Environmental Pillar[1] and the Stop Climate Chaos Ireland[2]: Submission to the consultation on Ireland's draft National Biomethane Strategy

March 2024

The Environmental Pillar welcomes the opportunity to respond to the public consultation on Ireland's draft National Biomethane Strategy.

We believe that, overall, the objective to expand the production of domestically produced biomethane to an annual level of 5.7 TWh by 2030, and the broad plans for reaching this goal as described in the draft Strategy, are **fraught with significant environmental and economic risks.** These risks, which we outline in our submission, have not been adequately addressed in the draft document. At a moment when securing the sectoral-wide commitment of farmers is pivotal to fostering genuine environmental reform in the sector, **this draft Strategy unfortunately promotes misleading policy signals, locks in intensive agriculture, achieves nothing for small farmers, and diverts attention from the magnitude of change that is urgently needed**. We view the making of this draft Strategy as being too closed, and have concerns regarding the influence of large agribusiness groups in the development of the draft Strategy, who will inevitably prioritise continued intensive food production at the expense of environmental protection. The considerable ecological and public health costs of this approach to policy making are clear in Northern Ireland, as outlined in sections of this submission.

The following submission addresses the questions contained within the consultation document. We do not offer recommendations in response to each question; instead, **our overall recommendation is for the Department of Agriculture, Food, and the Marine to rethink the**

[1] Established in 2009 by government decision, the Environmental Pillar comprises 32 national independent environmental non-governmental organisations and we work together to represent the views of the Irish environmental sector.

[2] Stop Climate Chaos (SCC) is a civil society coalition that campaigns for Ireland to do its fair share to tackle the causes and consequences of climate change. Launched in 2007, it is the largest network of organisations campaigning for action on climate change in Ireland and its membership includes overseas development, environmental, youth, health and voluntary organisations.

2030 target. We urge that, instead, the Department of Agriculture, along with the Department of the Environment, Climate, and Communications **develop and deliver a mitigation plan that commits the sector to meeting climate, water, biodiversity, and ammonia targets by setting limits on input nutrient quantities and outputs from high greenhouse gas emitting dairy and other livestock production.** The role of biomethane production can only then be considered within an agricultural system that prioritises sustainable food production within ecological limits.

We are available to meet officials to discuss any aspect of this submission.

Q2. The Draft National Biomethane Strategy was developed around five key pillars: (1). Sustainability, (2). Demand for Biomethane, (3). Bioeconomy and Circular Economy, (4). Economics of Biomethane, (5). Enabling Policy Requirements.

o Yes
X No
(If No, please specify)

We do not agree with how these five pillars have been framed within the draft Strategy.

On Sustainability:

The development of an indigenous biomethane sector cannot be justified as a viable decarbonisation solution.

The draft Strategy positions the development of an indigenous biomethane industry as a key objective to assisting in the decarbonisation of Ireland and increasing environmental sustainability in the agriculture sector. This is a flawed narrative because the overall mitigation benefit of bioenergy is highly variable, and this narrative does not take into account the environmental risks associated with biomethane development and as detailed throughout this submission. What is needed are significant and sustained reductions in the agriculture and land-use sector, and across all sectors of the economy. The development of an indigenous biomethane sector cannot be a substitute or sticking plaster in place of the political and policy ambition to achieve a significant realignment of the agricultural sector with our environmental obligations and ecological thresholds.

The latest IPCC report calls for immediate and sustained deep emissions reductions across all sectors, including agriculture and land use.[3] Ireland must contribute to a fair share of the global

[3] IPCC, 2023: Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core

effort to prevent climate change to the 1.5°C target set by the Paris Agreement – this requires swift and substantial cuts in methane (CH4) and nitrous oxide (N20), and immediate and substantial reductions in CO2 emissions from the burning of fossil fuels, cement manufacturing, and land use change. Agriculture is the single largest contributor to Ireland's overall climate impact. The sector is responsible for 92% of the country's nitrous oxide and 95% of its methane emissions. As of 2022, EPA data shows that agri-methane emissions had increased by 20% since 2010, reaching their highest ever level.[4]

We have consistently called for the alignment of the sector with Ireland's climate and environmental obligations.[5] In addition to complying with the sector's emission ceilings within the carbon budgets,[6] as stipulated by the Climate Act (2021), agriculture may need to further reduce its emissions to account for anticipated overshoot in the first budget and any unallocated reductions. The 2021 Climate Change Advisory Council carbon budget technical report calls for equal and significant reductions in both methane and nitrous oxide emissions by 2030.[7]

The present emissions reduction strategy set by the government for the sector is based on stabilisation rather than a significant decrease in methane emissions by 2030. This approach depends on the adoption of voluntary efficiency improvements on farms at a time when substantial reductions in emissions are urgently needed. It is evident that there is no scope for the development and delivery of costly and risky interventions, such as the production of biomethane, that lock in agricultural intensification.

There is a glaring disregard in the draft Strategy of the immediate need for course correction in Irish agriculture. The 2030 target, proposed in the Strategy, risks the lock-in of current unsustainable livestock and grass production volumes, as animal waste and grass feedstocks take on an economic value within intensive livestock farming operations. We reiterate our call that a mitigation plan be delivered that commits the sector to meeting climate, water, biodiversity, and ammonia targets by setting limits on input nutrient quantities and outputs from high emissions dairy and other livestock production. The role of biomethane production can only then be

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Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 1-34, doi: 10.59327/IPCC/AR6-9789291691647.001

[4] Environmental Protection Agency (2023). Agriculture. Available at: https://www.epa.ie/our-services/monitoring--assessment/climate-change/ghg/agriculture/

[5] Environmental Pillar, SWAN, and Stop Climate Chaos Coalition (2022). Towards a new agricultural and food policy for Ireland. Recommendations for Government. Available at: https://environmentalpillar.ie/towards-a-new-agricultural-and-food-policy-for-ireland-recommendations-for-government/

[6] 106 million metric tons of carbon dioxide equivalent (MtCO2e) for the first carbon budget period (2021–2025) and 96 MtCO2e for the second carbon budget period (2026–2030).

