Department of the Environment
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Draft Supplementary Planning Guidance to PPS 18 'Renewable Energy'

Anaerobic Digestion

Public Consultation

June 2013

Contents

Preamble

PPS 18 ‘Renewable Energy’ and its associated Best Practice Guidance document sets out the Department’s planning policy and guidance in relation to development that generates energy from renewable resources.

This Supplementary Planning Guidance (SPG) document provides additional advice and guidance specific to Anaerobic Digestion (AD) to complement the background information already set out in the Best Practice Guidance to PPS 18. The information set out in this SPG should be read in conjunction with both PPS18 and its associated Best Practice Guidance. It has been drawn up taking account of similar material available for other parts of the UK and the Republic of Ireland, including:

- Anaerobic Digesters - Planning Guidance Note: Northern Ireland Environment Agency (2012)
- Planning for Waste Management Facilities: A research Study (Chapter 2), Office of the Deputy Prime Minister (2004)
- The Anaerobic Digestion Portal: The National Non-Food Crops Centre with support of DECC and DEFRA

When published in final form, this SPG will be a material consideration in the determination of planning applications for AD development

1.0 Introduction

1.1 This Supplementary Planning Guidance (SPG) sets out advice and guidance in relation to proposals for Anaerobic Digestion (AD). It is intended for use by developers, the public and by planning officers in the assessment of planning applications for AD proposals.

1.2 The SPG provides a brief overview of this renewable technology; advice and guidance on the key planning issues raised by AD developments; details on the type of information that may be requested in processing a planning application for AD; and advice and guidance in relation to Environmental Impact Assessment (EIA).

1.3 In addition, this document provides guidance for those seeking to improve their farm waste management practices and/or the farm business viability through the consumption and/or sale of renewable electricity generated on the farm.

1.4 Applicants for all renewable energy development proposals should be aware that there may be significant capacity constraints in accessing certain parts of the NIE Grid network particularly in the west and north-west of NI.

2.0 Policy Context

Strategic Energy Framework

2.1 The Department of Enterprise Trade and Investment (DETI) Strategic Energy Framework, 2010 (SEF) has adopted a target of 40% renewable electricity and 10% renewable heat by 2020. The SEF identifies that bioenergy (including AD) has the potential to contribute to both these key targets.

Bioenergy Action Plan

2.2 In February 2012 DETI published its cross-departmental Bioenergy Action Plan for 2010 – 2015. The aim of the plan is to increase the sustainable deployment of bioenergy (including the sustainable uptake of AD). A key objective of the plan is to create and maintain a supportive and encouraging policy and regulatory framework within which the bioenergy sector can develop and thrive.

Northern Ireland Renewable Obligation

2.3 The Northern Ireland Renewables Obligation (NIRO), administered by DETI, is the main policy instrument for encouraging the development of additional renewables capacity. On 1 April 2011 DETI introduced an enhanced level of Renewable Obligation Certificates (ROCs) for smaller scale AD plants in Northern Ireland. Plant with a generating capacity of under 500kW capacity now receives 4 ROCs per MWh while plant over 500kW capacity receives 3 ROCs per MWh.

Renewable Energy Action Plan

2.4 The Department of Agriculture and Rural Development (DARD) Renewable Energy Action Plan 2010 sets out a framework which aims to support the land-based sector to further develop renewable energy opportunities. The action plan calls for opportunities to exploit sustainable scale AD and its associated technologies as well as exploiting the opportunities for renewable heat produced by AD.

DARD Rural White paper Action Plan

2.5 The DARD Rural White Paper Action Plan contains commitments on rural issues by all Departments and provides a framework for a more integrated approach by the Executive in seeking to address the issues faced by rural areas. A lead action by DOE is to facilitate the increased deployment of renewable energy production by providing a supportive planning policy framework and guidance on renewable technologies.

3.0 Planning Policy

3.1 Proposals for AD plants will be assessed under the provisions of PPS18 'Renewable Energy' and its associated Best Practice Guidance where landfill gas, sewage gas and biogas from organic agricultural material including wastes, digestible domestic or industrial waste, are used to fuel the generation of heat and/or electricity.

3.2 As AD proposals are regarded as waste treatment facilities, where the feedstock is classified as a waste under the relevant legislation, the provisions of PPS 11 'Planning and Waste Management' will therefore be a material consideration. Particular regard will be given to policy WM1 'Environmental Impact of a Waste Management Facility' and WM 2 'Waste Collection and Treatment Facilities'.

