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Briefing Paper

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Anaerobic Digestion in Northern Ireland – an overview

RalSe

This paper provides a broad overview of some of the Anaerobic Digestion development challenges and opportunities in Northern Ireland

Contents

Key Points

- Anaerobic Digestion (AD) converts organic materials – including slurries, manures, crops, and food waste – into biogas and nutrient-rich digestate, offering circular-economy benefits.
- Data on AD deployment in Northern Ireland is limited. There is no central, public dataset that quantifies the number of AD plants currently operating in the region with recent estimates ranging between 60 and 132 active AD sites over the last five years.
- Regulation is complex, involving multiple bodies and requirements across permitting, nutrient rules, planning, and ammonia guidance.
- Environmental risks include nutrient pollution, ammonia emissions, odour, digestate storage failures, and impacts on protected habitats.
- Planning for AD is challenging – often lengthy and technically complex, requiring multiple assessments.
- Economic viability, especially for farm-scale AD, remains uncertain due to cost, performance, and market factors.
- AD offers emissions reduction opportunities including methane capture and fossil-fuel displacement.
- Digestate can replace artificial fertilisers and produce value-added products, but careful management is required.
- AD can enhance farm resilience by reducing slurry volume, generating energy, and lowering fertiliser costs.
- Digestate storage poses risks, with UK-wide pollution incidents highlighting infrastructure vulnerabilities.
- High capital costs are a barrier: no dedicated AD capital grant scheme exists currently.
- DAERA's SULS programme is investing £12m (2024–2028) in slurry separation, AD feedstock production and high-solids AD demonstrations.
- Biomethane remains significantly more expensive than natural gas, limiting market uptake without policy support.
- Barriers include planning delays, grid constraints, high costs, lack of heat incentives, and nutrient management limits.

- No single AD solution fits all needs – systems must be tailored to feedstocks, size, goals and constraints.

Context

This briefing paper has been competed in response to a request from the Agriculture, Environment and Rural Affairs (AERA) Committee to provide an overview of some of the challenges and opportunities for Anaerobic Digestion (AD) development in Northern Ireland.

The paper is indicative rather than definitive, and has been written to enable and inform the AERA Committee in their plans for a potential stakeholder event on AD. The paper provides a high level overview of some of the issues relating to AD in Northern Ireland today. It does not provide a comprehensive assessment of AD opportunities or challenges within Northern Ireland at present.

With this context in mind, the paper provides an overview of existing AD provision in Northern Ireland, Departmental responsibilities in relation to AD and a section providing a high-level thematic overview of challenges and opportunities around AD in Northern Ireland, complemented by the inclusion of links to more detailed information. It should be noted that opportunities and challenges presented within this should **not** be assumed to be mutually exclusive.

1 Background to AD – what is it?

Anaerobic digestion involves the bacteriological breakdown of organic matter to produce biogas and digested effluent (digestate). Feedstocks for anaerobic digestion can include sewage, animal manures, agricultural crops, animal by-products, organic wastes from industry (mainly from food processing), and the organic portion of household waste. The biogas produced through this process can then be used to generate renewable energy in the form of either heat, electricity or as a fuel for gas powered vehicles or machinery.

As an accepted from of renewable energy anaerobic digestion is also carbon neutral.

It should be recognised that AD technologies are continuing to evolve and that there is significant ongoing research in this area worldwide. As such there can be considerable variation in the processes involved, raw materials used and outputs from systems.

2 Current AD provision in Northern Ireland.

Data on AD deployment in Northern Ireland is limited. There is no central, public dataset that quantifies the number of AD plants currently operating in the region. A range of estimates are available. These include estimates by:

- The Renewable Gas Forum Ireland, which estimated that there were 60 plants in operation in Northern Ireland[1].
- The Irish Farmers Journal, which estimated that there were 84 operational plants[2].

In addition, in answer to an Assembly Written Question on 15 December 2025, the Minster of Agriculture, Environment and Rural Affairs stated that 46 AD plants were authorised by the Northern Ireland Environment Agency. The Minister also noted that plants "that solely utilise green energy crops as feedstock do not require authorisation from DAERA"[3].

A previous RaISe Briefing Paper – Anaerobic Digestion in Northern Ireland (7 April 2021) found that there were 132 active AD Combined Heat and Power stations accredited under the Northern Ireland Renewable Obligation, and listed in Ofgem's Renewables and CHP register[4]. Please note: Ofgem's register is currently disabled due to "higher user activity than normal". As such it has not

[1] Renewable Gas Forum Ireland | Renewable Gas
[2] Anaerobic digestion: gearing up for phase two in Northern Ireland - Premium
[3] Questions Search Results
[4] Anaerobic Digestion in Northern Ireland

been possible to provide an update on the data included in the 2021 RaISe briefing[5].

3 Responsibilities and functions relating to AD in Northern Ireland

Table 1 below provides an overview of responsibilities and functions relating to the roll out and support of Anaerobic Digestion in Northern Ireland.

Table 1: AD responsibilities and functions

Body	Key Functions	Examples of key strategies/policy
DAERA/ NIEA	• Environmental protection and regulation e.g. water, air, species and habitats. • Environmental permitting e.g. Pollution Prevention Control Permits (large installations). • Waste management and licensing. • Statutory planning consultee /advice on risks to natural environment e.g. protected sites, species, environmental impacts assessments etc. • Development of environmental guidance for planning decisions e.g. air pollution and ammonia. • Development of Agricultural Policy including development of new Sustainable Agriculture Programme (SAP). • SAP includes a Sustainable Farming Investment Scheme that will provide capital funding – full details yet to emerge.	• Environmental Improvement Plan • Lough Neagh Action Plan • Draft Climate Action Plan • Revised Operational Protocol - ammonia • Draft Ammonia Strategy • Draft Nature Recovery Strategy • Draft Resources and Waste Management Strategy • Nutrients Action Programme • Sustainable Agriculture Programme
AFBI	• AFBI conducting ongoing research into AD at Hillsborough site. • AFBI focused on providing farmers and policy makers with scientific data to support sustainable food production. • Key AFBI themes in strategies and plans that would impact AD include decarbonising agriculture, nutrient and emission management and production efficiency.	• AFBI Science Strategy 2030 • AFBI Business Plan 2025-26 • AFBI Corporate Plan 2023-27

[5] Reports – RER – Ofgem

Body	Key Functions	Examples of key strategies/policy
Local Councils	• Development of Local development Plans and policy. • Planning decisions for small and major scale applications. • Assessments e.g. Habitats Regulation Assessments – conducted by the Shared Environmental Services (SES)	• SPPS and PPS 2 • PPS 18 guidance • LDPs (once fully adopted) • Natural Heritage Standing advice
DfE	• Setting energy policy and legislative direction. • Granting wayleaves for the installation or retention of gas pipelines. • Giving directions for the purpose of preserving gas supply. • Giving consent to the construction of LNG facilities. • Giving consent to the disposal or transfer of gas assets. • Designating pipelines for the purposes of the regulated common transmission tariff. • Prohibiting the use of or testing of a pipeline. • Holding inquiries in connection with the Gas (Northern Ireland) Order 1998 or the Energy (Northern Ireland) Order 2003.	• Northern Ireland Energy Strategy "Path to Net Zero Energy" • Decision on Fairer Grid Connection Costs • Final Scheme Design for a Renewable Electricity Support Scheme for Northern Ireland – Renewable Electricity Price Guarantee • Low carbon heat and energy efficiency workforce assessment: • Developing Biomethane Production Call for Evidence and Biomethane Call for Evidence Response Report
DfI	• Development of planning legislation and regional planning policy. • Planning decisions for Regionally Significant Development and called-in applications. • Called-in applications[6]. • DfI Rivers and DfI Roads statutory planning consultees.	• SPPS and PPS 2 • PPS 18 guidance • Natural Heritage Standing advice
Utility Regulator	• The regulator for gas and electricity in Northern Ireland.	• Utility Regulator (Support for Decarbonisation Preparation) Bill: Public Consultation Summary

[6]AQ answered 27 Jan 2026 AIMS Portal

4 Challenges: Environment and Planning

DAERA notes that AD facilities can affect natural heritage, including risks to water quality, biodiversity, and local ecosystems if not properly sited and regulated[7]. Therefore, AD development requires navigating a combination of planning, environmental permitting, and waste management regulations[8]. The following sections consider some of the challenges that AD development may face in this regard.