[7] Climate Change Advisory Council (2021). Carbon Budget Technical Report. Available at: https://www.climatecouncil.ie/media/climatechangeadvisorycouncil/Technical%20report%20on%20carbon%20budgets%2025.10.2021.pdf

considered within an agricultural system that prioritises sustainable food production within ecological limits.

The draft Strategy ignores the significant environmental risks associated with methane leakage

The draft Strategy fails to consider the considerable risks of further methane emissions associated with improper management and monitoring in the biomethane supply chain. Biomethane itself has very similar properties to natural gas – it contains over 90% methane, and the IPCC singled out the overall reduction of methane gas as a critical element in allowing the Paris goal of 1.5C to be secured.[8] Recent research shows that if methane leakage in the global gas system surpasses 4.7%, the emission intensity over its lifecycle matches that of coal, and such high leakage rates are regrettably frequent.[9] For biomethane to provide any decarbonisation potential, it relies on the improbable condition that no methane will be emitted to the atmosphere during the conversion of biogas to biomethane. Analysis within the broader scope of energy system decarbonization suggests that policymakers now need to recognize the potential climate intensity of biomethane, especially under plausible leakage rates and consumption patterns.[10]

Methane is released at various points during production to usage, but a thorough understanding of the specific locations, timing, and quantities of methane emissions is still lacking and remains unquantified. Leaks may originate from feedstock storage tanks, gas safety release valves from the digestion process, gas storage units, pipework, digestate storage tanks, flaring, foil roofs and wires and gas engine exhaust.[11] [12] A review of current data on biomethane and biogas methane emissions indicate that emissions across the supply chains are greater than previously estimated.[13] Currently the amount of methane released relative *to total biogas production* is

[8] IPCC (2023).

[9] Deborah Gordon et al., "Evaluating Net Life-Cycle Greenhouse Gas Emissions Intensities from Gas and Coal at Varying Methane Leakage Rates," Environmental Research Letters 18, no. 8 (2023): 084008

[10] Feedback EU, 2023, Biomethane: Setting a target that is fit for food and the climate – An analysis of biomethane feedstocks to help fast forward sustainable energy and food system transformation, Rijswijk, the Netherlands: Feedback EU.

[11] Bakkaloglu, S. et al. (2021). Quantification of methane emissions from UK biogas plants. Waste Management 124, 82-93. https://doi.org/10.1016/j.wasman.2021.01.011

[12] Grubert, Emily. "At scale, renewable natural gas systems could be climate intensive: The influence of methane feedstock and leakage rates." Environmental Research Letters. Vol. 15, No. 8. August 2020 at 1; Russell, Pye et al. MJB & A. "Renewable Natural Gas. The RNG Opportunity for Natural Gas." April 2017 at 1; Food & Water Watch (FWW). "Biogas From Factory Farm Waste Has No Place in a Clean Energy Future." July 2019.

[13] Bakkaloglu, S., et al. (2022) Methane emissions along biomethane and biogas supply chains are underestimated. 5(6), 724-736. https://doi.org/10.1016/j.oneear.2022.05.012

higher than for fossil gas – on average, one unit of biogas is more polluting than one unit of fossil gas, unless methane leakage is controlled much more tightly.[14]

Independent life cycle assessments (LCAs) of biogas and biomethane production are vital. For example, the climate impact of methane emissions from silage-heavy anaerobic digester feedstocks is more severe than standard carbon accounting methods would suggest.[15] To understand the environmental impacts associated with biogas production and biomethane, life cycle assessments should evaluate the global warming potential (GWP) of these gases over both 100-year and 20-year timescales, and analyse methane leakage rates across average, best, and worst-case scenarios. In addition, the impact induced by ADs on global warming needs to be assessed on a case-by-case basis, drawing on individual monitoring data.[16] In a future energy system moving away from high-GHG fuels, the anticipated methane leakage levels could render biomethane a less favourable GHG energy source compared to other alternatives.

Overall, the risk of leakage in the production and transportation of biomethane means that its use at scale would necessitate extremely robust and potentially costly independent regulation, monitoring, and safeguarding of production sites.[17] These conclusions emphasise the uncertain, risky nature of employing anaerobic digesters at scale as assisting in the decarbonisation of Ireland. Whilst assessments such as the SEAI's 2017 assessment of the costs and benefits of biomethane in Ireland refer to the risks associated with leakage,[18] the crucial role of measurement, monitoring, and strict regulation and how this can be adequately delivered at scale is given no attention. This same gap is apparent in the draft Strategy, and there appears to be no proactive regulatory measures being considered by the Government.

Further concerns regarding sustainability, and in particular the risks associated with ammonia emissions, are outlined in responses to Questions Six and Ten.

[14] Feedback EU (2023).

[15] Consideration must be given to the fact that methane's Global Warming Potential (GWP) over a century is 36 times higher than CO2 for the same mass. However, this figure jumps to 87 times within a 20-year period.