3.3 Depending upon the location of the proposal the provisions of PPS 21 'Sustainable Development in the Countryside' will also apply. The primary policies to consider are CTY 1 'Development in the Countryside'; CTY 13 'Integration and Design of Buildings in the Countryside'; and CTY 14 'Rural Character'.

4.0 What is Anaerobic Digestion?

4.1 AD is the process whereby organic material (plant and animal matter) is broken down by micro-organisms in a controlled, oxygen free environment (the anaerobic digester or 'bio-digester'). This produces a biogas (a mixture of methane and carbon dioxide) which is very similar to natural gas, and digestate, a nutrient rich residue made up of the undigested remnants of the feedstock that the micro-organisms cannot use.

4.2 The resultant biogas can be burned in a boiler or Combined Heat and Power (CHP) plant to generate renewable heat and/or electricity or may also be cleaned and used as a bio-fuel (sometimes referred to as bio-methane) that may be injected into the gas grid to provide heat and power; or condensed for use as a renewable fuel for transport. The residual digestate contains valuable plant nutrients such as nitrogen, phosphate and organic humus and can be spread on land as a bio-fertiliser in place of expensive artificial fertiliser.

4.3 Almost any biomass can be used as feedstock for an AD plant, including food waste; slurry and manure; plant residues, silage, and energy crops. As a result, materials that are currently going to landfill can be utilised; natural methane emissions are reduced and conventional fossil fuel generation, with its associated carbon emissions, can be displaced.

4.4 The benefits associated with AD include:

- a contribution toward meeting Government targets in relation to renewable energy and greenhouse gas emissions;
- a beneficial means of dealing with biomass wastes that would otherwise go to landfill;
- the opportunity to utilise the Regions natural resources to enhance security of energy supply; and
- support for jobs and businesses through the creation of a indigenous biomass supply chain.

4.5 AD plant can be developed at a range of scales in order to meet specific waste processing or energy generation requirements. At the smaller end of the scale, plants can be developed to treat agricultural residues arising from a single farm (or group of farms) or to process residues from the food processing industry. At the larger end of the scale, centralised AD facilities (CAD) can be developed to co-digest source separated municipal wastes with other wastes such as sewage sludge, agricultural residues and industrial organic wastes.

5.0 Agricultural or Farm-based AD

5.1 AD can complement normal farm business activities by contributing to waste management and nutrient recycling activities on the farm. Farm based AD can also improve farm business efficiency and environmental sustainability at the level of an individual farm or group of farms by helping to offset operating costs. This is because AD offers an effective and sustainable method of processing agricultural wastes and other appropriate biomass material to generate renewable electricity and/or heat (using CHP) for agricultural purposes within the farm. This energy can be used to offset consumption from the Grid, thereby helping to reduce operating costs. AD plant can also offer an additional complementary source of income to farmers from the sale of renewable electricity back to the grid.

5.2 The digestate produced as a by-product has a lower Biological Oxygen Demand (BOD)[1]. Digested slurry also benefits from a substantial reduction in slurry offensive odour. Digestate has an improved fertiliser quality and can also be used as a substitute to expensive inorganic fertiliser, further offsetting costs.

5.3 Farm-based AD plants may be 'on-farm' (where the feedstock is comprised entirely of organic residues or energy crops produced within the farm, including land held in conacre) or they may accept feedstock material from a number of neighbouring farms as part of co-operative or community initiative. These proposals might be located on an individual farm or some other location (such as an industrial estate) close to the source of the waste.

5.4 In general, on-farm AD is only likely to be sustained by large farms which can produce enough feedstock year round from within the farm unit for the economic operation of the plant. In practice most proposals for farm-based AD in Northern Ireland will involve the import of a proportion of feedstock material onto the farm to complement the feedstock originating from within the unit. Where this is the case it is important that the type, volume (in tonnes per annum) and source(s) of feedstock are clearly identified as part of the planning application. This is required in order to fully assess the transport/traffic implications of this movement and also consider other aspects such as the amenity impacts and the adequacy of existing or proposed feedstock storage provision.

5.5 Where it is proposed to transport farm residues from a group of neighbouring farms to a central point such an individual farm enterprise it is important that preventative measures are taken to minimise the risk of pathogen transfer. Further information is available from DARD.

[1] BOD is a measure of the polluting strength of organic wastes.

5.6 Proposals for large scale CAD plants to process agricultural residues and which are operated on a commercial (or merchant) basis and intended to accept material from a wide area will generally not be suitable for farm based locations. These proposals are likely to be more suitable in an industrial setting or in association with an existing industrial enterprise, such as a large scale food processing facility or industrial dairy.