4.1 Environmental Regulation

While environmental regulation of development and activities may be necessary to ensure the sustainable use and protection of our natural heritage and assets, regulation may in fact create challenges for AD development. The following section considers some of these challenges such as pollution prevention requirements, waste management, and protection of biodiversity and habitats.

4.2 Pollution Control

AD installations may have to go through rigorous pollution prevention and control regimes in relation to air, water, sound and odour etc. pollution. This is regulated under the Industrial Emissions Directive and transposed under the Pollution Prevention and Control (Industrial Emissions Regulations) 2013 (as amended)[9]. These are implemented by both the NIEA and local councils, depending on the type and size of the facility. For example, larger more complex installations are dealt with by NIEA, with smaller ones by local councils[10].

For further information see DAERA Integrated Pollution Prevention and Control (IPPC) - guidance and application forms and Pollution prevention and control |

[7] DAERA [online] Anaerobic Digestion Facilities and DAERA (2021) Environmental Advice for Planning Energy generation – Anaerobic Digestion
[8] DAERA [online] Anaerobic Digestion Facilities
[9] NIEA (2025) Significant Water Issues Consultation (p.22) Significant Water Management Issues | Department of Agriculture, Environment and Rural Affairs
[10] NIEA (2013) Industrial emissions Directive Guidance for Part A installations and Part A mobile plant p.3 and DEFRA (2012) Environmental Permitting General Guidance Manual on Policy and Procedures for A2 and B Installations p.2

Belfast City Council licences and permits and NetRegs Pollution Prevention and Control (PPC) Permits in Northern Ireland.

4.3 Ammonia

A draft Ammonia Strategy was produced by DAERA and consulted on from January to March 2023. The challenge here is that NI appears to have the highest concentrations of ammonia compared to the rest of the UK and has a high level of protected sites (Special Protected Areas (SPAs), Special Areas of Conservation (SPAs) and Areas of Special Scientific Interest (ASSIs)) that exceed ammonia concentrations[11].

As NI's largest business sector, but 97% of ammonia emissions in NI come from the agriculture sector and over half of all nitrogen deposition in NI comes from local agriculture; mostly cattle (63%), then poultry, pigs and sheep[12].

With this in mind, the draft Strategy's main aims are to reduce:

- agricultural ammonia emissions by at least 30% from 2020 levels by 2030 and
- ammonia concentrations at 40% of protected sites (to below critical loads) by 2030.

To ensure sustainable development and protect the environment against excess ammonia, DAERA had developed an ammonia Operational Protocol (guidance) for local planning authorities and applicants around making decisions on certain livestock developments[13]. The OEP held an investigation around how DAERA's ammonia guidance breaches environmental law[14].

After a call for evidence from July to September 2023, the NIEA published a Revised Operational Protocol for assessing ammonia and air pollution impacts on the natural environment.

[11] DAERA Draft Ammonia Strategy (p.17) and Trends Report 2022: Trends in Critical Load and Critical Level exceedances in the UK (p.6, 61- 63)
[12] Ibid p.24
[13] DAERA [online] Ammonia emissions in Northern Ireland
[14] OEP (May 2023) OEP launches investigation into DAERA's advice on ammonia emissions

4.4 Waste Management

Under the Waste and Contaminated Land (Northern Ireland) Order 1997 and the Waste Management Licensing Regulations (Northern Ireland) 2003, any activity which involves the treatment, keeping or disposal of waste must be authorised by NIEA, meaning AD plants processing waste as part of its feedstock are required to obtain a Waste Management Licence (WML) from NIEA[15].

However, certain activities may be exempt provided they comply with requirements under Regulation 17 and Schedule 2 of the Waste Management Regulations 2003. This may include composting and storage of biodegradable waste (Paragraph 13) and storage of sludge[16] from waste water treatment plants (Paragraph 10b).

A WML will only be granted if planning permission has been granted[17]. During NIEA's 2019 review of AD plants, it was found that out of 68 operational facilities, 28 were either in the process of acquiring a WML or had not applied for one, and two plants were undergoing enforcement proceedings[18].

Confusion may exist around whether a feedstock and digestate is classed as a waste, or not, and is therefore subject to waste licensing. DAERA lists how certain digestate products may meet end of waste criteria/protocol requirements and may no longer face waste management controls. DAERA makes reference to UK Environment Agency guidance on digestate which details the types that may no longer be classed as a waste. For example:

> *…straw, other crop residues, riverine vegetation and spent growing media based on plant issues, such as compost derived from source-segregated biodegradable waste, peat and bark.*[19]

[15] RaISe (2021) Anaerobic Digestion in Northern Ireland p.9
[16] 'Sludge' means residual sludge from sewage plants treating domestic or urban waste waters and from other sewage plants treating waste waters of a composition similar to domestic and urban waste waters. See S.2 The Sludge (Use in Agriculture) Regulations (Northern Ireland) 1990
[17] DAERA [online] Waste management licensing
[18] NIAO report (2020), Generating electricity from renewable energy (p. 51)
[19] UK Environment Agency [online] Anaerobic digestate: resource framework - GOV.UK s.2.1

This perhaps demonstrates the complexities around understanding the waste regulation of feed stock and digestate from AD. It appears to depend on the type of feedstock used and whether all, or some, of the digestate/produce can be classed as a resource, waste, or combination of both.

While it could bring opportunities for new jobs and expertise etc., the uptake of AD could create problems in the form of costs for new technology, training of staff and lack of expertise. The draft Climate Action Plan (CAP) highlights that:

> *Businesses and organisations operating within the resource and waste sector will need to forge more collaborative, interconnected working relationships with specialists in other industries in order to complement the expanded skills set. From material and chemical engineers, product designers, producers and manufacturers, to data and IT consultants, working cross-industry will help the resource and waste sector to maximise its potential and successfully deliver on the major resource capture and decarbonisation plans being implemented at a policy level*.[20]

However, this may raise questions around how to facilitate and support the level of co-ordination identified by the CAP.

4.5 Nutrient Management

DAERA has a duty under the Water (Northern Ireland) Order 1999 to promote the conservation and cleanliness of water resources . In exercising its functions, the Department must have regard to:

- the needs of industry and agriculture;
- the protection of fisheries; the protection of public health;
- the preservation of amenity and the conservation of flora and fauna; and

[20] Draft Climate Action Plan 2023-2027.pdf p.149

- the conservation of geological or physiographical features of special interest and any feature of archaeological, historical, architectural or traditional interest[21].

NI's water environment is managed and protected by The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017. These require a catchment based approach through the production and implementation of River Basin Management Plans (RBMPs) every six years.

According to DAERA, Northern Ireland faces significant phosphorus pollution, largely from livestock slurry, also wastewater treatment works, septic tanks and industry[22]. AD plants that rely on slurry can contribute to nutrient surpluses unless digestate is carefully managed[23].

The Environmental Improvement Plan and Lough Neagh Action Plan introduce and support a number of measures to reduce phosphorus and nutrients in NI water bodies and soils.

