

ROADMAP FOR RENEWABLE GASES IN IRELAND



REGATRACE
Renewable Gas Trade Centre in Europe



Renewable Gas
Forum Ireland

This Roadmap is a working document that will be regularly reviewed and updated by RGFI as events unfold in the development of Ireland's biomethane industry.

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INTRODUCTION

REGATRACE

REGATRACE (REnewable GAs TRAdE Centre in Europe) project, started in June 2019. It aims to create an efficient trading system based on the issuing and trading of biomethane Guarantees of Origin (GoO) with exclusion of double sale. The European vision is that Ireland and other target countries, will be prepared to join the European biomethane/renewable gas trading system through the establishment of national, renewable gas GoO issuing bodies.

REGATRACE has supported the development of a long-term strategic Vision and Roadmap for biomethane in each target country, via a participative process. In Ireland this work has been led by the Renewable Gas Forum Ireland (RGFI), in collaboration with its members and other organisations. It has complemented wider RGFI activity in raising the profile of biomethane in Ireland, supporting industry collaborations to develop the related business case and liaising with government on the key asks in terms of policy, legislation and finance.

Ireland context

Ireland lags behind other EU countries in not having policy and legislation to support the establishment of an indigenous biomethane industry. This has meant that work to establish suitable market conditions and trading environment has been concurrent with the work of Renewable Gas Forum Ireland and industry consumers to develop the integrated business case, achieve stakeholder and government recognition of, and policy and legislative support for, biomethane, bio-fertiliser production and the Carbon Farming Initiative.

Ireland is particularly suited to growing sustainable agricultural feedstock to supply to AD in producing sustainable biomethane and bio-fertiliser. This is because because 80% of its land is pasturelands, with a strong agri-food and dairy industry, and ready availability of sustainable forage (silage) and animal slurry feedstock.

In 2020, 1,013 MWh of biomethane was injected into the grid at a demonstration central injection facility. The production capacity for biomethane increased to 4,972 MWh in 2021 and the projection for 2022 is approximately 21,285 MWh of biomethane produced and injected into the grid.

Recent research from the government agricultural research agency, Teagasc, and Devenish Nutrition, shows how a move to mixed species sward pastures can further improve the sustainability of renewable energy value and environmental benefits of the agricultural feedstock. It describes how approximately only 2% of land would be required and 735kHa of under-utilised permanent pasturelands is available, to grow sustainable agri feedstock to supply an indigenous and sustainable AD biomethane industry.

This is in line with the *Principles of Sustainability* and *Food First* within the National Policy Statement (NPS) on the Bioeconomy and the *Precautionary Principle* will be applied going forward. AD biomethane production can also support the *Cascading Principle* within the NPS as there is potential to consider grass biorefining to cascade the use of grass, complementing biomethane and bio-fertiliser production. This is also in line with the Communication from the European Commission on *Sustainable Carbon Cycles*. https://ec.europa.eu/clima/system/files/2021-12/com_2021_800_en_0.pdf.

CURRENT SITUATION

EU Raised Ambition for Renewable Gas Production

The European Commission announced in March 2022 that it will accelerate the roll-out of renewable gases in its plan to make Europe independent from Russian fossil fuels well before 2030, and to respond to rising energy prices, storage and security of supply. The target for biomethane production by 2030 will increase to 35 billion cubic metres (bcm) (350TWh), in particular from sustainable, agricultural, biodegradable materials.

Renewable Gas Forum Ireland (RGFI), as a board member of the European Biogas Association (EBA), advocating on behalf of gas consumers, has been lobbying for an increased ambition across Europe for many years. Talks intensified in early 2022, with EC and national government consultation, in view of the Russia / Ukraine crisis and concerns for energy security and pricing. The measures within the REPowerEU strategy and plan, could gradually displace at least 155 bcm of fossil gas use, which is equivalent to the volume imported from Russia in 2021. The Commission proposes to work with Member States to develop National Biomethane Plans and identify the most suitable projects to meet these objectives.