5.7 Proposals for farm-based AD will require a Waste Management Licence (WML) or Pollution Prevention Control (PPC) permit. AD plant including associated silos and storage tanks must also comply with the minimum standards set out in The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) (SSAFO) Regulations (Northern Ireland) 2003 (as amended). These standards require that all new (and substantially reconstructed) stores:

- are sited at least 10 metres away from any waterway;
- have a design life of at least 20 years;
- are designed and constructed to meet specific standards and requirements;
- be notified to NIE at least 28 days before commissioning. A qualified chartered, structural or civil engineer must sign the requisite notification (more information is available from NIEA Water Management Unit).

5.8 Proposals must also comply with the provisions of the Nitrates Action Programme Regulations (Northern Ireland) 2010. Under these provisions any run-off meeting the definition of slurry must be collected in an appropriately constructed slurry tank.

5.9 The Department has recently concluded a consultation on revised permitted development rights for agricultural buildings. As part of the consultation views were sought on introducing permitted development rights to provide for the installation, alteration or replacement of structures to house anaerobic digestion plant on agricultural units subject to the certain limitations. This includes a requirement that feedstock is limited to materials generated on the agricultural unit and the ground area of the plant not exceeding 500m². The outcome of the permitted development consultation will inform the final version of this draft guidance.

6.0 Planning Issues

6.1 AD proposals raise a number of planning issues including visual and landscape impacts arising from industrial scale plant/buildings; potential odour impacts, air emissions, noise impacts, and traffic impacts. This section identifies each issue in turn and sets out the type of supporting information that is likely to be required as part of a planning application in order to allow each of these impacts to be fully considered and, where possible, mitigated.

6.2 The Department would stress that failure to supply adequate environmental information to accompany planning applications for anaerobic digestion projects is a key cause of delay in determining such proposals.

LANDSCAPE AND VISUAL IMPACT

6.3 An AD facility requires buildings and structures of an industrial character. Typically this will include feedstock reception tanks, biodigester vessels, CHP plant and buildings; digestate storage tank(s) as well as ancillary development. Where CHP plant is proposed, new electricity lines to transfer electricity to the National Grid may also be required and will have a visual impact both on and off the site.

6.4 The landscape and visual impacts of a proposed AD facility will vary according to scale, siting and location. Smaller proposals are unlikely to cause significant impact, particularly where new plant and buildings can be co-located with existing light industrial or agricultural units. Larger scale CAD plants have the potential to create the greatest visual impact. It is important in all cases to give full consideration to the siting, location and design of AD plant and infrastructure in order to minimise the potential for adverse impacts.

6.5 The significance of landscape and visual impacts will depend on site specific considerations such as the character of the existing landscape; the proximity of the proposal to designated landscapes (such as AONBs); the site setting (including the proximity of listed buildings and/or conservation areas); the presence of existing built structures of similar scale and massing; and the impact upon critical public views.

6.6 In all cases the character and scale of a proposal should be appropriate to its location and should respect existing landscape character and setting. Careful site selection and appropriate orientation of proposed plant and buildings can help to minimise any potential adverse visual impact. Landscaping can assist with integration of new AD development. Depending upon the location of the proposed plant, the need for site security and/or livestock proofing may also be important.

6.7 In order to minimise the landscape and visual impacts of a proposed AD facility the following points should be considered early in the process of site selection, layout and design:

SITING

- where possible, AD plant and buildings should be sited in association with existing buildings of similar scale, height and massing;
- in the case of locating within an agricultural unit, AD plant and buildings should be sited as close as possible to existing agricultural buildings or other structures of similar scale such as silos; and
- where appropriate, plant and buildings should be sited to take advantage of existing topography and / or vegetation or trees to assist with visual integration.

PLANT AND BUILDING DESIGN

- the scale, massing and height of new plant and buildings should be compatible with that of surrounding buildings / structures;
- the design, colour and external finish of new buildings and/or plant should complement those of existing neighbouring buildings / structures;
- partial excavation and burial of elements of the AD plant (such as digesters and storage tanks) or other site profiling and engineering measures to reduce the visual impact of plant may be appropriate; and
- the reuse and/or conversion of existing redundant buildings to contain elements of the AD process should be considered to avoid the need for new development.

LANDSCAPING AND BOUNDARY TREATMENT

- the use of bunding to provide a boundary or screening for new buildings, plant or structures;
- the planting of boundaries or bunding with indigenous trees and/or shrubs to provide additional screening (where planting is proposed a schedule of plant species, heights, and maintenance should be submitted with the application); and
- the use of site fencing and/ or boundary walls of a scale and type appropriate to their location.