The Nutrient Action Programme Regulations (Northern Ireland) 2019 are an integral part of RBMPs with the protection of water quality from pollution caused by agricultural nutrients. It sets requirements for AD digestates, including a fertilisation plan, spreading method (Low Emission Slurry Spreading Equipment), storage, record keeping, and compliance monitoring, to ensure the protection of waters against pollution caused by agricultural practices. Additionally, the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations (Northern Ireland) 2003 set minimum standards for the storage of farm slurry, including the design, construction and operation of said systems.

According to NIEA's Significant Water issues consultation Report (closes June 2026), the management of excess phosphorus is more of a main issue for rivers and lakes. While excess nitrogen is typically a major issue for groundwaters, estuaries and coastal waters. According to the Report, the ratios of nitrogen to

[21] The Water (Northern Ireland) Order 1999 (s.4)
[22] The Lough Neagh Report p.13 and RePhoKUs Report (Oct 2020) | Agri-Food and Biosciences Institute
[23] DAERA, DAERA awards third company £4million to advance Sustainable Utilisation of Livestock Slurry and The Brief NI DAERA Awards £4m for Northern Ireland's First High-Solids Anaerobic Digestion Facility

phosphorus in waterways may determine the type of algal bloom. This can also impact gravel habitats for fish and other dependent species[24].

According to DAERA, run-off contaminated with organic matter from AD facilities can lead to:

- increased biochemical oxygen demand of watercourses;
- nitrogen and phosphorus levels in excess of crop requirements in soil;
- nutrient leaching to watercourses and groundwater causing nutrient enrichment; and
- potential for increased mineral and metal content of soils.[25]

Contaminated run-off or water quality issues may occur when facilities are not managed in line with permitted conditions and good practice. Therefore, some industries/ activities may require an industrial consent for surface water discharge[26].

4.6 Biodiversity/Habitats

The Wildlife and Natural Environment Act (Northern Ireland) 2011 introduced a biodiversity duty on public bodies in Northern Ireland. It states that:

> *…it is the duty of every public body, in exercising any functions, to further the conservation of biodiversity so far as is consistent with the proper exercise of those functions.*

Regulation 43 of the Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 (as amended), requires that every public body, (including the granting of planning permission, Regulation 49) must consider the implications of a proposal, such as AD plants[27], on European designated sites, and therefore make appropriate assessments.

[24] NIEA (2025) Significant Water Issues Consultation (p.20) Significant Water Management Issues | Department of Agriculture, Environment and Rural Affairs.
[25] DAERA [online] Anaerobic Digestion Facilities
[26] NIEA (2025) Significant Water Issues Consultation (p.22) Significant Water Management Issues | Department of Agriculture, Environment and Rural Affairs
[27] DAERA Environmental Advice for Planning ENERGY GENERATION – ANAEROBIC DIGESTION (2021)

The Shared Environmental Service (SES) was set up in 2015, following the Review of Public Administration (RPA), to take over habitats regulations assessments (HRAs) from NIEA[28]. It was established to support councils across NI to carry out their HRAs for their planning functions.[29]

4.7 Planning Requirements

Planning for AD in NI is set out under the Planning Act (Northern Ireland) 2011 and the updated Strategic Planning Policy Statement for Northern Ireland, Edition 2 (SPPS). Planning Policy Statement 18: Renewable Energy has been cancelled and replaced by SPPS2. However, the guidance contained in Best Practice Guidance to PPS 18 - Renewable Energy will continue to have effect until DfI replaces or revises it[30]. Planning Policy Statement 2: Natural Heritage, provides the policy for making decisions on the impact of development proposals on natural heritage such as protected sites, biodiversity etc. This will be replaced once local councils have adopted their Plan Strategy as part of their Local Development Plans (LDPs)[31]. Councils are at different stages of the LDP process, with some having adopted their Plan Strategy, while others are in development[32].

Planning permission is predominately the preserve of local councils for small scale applications and DfI for Regionally Significant Development (RSD), or called-in applications[33].

Some small scale AD may fall under permitted development in relation to the *installation of domestic microgeneration equipment* under The Planning (General Permitted Development) Order (Northern Ireland) 2015 (Sch Part 7 Class D). This may include the erection, extension, alteration of a building/structure (such as a flue) on an agricultural unit for the generation of

[28] SES provides guidance and specialist support to allow councils to meet their statutory responsibilities under the habitats regulations
[29] NI Assembly (22 April 2023) Shared Environmental Service: Mid and East Antrim Borough Council Minutes Of Evidence Report
[30] DfI Strategic Planning Policy Statement for Northern Ireland, Edition 2 (SPPS) p.4
[31] DfI [online] Retained Planning Policy
[32] AQ Answered 27 Jan 2026 AIMS Portal
[33] DfI Department's Determination of Applications

energy from AD, or storage of digestate. This is provided (and not limited) to some of the following conditions:

- The area of agricultural land is over 0.5 hectares; works don't involve a dwelling; and is less than 75m from the principal group of farm buildings.
- The ground area is less than 500m^2 and height is less than 12m high (3m if close to an airport).
- The total capacity of the AD system doesn't exceed 200 Kilowatts of electricity or 285 Kilowatts of heat.
- The AD uses or stores feedstock produced on land within the agricultural unit.
- There isn't more than one AD system within the agricultural unit.

For more information refer to Schedule: Part 7agricultural buildings and operations (Class D)

AD plants may also be required to undertake an Environmental Impact Assessment if they are over specified thresholds and criteria under the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 (schedules 2.3 and/or 2.11).

As a statutory consultee (as well as others listed under Schedule 3 of the Planning (General Development Procedure) (Amendment) Order (Northern Ireland) 2016), NIEA/DAERA provides advice on planning applications and consultations impacting designated sites, protected species and habitats, environmental impacts assessments etc.[34]. For further information on statutory consultees e.g. DfI Roads and Rivers, DfC Historic Environment Division, DAERA, NI Water, NIHE see: DfI Planning guidance from statutory consultees for developers

Due to the potential environmental impacts of AD, a list of complex reports/assessments may be required to accompany a planning application. Some of these may include[35]:

[34] DAERA [online] When is NIEA consulted? and DAERA [online] Consultation procedure and Article 13 and Sch3 of The Planning GDPO (2015) as amended
[35] DAERA [online] Anaerobic Digestion Facilities

- Feedstock details including: type, source(s) with European Waste Code, arrangements for delivery, storage and transfer to digester.
- Full Drainage Plan (showing the provision of all dirty water/slurry tanks).
- Air Impact Assessments e.g. screening tools (ammonia, odour, dust emissions) detailed Air Dispersion Modelling (ammonia, odour, dust emissions).
- Nutrient Management Plan / Waste (digestate) Storage and Disposal Plan / evidence of export certificates etc.
- Pollution Prevention Measures e.g. outline construction management plan.
- Odour Management Plan (A requirement of the permitting process where a proposal will be subject to separate environmental permitting, such as a PPC permit).

For further information on the key documentation that may be required by DAERA for consultation on planning applications, see Required Documentation | Department of Agriculture, Environment and Rural Affairs.

As well as the complex environmental and planning regulation process, community concerns about odour, traffic, landscape impact, and environmental risks, can add further delay and challenges to planning applications. Planning opposition to AD in NI has tended to be focused on larger AD facilities that are in close proximity to residential areas. Some examples of opposition to AD in NI are provided in the RaISe paper Anaerobic Digestion in Northern Ireland 2021 (NIAR 82-21).

5 Opportunities: Environment

5.1 Greenhouse Gas (GHG) Reduction

The Climate Change Act 2022 requires net zero by 2050 and for the reduction of methane by 46% by 2050.