[16] Paolini, V. et al. (2018) Environmental impact of biogas: A short review of current knowledge, Journal of Environmental Science and Health, Part A, 53:10, 899-906, DOI: 10.1080/10934529.2018.1459076

[17] Liebetrau,, J. et al. (2017) Methane emissions from biogas plants: Methods for measurement, results and effect on greenhouse gas balance of electricity produced, Murphy, J.D (Ed): International Energy Agency (IEA) Bioenergy: Task 37: 2017: 12. Available In: http://task37.ieabioenergy.com/ files/daten-redaktion/download/Technical%20Brochures/Methane%20Emission_web_end.pdf

[18] Sustainable Energy Authority of Ireland. (2017). Assessment of Cost and Benefits of Biogas and Biomethane in Ireland. Available at: https://www.seai.ie/publications/Assessment-of-Cost-and-Benefits-of-Biogas-and-Biomethane-in-Ireland.pdf

On Demand for Biomethane

The draft Strategy argues in favour of anaerobic digestion based on its ability to produce biomethane for use in sectors where decarbonization is challenging, such as gas heating and the operation of heavy goods vehicles (HGVs). The achievability of the proposed 14-20% gas target for 2030 labelled as "renewable" is subject to debate, and such a target is unlikely to significantly counterbalance an economy that is dependent on a minimum of 80% fossil gas.[19] Regarding the role of natural gas in a decarbonised future, analysis by E3G found that "none of the Paris-compliant scenarios with renewable or decarbonised gas show increasing gas demand, and most of them show a sharp decline in gas volumes compared to today.." The report notes that biogas may be best targeted at harder-to-abate sectors, such as heavy industry. However, the authors of the report point to significant uncertainties regarding the technical and economic potential of biogas, as well as the lifecycle emissions of these options and their infrastructure implications.[20] They underline that the guiding principle should be whether there are alternative options for decarbonisation. Instead, it underestimates the degree of change required by the energy sector in contributing to Ireland's Paris Agreement commitments.

The draft Strategy claims that biomethane could help diversify sources of gas and improve Ireland's energy security. The optimum approach for managing energy security risk is effective management of energy demand, and "demand-side investments should be given parity with other forms of infrastructure for energy security and be treated as a deployable option rather than as a fixed externality."[21]

Overall, the draft Strategy underestimates the extensive transformation the energy sector must undergo for Ireland to fulfil its obligations under the Paris Agreement. The significant investments allocated to the development of a biomethane sector in Ireland would be better spent towards enhancing energy efficiency and advancing the delivery of renewable energy. Renewable energy sources such as wind and solar have a significant advantage over anaerobic digestion in terms of both lower emissions and cost-effectiveness. Research shows that solar PV generates 12–18 times more energy per hectare than maize or grass grown for anaerobic digestion.[22] Wind, solar, and other renewable energy sources not only emit significantly lower levels of greenhouse gases but also tend to be more cost-effective compared to anaerobic

[19] McMullin et al. (2018) Is Natural Gas "Essential for Ireland's Future Energy Security"? Available at: https://www.stopclimatechaos.ie/assets/files/pdf/is_natural_gas_essential_for_irelands_future_energy_security_scc_study_november_2018.pdf

[20] Fischer, L. (2018). E3G Renewable and Decarbonised Gas Options for a Zero-Emissions Society. Available at: https://www.e3g.org/publications/renewable-and-decarbonised-gas-options-for-a-zero-emissions-society/

[21] Gaventa, J. et al. (2016). More security, lower cost: A smarter approach to gas infrastructure in Europe. Available at: https://www.e3g.org/library/moresecurity-lower-cost-a-smarter-approach-to-gas-infrastructure-in-europe

[22] Feedback EU. (2021) Green Gas without the Hot Air. Defining the true role of biogas in a net zero future. Available at: https://feedbackglobal.org/wp-content/uploads/2021/07/Feedback-2020-Green-Gas-Without-the-Hot-Air-Exec-Summary.pdf

digestion. A comparison of electricity generation costs of different renewable energies and their future potentials shows that while electricity from huge biogas plants offers generation costs from 10 to 15 ct/kWh, electricity from onshore wind and huge solar systems offers generation costs from 4 to 8 ct/kWh.[23] Directing investments towards the energy reduction measures, and the rapid and extensive electrification of transport and heating offers a better solution than investing in costly and risky biomethane production.

On the Economics of Biomethane

The Irish Academy of Engineers refers to significant challenges, including planning, permitting, timescales, public acceptance, scale and costs of infrastructure, gas quality control, amongst others. While supportive of biomethane development, they conclude that biomethane will account for only a small portion of Ireland's gas supply by 2040. In light of these challenges and the ecological risks we have outlined throughout this submission, we question the major incentivisation of the biomethane development and injection.[24]

A 2019 assessment on the fiscal support to aid in the establishment of an AD industry in Ireland indicates that an initial budget of €40 Million could be required to develop just 25 anaerobic digester plants producing 1.6TWh of biogas (200 MW biomethane).[25] Extremely difficult to deploy at scale, the development of a biomethane industry in Ireland, in line with the proposed 2030 draft Strategy target will require large investment.[26] The risk of leakage in the production and transportation of biomethane means that its use at scale would also necessitate extremely costly independent regulation and monitoring of production sites.[27] Likewise, anaerobic digesters cost millions, and these expensive facilities are dependent upon significant public funding and incentives.[28] Any large investments into gas infrastructure, for example, connecting new plans to the gas grid, will lead to significantly higher system costs and grid tariffs in future years. Such investments have long-term horizons, risking fossil-fuel lock-in or ending up as stranded assets,

[23] Kost, C., et al. (2018). Stromgestehungskosten Erneuerbare Energien. *Fraunhofer Institut Für Solare Energien, ISE.*, 150, 277–294.