The Imperative to Decarbonise

Momentum is gathering in Ireland to embrace sustainable indigenous biomethane and bio-fertiliser production and use, to help meet decarbonisation targets in difficult to decarbonise sectors of thermal demand, agriculture and transport. This is happening within a new policy and legislative framework and with strong consumer demand and collaboration from manufacturing, processing (thermal demand) , sustainable food production and transport (heavy goods vehicles).

The legally binding framework is provided through Ireland's Climate Action Bill (*Climate Action and Low Carbon Development (Amendment) Bill 2021*), which also establishes carbon budgeting, structures and processes to support Ireland's transition to Net Zero by no later than 2050 and with a 55% reduction in GHG emissions by 2030.

The strong agri-food and beverages sector, in the form of a collaboration of some leading companies (Project Clover), has reached the conclusion that sustainable agricultural feedstock based, AD biomethane and bio-fertiliser production, is the only commercial, practical and technically feasible and viable way for industry to decarbonise its food production, and thermal demands for manufacturing and processes. It supports Carbon Farming utilising best practices in Monitoring, Reporting and Verification (MRV), aligned with the Paris Agreement and IPCC Guidelines.

Heavy Goods Vehicles (HGV) transport has been identified as the other main market for the economically viable use of biomethane to decarbonise the sector. In the last decade, the number of CNG/LNG trucks on the European road network has increased sharply and the first ships with gas engines have been developed.

Project Clover Feasibility Report has been informed by professional independent advisory services from KPMG and a series of comprehensive Reports since 2019, providing trusted, independent information and data, science based targets, full economic assessment and cost benefit analysis, in compliance with the Public Spending Code, and providing reliability and warranties.

Recent work has determined that, with appropriate Government policy and legislative supports, AD biomethane, utilising sustainable agricultural feedstock, has the potential to replace natural gas in a way that is technically feasible and commercially viable, with associated bio-fertiliser produced. This would have tremendous environmental and economic benefits in terms of reducing carbon emissions (c 700kt CO₂pa), capturing carbon in soil (carbon farming), and improving biodiversity, air and water quality (reducing nitrate run-off). The rising price of carbon continues strengthens the business case for AD biomethane as a central enabler to climate neutral farming.

This approach would provide farmers with a diverse, reliable income stream, through biomethane and bio-fertiliser production. It supports the development of a circular, rural bio-economy and the commercial

sustainability and competitiveness of the Irish food and drinks industry. It is projected to create 3,000 sustainable jobs across rural Ireland.

It aligns with the Paris Agreement, EU Green Deal, Farm to Fork Strategy, national agricultural and climate action strategies, and will be underpinned by an AD Charter to ensure the responsible delivery of environmental commitments.

This approach also supports the *NPS on the Bio-economy* and carbon neutral farming.

There is a national requirement to recycle carbon from biodegradable materials, from sustainable sources of biomass or directly from the atmosphere, and to use it to replace fossil carbon. Innovative technology solutions for carbon capture, storage, use and the production of sustainable advanced biofuels or other non-fossil based carbon products should be promoted within the circular bio-economy.

It is acknowledged that there is a need to accelerate scalable carbon removal solutions that capture CO₂ from the atmosphere and store it for the long term, either in ecosystems through natural protection and carbon farming solutions or in other storage forms through industrial solutions. This must be achieved while ensuring no negative impact on biodiversity or ecosystems, in line with the *Precautionary* and *Do No Significant Harm* principles. The development and deployment at scale of carbon removal solutions is indispensable to climate neutrality and requires significant targeted support in the next decade.

Climate Action Plan

The Government of Ireland *Climate Action Plan*, published in October 2021, recognised and acknowledged biomethane as a zero emissions gas for the first time. This reflects evidence from the RGFI commissioned KPMG *Integrated Business Case for Biomethane Production 2019*, the Project Clover industry-led collaboration and ambition for 2.5TWH of biomethane production by 2030 and the REI *40by30* that informs the draft *National Heat Study*, along with the GNI commissioned KPMG/Devenish *Sustainable Feedstock Report 2021*.

Within the Climate Action Plan 2021, biomethane is recognised within “zero emissions gases” to be “directed towards hard to abate sectors”.