AD is a means of capturing methane that escapes from slurry, food waste, or other organic materials. Methane is a potent GHG as discussed in RaISe paper NIAR 175-21. Along with carbon dioxide, it is a constituent of biogas. According

to the CAP, converting biogas to biomethane, not only helps to reduce emissions by displacing the use of fossil fuels, but can provide further benefits by way of carbon capture[36].

This form of GHG emission mitigation and methane capture may be used as credits for carbon trading by businesses under the UK ETS[37].

The draft Climate Action Plan explains that DFE has plans for biomethane and hydrogen strategies for the development of policy and legislative requirements. However, it is currently unknown how many renewable gas planned projects would be completed within the carbon budget period[38].

5.2 Waste utilisation and pollution reduction

Dealing with waste from agricultural practices may present problems in relation to water pollution, greenhouse gas emissions and land use. However, according to work from QUB, AD provides an opportunity of dealing with agricultural waste in a sustainable way by transforming waste into renewable energy in the form of biogas, acting as a circular economy[39]. However, this work focuses on insights from China and across Europe, which may not be directly comparable to the specific circumstances in NI.

The Draft Resources and Waste Management Strategy (January 2016) states:

> *…there are opportunities to make waste products and surplus nutrients from agri-food production part of Northern Ireland's decarbonisation journey. Biogas from anaerobic digestion (AD) plants is already contributing and there is more potential in the sector, particularly as AD moves to adopt direct gas-to-grid technology.*[40]

[36] DAERA Draft Climate Action Plan 2023-2027.pdf p.96, 106, 115
[37] ibid
[38] Draft Climate Action Plan 2023-2027.pdf p.97
[39] Alengebawy, A., Ran, Y., Osman, A. I., Jin, K., Samer, M., & Ai, P. (2024). Anaerobic digestion of agricultural waste for biogas production and sustainable bioenergy recovery: a review. Environmental Chemistry Letters.
[40] DAERA (Jan 2026) Draft Rethinking our Resources: NI Resource and Waste Management Strategy (p.45)

The potential for the reduction of phosphorus pollution from slurry has been recognised by DAERA through the funding of NI's first High-Solids AD facility, under the SULs project[41].

AD also produces a nutrient-rich digestate which may be used as an organic fertiliser, improving soil fertility and decreasing reliance on synthetic fertilisers[42]. AFBI explains how the nitrogen in digestate is more readily available as a plant nutrient, compared to undigested slurry[43]. That being said, research explains that if improperly applied, digestate can harm plant growth and soil, and can have sustainable disposal problems due to its chemical composition. This illustrates that digestate use can be complex, requiring comprehensive management strategies[44].

According to the draft Climate Action Plan (CAP), AD may lead to a reduction in the amount of residual and biodegradable waste going to landfill. And as a result, a decreased cost to waste operators while reducing the associated greenhouse gas emissions.[45]

AD may provide a controlled way of processing food waste, reducing the amount that goes to landfill. According to the CAP, there will be benefits to water management companies who bear the cost of food waste disposal into the public sewer network. This can cause blockages, with potentially fewer sewer blockages. There is a massively decreased risk of sewer blockages, flooding, pollution, odours and infestations occurring with a ban on disposing food waste this way.[46]

According to AFBI, AD can lower the odour from farm slurries by up to 80%.[47]

[41] DAERA [online] DAERA awards third company £4million to advance Sustainable Utilisation of Livestock Slurry
[42] Alengebawy, A., Ran, Y., Osman, A. I., Jin, K., Samer, M., & Ai, P. (2024). Anaerobic digestion of agricultural waste for biogas production and sustainable bioenergy recovery: a review. Environmental Chemistry Letters
[43] AFBI 1 - Benefits of Anaerobic Digestion | Agri-Food and Biosciences Institute
[44] B. Lamolinara, and A. Pérez-Martínez et al, Anaerobic digestate management, environmental impacts, and techno-economic challenges, Waste Management, Volume 140, 2022, Pages 14-30,
[45] Draft Climate Action Plan 2023-2027.pdf
[46] Draft Climate Action Plan 2023-2027.pdf p.149
[47] 1 - Benefits of Anaerobic Digestion | Agri-Food and Biosciences Institute

6 AD in agriculture – opportunities and challenges

Agriculture in Northern Ireland is dominated by the farming of livestock and the management of animal slurries and wider waste associated with the production of food continue to present challenges for local farmers. These challenges are undoubtedly compounded by the responsibilities farmers have in relation to environmental protection and enhancement.

More positively, Northern Ireland's predominantly livestock based agriculture could provide opportunities for Northern Ireland to address up to 80%[48] of the total gas distribution network demand through the use of biomethane generated by AD systems.

6.1 Farm income/cost reduction

The issues of farm income volatility have been prominent in recent years and due to factors including war in Ukraine, extreme weather events at a global and more local level and the COVID-19 pandemic.

Impacts on farm income from these events can either come from a direct change to the market price for an agricultural product or a change in the price of a commodity central to production.

Within this context, any technology which either presents the opportunity to generate income or reduce production costs will be attractive to many farm businesses.

There are numerous examples of farms having utilised AD technology with the aim of either income generation or cost reduction including:

- **Small scale combined heat and power systems** – these convert biogas created by AD into electricity and heat which can be either used on farm or sold into grid. Numerous examples operating including at the AFBI site in Hillsborough.

[48] https://www.agriland.ie/farming-news/biomethane-volumes-in-n-i-much-greater-than-estimated/

- **Conversion of AD generated biogas into biomethane to power farm machinery**. New Holland T7.270 Methane Power tractor as an example. Opportunity for energy independence on farm and removal of fuel price volatility.
- **Conversion of AD generated biogas into biomethane for injection into the natural gas network.** Operational system at Granville Eco Park site in Dungannon since November 2023[49], using biomethane derived from a food waste powered AD system.

In addition to the previous uses the actual digestate resulting from completion of the AD process is nutrient rich and can be utilised in a number of ways including:

- As a spreadable fertiliser either on farm (providing metal levels are within tolerance), reducing reliance on expensive chemical fertilisers, or can be sold on to others as a means of generating income.
- Conversion by heating at high temperature into biochar[50] which can be used to sequester carbon and condition soil. AFBI has also undertaken research into the potential of using pelletised biochar as a fuel source in power stations[51].
- Compost.
- Derived into bio-based chemicals and products such as bioplastics, biosurfactants, biofuel, biopesticides, and enzymes that have diverse commercial uses[52].

It should be noted that the price of these products derived from digestate can vary and as such it is not possible to make a full assessment as to the level of income these products could provide on farm. See section 8.1.2 for further detail.

[49] Bio Capital Announces Historic First Renewable Gas Injection for NI , Press release, 21 November 2023
[50] Gamaralalage, D., Rodgers, S., Gill, A., Meredith, W., Bott, T., West, H., Alce, J., Snape, C., & McKechnie, J. (2025). Biowaste to biochar: A techno-economic and life cycle assessment of biochar production from food-waste digestate and its agricultural field application. Biochar, 7, Article 50.
[51] The benefits of slurry separation according to AFBI, Agriland website, 14 February 2024
[52] Nayak, J.K. & Ranade, V.V., 2025. Valorisation of digestate: Characteristics, products, processes and potential. Chemical Engineering Journal Advances, 24, 100887

In summary, AD use on farm offers the potential opportunity to reduce price volatility around some key farm inputs such as energy and fertiliser whilst also generating income through valorising outputs from the system. Variables such as the costs of energy and chemical fertiliser will mean that the scale of the on farm AD benefits may vary however.