Supporting information

6.8 To allow for full assessment of the visual and landscape impacts the following information will normally be submitted as part of an application for full planning permission or reserved matters:

- a site layout / block plan showing the location of the proposed AD plant and related buildings and all ancillary structures (including feedstock storage tanks, CHP housing, digestate store, flare stack, augers etc) in relation to site boundaries and any existing buildings within or adjacent to the site;

- drawings showing existing and proposed site levels and site sections;

- drawings showing proposed plant and buildings in plan and elevation view (including contextual elevations showing the development in relation to existing adjacent buildings or other features where these exist);

- details of the proposed landscaping works including, where appropriate, a planting plan and schedule detailing suitable tree and shrub species and planting distances; and

- where connection to the National Grid is proposed, information on grid connection works, including location of transformer and indicative routing for transmission lines.

TRANSPORT, TRAFFIC AND ACCESS

6.9 The construction and operation of a small scale AD plant, such as a self-contained on-farm facility, is unlikely to give rise to significant transport or traffic impacts. However proposals for centralised farm-based AD plant utilising feedstock materials from a number of neighbouring farms and those for large scale commercial 'CAD' facilities will generate additional vehicle movements and the transport and traffic impacts of these movements is a material planning consideration. The type of vehicle movements will depend upon the facility and may include enclosed farm tankers, bulk haulage vehicles and/or waste collection vehicles. The number of vehicle movements will be dictated by vehicle type, throughput capacity of the AD plant and the characteristics of the feedstock material.

6.10 There is a need to ensure that the local road network is capable of accommodating the type and number of vehicle movements that the proposal is expected to generate. In order to avoid or mitigate against any adverse impacts, the Department may specify the use of a particular route or routes or require routes to be improved. Where the road network cannot accommodate the predicted number of vehicle movements without adverse traffic or road safety impacts, it is likely that planning permission will not be granted.

6.11 Proposals for commercial scale CAD should generally therefore be located on sites with good access to the primary road network and be readily accessible from roads which are free from HGV restrictions.

6.12 Safe access to and from the site onto the local road network is also required. New access arrangements should be designed in accordance with published standards and should not prejudice road safety or significantly inconvenience the flow of traffic on the local road network. Advice on all matters relating to access and traffic will be obtained from the Department for Regional Development's Roads Service.

6.13 Proposals should incorporate adequate parking, manoeuvring and circulation spaces within the site for operational, employee and visitor vehicles. This is necessary to ensure the proposed layout will function

internally without giving rise to adverse traffic impacts on the road network in the vicinity of the plant. These arrangements should be sufficient to accommodate the size and type of vehicle required to deliver feedstock or remove digestate.

6.14 Depending on the scale of the development, in order to fully evaluate all the possible transport implications, a developer may need to provide a full Transport Assessment (TA). Detailed advice and guidance on the preparation of TA's is available in the document 'Transport Assessment: Guidelines for Development Proposals in Northern Ireland' (DOE/ DRD, 2006).

Supporting information

6.15 To allow for full assessment of all of the possible traffic and transport implications the following information will normally be submitted as part of an application for full planning permission or reserved matters:

- drawings detailing the proposed access arrangements onto the public road (including visibility splays);
- detailed drawings indicating the internal arrangement of the site (to include service, employee and visitor parking areas; turning and manoeuvring areas; and/or HGV waiting areas as appropriate);
- information on the anticipated number of vehicle journeys to be made to and from the site each day broken down by vehicle type (e.g. tractor and trailer or Heavy Goods Vehicles. For HGV the size and type of vehicle should also be detailed);
- detail on the proposed routing arrangements for vehicles accessing the site (including HGV vehicles);
- estimated peak times for traffic entering the site;
- any other information on the anticipated transport impacts of the development (e.g. noise and air quality implications etc); and
- information on any measures considered necessary to mitigate transport impacts (for example a service plan setting out vehicle routing to avoid sensitive areas or scheduling HGV deliveries outside of local peak traffic periods).

ODOUR, EMISSIONS AND DUST CONTROL

6.16 The breakdown of organic materials is, by its nature, an odorous process. As the AD process is largely enclosed and controlled, the potential for odour nuisance is considerably reduced. However if managed incorrectly, the AD process and related activities such as the storage and transfer of

feedstock and the removal, storage and distribution of digestate, have the potential to give rise to unacceptable odour and other air quality impacts.

