agency.gov.uk/business/sectors/109792.aspx>

The producer will need to demonstrate that the biomethane has been processed into a distinct, marketable product, which can be used in exactly the same way as an ordinary fuel and with no worse environmental effects.

We are exploring a regulatory position on biomethane to avoid the need for an end of waste application.

Quality protocol

We are working with WRAP (Waste & Resources Action Programme) and have developed a Quality Protocol to make it easier to collect, store, transport and re-use digestate from anaerobic digestion of source segregated biodegradable waste.

The Quality Protocol sets out criteria for the production of quality outputs from anaerobic Digestion of material that is biodegradable waste (biowaste). Quality outputs from anaerobic digestion include the whole digestate, the separated fibre fraction and the separated liquor. If the criteria in the Quality Protocol are met (including certification to PAS110), quality outputs from anaerobic digestion will normally be regarded as having been fully recovered. This means that in those circumstances the use of the fully recovered material may not require an authorisation.

Further guidance on this Quality Protocol is available from:

<http://www.environment-agency.gov.uk/business/topics/waste/114395.aspx>

How to apply for an environmental permit or exemption

Guidance on our permitting process and application charges can be found on our website:-

<http://www.environment-agency.gov.uk/business/1745440/1745496/1906135/>

For waste exemptions, the registrations are dealt with by our National Customer Contact Centre (NCCC), tel no. 08708 506 506. If you are intending to set up an AD plant, NCCC will direct you to your local Environment Agency Area office for prior discussion with us before you submit an application for an Environmental Permit.

If you are a farmer wishing to register an exemption then you can register online:-

<http://www.environment-agency.gov.uk/business/sectors/32777.aspx>

If you are not applying on line you will need to obtain an exemption pack. You can order one of these by ringing our dedicated agricultural waste help line, 0845 603 3113.