[24] Irish Academy of Engineering. (2018) Natural Gas. Essential for Ireland's Future Energy Security. Available at: https://iae.ie/wp-content/uploads/2018/08/IAE_Natural_Gas_Energy_Security.pdf

[25]Irish bioenergy association & Composting & Anaerobic Digestion Association of Ireland. (2019). Mobilising an Irish Biogas Industry with Policy and Action. Available at: https://www.irbea.org/wp-content/uploads/2019/08/IrBEA-Cre-Biogas-Policy-Paper-Final_1.pdf

[26] Rajendran, K. et al. (2016) The Role of Incentivising Biomethane in Ireland Using Anaerobic Digestion. Environmental Protection Agency. Available at: https://www.epa.ie/publications/research/waste/Research_Report_279.pdf

[27] Food and Water Watch. Biogas from Factory Farm Waste has no Place in a Clean Energy Future. (2019) Available at: https://www.foodandwaterwatch.org/sites/default/files/ib_1906_biogas_manure-2019-web.pdf

[28] Jaffe, et al. (2016). The Feasibility of Renewable Natural Gas as a Large-Scale, Low Carbon Substitute." UC Davis, Institute of Transportation Studies, 11.

and barriers to change.[29] We oppose an approach which would see Gas Networks Ireland seeking to expand network assets for biomethane while ultimately demanding subsidised protection where development of biomethane does not meet expected levels.

There is a clear acknowledgement within the draft that the 2030 target for biomethane production is ambitious, with significant investment of between 150-200 new median sized production units, and the greatest likelihood for a smaller number of larger plants to evolve as the market develops. The economics of biomethane generation at scale requires intensive farming. Farms with larger herd sizes or more intensive farming operations provide more viable sites for anaerobic digester plants owing to the larger mass of manure available. However, even when the manure resource is available, connecting to the electricity network is expensive and difficult, and linking plants in rural Ireland to energy users requires novel interventions.[30] The economics of biomethane prefer larger, grid connected plants that can produce biomethane at a cheaper price than smaller scale plants (requiring truck and trailer transportation of gas), and with this, a productivist model of agriculture focused on specialisation and intensification.

The need for scale narrows the possibilities for small family-owned farms, as certain studies indicate that merging smaller farms into bigger ones (along with increasing herd sizes) benefits the anaerobic digestion sector. Additionally, this situation suggests that the planned anaerobic digesters in Ireland, numbering between 150 to 200, will be situated in areas with high intensive farming, particularly in the south and south-east of the country. In addition to ecological risks, this raises alarms about the potential public health ramifications related to the production of biogas and biomethane in a limited geographical space[31] – a point not addressed in the draft Strategy.

While the installation of an anaerobic digester might seem like a financial opportunity for farmers, it inadvertently binds them to fossil fuel infrastructure due to the requirements for biomethane production and distribution, such as pipelines, transportation fleets, and electricity grid connections. This push can often benefit developers and large investors rather than farmers, potentially at the detriment of local agricultural communities and their long-term sustainability. At a critical moment for agriculture, farmers should be moving towards less intensive farming

[29] McInerney, C. et al. (2019). Fossil Fuel Lock-in in Ireland: How Much Value is at Risk?. Environmental Protection Agency. Available at: https://www.epa.ie/publications/research/climate-change/Research_Report_302.pdf

[30] The role for a manure-based biomethane sector, for example, is undermined by small herd sizes and the short periods of time during which manure can be collected throughout the year. IEA Bioenergy. (2021) Potential and utilisation of manure to generate biogas in seven countries. Available at: https://www.ieabioenergy.com/wp-content/uploads/2021/07/Potential-utilization_WEB_END_NEW.pdf

[31] Werkneh, A. (2022). Biogas impurities: environmental and health implications, removal technologies and future perspectives. 10.1016/j.heliyon.2022.e10929

practices and instead be supported with equitable and just solutions that align with sustainable agriculture.

On Bioeconomy and the Circular Economy

We acknowledge that there may be a niche role for anaerobic digestion of unavoidable organic waste streams where it is a suboptimal choice in competition with better alternative uses for feedstocks and land. Crucially, this role needs to sit within an agricultural system that prioritises sustainable food production, a shift away from intensification and is aligned with regional ecological limits and Ireland's environmental commitments. The volume of biomethane produced will be limited and will need to be much smaller than envisaged by industry to avoid negative impacts on food security, the environment, and the climate. The role of biomethane in Ireland should only be assessed after the necessary planning and regulatory context has been established, and limits have been set on input nutrient quantities and outputs from high-green-house gas emissions dairy and other livestock production. This volume should only be allocated to the most difficult to decarbonise sectors, such as aviation, heavy-duty road transport, and shipping, subject to an overall "reduce-demand-and-increase efficiency-first" approach.

An Enabling Policy Environment

Absent from the draft Strategy is any serious consideration of the scale of measurement, monitoring, strict regulation, and compliance required to minimise the potential of methane leakages from biomethane production and supply, and air and water pollution associated with digestate storage and application. Without proper and strict planning and regulatory controls, there is a risk that policy incentives provided for the scaling up of anaerobic digesters can be easily exploited – as has happened in Northern Ireland. High investment and significant subsidies are required – risking further lock-in of an intensive agricultural system which achieves little for farmers, sustainable food production or for environmental protection. It is important that the CRU examines the wide-ranging uncertainties and risks regarding biomethane development and injection in Ireland and addresses the likelihood that sufficient volumes will not be generated to sufficiently decarbonise the gas grid. A robust, independent, science-based analysis of biomethane development and usage is needed, that is not merely based on projections by Gas Network Ireland.

