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RE: Submission to the Commission for Regulation of Utilities on Gas Networks Ireland's Draft Ten-Year Network Development Plan 2023

A Chara,

An Taisce wishes to make the following submission on the CRU's consultation on Gas Networks Ireland's (GNI) Draft Ten-Year Network Development Plan 2023 (TYNDP).

1. Preliminary Matter: Aarhus Convention Requirements

It is acknowledged that this consultation falls under Article 22 of EU Directive 2009/73/EC and SI 16 of 2015 on Energy Regulation, and that Article 22(4) of that Directive contains a specific provision on the consultation process to be undertaken by the regulator:

> *"The regulatory authority shall consult all actual or potential system users on the ten-year network development plan in an open and transparent manner. Persons or undertakings claiming to be potential system users may be required to substantiate such claims. The regulatory authority shall publish the result of the consultation process, in particular possible needs for investments."*

In the consultation paper, the CRU states the following:

> "*The CRU is interested in the views of actual and potential users of the system regarding the TYNDP as presented by GNI, which is published alongside this consultation paper. Following the consultation, the CRU will request GNI to fully consider all comments and suggestions submitted as part of the consultation before submitting the final TYNDP to the CRU for approval.*"

Ireland and the EU are parties to the Aarhus Convention which provides for access to environmental information, public participation in environmental decision-making, and access

to justice in environmental matters. Given the significant and wide-ranging climate and environmental implications of the national gas system operator's gas network development plan, it is submitted that the determination by the CRU on the GNI TYNDP constitutes environmental decision making and therefore falls within the ambit of the Aarhus Convention. While the CRU's above statement on the consultation does not explicitly exclude responses from non-system users, it does not invite public submissions. We therefore submit that the consultation and public notice do not comply with Aarhus requirements for public participation in environmental decision-making and that the consultation needs to be reopened and readvertised.

2. Strategic Environmental Assessment and Appropriate Assessment

In a small note at the end of the table of contents, GNI provides the only statement in the entire TYNDP document on why it has deemed Strategic Environmental Assessment (SEA) unnecessary:

> *"The NDP has been subject to Strategic Environmental Assessment (SEA) Screening to determine the requirement to carry out SEA on the same. In accordance with EPA's Good Practice Guidance on SEA Screening, the NDP was assessed using the 'pre-screening' flowchart and criteria. This flowchart allows for rapid screening out of those plans and programmes that are not likely to have any environmental impact and screening-in of those that do require SEA. Following this assessment, it was concluded that the NDP does not fall within the requirements of the SEA Directive in that:*
>
> - *The NDP is subject to preparation and adoption by a National Authority;*
> - *The NDP is required by legislative, regulatory or administrative provisions;*
> - *The NDP is prepared for the energy sector;*
> - *The NDP applies to one or more of the sectors in the SEA Directive, however, is not considered to set a framework for development consent for projects listed in the EIA Directive; and*
> - *The NDP is not considered to have the potential to significantly effect a Natura 2000 site.*
>
> *In accordance with the EPA methodology, the NDP was therefore not taken forward to SEA Screening. No requirement for SEA is therefore identified as a result of this SEA Screening assessment.*
>
> *Gas Networks Ireland have made an SEA Determination that the NDP 2023 will not give rise to likely significant environmental affects and does not require SEA."*

In the first instance, this statement is contradictory in that it states that the TYNDP was subject to SEA screening and then states that a screening was not carried out.

The TYNDP fulfils the criteria under Article 2(a) of the SEA Directive in that:

a. It was prepared and/or adopted by an authority at national, regional or local level (Gas Networks Ireland – a national authority); and

b. It was required by legislative, regulatory or administrative provisions (EU Directive 2009/73/EC and SI 16 of 2015 on Energy Regulation).

This means it qualifies as a plan falling under the scope of SEA Directive. GNI appear to reach the same conclusion in their SEA note.

Under Article 3 of the Directive, the TYNDP must then also meet the following criteria for a mandatory SEA to be required. It must:

a. belongs to the list of sectors (it does – the energy sector); and
b. set the framework for future development consent of projects listed in Annexes I and II to the EIA Directive, **or**
c. require an Appropriate Assessment under the EU Habitats Directive (92/43/EEC).