6.17 In developing their proposals applicants and their agents should consider the potential sources of odour and dust arising from their scheme and, if necessary, amend their proposal and/or establish procedures to adequately control odour and dust emissions. As part of this assessment it is also important to identify sensitive receptors in the vicinity of the proposal (such as residential properties, schools, hospitals) and consider what measures can be put in place to prevent or limit their exposure to odour and/or dust emissions.

6.18 As the AD process takes place within sealed containers the potential for odour and dust disturbance to occur directly from the digestion process is low. Related activities such as the movement and storage of feedstock and the subsequent removal, storage and distribution of residual digestate/ liquor do however have the potential to generate odour and/or dust disturbance. There is also the potential for odour and dust release during the delivery of solid feedstock to designated storage areas; and during its transmission to the digester via the feedstock hopper/auger. These impacts, where they do occur, are likely to be periodic and localised. Liquid feedstock, such as slurry, is usually pumped directly into a holding tank from where it is delivered by pump directly into the AD digester and so the potential for odour from this source is also low.

6.19 Standard good practice measures should be adopted to reduce the potential odour and dust release during these activities. These include ensuring that the delivery and storage of solid feedstock takes place within buildings with appropriate negative ventilation systems and, where appropriate, bio-filters.

6.20 Where outdoor storage of solid feedstock is proposed (as in the case of agricultural silage clamps) the use of tarpaulin/plastic covers to cover up exposed surfaces, while leaving the worked surface accessible, is recommended. The use of covered trailers or HGV's will also reduce the potential for odour/ dust during feedstock delivery. Vehicle wheel washing is likely to be necessary at centralised facilities to minimise dust levels and reduce the potential for transmission of contaminants.

6.21 The biogas produced as a result of the AD process is odorous if allowed to vent directly to the atmosphere however under normal operating conditions this is prevented by the gas holder which acts to regulate the flow of biogas to the CHP engine.

6.22 Flue gases from the normal operation of a CHP engine are unlikely to give rise to significant odour emissions provided the equipment meets relevant design specifications and is properly serviced. Similarly, emissions from the gas flare stack (operative during the plant commissioning, testing or under abnormal operating conditions) will also not normally give rise to significant environmental problems or unacceptable odour emissions. For larger plant

(such as CAD facilities) emissions to air from these sources are regulated by NIEA through the PPC permitting process.

6.23 The AD process acts to reduce the odour potential of the input feedstock (AD has been shown to lower the odour of farm slurries by up to 80%). Digestate will typically be stored within a tank or slurry lagoon prior to distribution and disposal by land spreading. There may be a requirement to cover digestate tanks/ lagoons to reduce emissions of ammonia/odour.

Supporting information:

6.24 To allow for full assessment of odour and dust impacts the following information will normally be submitted as part of an application for full planning permission or reserved matters:

- information on the type of feedstock and its source(s) including European Waste Code (EWC);
- information on the storage arrangements for feedstock including how feedstock reception buildings are sealed and ventilated;
- detail on the arrangements for delivery of feedstock (including detail on how feedstock is sealed during delivery in order minimise odour emissions);
- detail on the arrangements for transferring feedstock from the storage area / reception building to the AD digester;
- arrangements for the extraction, storage and distribution of digestate; and
- information on measures in place to address odour impacts arising from unscheduled interruption in normal operation of AD plant as a result of equipment failure.

6.25 Where a proposal will be subject to separate environmental permitting (such as a PPC permit) a formal Odour Management Plan will need to be prepared as a requirement of the permitting process.

NOISE

6.26 The most significant noise emitting element of the AD proposals is the Combined Heat and Power (CHP) plant responsible for producing both renewable heat and electricity from the biogas generated by AD. This noise is produced primarily from the exhaust stream of the CHP engine and, to a lesser degree, from the electrical generator.

6.27 CHP plant will usually operate for 24 hours per day, 7 days a week. This mode of operation has the potential to give rise to noise nuisance at sensitive receptors such as adjacent residential properties, especially at night or in the early morning when background noise levels are normally

lower. For this reason careful consideration should be given to the siting of the CHP. In particular plant should be located away from sensitive receptors to ensure that the potential for noise nuisance is minimised.

6.28 CHP plant should generally be housed in a suitable enclosure that incorporates adequate sound reduction measures such as sound attenuating brick or other acoustic insulation technology. CHP plant is now also available in a containerised module which is pre-fitted with noise attenuation measures. While this plant is designed for open air operation, its location within a suitable building will provide an extra degree of sound attention in addition to added security. If required, additional noise attenuation measures, such as acoustic fencing or bunds should be incorporated to ensure that noise levels are within the recommended guidelines.