Biomethane is ready to be implemented now, subject to necessary Government policy and legislative supports, and capital funding to meet targets to 2030. Green hydrogen technology is still in early stage development and has a future potential role in an Integrated Energy System that is designed and structured to decarbonise the economy by 2050.

On-going collaboration

The Renewable Gas Forum Ireland (RGFI) and sectoral representations with collaborations from industry participants and members in the hard to decarbonise sectors continue to liaise with government departments, state agencies, key stakeholders, communities and farming representatives, to gather momentum for change.

As part of the REGATRACE Project, RGFI hosted three participatory workshops in June, July and December 2021 which placed the work being done in Ireland within the European context and developed a focus for the shared vision and this Roadmap. The fourth REGATRACE event, in June 2022, marked the culmination of the project in Ireland.

ROADMAP / PATHWAY MEDIUM TERM TO 2030

The Shared Vision

A vision for the renewable gas industry in Ireland has emerged from extensive consultations and collaborative work led by RGFI, through industry partnership, and as part of the REGATRACE EU project, to create an integrated business case, sustainable agriculture feedstock, standardised cross border trading platform for biomethane and Guarantees of Origin, with a common set of key attributes and market demand for sustainable biomethane and other renewable gases in Europe.

The focus out to 2030 is on using sustainable agricultural feedstock for AD biomethane and bio-fertilisers to help decarbonise industrial thermal demand, transport (HGVs) and agriculture.

The vision is for a consumer-led collaboration, scalable, with a renewable gas biomethane industry that incorporates the socio economic benefits, environmentally responsible production, end use of biomethane and its role in the circular bio-economy:

- *decarbonising difficult to decarbonise sectors ie the thermal demands of industry, and agriculture;*
- *supporting sustainable, diverse, profitable agriculture and the circular rural bioeconomy and its principles;*
- *supporting sustainable transport, especially decarbonising HGV fuel demand;*
- *aligned with EU and National sustainability and climate action policies;*
- *with Green Gas Certification in place;*
- underpinned by AD Charter (setting out environmental protection and nature positive measures - under development)

The *Climate Action Bill* stipulates a 55% reduction in Ireland's carbon emissions by the end of the decade. Since April 2021, Ireland is legally bound to reduce its emissions (carbon footprint) and the Programme for Government sets out a 7 % per year reduction in emissions per annum in order to achieve 2030 target.

The Potential for Decarbonisation

A core measure in the Climate Action Plan is to work with the agriculture and waste sector, to contribute sustainable agricultural feedstocks in the production of 1.6 TWh per annum of indigenous, sustainably produced biomethane, for injection into the gas grid by 2030, representing about 3 % of natural gas supply. Section 16.3.2 of the Plan states that this will abate c. 0.1-0.2 MtCO₂eq per annum for the agriculture sector, and will displace 0.4 MtCO₂eq per annum for the energy sector. (Note the higher level of ambition of the industry led collaboration described below.)

The principle of cascading use should be applied to ensure that production is in line with the National Bioeconomy policy. There is an opportunity to examine biorefining (separation and conversion technologies) alongside AD biomethane, biofertilisers and Carbon Farming Initiatives.

Industrial gas consumers have welcomed the Climate Action Plan's commitment to pursue opportunities for the production and increasing levels of biomethane above 1.6 TWh, building on the output of the forthcoming National Heat Study and Land Use Review. Industrial gas consumers, under Project Clover, have an ambition to develop at least 125 x 20GWh AD plants by 2030 generating a minimum of 2.5TWh of biomethane per annum, representing 15% of industrial and commercial gas usage.

The 2.5 TWh ambition, displacing c.700kt CO₂ per annum, is supported by a number of KPMG reports commissioned by RGFI, Project Clover, with input from Devenish Nutrition, GNI and Teagasc. They have confirmed that 125 agri-based AD biomethane plants and bio-fertiliser production, using sustainable agricultural feedstock from mixed species swards, grass silage, sequential cropping, crop residues and management of animal slurry, is practical, technically, commercially and environmentally feasible and sustainable.