GNI states that the TYNDP does not meet either b or c (only one of these is required to be fulfilled). Regarding point c and Appropriate Assessment, GNI states: "*The NDP is not considered to have the potential to significantly effect a Natura 2000 site.*" However, no Appropriate Assessment screening appears to have been carried out that would allow that that conclusion to be reached. We would highlight the EPA's Good Practice Guidance on SEA Screening[1], which GNI themselves cite, which states the following regarding Appropriate Assessment and point c above:

> *"SEA is directly linked to Appropriate Assessment under the EU Habitats Directive through Article 3.2b. In circumstances where screening for SEA is pointing toward screening out (i.e. SEA is determined not to be required), this determination cannot be concluded until such time as screening for Appropriate Assessment (AA) has been concluded."*

In the absence of such a screening under the Habitats Directive, GNI cannot actually legally make the determination that the TYNDP will not have significant impacts on a Natura 2000 site, and as such the need for mandatory SEA cannot be ruled out on that basis. A screening should now be conducted and a full Stage 2 Appropriate Assessment carried out if needed. If a full Stage 2 AA is needed, mandatory SEA is also required.

With regard to point b and whether the TYNDP sets a framework for future development consent of projects listed in Annexes I and II to the Environmental Impact Assessment Directive, many of the gas infrastructure projects GNI carries out and may continue to carry in the future out fall under those Annexes. The TYNDP will in all likelihood be used as the basis and justification for future gas infrastructure projects. We consider that there is uncertainty around this point and on whether this constitutes a framework – therefore, an SEA screening should be carried out.

Regardless of whether the TYNDP fulfils b and/or c of the Article 3 criteria listed above, SEA (and at least SEA screening) may still be needed if the TYNDP may have significant environmental effects. GNI state that, "*Gas Networks Ireland have made an SEA Determination that the NDP 2023 will not give rise to likely significant environmental affects*

[1] EPA Good Practice Guidance on SEA Screening: https://www.epa.ie/publications/monitoring--assessment/assessment/strategic-environmental-assessment/SEA_Screening_GoodPractice_2021.pdf

and does not require SEA." No evidence or analysis supporting this determination have been presented. We consider that significant effects are indeed likely, in particular impacts to climate. There are also multiple potential significant direct and indirect effects of various elements of the TYNDP, many of which are discussed later in this submission. We therefore submit that, at minimum, an SEA screening is required, and that full SEA is very likely needed.

It should be noted that the CJEU has generally taken a broad approach to the interpretation and application of the various aspects of the SEA Directive. This is also highlighted in the EPA SEA Screening guidance.

We submit that the need for an SEA screening, and likely a full SEA, in relation to the TYNDP cannot be ruled out at this stage and that the CRU cannot proceed with assessing and making any decision on the TYNDP until this is determined. As it stands, we do not consider that the TYNDP meets either SEA or Habitats Directive legal requirements.

3. Ireland's Legal Obligations Regarding Emissions Reduction

Section 4 of the TYNDP outlines its view of Ireland's emissions reduction commitments:

> *"Ireland's Programme for Government (PfG) sets a commitment to reducing overall greenhouse gas emissions by 7% per annum from 2021 to 2030, with the aim of achieving net-zero emissions by 2050. The Climate Action and Low Carbon Development (Amendment) Bill 2021 also sets a commitment to net-zero emissions by 2050. These are significantly higher targets than set out in previous policy and are set to shape the Irish energy landscape into the coming decades. In 2022, a carbon budget programme comprising of three 5-year budget periods and sector-specific emissions ceilings, operating within the parameters of the carbon budgets, were approved by the Government and came into effect. The carbon budgets and sectoral emissions ceilings provide a pathway towards Ireland's 2030 and 2050 climate targets."*

We would highlight, however, that emissions in Ireland are subject to two sets of legal obligations:

- Compliance with two carbon budgets (and corresponding sectoral emissions ceilings): 295Mt for 2021-2025 and 200Mt for 2026-2030 based on a 2018 baseline per the Climate Action and Low Carbon Development (Amendment) Act 2021 (hereafter referred to as the Climate Act); and
- A 42% reduction in national Emission Sharing Regulation (ESR) emissions by 2030 based on a 2005 baseline (EU Climate Law).