According to AFBI, '..At present information on the performance and economics of on-farm AD in Northern Ireland are unknown[53]'. Due to the many, as yet unknowns, wide scale adoption of on-farm AD within Northern Ireland cannot yet be recommended. An on-farm AD will be installed at AFBI, Hillsborough as part of the AFBI Renewable Energy Centre. The feasibility and precise requirements for on-farm AD in Northern Ireland will be determined by research work with this digester. Because the on-farm digester at Hillsborough will be used for research, the specification of the system will include technologies that may or may not be required at farm level. 4 - Conclusions on Anaerobic Digestion | Agri-Food and Biosciences Institute.

6.2 On farm storage – slurry and AD digestate

Recent media coverage has highlighted the challenges of slurry storage capacity in a wet climate. The winter of 2025 and 2026 in Northern Ireland has been marked by a high level of rainfall, associated flooding and waterlogged soils.

Within this context, the local agricultural industry, with its primary focus on intensive livestock, has faced considerable pressures around the storage of animal slurries. The Nutrient Action Programme Regulations[54] which apply in Northern Ireland, prohibit the spreading of slurry between 15 October and 31 January, and slurry spreading is also not permitted in instances including where the soil is waterlogged, land is flooded or likely to flood or when there is heavy rain or heavy rain forecast within 48 hours.

[53] Anaerobic digestion webpage, AFBI website, 16 March 2026
[54] The Nutrient Action Programme Regulations (Northern Ireland) 2019

In circumstance such as these AD and associated processes can provide benefits for farmers concerned about slurry tanks which are close to full but from which slurry cannot be spread.

Firstly, directly feeding slurry into an AD system from a slurry tank will automatically reduce the volume of slurry in the tank. Secondly, techniques such as slurry separation (like that being undertaken by the DAERA-supported SULS projects) will reduce the volume of slurry by removing solids for utilisation in an AD system which does not even need to be on the same farm.

Whilst these are positive interventions, there can however be challenges around the storage of digestate produced by AD systems on farm. As already highlighted, digestate produced by AD systems will be in liquid and solid form. Storage and containment of liquid digestate needs to be appropriate due to the environmental risks it can pose

There have been numerous pollution incidents directly related to AD digestate, with the UK Environment Agency publishing a review of environmental incidents at AD plants in GB between 2010 and 2018[55], and a number of these were related to digestate storage failures. The impacts of liquid digestate entering a watercourse are well established, with a local example on the Muff River near Eglinton causing the death of more than 2,000 fish in November 2023[56].

Whilst solid digestate can be theoretically easier to store and utilise, it can contain high concentrations of toxic metals, depending on the feedstock used in the AD system. In such circumstances there can be challenges in how to store/utilise or process the solid digestate in a way that minimises risks of land contamination.

6.3 Access to capital/funding

[55] A Review of Environmental Incidents at Anaerobic Digestion (AD) Plants and Associated Sites between 2010 and 2018, Environment Agency, 2019

[56] Loughs Agency secures conviction following major Muff River fish kill, Loughs Agency website, 12 March 2026

A key challenge for any farms wishing to adopt AD technology is the initial capital required to establish systems and the ongoing operational and maintenance costs.

The actual process of costing AD is complex as there are so many external variables that can impact upon how long any installation takes to pay for itself such as the cost of electricity and cost of potential feedstocks for example. AFBI research in this area highlights the fact that costs can vary due to the scale and nature of AD system. Data[57] from AFBI reveals that:

> *…capital cost for a 175m^3 mesophilic digester and CHP required for 100 dairy cows indicated could be in the order of £1,250 per cow. This cost excludes any civil works, additional digestate storage tanks, pre-treatment and post treatment technologies.*

If these figures are accurate this would mean that a typical AD installation for a 100 cow dairy herd would have a total cost of approximately £125,000, but as stated, this figure would not include all the elements required to make any such installation operational. In this context it seems fair to surmise that actual capital costs may well be higher for many installations.

A recent published example in the Farmers Weekly highlighted a recent AD plant installation in England for a 550 head Holstein dairy herd which cost £595,000 ex VAT[58], equating to a cost of approximately £1,081 per cow.

Given the costs of adopting AD technology, farmers may well need access to either private capital, grant support or both. At present within Northern Ireland there is no farm specific grant support for meeting the capital costs of AD plant development. DAERA is currently in the process of rolling out the new Sustainable Agriculture Programme and an integral part of the Programme is the Sustainable Farming Investment Scheme (SFIS). Whilst the Scheme is yet to launch DAERA'S overview includes the following[59]:

[57] Potential performance of on-farm anaerobic digestion in Northern Ireland, AFBI website, 12 March 2026
[58] How slurry investment will slash dairy unit's energy bills, Farmers Weekly, 7 March 2026
[59] SAP New Schemes and Measures: Payment Schemes webpage, DAERA website, 12 March 2026

> *Support will focus on assisting the industry to meet net zero targets and improve air and water quality. The Sustainable Farming Investment Scheme will support the adoption of precision technology and equipment to reduce ammonia emissions, carbon emissions, and nutrient loss.*

A recent Assembly Question[60] to the DAERA Minister, Andrew Muir MLA, provided the following information in relation to both the roll out and areas of support under the SFIS:

> *I intend to open Sustainable Farming Investment Scheme as soon as possible, subject to necessary approvals and budget availability. My officials are working to finalise preparations, and information on the scheme will be available in due course at www.daera-ni.gov.uk/topics/sustainable-agriculture-programme .*
>
> *The application period is likely to run for 6 weeks. This will be confirmed in advance of the scheme opening, as part of a period of information and engagement to help farm businesses prepare for the scheme.*
>
> *It is planned that the scheme will include support for equipment and technology for farms to improve environmental performance and business efficiency, and will include options for the management of fruit, vegetables, crops, grassland and livestock, and for resource and slurry management, including Low Emission Slurry Spreading Equipment. The list of eligible items will be published when the scheme opens for applications.*

At the time of writing, whether AD systems or component parts of the same will be eligible for support under the SFIS, the overall size of the budget and the levels of support offered remain unclear.

6.4 From government pilot to mainstream?

[60] AQW 41338/22-27

DAERA's Sustainable Utilisation of Livestock Slurry (SULS) programme has been developed to help the agricultural sector in Northern Ireland to meet the challenges presented by livestock slurry.

To date the programme has been delivered through a series of innovation and demonstration projects through the Small Business Research Initiative (SBRI).

Phase 2 of the Programme which commenced in 2024, and is scheduled to conclude in October 2028, has seen DAERA award £12 million of funding to a number of projects including:

- **£4 million to BH Estates**[61] in Dundonald enabling them to manage excess phosphorus from livestock slurry and anaerobic digestate using large mobile slurry separators which they will put to work on farms and AD plants to produce feedstock for renewable energy and organo mineral fertiliser.
- **£4 million to The Centre for Competitiveness (C for C) and their LUCERNE**[62] programme. Using funded mobile slurry separators to produce feedstock for anaerobic digestion. Ultimately, the Mid Ulster Cluster wishes to build a 10MW biorefinery in the region which will produce biomethane, biofertiliser, low carbon cement and bricks from separated AD digestate in addition to biogenic CO2 and help to develop our circular bioeconomy whilst reducing nutrients in Lough Neagh and other catchment areas aiding improvement of water quality in our rivers, lakes and loughs.
- **£4 million to Natural World Products (NWP)**[63] focuses on the development of Northern Ireland's first high-solids anaerobic digestion (HSAD) facility, located at Glenside, Dunmurry.