There has been a long-standing failure to align the sector with Ireland's obligations under environmental law. We have called on the Government to provide a detailed strategy for the agricultural sector, setting out how environmental targets and commitments as they relate to biodiversity, climate, soil, air, and water quality will be met and enforced, and how primary

producers will be supported in achieving these targets.[32] This needs to be a plan that aligns the sector with meeting Ireland's binding five-year carbon budgets and its 2030 target and beyond 2030 to 2050.

Q3. What key learnings should Ireland's biomethane sector ensure it follows from the growing biomethane sector in Europe?

None of the above. Ireland's primary source of emissions stems from its agricultural sector, the sector is closely associated with the loss of biodiversity, and notable increases in water pollution and nutrient levels. This presents substantial obstacles for Ireland in meeting its climate targets for 2030 and adhering to its commitments for water and air quality. Any consideration of biomethane's role must be made within the framework of these specific environmental and agricultural challenges, the direction that agricultural policy in Ireland needs to take, and the ecological thresholds of key regions.

Q4. Based on the scenario analysis completed for the Draft National Biomethane Strategy: *Scenario 1: Widespread Deployment, Scenario 2: Current Policies Only, Scenario 3: Economic Deployment.*
Which scenario do you think is optimal in terms of a biomethane sector in Ireland (this can be a combination of more than one scenario)?

- o Scenario 1
- o Scenario 2
- o Scenario 3

We do not agree with any of the scenarios outlined in the draft Strategy. These scenarios fail to encompass the extensive regulatory and compliance obligations necessary for planning and management, and do not cover the management strategies for environmental risks related to methane emissions, effluent-induced water pollution, and impacts on odour and air quality. The Scenarios briefly touch on cost efficiency but do not address the economic risks, or how these risks will be managed. These risks encompass the considerable upfront costs—which pose a significant financial hurdle for small-scale farmers—alongside operational expenses, the uncertainty tied to technology and its performance, and the volatility in market conditions. The biomethane target on which this draft Strategy is based will require the deployment of large scale anaerobic digester plants, with significant economic and environmental risks that differ in scale and complexity from those associated with smaller operations.

[32] Environmental Pillar, SWAN, and Stop Climate Chaos Ireland. (2022).

Q5. As shown in the Draft Strategy, biomethane is more expensive than fossil gas. Based on the analysis set out in the document, in addition to the introduction of a Renewable Heat Obligation, what support mechanism is optimal (in terms of cost, time to deliver, funding) for delivering 5.7 TWh by 2030? (Please rate 1 -3 with 1 being the most optimal).

o Capital Support
o Operational Support
o Feedstock Support

Anaerobic digestion requires significant subsidies to bring to scale. As such, extensive innovations across the entire biogas value chain are essential for it to compete in energy markets without the need for substantial subsidies.[33] Anaerobic digester plants of any size "cannot be run profitably solely through wholesale [electricity and gas] prices"[34], so they require subsidies and other revenue streams. Many anaerobic digester plants will still be operational and need to claim subsidies for many years following their development, risking further lock-in.

One concern regarding anaerobic digester plants is that subsidies tend to benefit larger agricultural operations. This can lead to more intensive farming practices, with implications for environmental degradation and animal welfare. Anaerobic digester plants in Northern Ireland, for example, with capacities ranging between 180 kW to 500 kW, are structured in such a way that the largest 500 kW plants receive the most substantial financial returns, which may not be suitable for smaller farms.[35] This has been a point of contention, as noted by the Ulster Farmers' Union (UFU), which has argued that smaller-scale operations have been overlooked in the subsidy design.[36] Such an approach to subsidies – presented as aiding an environmental solution – can reinforce larger farms' dominance, potentially neglecting smaller farms' needs and exacerbating the environmental footprint of agriculture.

Evidence also from Northern Ireland shows that a public subsidy scheme for anaerobic digesters can be easily exploited by the private agri-food industry especially because of insufficient centralised and planning controls.[37] In 2015, key players in the agrifood sector effectively influenced the government to maintain high subsidy levels, which were at that point four times

[33] Bahrs, E. and Angenendt, E. (2018) Status quo and perspectives of biogas production for energy and material utilisation. GCB Bioenergy. 11(1). https://doi.org/10.1111/gcbb.12548
[34] ADBA (2020) Biomethane: Pathway to 2030. Anaerobic Digestion & Biogas Association. Available at: http://adbioresources.org/docs/ Biomethane_-_Pathway_to_2030_-_Full_report.pdf
[35] Macauley C (2018) Auditor calls for an investigation into anaerobic digester subsidies. BBC News, 15 November. https://www.bbc.co.uk/news/uk-northern-ireland-46213976
[36] Gladkova, E. (2021) The Criminogenic Nature of Food Production Harm Responses: A Case Study of Anaerobic Digestion Technology Subsidies in Northern Ireland. International Journal for Crime, Justice and Social Democracy, Vol. 10.
[37] Leroux (2018).

greater than those in any other region of the UK. By securing these subsidies, the industry was able to legitimise its ongoing expansion, receiving financial support for further growth and development, all the while avoiding any disruption to its production processes.[38] [39]

Generating biomethane poses risks to local communities, can increase the debt burden of farmers, and encourage the continuation and growth of damaging agricultural methods, alongside a rise in fossil fuel infrastructure. Currently, national agricultural policies fall short of safeguarding or promoting the sustainable farming methods needed to restore biodiversity and capture carbon effectively. Rather than supporting misguided approaches, efforts should be directed towards overhauling national farm policy and other governmental schemes to foster and finance farming practices that are sustainable, and farmer centred.