The TYNDP characterises the carbon budgets and corresponding sectoral ceilings as "*providing a pathway towards Ireland's 2030 and 2050 climate targets*". They also state in section 6.5.9 that:

> *"Gas Networks Ireland recognises the importance of these targets* [carbon budgets and sectoral ceilings] *as a method of reducing the use of fuels with the highest carbon emission rates, and also in promoting the uptake of energy efficiency measures."*

However, we cannot overemphasise that, per the Climate Act, on-time compliance with all carbon budget tonnages is **legally binding**. They are not simply targets. We would highlight that, in the absence of immediate course adjustment and urgent measures, both the Climate Change Advisory Council (CCAC) and the Environmental Protection Agency project a failure to comply with the first budget and indeed with the second as well.

The TYNDP also states in section 6.5.9 that:

> *"In reporting on Ireland's anticipated capability in meeting these carbon budgets and annual targets, Gas Networks Ireland is limited as the NDP does not model the whole energy system, rather it focuses on gas demand i.e. natural gas, biomethane and hydrogen."*

Without such whole system modelling, the GNI assumptions and assertions are meaningless in the context of meeting the legally binding five-year national carbon budget limits and their constituent sectoral emission ceilings. We submit that the CRU needs to assess how the proposed TYNDP aligns or does not align with the legally binding carbon budgets, and as it stands, the TYNDP does not provide enough information and modelling to enable such an assessment. We therefore submit that it should not be approved until such modelling is carried out.

The TYNDP also frequently cites and relies upon measures set out in the Climate Action Plan 2023. However, the measures therein are insufficient to achieve compliance with the 2021-2025 carbon budget. Similarly, the Climate Action Plan 2024, which is currently being finalised following public consultation, also fails to include sufficient measures to get Ireland back on track to carbon budget compliance.

3.1 Obligations Under Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended)

Section 15(1) of the Climate Action and Low Carbon Development Act 2015 (as amended) places obligations on relevant bodies, including GNI and the CRU:

> "*15(1) A relevant body shall, in so far as practicable, perform its functions in a manner consistent with—*
>
> *(a) the most recent approved climate action plan,*
>
> *(b) the most recent approved national long term climate action strategy,*
>
> *(c) the most recent approved national adaptation framework and approved sectoral adaptation plans,*
>
> *(d) the furtherance of the national climate objective, and*
>
> *(e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State.*"

The TYNDP gives no consideration to how GNI will comply with the requirements of s.15(1). Similarly, the consultation document prepared by the CRU also provides no consideration of this. In particular, neither GNI nor the CRU have performed the due diligence required to meet

the s.15(1) requirements under subsections (d) and (e). We would again highlight the TYNDP statement in section 6.5.9 that:

> *"In reporting on Ireland's anticipated capability in meeting these carbon budgets and annual targets, Gas Networks Ireland is limited as the NDP does not model the whole energy system, rather it focuses on gas demand i.e. natural gas, biomethane and hydrogen."*

To comply with (d) and (e), we submit that the CRU cannot support the TYNDP unless and until such modelling is undertaken.

It should also be noted that if the Climate Action Plan 2024 is approved prior to the final determination being made on the TYNDP, per s.15(1)(a), it will be *that* Plan that must be taken into account by the CRU and GNI, not the 2023 Plan.

4. Overarching Comments on Gas Demand and TYNDP Projections

The TYNDP sets out three scenarios modelling gas demand over the period 2022/2023 to 2031/2032 - Low, Best Estimate & High. The modelling predicts an overall decrease in annual gas demand across all three scenarios:

- Low demand – decrease of 34%;
- Best estimate – decrease of 21%; and
- High demand – decrease of 3%.

GNI summarises the reasons for these projected decreases as follows:

> *"The decrease in all three scenarios is primarily driven by the anticipated fall in gas demand in the Power Generation sector, followed by the projected decrease in the Residential sector. The trend in Power Generation demand is linked to the ambitious build-out target assumed for offshore wind and solar generation in Ireland coupled with changes to existing electricity system constraints designed to achieve an 80% renewable energy share in electricity generation by 2030. These factors offset any growth forecast in electrical demand in all scenarios."*

Demand within each sector decreases or increases depending on the sector – we cover sectoral issues in section 6 of our submission.