[61] DAERA awards £4m to first successful Sustainable Utilisation of Livestock Slurry SBRI Phase 2 company, DAERA press release, 14 October 2024
[62] DAERA awards £4m to Mid Ulster based successful Sustainable Utilisation of Livestock Slurry SBRI Phase 2 company, DAERA press release, 28 October 2024
[63] DAERA awards £4m to project focused on sustainable use of slurry, Agriland website, 19 February 2025

Two of the Phase 2 SULS projects are indirectly linked to AD through the separation of slurry and production of feedstocks for AD, whilst the most recently awarded project, namely NWP, is a direct AD development.

Whilst these developments and the undoubted learning from them will be invaluable in AD development here, a key question remains in relation to what happens after 2028. Will all three projects be able to operate as they are without public money moving beyond 2028? In effect, will the market fund their ongoing operation or will public subsidy remain a key requirement? The answers to these questions could have wider implications for AD development in Northern Ireland moving forward.

6.5 No system does it all – very much a need for tailored approach

A key challenge and opportunity is that there is no one size fits all AD system for farms. The type of system adopted will need to be carefully considered based on a number of factors such as:

- What feedstocks are readily and reliably available;
- What development space is available to construct the system and associated infrastructure;
- What installation is likely to secure planning approval;
- How much capital or grant aid is available;
- What are the desired outputs from the system – heat, electricity, biomethane, digestate products or combinations of the same?

Within this context there is a clear need for tailored professional support and guidance to farmers considering the adoption of AD on their farm. A key question here is who is best placed to provide this advice within Northern Ireland. DAERA's new Sustainable Agriculture Programme (SAP) includes a Farming for Sustainability - Knowledge Transfer component and the College of Agriculture, Food and Rural Enterprise (CAFRE) is actively involved in

delivering this part of the SAP. Is there potential for this work by CAFRE staff to include specific tailored AD advice to individual farms?

7 Anaerobic Digestion – an energy perspective

The following subsections set out the responsibilities of key players in Northern Ireland's energy policy and regulatory system. It also provides an overview of key documents that influence anaerobic digestion (AD) from the perspective of Northern Ireland's energy policy.

7.1 Key players

Four governmental bodies have statutory roles within Northern Ireland's energy system. Those bodies are the Department for the Economy (DfE), the Utility Regulator (UR), the Consumer Council for Northern Ireland (CC) and the Competition and Markets Authority (CMA). Table 2 provides a summary of each body's roles and responsibilities.

It is worth noting that in addition to the UR functions set out in Table 2 below, the proposed "Utility Regulator (Support for Decarbonisation) Bill", if enacted post introduction and thereafter receiving Royal Assent, would provide the existing UR with additional powers to provide advice to the DfE in relation to its net zero policy.[64]

Table 2: Functions of the DfE, the UR, the CC and the CMA in relation to energy

Body	Electricity Functions
DfE	• setting energy policy and legislative direction • granting consent for the construction of generation stations with a capacity of 10MW and power lines over 20 Kilovolts • collecting statistical information from licence holders • appointing electrical inspectors to inspect and test aspects of the system

[64] Utility Regulator (Support for Decarbonisation Preparation) Bill | Department for the Economy

Body	Electricity Functions
	• granting wayleaves for the installation or retention of gas pipelines • giving directions for the purpose of preserving gas supply • giving consent to the construction of LNG facilities • giving consent to the disposal or transfer of gas assets • designating pipelines for the purposes of the regulated common transmission tariff • prohibiting the use of or testing of a pipeline • holding inquiries in connection with the Gas (Northern Ireland) Order 1998 or the Energy (Northern Ireland) Order 2003.
UR	• granting, monitoring, modifying and enforcing licences for generation, supply, transmission, and supply of electricity • regulating wholesale, network, and supply businesses. Including setting price controls for regulated business, including Power NI, SSE Airtricity Gas Supply (NI) Ltd, and Firmus energy (Supply) Ltd. • determining standards of overall performance of energy suppliers and, in relation to the efficient use of energy; • investigating and enforcing licence conditions and applicable legislation • promoting competition in markets • operating the Northern Ireland Sustainable Energy Programme. The UR also has statutory duties relating to the Climate Change Levy, the Northern Ireland Renewable Obligation and Renewable Guarantees of Origin Certificates.
CC	• carrying out investigations • providing and publishing advice and information • requesting information from the UR and energy companies
CMA	• investigating “competition prohibitions” • conducting market studies and investigations

Source: Compiled by RaISe (2026, links in table text)

In addition to the above, the following bodies have roles within the Northern Ireland electricity market:

- The System Operator for Northern Ireland (SONI) – the transmission system operator

- NIE Networks – the distributions system operator and owner of the transmission system
- The Single Electricity Market (SEM) Committee – the UR and the Republic of Ireland's Commission for Regulation of Utilities (CRU) jointly regulate the SEM.
- SEM Operator – SONI and EirGrid jointly operate the SEM.

The following bodies have roles within Northern Ireland's gas market:

- The Gas Market Operator – it operates the natural gas transmission market in Northern Ireland on behalf of the four gas transmission operators – GNI (United Kingdom), Premier Transmission Limited, Belfast Transmission Limited and West Transmission Limited.[65]

7.2 Key DfE strategies and policies – an overview

The following DfE strategies and policies influence Anaerobic Digestion direction in Northern Ireland:

- Northern Ireland Energy Strategy "Path to Net Zero Energy": published in December 2021, the strategy set out Northern Ireland's energy pathway until 2030. From the perspective of AD, one of the strategy's five key principles is to "replace fossil fuels with renewable energy". The strategy aims to phase out fossil fuels and to decarbonise "power, heat and transport". To achieve this the strategy proposed the development of support schemes for both renewable electricity generation and low carbon heat technologies. The development of these supports is considered in greater detail below.[66]
- Decision on Fairer Grid Connection Costs: in response to high grid connection costs, the DfE made consulted on changes to grid connection policy in January 2025. In its decision document (November 2025), the DfE set out its rationale for adopting the "full socialisation of reinforcement costs for electricity distribution network in connections" in

[65] GMO Northern Ireland (en-GB)
[66] Northern Ireland Energy Strategy "Path to Net Zero Energy"

Northern Ireland. The new connection regime would mean that while homes, business and generators would be required to pay for the own assets from the "point of connection to their connection point", "any distribution network costs is socialised", meaning it is paid for by all electricity consumers. The full socialisation of network reinforcement is subject to a "High-Cost Cap" of £1,000 per kVA for demand customers and £200/kW for generation customers.[67]

- Final Scheme Design for a Renewable Electricity Support Scheme for Northern Ireland – Renewable Electricity Price Guarantee: the DfE set out its final scheme design for renewable electricity support scheme – known as the Renewable Electricity Price Guarantee – in September 2025. The Scheme aims to promote renewable electricity development with a view to achieving the Climate Change Act 2022 statutory target of 80% renewable electricity consumption by 2030. REPG support will be awarded following an auction process. Support will be available to Solar PV, Onshore Wind and battery storage assets for 5MW or above. Legislation is required to deliver the REPG.[68]
- Low carbon heat and energy efficiency workforce assessment: in March 2025 the DfE published the results of research into the ability of Northern Ireland's supply chains to deliver more low carbon heating. From a biomethane production perspective, the research found that the workforce required to install biomethane fuelled heating was "not only considered to be sufficient, but in oversupply". This contrasted the report's finding on heat pumps, where the need for significant growth in installer numbers was identified.
- Developing Biomethane Production Call for Evidence and Biomethane Call for Evidence Response Report: on 16 April 2025, the DfE published its response to a May 2024 call for evidence on "Biomethane Production in Northern Ireland". The Response Report noted that future policy on

[67] Decision on Fairer Grid Connection Costs
[68] Final Scheme Design for a Renewable Electricity Support Scheme for Northern Ireland – Renewable Electricity Price Guarantee

biomethane production would give “careful consideration” to the following:

- The potential for setting specific Northern Ireland targets for biomethane production.
- The need for effective management of feedstocks and nutrients.
- The issue of AS plant size and what approach might best promote growth in Northern Ireland’s biomethane sector.
- Potential options for “an affordable mechanism to support the development of a sustainable biomethane sector”.
- Consideration of the economic regulation of the production of biomethane.
- Options for the certification of biomethane as a renewable gas in Northern Ireland.
- Policy options in respect of fair treatment of networks connection costs and the impacts on consumers.[69]

8 AD Opportunities and barriers – from an energy perspective

The following sub-sections rely on publications from the DfE and the International Energy Agency to provide an overview of some of the opportunities of and barrier to AD from an energy perspective.