Q6. Sustainability of biomethane production is a key priority as set out in the Draft National Biomethane Strategy. Can Biomethane be sustainably produced in Ireland?

o Yes
o No
(If No, please specify)

In our response to Question 1, we argue that the sustainability pillar must provide the overriding criteria for determining the role of biomethane in Ireland. As we've outlined, the generation of biomethane cannot be a substitute for the immediate and sustained reductions needed in emissions from agriculture.

Biogas, generated to produce biomethane, is combustible, extremely poisonous, and can be explosive. The production and utilisation of biogas lead to the release of harmful substances and air pollutants into the atmosphere, arising from both the burning process and emissions that occur without combustion.[40] [41] Issues such as odour, noise, traffic from trucks, waste discharge, and the use of gas pipelines, along with the need for connections to the electricity grid, can adversely affect the health and well-being of nearby residents. Absent from the draft Strategy is any consideration of the local or regional public health implications of situating large production

[38] Gladkova, E. (2021).

[39] Attorp, A. and McAreavey, R. (2020). Muck, brass and smoke: Policy post-exceptionalism in the agri-food sector. Journal of Rural Studies. Vol. 79. doi.org/10.1016/j.jrurstud.2020.08.050

[40] Werknah, A. (2022).

[41] Paolini, V. et al. (2018) Environmental impact of biogas: A short review of current knowledge, Journal of Environmental Science and Health, Part A, 53:10, 899-906, DOI: 10.1080/10934529.2018.1459076

units within areas of rural Ireland already exposed to the ecological costs of intensive agriculture.[42]

The utilisation of manure for biogas production in Ireland is limited, primarily due to the unfavourable economics of anaerobic digestion in Ireland at present, herd sizes, and concerns from the public regarding the safety of anaerobic digestion.[43] Promoted in the draft Strategy is the use of slurry and grass feedstocks. Beausang et al. (2021) reported that the preferred high silage (low slurry) feedstock for anaerobic digesters, as proposed by the SEAI Heat Study using Teagasc modelling, may be more detrimental to the environment than fossil natural gas and chemical nitrogen, due to the likelihood of increased methane leakages from anaerobic digester plants and higher ammonia losses from the use of nitrogen fertilisers in growing silage and applying digestate.[44] In the Beausang et al. study, higher environmental burdens were observed for mixes with a greater ratio of grass silage to slurry[45], and the mono-digestion of grass silage has been shown to become unstable in long term operation.[46]

Increasing the amount of silage in biogas feedstock mixes can reduce the cost of methane production and enhance the profitability of biogas plants due to higher methane yields. Using more grass silage, however, leads to greater environmental impact in terms of global warming, acidification, and eutrophication. Specifically, co-digesting slurry with a higher proportion of grass silage amplifies the environmental burden, notably affecting global warming and terrestrial acidification. Furthermore, the impact for co-digestion of slurry with substrates is highly dependent on the alternative use of the substrate in question. Generally, it is recommended that co-digestion with feedstocks that may otherwise be used for feed or food production should be avoided.[47] Although switching from calcium ammonium nitrate (CAN) to protected urea can mitigate some global warming impacts, it does not alleviate, and may even exacerbate, issues with terrestrial acidification due to heightened ammonia emissions. In Ireland, where agriculture is the main contributor to ammonia emissions—primarily from animal manure decomposition and fertiliser application—the country has consistently surpassed its ammonia emission limits for several years and emissions are projected to continue to increase. While there might be economic

[42] See for example accounts in Leroux (2018) Muck for Brass: How agribusiness and opportunists are turning Northern Ireland's poo mountain to cash – and endangering the environment. Source Material. Available at: https://www.source-material.org/muck-for-brass/

[43] IEA Bioenergy (2021).

[44] Beausang, C. et al. (2021) Assessing the environmental sustainability of grass silage and cattle for biogas production. Journal of Cleaner Production, 298. doi.org/10.1016/j.jclepro.2021.126838

[45] Ibid.

[46] Wall, et al. (2014). Optimisation of digester performance with increasing organic loading rate for mono- and co-digestion of grass silage and dairy slurry Bioresour. Technol., 173 (2014), pp. 422-428, 10.1016/j.biortech.2014.09.126

[47] Styles, E.M. et al. (2016). Environmental balance of the UK biogas sector: an evaluation by consequential life cycle assessment Sci. Total Environ., 560 (2016), pp. 241-253, 10.1016/j.scitotenv.2016.03.236

benefits to using more grass silage for biogas, there's a clear accompanying increase in environmental risks that cannot be ignored.[48]

The draft Strategy recognises that activities associated with producing anaerobic digester plant feedstocks must not lead to an increase in farm intensification (such as increased use of chemical fertiliser to promote grass growth). It states that the aim is to improve the efficiency of land already producing grass to increase the supply of feedstocks but accepts that individual farms will make decisions according "to their own socio-economic circumstances". The Strategy provides no additional insight into the regulation of the application of chemical fertiliser and monitoring of farm intensification because of growing grass for feedstock. To ensure emissions reductions, it relies on the greater on-farm adoption of legumes to reduce the scale of emissions generated and comply with RED requirements. Whilst DAFM have developed several initiatives to encourage greater adoption of legumes, the adoption of these initiatives requires on-farm voluntary uptakes – which requires time and targeted interventions to build and promote. Grass yield depends on several factors, which may influence the application of chemical fertilisers and the availability of grass feedstock for biogas production – including weather and the impact on fodder and feed reserves. Biogas yield is an important component in plant operating costs, putting pressure on their being a reliable source of grass feedstock being available year-round.