Irish agri-food sector needs in relation to alternative protein sources for food and feed should be considered and pursued via the national asset base of AD biomethane plants.

However, in the first instance industry will focus on developing a number of 20MW plants that can be used to develop proof of concept in relation to commercialising biofertilisers (digestate) and soil carbon sequestration as part of Carbon Farming Initiative, along with grass biorefining and the cascading use of grass.

Infrastructure and Certification

The Irish gas network, owned and operated by Gas Networks Ireland (GNI), is one of the most modern in Europe. Small volumes of biomethane is already directly injected into the distribution grid at a demonstration injection facility at Cush, Co. Kildare and GNI propose to develop Central Grid Injection (CGI) facility on the transmission grid at Mitchelstown to accommodate direct grid injection and commercial scale biomethane production. An economical and competitive viable alternative for the off grid production of biomethane is road transportation to a CGI and can be considered for AD biomethane facilities within a 80Km radius. The principle of “Clustering” of AD biomethane plants will help with standardisation and competitiveness in procurement for CAPEX and OPEX, to reduce overall capital and operational costs.

Ireland already has a blue print Green Gas Certification Scheme designed by Dena and DBFZ, in collaboration with RGFI and GNI, and Renewable Gas Registry, implemented and operated GNI. Its blueprint was developed in 2018 by the German agencies DENA and DBFZ, co-ordinated by the International Energy Research Centre and commissioned by RGFI and GNI, as joint licensees of the scheme. The Scheme will facilitate and support the sustainable biomethane produced in Ireland, complies with the sustainability criteria set out in the Renewable Energy Directive II, and is in line with best practice, fully transparent and accountable, with verification by accredited bodies such as ISCC or RedCert, who are recognised and approved by Global and EU Commission carbon accounting principles. It provides confidence, certainty and assurances to gas consumers, in validating and verifying, in a fully accountable and transparent manner, that biomethane is sustainably produced.

Support and Policy

With 2030 as a key milestone, there is a clear understanding within the Climate Action Plan 2021 that the groundwork for deployment of AD biomethane needs to begin now to ensure an economic, steady, resilient, and reliable supply. The required measures involve policy, legislation, capital funding and ongoing improvements to drive competitiveness and efficiencies and research into innovative technologies.

Agri-food industry consumers of gas are demanding a switch from natural gas to biomethane to decarbonise their thermal demand for manufacturing and processing and help decarbonise their supply chain in utilising and commercialising biofertilisers. The Project Clover industry led collaboration have stated their commitment to work closely with farmer producers, developers, and key stakeholders to establish a network of national AD biomethane plants utilising sustainable agricultural feedstock, and management of animal slurry. The proposal is to develop a number of AD plants that would pilot the use of sustainable forage such as multi species swards and animal slurries and develop the commercial proposition for bio-fertiliser production and carbon farming using MRV for net gain with soil carbon sequestration. Project Clover would also be central to the development of a related charter underpinning biomethane and bio-fertiliser production with environmental and social sustainability principles.

The key new policy required is the implementation of *Article 23 RED II*, which would see the introduction of a Renewable Heat Obligation scheme to socialise the cost of biomethane production. RGFI / Project Clover

industry led collaboration members have been very proactive in urging government to introduce an RHO as early as possible and welcomed the opportunity for public consultation in October 2021 and the inclusion of the RHO within the Climate Action Plan 2021. A Government announcement on the RHO is expected in 2022 and further liaison with industry as a next step is required for implementation in 2023.

Capital funding supports are necessary to establish the sustainable agricultural feedstock AD plants and the *Climate Action Plan 2021* presents a number of potential options for capital funding that could be applied, targeted at helping industry to decarbonise, and supporting sustainable, regenerative agricultural practice.