8.1 Opportunities

8.1.1 Energy generation

As noted in section 7.2, above, the Climate Change Act 2022 introduced a statutory target of securing 80% renewable electricity consumption by 2030.[70] The Northern Ireland Energy Strategy contains an objective to:

[69] Biomethane Call for Evidence Response Report
[70] Northern Ireland Energy Strategy “Path to Net Zero Energy”

Replace high carbon heating sources with lower and zero carbon sources in households and businesses.[71]

And an objective to:

Support the transition to low and zero carbon fuels for vehicles.[72]

The DFE's Biomethane Call for Evidence highlighted the potential role AD could play in supporting all three targets. Currently, many of the AD plants operating in Northern Ireland were supported by the Northern Ireland Renewable Obligation Support Scheme for renewable electricity. As such, these plants tend to produce biogas for the purposes of electricity production to be used onsite or fed into Northern Ireland's electricity grid.[73] The Call for Evidence document and the subsequent Response Report identified further opportunities for biomethane production in Northern Ireland, including:

- **Biomethane in power production:** as noted above, many of the AD plants currently in operation in Northern Ireland were supported through the NIRO and, as consequence, are used to produce electricity. The latest DfE data on renewable energy shows that of the 4,073 gigawatt hours of renewable electricity generated in the 12 months up to December 2025, 20% of that was generated by biomass and biogas, with a further 1% from landfill gas. This compares to 72% from wind and 6% from solar.[74] The DfE's call for evidence response document argued that as the heat sector in Northern Ireland had not experienced similar levels of decarbonisation as the region's electricity sectors, there was a "logic in prioritising biomethane production for the decarbonisation of the gas network".[75]
- **Biomethane injection into the gas network:** due to its chemical similarity to natural gas, biomethane can be injected into the gas network to replace traditional natural gas. The DfE argued in its 2024 call for evidence that biomethane injection could:

[71] Northern Ireland Energy Strategy "Path to Net Zero Energy"
[72] Northern Ireland Energy Strategy "Path to Net Zero Eney"
[73] Call for Evidence - Developing Biomethane Production in Northern Ireland
[74] Electricity Consumption and Renewable Generation Statistics | Department for the Economy
[75] Call for Evidence - Developing Biomethane Production in Northern Ireland

…provide a sustainable decarbonised supply of heat for local communities, using existing infrastructure, with many of the advantages of natural gas (storage, flexibility, high-temperature heat) without the net carbon emissions.[76]

A 2022 Centre for Advanced Sustainable Energy (CASE) study found that the total potential for biomethane production from organic streams in Northern Ireland could provide up to 80% of current gas demand in the region.[77]

In November 2023 the first injection of locally produced biomethane took place in Dungannon. Northern Ireland's local gas companies have set a target of injecting 1.5 terawatt hours (TWh) of biomethane into the gas network annually by 2030, equivalent to approximately 22% of gas distribution volumes in 2022.[78]

- **Compressed biomethane for transportation:** the DfE's calls for evidence noted that compressed biomethane can be used as a fuel for transport.[79] The International Energy Agency's 2020 outlook report on Biomethane and biogas noted that electrification and alternative fuels – such as bioethanol or biodiesel – are the "key vectors" for decarbonising the transport sector. That report argued that the case for using compressed biomethane was "strongest in transport segments where electrification is a more challenging prospect" such as long-haul road freight and shipping.[80]
- **Direct use of biomethane by industry:** the DfE's call for evidence noted that biomethane was "particularly suited to high temperature processes in energy intensive industries" and that large industrial users who currently use natural gas to fuel process heat" may be able to switch to biomethane.[81] A large minority of respondents (28% of all

[76] Call for Evidence - Developing Biomethane Production in Northern Ireland
[77] CASE-Summary-Report.pdf
[78] Call for Evidence - Developing Biomethane Production in Northern Ireland
[79] Call for Evidence - Developing Biomethane Production in Northern Ireland
[80] Outlook for biogas and biomethane: Prospects for organic growth – Analysis - IEA
[81] Developing Biomethane Production in Northern Ireland - Call for Evidence Response Report

respondents) to the call for evidence argued however that large energy users "would not be willing to pay a premium for biomethane".[82]

8.1.2 By-product market

The production of biomethane produces two main by-products: digestate and biogenic CO_2. Both have potential markets and could provide additional revenue streams to AD producers:

- Digestate can be used to produce biofertiliser. It has other applications in horticulture, landscaping, mushroom growing, construction material, ethanol production and fuel pellet production.
- Biogenic CO_2 can be used to produce e-fuel and can be used as a carbon-neutral source of CO_2 for food and drink manufacturers.[83]

In addition to the above, the waste heat from AD processes could be used to heat local buildings or industrial processes. Combined heat and power AD plants could be used to provide grid balancing services during periods of peak demand.[84]

In the 2020 report entitled "Outlook for biogas and biomethane: prospects for organic growth", the International Energy Agency (IEA) noted monetising the byproducts of biomethane production could increase the product's competitiveness.[85] The competitiveness of biomethane, relative to natural gas is explored more in sub-section 8.2.1 below.

8.2 Barriers

8.2.1 Cost of biomethane products

As noted above, relative to fossil fuels, AD and the production of biomethane presents opportunities for low-carbon electricity and heat production. At present,

[82] Developing Biomethane Production in Northern Ireland - Call for Evidence Response Report
[83] Developing Biomethane Production in Northern Ireland - Call for Evidence Response Report
[84] Developing Biomethane Production in Northern Ireland - Call for Evidence Response Report
[85] Sustainable supply potential and costs – Outlook for biogas and biomethane: Prospects for organic growth – Analysis - IEA

the biomethane produced through AD is estimated to be a higher priced fuel source than natural gas.

The DfE's 2024 Call for Evidence on Biomethane production included an estimate of the cost to consumers of biomethane and compared that estimate to the cost of natural gas. In said comparison, the unit price paid by consumers for natural gas was assumed to be 2.5 pence per kilowatt hour (p/kWh), based on approximate unit price per kWh in mid-December 2023. It is important to note the volatility of natural gas prices, which are dependent upon global events outside the control of policy makers in Northern Ireland. For example, the conflict between the United States/Israel and Iran saw United Kingdom Natural Gas Futures increased from 74.070 pence per therm (p/thm) on the 25 February 2026 to 140.65p/thm on 3 March 2025, before falling to 120.55p/thm on 10 March 2026.[86] That volatility influences the prices consumers pay for their natural gas.