The additional difficulty with anaerobic digestion is that it does not capture ammonia emissions. As such, a scaled up biomethane industry may further exacerbate Ireland's ammonia problem. Ireland is currently in breach of the National Emission Ceilings Directive (NECD) on ammonia, with agriculture dominating emissions of ammonia (99%) because of animal manures and nitrogen fertiliser.[49] Considering the voluntary and unfunded nature of abatement measures, full on-farm implementation is highly unlikely, and Ireland will continue to breach binding ammonia limits for both 2020 and 2030. Ammonia emissions can increase due to improper feedstock storage and digestate storage and application.[50] Research shows that, crucially, to ensure any increased environmental impact is accounted for, further investigation is needed on the effect of NH_3 emissions and the effect of altered characteristics of digestate.[51] There appears to be no consideration in the draft Strategy to risks associated with ammonia emissions.

[48] Himanshu et al. (2019). Impacts of characteristics of grass silage and cattle slurry feedstocks on the cost of methane production. Biofuel Bioprod. Biorefin., 13 (1) (2019), pp. 129-139, 10.1002/bbb.1947

[49] Environmental Protection Agency (2022) Ireland's Air Pollutant Emissions 2020 (1990-2030). Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-air-pollutant-emissions-2020-1990-2030.php

[50] Paolini, V. et al. (2018)

[51] Lemes, Y. et al. (2023) Effect of anaerobic digestion on odor and ammonia emission from land-applied cattle manure. Journal of Environmental Management, 338. https://doi.org/10.1016/j.jenvman.2023.117815

Without the implementation of strict and diminishing national and watershed restrictions on nitrogen usage or livestock numbers, there is a genuine risk that policies favouring biomethane production may increase the overall use of chemical nitrogen. This would monetize waste streams from livestock, inadvertently supporting nitrogen-heavy, polluting agricultural practices instead of diminishing them. There is risk that perverse incentives arise, leading to its increased production of manure, slurry, and silage as a co-product, rather than a by-product, of intensive agriculture. Alternatives to using silage for anaerobic digestion should be considered, such as optimising land more effectively for solar and wind energy generation, sustainable food production, nature-restoration, and enhanced carbon sequestration.

Q7. Feedstock utilised by AD developers will be a mix of wastes and agricultural based feedstocks. Do you agree with the research quoted in the Draft Strategy that Ireland has ample supply of feedstock to deliver on the 5.7 TWh?

o Yes
o No
(If No, please specify)

No. See our response to Question 6.

Q8. The Draft Biomethane Strategy commits to developing a 'Biomethane Charter' which aims to increase the sustainability and environmental benefits of biomethane production in Ireland. What inputs would you like to see assessed here?

o Feedstocks
o Plant Design
o Digestate
o Operation of the Plant
o Other (Please Specify)

Other. Cited in the draft Strategy, The National Policy Statement on the Bioeconomy states that environmental sustainability is an integral principle of the bioeconomy and that the biomaterial generated should not degrade resilience or biodiversity in the ecosystem. This position completely fails to acknowledge that intensive agriculture in Ireland is leading to potentially permanent harm to our vital ecosystems, including soil, air, biodiversity, and water sources, and that significant change is urgently needed. Surpassing the Earth's ecological boundaries risks undermining the foundational systems vital for food production and the health of ecosystems. This position also ignores the ecological risks - outlined in this submission - associated with anaerobic digesters.

We also wish to draw attention to the representations included in the initial stakeholder activity engagement which has shaped this draft Strategy. This representation is primarily from the agricultural and gas industry. We point to other jurisdictions, such as Northern Ireland, where lobbying for biogas by the major meat processing companies helped sidestep the environmental regulations of the European Union's Nitrates Directive.[52]

Given the draft Strategy's core aim "to deliver on the ambitious target set by the Government as part of the agreement on the Sectoral Emission Ceilings" and to improve the environmental sustainability of the sector, it is not clear why this engagement group was not expanded to include the independent voices of Ireland's leading climate scientists, and the Climate Change Advisory Council, and Ireland's environmental non-governmental organisations, including the Environmental Pillar. We urge that these bodies are adequately consulted with, beyond the limited scope provided by this consultation process.

Q10. Do you agree that Digestate (a by-product) of biomethane can be used back into the circular bioeconomy to maximise nutrient recycling as an environmentally friendly product?

o Yes
o No
(If No, please specify)

No. We do not believe that digestate of biomethane can be used back into the circular bioeconomy to maximise nutrient recycling as an environmentally friendly product. There is a possibility that anaerobic digester plants may increase ammonia emissions in Ireland, primarily through the storage of feedstock and digestate, and the land spreading of the latter. The draft Strategy fails to address any of the serious environmental implications related to the storage and application of digestate.

The practice of processing animal waste through anaerobic digestion before its application on agricultural land has largely avoided in-depth examination regarding its effects on ecologically sensitive areas. This oversight has permitted the farming sector to sidestep the nutrient limits established by the European Union's Nitrates Directive, effectively circumventing regulations designed to prevent nutrient overloading and protect water quality, as has been the case in Northern Ireland.

[52] Gladkova, E. (2021).