Research and Knowledge Transfer

Research funding is required to develop and implement the full potential of bio-fertilisers and pursue the opportunities for carbon farming under the MRV principles and measuring the net gain of carbon in the soil, an appropriate most economically beneficial structure to be pursued and the business case further strengthened. Research within the REGATRACE project has shown that the perceived value of biomethane is related to its GHG abatement with significant potential and opportunities for wider economic and environmental benefits. Biomethane is recognised as a “zero emissions fuel” with a low or negative carbon footprint therefore has a higher potential for further market development. In addition, the Green Gas Certification Scheme is in compliance with REDII, that measures the inputs with any GHG of the sustainable feedstock and production process will have a positive impact and effect on the public image of biomethane. A transparent calculation method in the GGCS to quantify the carbon footprint is essential to measure, monitor, optimise and communicate the status of current and future biomethane production and its environmental and economic benefits, delivering consumer confidence and certainty on the sustainability credentials of biomethane.

The Irish agricultural research agency, Teagasc, has indicated that there is potential to facilitate knowledge transfer to and among farmers via the Teagasc Signpost Farms’ Programme and a Teagasc AD biomethane demonstration plant. This plant and / or a pilot project could potentially consider the AD Biorefining Business case as developed in the Biorefinery Glas Demonstration project.

Summary of the main barriers / obstacles:

- Lack of a Renewable Heat Obligation to bridge the funding gap.
- Need to adjust the GBER exemption threshold to allow capital funding required and related structure / mechanism to support the establishment of a mature biomethane industry.
- Lack of understanding of the benefit of AD biomethane to the environment, energy security, storage and pricing and the circular bioeconomy.

Summary of the main drivers / opportunities:

- Implementation of a Renewable Heat Obligation Scheme in 2023/23 to bridge the funding gap
- Develop a National Biomethane Strategy
- National and international imperative to address climate change by decarbonising
- Project Clover agri-food industry led collaboration, working in consultation with Government and farmers to decarbonise their thermal processes and support zero carbon farming
- Need to develop indigenous, secure energy supplies, storage and pricing and the implementation of the REPowerEU plan, aligned with capital grants for AD biomethane plants
- Need to support farmers and regenerative agriculture and to sustain diverse farm incomes
- Research and innovation on
 - sustainable agri feedstock AD biomethane and biofertiliser sustainability,
 - available feedstock and the potential for multi spp swards
 - food and energy production systems
 - the business case and commercial feasibility studies for sustainable Agri feedstock AD biomethane, biofertilisers and Carbon Farming Initiative and related products
- Development of Teagasc Grange Centre of Excellence for AD biomethane
- RGFI as a national co-ordination and design authority and its role in representing its members, developing collaborations and knowledge exchange.

Elements of the Roadmap to 2030:

- The announcement of a Renewable Heat Fuel Obligation scheme, in 2022, with implementation by 2023, and a biomethane target of 11% by 2030.
- The EU Commission is incentivising industry to do more by increasing the price of carbon, EAU. REGATRACE workshop participants ranked a higher carbon price tax slightly ahead of exchequer funding and other tax incentives, as additional measures to support the business case for biomethane.
- Government support with matched capital funding of 50% for the scheme would support further the full potential to commercialise bio-fertilisers and carbon farming (soil carbon sequestration) 2022 -2025 and capital funding to support full roll out to 2030;
- Consultation with industry on the optimum economic structure for a national carbon farming to support measures towards climate neutral farm initiative.
- A Green Gas Certification Scheme / Guarantees of Origin – Government to sign off on the Statutory Instrument on appointing GNI as the operator the Renewable Registry .
- Facilitating cross border trade of renewable gases and Guarantees of Origin.
- AD biomethane can deliver cross sectoral benefits in decarbonising agriculture, food production, manufacturing and processing and transport, while being a central enabler for circular bio economy.
- Research, knowledge and information transfer especially in relation to co-products such as grass biorefining (protein extraction), bio-fertilisers and soil carbon sequestration and climate neutral farms.
- Greater public awareness of the opportunity to decarbonise and sustainable carbon cycles and the associated environmental benefits.

Biomethane will be a valuable addition to the Integrated Energy System (renewable) energy portfolio in Ireland. Other biobased products, such as bioactives and biostimulants will promote technological solutions for carbon capture and use (CCU) and the production of sustainable advanced biofuels or other non-fossil based food, feed or carbon products.