6.29 Other elements of the AD plant, including gas flares, pumps, feedstock augers etc are not significant noise sources and are unlikely to give rise to noise disturbance.

6.30 A potential source of noise related to the operation of AD plant is that associated with traffic generated by the movement of feedstock and digestate to and from the proposal; and from vehicle movements within the site itself. Noise impacts arising from off-site traffic movements may, where appropriate, be controlled though the use of a transport routing plan. Impacts arising from on-site vehicular movements can be minimised by appropriate site layout and access design. Where appropriate noise impacts can also be controlled through the imposition of conditions restricting deliveries or hours of operation.

Supporting information

6.31 To allow for full assessment of potential noise impacts the following information will normally be submitted as part of an application for full planning permission or reserved matters:

- information on the noise levels generated by the proposed AD/ CHP plant;
- a block plan identifying the location of the proposed CHP/AD facility with respect to noise sensitive receptors;
- information on the type of noise attenuation measures proposed (e.g. the use of sound attenuating brick in CHP enclosures or the location of acoustic fencing/bunding); and
- auditable predictions of noise levels arising from the operation of the AD/CHP facility at the closest noise-sensitive receptors (including, where appropriate, a noise assessment carried out in accordance with BS 4142).

WATER ENVIRONMENT

6.32 The input feedstock to the AD process, which can include slurry, silage and other biodegradable organic residues such as sewage sludge, have high concentrations of dissolved nitrogen and organic material and a high BOD. The outputs from the process, including digestate and liquor have a reduced BOD but are still highly polluting if they enter groundwater or a watercourse. It is therefore important to make adequate provision on site for the safe collection and storage of feedstock and for dealing with dirty water that may arise as a result of operations on the site.

6.33 AD facilities have the potential to cause indirect pollution to watercourses if the correct containment systems are not in place. Suitable arrangements should be in place to minimise the risk of dirty water entering watercourses of groundwater during the storage and delivery of feedstock and the subsequent storage and distribution of digestate and/or liquor. Storage of feedstock such as slurry or silage should take place in appropriately constructed tanks/stores. All storage and handling of feedstock and digestate should be undertaken on impermeable surfaces and within areas with an engineered site containment and drainage system designed to contain all contaminated runoff.

6.34 In addition to making adequate provision to contain accidental spillages, proposals should incorporate measures for dealing with the management of dirty water and other liquid contaminants arising from within the unit. In particular it is necessary to ensure that dirty water does not enter the storm drainage system. This can be achieved through collection and storage in a suitably sized tank.

6.35 Where digestate from the AD plant is to be disposed of by land spreading it will be necessary to demonstrate an adequate land-source in order to comply with the land application limits of the Nitrates Action Programme (NAP) Regulations (Northern Ireland) 2010. Full detail on the location and extent of the land in question should also be provided by way of relevant farm maps.

6.36 Depending upon the nature of their proposal applicants should contact the Land and Resource Management Unit, Water Management Unit Agricultural Regulations Team and/or the Industrial Pollution and Radiochemical Inspectorate within NIEA to discuss the particular storage and drainage requirements at their site.

Supporting information:

6.37 To allow for full assessment of the water quality impacts of the proposed development the following information will normally be submitted as part of an application for full planning permission or reserved matters:

- a site drainage plan showing the arrangements for the management of dirty water arising from within the development (this plan should

detail how drainage of contaminated areas is separated from uncontaminated site drainage);

- detail on the storage arrangements for feedstock prior to input to the digester;
- full details of how the resultant digestate will be stored and disposed of (if disposed of by land spreading, farm maps showing the location and extent of that land);
- a map or block plan indicating the position of the proposal in relation to any nearby waterways; and
- details of the arrangements for containing spillages.

7.0 Environmental Impact Assessment (EIA)

7.1 Environmental Impact Assessment (EIA) is a method of ensuring that the likely environmental effects of a proposal are fully understood and taken into account before consent is given for development to proceed.

7.2 The process is governed by the Planning (Environmental Impact) Regulations (Northern Ireland) 2012. These regulations describe a range of developments within two schedules (Schedules 1 and 2) where EIA is either a requirement (Schedule 1 development) or where EIA may be required if the development meets certain thresholds or criteria or is located in a sensitive area (Schedule 2 development). Schedules 3 and 4 set out respectively the criteria which must be taken into account when determining whether a development is likely to have significant effects on the environment and those matters which should be included in any environmental statement.