Contrary to claims from industry that digestate can "regenerate our depleted soil," both digestate and synthetic fertilisers share similar drawbacks, such as their limited ability to enhance long-term soil fertility and the increased risk of ammonia release and nitrate pollution into water bodies.[53] Additionally, digestate contains mineral nitrogen, which can encourage fungal diseases and weeds, potentially leading to a greater dependence on herbicides. Based on these factors, Poux and Aubert (2018) argue that anaerobic digestion, at scale, does not fit within an agro-ecological approach to farming.[54]

The form of nitrogen most prevalent in digestate is ammonium, which, if not carefully managed, could incur significant economic and environmental repercussions. Ammonia emissions also have consequences for biodiversity and water pollution. There is also an increased danger of atmospheric emissions and nitrate infiltration into water systems with digestate compared to compost.[55] The process known as ammonia volatilization refers to the conversion of ammonium in fertilisers, such as the digestate from anaerobic digestion, into gaseous ammonia at the soil surface. Research including a study on the use of anaerobically digested cattle slurry indicated that there could be a significant loss of nitrogen through this process. For example, Matsunaka et al. (2006) observed a nitrogen loss of 13% through volatilization when digestate was applied as a soil fertiliser.[56] Paolini et al. (2018) further estimated that nitrogen loss could reach up to 30% due to ammonia volatilization.[57]

The environmental sustainability of digestate is also challenged by the distance and feedstock quantity used for biogas production. Digestate cannot be applied in large quantities to land at risk of nitrate saturation, and nearby non-vulnerable land capable of safely assimilating the digestate within nitrate vulnerable zone constraints would be required.[58]

Approximately half of Ireland’s rivers and lakes are now polluted, and two-thirds of our estuaries; agriculture is by far the biggest pressure on our waters with nitrate loads increasing

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[53] Paolini, V. (2019)

[54] Poux, X and Aubert, PM (2018). An agroecological Europe in 2050: multifunctional agriculture for healthy eating. Available at: https://pae.gencat.cat/web/.content/al_alimentacio/al01_pae/05_publicacions_material_referencia/arxius/180918-An-Agroecological-Europe-in-2050_IDDRI-Study.pdf

[55] Zilio, M. et al. (2021) Measuring ammonia and odours emissions during full field digestate use in agriculture. Science of The Total Environment, 782. https://doi.org/10.1016/j.scitotenv.2021.146882

[56] Matsunaka T., et al. (2006) Efficient use of digested cattle slurry from biogas plant with respect to nitrogen recycling in grassland. International Congress Series 1293: 242–252. https://doi.org/10.1016/j.ics.2006.03.016

[57] Paolini V., et al. (2018) Environmental impact of biogas: A short review of current knowledge. Journal of Environmental Science and Health 53(10): 899–906. https://doi.org/10.1080/10934529.2018.1459076

[58] Huygens D, Orveillon G, Lugato E, Tavazzi S, Comero S, Jones A, Gawlik B, Saveyn HGM, Technical proposals for the safe use of processed manure above the threshold established for Nitrate Vulnerable Zones by the Nitrates Directive (91/676/EEC), EUR 30363 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-21539-4, doi:10.2760/373351, JRC121636.

since 2013,[59] correlating with an increase in the dairy herd. The declines in water quality and the increases in nitrate loads are particularly stark in the South and Southeast where the majority of intensive (derogation) farms are situated.[60] Considering the proposed plans to create 150 - 200 anaerobic digester plants across Ireland by 2030, with the likelihood of larger production plants located closest to feedstock sources, the further risks to water and air quality in these areas because of digestate application is considerable and will require that digestate is transported elsewhere to reduce the risk of further nitrate saturation. This adds to the financial and environmental costs, as well as the potential for illegal activity as we have seen in Northern Ireland where digestate has been transported illegally across the Border, and spread in ecologically sensitive areas.[61] It is also worth adding that 96% of Northern Ireland's very high ammonia levels comes from agriculture.[62]

The majority of digestate produced is in liquid form, which is "inconvenient to transport and harder to store," as acknowledged by the industry itself. While converting liquid digestate to a "dried" form may address some of these issues, the drying process is energy-intensive, calling into question the sustainability of such a solution. It is difficult to envisage how the application of digestate would not pose significant risks to Ireland's water and air quality. As with other environmental risks, these considerations have not been fully addressed in the draft Strategy.

The anaerobic digestion process does not appreciably change the amount of ammonia (or other nutrients) present in waste. All the nitrogen present in digestate originates from animal slurry or solid feedstocks like grass silage, and the total quantity of nitrogen produced in this system is highly contingent upon the initial nitrogen input. Even if multi-species grasslands, which include nitrogen-fixing clovers, are introduced extensively in Ireland, it would be these plants, and not the digestate, that could potentially reduce some of the need for imported nitrogen within an otherwise unchanged agricultural system.

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[59] Environmental Protection Agency (2023). Water Quality in 2022. Available at: https://www.epa.ie/publications/monitoring--assessment/freshwater--marine/Water-Quality-2022-Indicator-Report-Web.pdf

[60] Ibid.

[61] See: The Guardian. (6th July, 2022). Northern Ireland turning Republic into a 'toilet' for excess manure pollution. Available at: https://www.theguardian.com/environment/2022/jul/06/northern-ireland-turning-republic-into-a-toilet-for-excess-manure-pollution

[62] Department of Agriculture, Environment and Rural Affairs (2023) Ammonia Emissions and Agriculture. Available at: https://www.daera-ni.gov.uk/news/ammonia-emissions-and-agriculture#:~:text=Ammonia%20is%20emitted%20whether%20the,Northern%20Ireland%20comes%20from%20agriculture.

Q11. What is the optimal end use for Biomethane in Ireland?

- o High temperature Heat
- o Transport Sector
- o Electricity Sector
- o Built Environment
- o Food industry
- o Other (Please Specify)

Other. We are of the view that biomethane should not be used through blending to support the use of fossil gas. In this submission, we've argued that biomethane should be designated only for sectors where decarbonization is most challenging, such as aviation, heavy-duty road transport, and shipping. This should be within the context of an overarching strategy that prioritises reducing demand and enhancing efficiency before considering other options and replaces the current 2030 target with a much lower target set within a sustainable food production system.

END

To discuss any aspect of this submission, please contact:

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