The findings of the DfE's analysis on the likely price of biomethane derived from three feedstock types are presented in Table 3 below. That shows biomethane gas would need to be priced at between 7 to 12p/kWh (relative to 2.5p/kWh for natural gas) to ensure production costs recovery. Furthermore, Departmental analysis shows initial investment cost recovery in construction, as well as production over the life of the plant – also known as the "Levelised Cost of Energy", or LCOE, biomethane would need to be sold at between 14p/kWh and 21p/kWh, depending on feedstock.[87]

Table 3: Estimated cost of biomethane production by feedstock 2024[88]

Feedstock	Production costs (p/kWh)	LCOE (p/kWh)
Chicken litter	7.3	14
Municipal waste	12	21
Silage/Slurry mix	9.8	15

[86] UK Natural Gas - Price - Chart - Historical Data - News
[87] Call for Evidence - Developing Biomethane Production in Northern Ireland
[88] Call for Evidence - Developing Biomethane Production in Northern Ireland

Source: DfE (2024)

The price differential between natural gas and biomethane raises the question of whether consumers would pay a premium for biomethane over natural gas. Amongst respondents to the call for evidence, 44% thought that large energy users might be willing to pay such a premium. Conversely, 28% of respondents, including large energy users, argued that large energy users would not pay such a premium. Approximately 47% of respondents believed that domestic consumers would not pay a premium.[89]

When asked about how biomethane could be supported to increase its affordability, responses included:

- Recognising biomethane within the United Kingdom's Emission Trading Scheme.
- Introducing tax exemptions for biomethane supplies, for example removing Value Added Tax.
- Focusing on energy efficiency to reduce household gas usage.
- Taking action to reduce the costs of production, including:
    - Providing capital grants;
    - Introducing a support mechanism (see below for further details);
    - Encourage gas sale agreements to reduce producer risk;
    - Promote economies of scale in large-scale AD plants;
    - Requiring waste producers to pay for their waste to be processed by AD plants.[90]

8.2.2 Route to market:

Northern Ireland had previously supported renewable development in the electricity sector through the Northern Ireland Renewable Obligation (NIRO), and in the heating sector through the Renewable Heat Incentive (RHI). Both support schemes have been closed to new applicants for some time. The Non-

[89] Developing Biomethane Production in Northern Ireland - Call for Evidence Response Report
[90] Developing Biomethane Production in Northern Ireland - Call for Evidence Response Report

domestic RHI Scheme closed to new applicants in 2016.[91] The NIRO closed to new wind applicants in 2016 and all other applications in 2017.[92]

As noted, sub-section 8.1.1.2 above, the DfE is currently working on a REPG scheme that will support renewable electricity generation. According to the final scheme design published in September 2025, it will target large-scale onshore wind and solar PV generation.[93] With regard to smaller generation, the Minister for the Economy stated in 2024 that:

> *Further options for microgeneration support, including domestic renewable energy generation, will continue to be evaluated as part of our net zero ambitions.*[94]

The DfE's 2025 response to the Biomethane call for evidence noted that:

> *In seeking to develop the biomethane sector, there are a number of key issues to be addressed, including that the cost of producing biomethane means that the price which has to be charged for this renewable gas is significantly higher than that of natural gas. This means that it is unlikely that widespread, unsupported production of biomethane will be achieved by the market alone in its current model. While biomethane production is an established process in a number of European countries, it tends to be heavily subsidised. The challenge, therefore, is to develop a policy framework, and additional added value streams, which could support the biomethane sector to become economically viable without long-term subsidies.*[95]

The response document also noted that options for "an affordable mechanism to support the development of a sustainable biomethane sector" would be considered as part of any future biomethane policy development[96].

[91] Department for the Economy Response to the 2025 Non-Domestic RHI Scheme Closure Consultation
[92] Northern Ireland Renewables Obligation | Department for the Economy
[93] Final Scheme Design for a Renewable Electricity Support Scheme for Northern Ireland – Renewable Electricity Price Guarantee
[94] AIMS Portal
[95] Developing Biomethane Production in Northern Ireland - Call for Evidence Response Report
[96] Developing Biomethane Production in Northern Ireland - Call for Evidence Response Report

The DfE does not currently offer any support scheme for renewable heat. The Non-Domestic RHI closed to new applications in 2016. At the time of writing, the RHI (Closure of Non-Domestic Scheme) Bill – that is, legislation that would empower the DfE to introduce a final closure regime for the Non-domestic RHI Scheme has completed "Committee Stage" under the Northern Ireland Assembly Standing Orders – now awaits a date for "Consideration Stage".[97]

In evidence to the Committee for the Economy on 8 October 2025, the DfE noted that closure of the Non-Domestic RHI Scheme under the RHI (Closure of Non-Domestic Scheme) Bill, if enacted as introduced, would enable the Department to utilise Annual Managed Expenditure (AME) funding that currently is returned to the His Majesty's Treasury (HMT), and instead use it to fund a new Scheme that would promote renewable heat (distinct from the existing Non-Domestic RHI Scheme). That policy, if successfully delivered, could assist in implementing and therefore meeting its specified commitments under its current Energy Strategy[98] – that is, both to decarbonise Northern Ireland's heat sector and to contribute towards the net-zero emission statutory duty, as set out in Section 1 of the Climate Change Act (Northern Ireland) 2022.[99]

In that October 2025 Committee meeting, the DfE officials explained it is developing policy in that area but was not in a position to provide a definitive delivery date. Though they did confirm that a support scheme would "not be in place next year".[100]

8.2.3 Grid connection

Alongside route to market (see sub-section 8.2.2) and planning, grid connection has been highlighted as a barrier to renewable electricity development in Northern Ireland. For example, in 2023 the industry body Renewables Northern Ireland identified the following challenges in relation to electricity grid connections:

[97] RHI (Closure of Non-Domestic Scheme) Bill
[98] Department for the Economy The Path to Net Zero Energy. Safe. Affordable. Clean. (December 2021)
[99] s1 Climate Change Act (Northern Ireland) 2022
[100] Committee for the Economy Minutes Of Evidence Report (8 October 2025)

1. a lack of investment over the previous ten years had led to increased renewable energy placing increased pressure on the gird
2. constraint and curtailment issues were preventing viable renewable energy from being used to its full potential
3. a shortage of the skills needed to deliver grid development
4. an "evidence-based approach to investment" as opposed to an "anticipatory" approach had prevented "ahead of time" grid development
5. unlike Great Britain, where planning and grid applications take place concurrently, the requirement for planning permission to be secured prior to a grid application had resulted in "timeline issues" in Northern Ireland
6. prohibitive grid connection costs and timelines making renewable projects economically unviable.[101]

A number of policy documents have been produced to address the above barriers, including:

7. Decision on Fairer Grid Connection Costs: in response to high grid connection costs, the DfE made consulted on changes to grid connection policy in January 2025. In its decision document (November 2025), the DfE set out its rationale for adopting the "full socialisation of reinforcement costs for electricity distribution network in connections" in Northern Ireland.[102]

   Smart Meter Design Plan: in December 2022, the DfE completed a cost/benefit analysis of smart meters in Northern Ireland. A consultation on a Smart Meter Design Plan was completed in January 2025. A summary of consultation responses and a decision paper with a final plan was anticipated for Quarter 2 2025, but had not been published at the time of writing.
8. Smart Systems Flexibility Plan: **DfE** conducted a consultation on a Smart Systems Flexibility Plan between January and April 2024. The Report on the Energy Strategy Action Plan 2024 notes that the DfE was planning to carry out an analysis of responses in early 2025 "with a view to drafting a report mid-way through the year". At the time of writing this Paper, that

[101] Renewable Northern Ireland, Accelerating Renewables Report (September 2023)
[102] Decision on Fairer Grid Connection Costs

report was not published. Once published, it is to set out a "policy roadmap" for delivering a renewables-based electricity system". The consultation covers topics such as monitoring flexibility, consumer led flexibility and grid led flexibility (such as storage, interconnection and dispatchable renewable generation).

9. SONI – "Transmission Development Plan for Northern Ireland 2023 to 2032": The Development Plan sets out a £630 million investment project over ten years, which includes "several essential upgrades to the electricity network".[103]

[103] Transmission Development Plan for Northern Ireland | SONI