7.3 The majority of AD proposals will require a screening determination under Schedule 2 of the regulations because they comprise either an installation for electricity generation where the area of the development proposal exceeds 0.5 hectare; or are an installation for the disposal of waste where the area of the development exceeds 0.5 hectare, or the installation is proposed to be sited within 100 metres or any waterway or water in underground strata or marine waters. In either case if a proposal is located in a sensitive area (such as an Area of Special Scientific Interest or an Area of Outstanding Natural Beauty) it will constitute Schedule 2 development and therefore require a screening determination as to whether it constitutes EIA Development requiring the submission of an Environmental Statement.

7.4 Applicants may, prior to the submitting a planning application, request a screening determination from the Department to confirm whether or not a proposed AD plant is subject to EIA. Such an request must be accompanied by:

- a plan sufficient to identify the land;
- a brief description of the nature and purpose of the development and of its possible effects on the environment; and
- such other information or representations as the applicant may wish to provide or make.

7.5 A key consideration of the screening determination is whether the development is likely to have significant effects on the environment by virtue of factors such as its nature, size or location. Schedule 2 developments which are judged to be likely to have significant effects on the environment by virtue of factors such as their size, nature or location will require EIA.

8.0 Other Consents

Waste management

8.1 Depending upon the type of input feedstock, the processing capacity of the AD facility, and whether the process is classed as recovery or disposal[2] other consents may apply. The main other consenting regimes that may apply to AD plant are the Pollution Prevention and Control (Industrial Emissions)Regulations (Northern Ireland) 2012 and the Waste Management Licensing Regulations (Northern Ireland) 2003.

8.2 Applicants are advised to contact NIEA Land and Resource management Unit to determine if their proposal will require a Waste Management Licence (WML); an Exemption or a PPC permit. Further information on the regulation of AD from a waste management perspective is available from the NIEA Land and Resource Management Unit.

Water quality

8.3 Where major earthworks are proposed, consent to discharge under the Water (NI) Order 1999 may be required to deal with site drainage during the construction phase.

8.4 Where an underground or partially buried AD/storage vessel is proposed and the water table is encountered during the required excavation then an abstraction/impoundment license may also required under the Water Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) 2006. Applicants should contact the Abstraction and Impoundment Licensing team of NIEA Water Management Unit for further advice.

8.5 If a proposed AD plant is planned on the same site/directly associated with an existing installation regulated by the NIEA Industrial Pollution and Radiochemical Inspectorate (e.g. an intensive pig or poultry farm) a variation to an existing permit may be required and they should be contacted for further advice.

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[2] 'Recovery' means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfill a particular function, or waste being prepared to fulfill that function, in the plant or in the wider economy. 'Disposal' means any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy

ANNEX A - AD - Technology types

A1 A number of different types of AD technology exist. These technology types differ in terms of plant design, operating conditions and input feedstock, however they all exploit the same basic process of the anaerobic breakdown of biological material.

Mesophilic or Thermophilic:

A2 AD systems may be either Mesophilic or Thermophilic. Mesophilic systems operate at 25-45°C while thermophilic systems operate at 50-60°C or above. Thermophilic plant has a faster throughput with faster biogas production per unit of feedstock and m³ of digester volume. Mesophilic systems are characterised by longer retention times and larger digesters.

Wet or Dry AD

A3 The AD process may be run as either 'wet' (low solid) or 'dry' (high solid). The more common process is wet, where the feedstock is typically <15% total solids. With this type the input feedstock has the consistency of aqueous slurry which can be pumped into the digester. Such systems tend to be run as a continuous process where feedstock and digestate is continually input / drawn off. Wet AD has a lower set-up capital cost than dry systems. Wet AD systems also generally give more biogas per unit feedstock and their operating costs are typically lower. Most agriculturally based AD systems are wet systems due to the nature of the input feedstock.

A4 Dry AD systems are less common than wet AD. The input feedstock is typically 15 – 40% total solids. These feedstock characteristics mean that the design of such systems is significantly different from that of wet AD. Feedstock is moved using conveyors and screws or powerful pumps. Digester vessels are typically smaller and there is a reduced feedstock storage requirement due to the lower water content of the feedstock. Dry AD systems use a plug flow method to move feedstock through the digester, and may also be vertical or horizontal. They also typically have lower energy requirements because of the lower water content of the feedstock.