Biomethane has unique characteristics compared to other renewable sources: meets the technical standards required for injection into the grid; can utilise the existing gas grid; can be stored for longer periods without loss of energy; is on demand and flexible; and it is the lowest cost, least disruptive renewable heat technology to meet hard to decarbonise market segments.

Biomethane needs to be factored into the following policies and plans currently in progress or proposed:

- Renewable Heat Obligation Scheme and ongoing liaison with industry
- Annual Review of the Climate Action Plan, Sectoral Climate Action Plans to be produced from 2022 and 5 yearly Local Authority Climate Plans
- National Biomethane Strategy – proposed new policy action
- Renewable Energy Directive Article 23 – RHO implementation by 2023.
- Draft Circular Economy Bill to be published

- Circular Economy Strategy
- Waste Action Plan for a Circular Economy updated
- Bio-economy Action Plan
- Land Use Review, currently underway, to be followed by Diversification Reviews for income and land use for farmers Just Transition Fund
- National Heat Study
- Recovery and Resilience Plan
- National Adaptation Framework produced in Jan 2018 will be reviewed in 2022.
- Refresh of Regional Development Plans up to 2024
- New national strategy for Research and Innovation
- EU taxonomy will come into force in 2022/23 to support the financial system to direct essential investments into climate action
- Sustainable Finance Ireland.
- EU Strategy for Sustainable Finance

ROADMAP / PATHWAY Long-term (2030 to 2050)

By 2030 Ireland will have an established AD biomethane and bio-fertiliser industry focussed on reducing GHG emissions in manufacturing and processing industries , agriculture, sustainable food production and transport, as part of the circular bio-economy and supporting regenerative agriculture. Organic bio-fertilisers, produced from the digestate and other sources, to replace artificial fertilisers and will satisfy the nutrient requirements of different crops and regenerate soils. Additionally, Ireland will promote technological solutions for carbon capture and use (CCU) and the production of sustainable advanced biofuels or other non-fossil based carbon products.

Having an indigenous supply of biomethane, also lowers reliance on imported fossil fuels, strengthens energy security and supply, can lead to the potential to pursue other revenue streams such as biogenic CO₂, alternative feed and food products, bio actives and other bio products.

In the coming years, new innovative technologies, commercialising and monetising of by-products, developing new markets and technologies for the recovery of these by-products will develop further. Their role in the future bio-economy and socio economic benefits will be important: providing alternatives for chemical fertilizers, replenishing the carbon in our soils and supplying green biogenic CO₂ for industry and horticulture uses. It is important that the policy, legislation, regulatory environment and licensing stimulates, activates and supports a more circular bio-economy by paving the way for these bio-based products: new product regulations, adapted fertilisers rules, etc

The cost of renewable electricity is expected to stabilise in the coming years with a maturing market and reducing production costs of PV-installations, wind turbines and batteries. The Government in the Climate Action Plan 2021 and EU Commission has recognised and acknowledge the key role of biomethane. Biomethane will be used for applications where there is no other economic, competitive, scalable and effective alternative for thermal processes used in the manufacturing and processing sector.

New market opportunities will be created by a European biomethane trading system.

Useful References:

An Integrated Business Case for Biomethane in Ireland, RGFI / KPMG, 2019
<https://www.renewablegasforum.com/library/>

Cost Benefit Analysis, RGFI / KPMG 2019 <https://www.renewablegasforum.com/library/>

2nd Regatrace workshop “The vision for Biomethane in Ireland presentations
:<https://www.renewablegasforum.com/collaboration-on-the-vision-for-renewable-gas-biomethane-as-rgfi-hosts-2nd-regatrace-workshop/>

Project Clover description: <https://www.renewablegasforum.com/projects/project-clover/>

Sustainability of Biomethane Production in Ireland: <https://www.gasnetworks.ie/biomethane-sustainability-report-2021.pdf>

NPS on the Bioeconomy: <https://assets.gov.ie/2244/24101811573-41d795e366bf4000a6bc0b69a136bda4.pdf>



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