Continuous Flow or Batch Flow

A5 Most AD digesters are continuous flow with the input feedstock continually fed into the digester and digestate continuously removed to a suitable storage tank. In batch flow systems the digester is loaded periodically with feedstock then sealed. Anaerobic Digestion is allowed to proceed for a time before the digester vessel is opened and its contents removed. To overcome peaks and troughs in gas production in such systems there are usually multiple batch digesters with staggered changeover times. As a

result management of batch flow systems is more complicated than continuous flow systems. Batch flow systems tend to be associated with dry AD systems, while continuous flow is associated more often with wet systems

Single or Multiple Digesters:

A6 The AD process occurs in several stages. Some AD plants incorporate multiple digesters to ensure each stage is as efficient as possible. This configuration can yield more biogas per unit feedstock but capital and operating costs are higher and there are greater management requirements. In practice most digesters in the UK and Ireland are single or double digesters. Some systems are available with a ring within a ring configuration where the secondary digester is enclosed entirely within the primary digester resulting in a structure with the appearance of a single large digester vessel.

Vertical or Horizontal Plug Flow:

A7 AD digesters may be vertical, where incoming feedstock is pumped to the top of the digester and moves downwards as a plug, or horizontal where plug flow is aided by slowly-rotating impellers inside the reactors. Vertical tanks are simple and cheaper to operate, but the feedstock may not reside in the digester for the optimum period of time to maximise potential biogas production. Horizontal tanks are more expensive to build and operate as this design incorporates slowly rotating impellers inside the reactor to control the flow of feedstock and help ensure that it does not leave the digester too early.

ANNEX B -Typical AD plant components

B1 The configuration of an AD plant depends upon a range of factors including the specific AD process to be adopted; the input feedstock; and how the resultant biogas will be used. In the case of farm AD, storage tanks and vessels should meet the requirements of the The Silage, Slurry and Agricultural Fuel Oil (SSAFO) Regulations. The main components of a typical 'wet' AD system (the most common system in the UK and Ireland) are:

- **Feedstock storage:** This will vary from one feedstock to another. Liquid inputs will usually be stored in tanks. Solid feedstock (including energy crops such as silage) will typically be stored in agricultural style 'silage clamps' or silos.

- **Pre-treatment plant:** Liquid feedstock is pumped from its storage tank. Solid feedstock is typically introduced via a hopper/auger and may also receive pre-treatment in a macerator. Mixing of liquid and solid feedstocks will take place and the resultant slurry is usually introduced to the digester through one or more inlet pipes. Water or recycled liquid from the digester may need to be added to the new feedstock in this pre-treatment stage but this should all happen in sealed conditions. For plants that accept municipal waste (including animal by-products) pasteurisation pre-treatment is also necessary.

- **Digester(s):** A sealed, thermally insulated, gas tight tank where feedstock is broken down in the absence of oxygen. Tank designs can vary considerably and may be constructed from reinforced concrete; steel; plastic; or some other material. Vessels may be sited above or below ground depending upon requirements. Tank size can vary considerably depending upon technology type, the volume of feedstock throughput, and the temperature and retention time of the particular system. Depending upon the biological processes to be used, the contents of the digester are maintained at constant temperature and so require heating using a heat exchanger system. The content of the digester is continuously agitated by mechanical stirring or gas recirculation to optimise the AD process. Many AD systems incorporate primary and secondary digester tanks while larger systems incorporate multiple digester tanks.

- **Digestate store:** The AD process does not significantly reduce the volume of the input feedstock. A tank or lagoon is therefore required to store the resultant digestate prior to their disposal / distribution. In the case of farm based AD the provisions of the Nitrates Action Programme Regulations will apply. A tank capable of storing at least 6 months output of digestate is usually required in order to ensure that digestate can be spread under appropriate conditions. In the case of farm-based AD the digestate is considerably less odorous that the input slurry.

- **Gas holder:** Biogas storage is needed to provide a buffer to compensate for fluctuations in the production and consumption of biogas as well as temperature-related changes in volume of gas. The storage vessel may be integrated into the digester vessel so that the gas is collected at the top of the tank. This is usually by way of a steel 'floating roof' on top of the digester vessel itself. Storage may also take place in a separate concrete tank with a steel fabricated floating bell. Biogas can also be stored in a flexible membrane gas holder in the shape of a half sphere.

- **Gas Flare Stack:** The gas flare stack is only required under abnormal operating conditions when excess biogas, which cannot be utilised by the CHP plant, is flared to prevent over-pressurisation of the system. The size of the flare stack varies according to the scale of the AD plant.