We note that these projected decreases are set against the context of a peak high gas demand around 2020/2021 (per TYNDP Figure 5-2, Historic Annual Gas Demand), continued planning and licensing applications for fossil gas-fired power plants, continued proliferation of energy-intensive data centres (many of which are attempting to connect to the gas grid), and slow up-take of alternative residential heating options such as heat pumps. The impacts of these factors must all be modelled.

The dominant framing of the TYNDP is the stated need to meet customer demand. There is a distinct lack of any serious focus on demand management and reduction, which is needed to

ensure emissions reduction and alignment with carbon budgets. By perpetuating lock-in to the use of fossil gas, the TYNDP runs counter to our fair-share Paris Agreement commitments, European and national climate policy to phase out reliance on fossil fuels, and compliance with national carbon budgets.

5. Reliance on "Renewable Gas" and Associated Strategies

The TYNDP's proposals to decarbonise the gas grid with "renewable gases" focus on the use of biomethane and hydrogen. Critically, these proposals are reliant upon separate strategies, namely the National Biomethane Strategy and the National Hydrogen Strategy. These strategies a) are outside of the control of GNI and b) have failed to resolve serious scientific doubts about the actual ability of these gases to contribute to decarbonisation.

Quite aside from those scientific doubts, which we will elaborate on in the following sections, renewable gases are only projected to comprise a small share of the overall gas demand over the TYNDP period. GNI states: *"In the Best Estimate scenario, renewable gases are forecast to grow from 0.1% of demand in 2022/23 to account for just over 16% of demand by 2031/32*" (13.6% biomethane and 2.1% hydrogen) Therefore, even with these best estimate projections, fossil gas will still make up 84% of demand in 2031/32.

5.1 Biomethane

The Draft National Biomethane Strategy (NBS) is intended to facilitate achievement of the Government target of 5.7TWh of biomethane production by 2030 (displacing around 10% of fossil gas in the gas supply) from 150 to 200 anaerobic digestion (AD) plants, primarily for injection into the existing natural gas grid. The TYNDP states that one of its key aims is supporting that target: "*delivering on Ireland's increased ambition for biomethane production to 5.7TWh by 2030, is one of Gas Networks Ireland's key priorities*."

An Taisce made an extensive submission to the public consultation on the Draft NBS, which is attached to this submission as an appendix. We request that the CRU take the points therein into account when assessing the TYNDP and its very heavy reliance on the NBS and the scaling up of biomethane production in Ireland. We consider that the Draft NBS likely cannot deliver on its ambitious sustainability and decarbonisation objectives without significant revision on foot of additional analysis of the potential environmental and climate impacts of biomethane production that are evidenced in available expert scientific literature.

The TYNDP consistent frames biomethane as "decarbonised". Crucially, however, biomethane cannot necessarily be labelled as "renewable gas", a "zero-carbon rated fuel", or "decarbonised gas" due to the environmental risks associated with fugitive methane losses, the use of chemical fertiliser to produce silage as a feedstock, and the ammonia emissions which can result from applying the by-product of the AD process, namely digestate. GNI's reliance on biomethane as a gas grid decarbonisation solution completely overlooks these issues, and the assumption of climate neutral biomethane production is highly questionable at best. Just because biomethane production is renewable does not mean it is climate neutral as Figure 4-5's "Renewable Gas Story" in the TYNDP misleadingly claims.

Multiple scientifically reported field assessments show that anaerobic digesters suffer from significant fugitive emissions problems via methane leaks. The effect of the leakage of this potent greenhouse gas may greatly reduce or even negate the potential climate benefits of using biogas in place of fossil fuels. As the 2020 peer-reviewed journal article by Grubert[2] makes clear, AD systems can be climate intensive with high emissions. Any such system would therefore require highly independent, constant monitoring of all AD plants to ensure methane leaks are immediately detected so that plants are immediately shut down until repairs are undertaken. See Appendix 1 for an outline of current scientific evidence regarding fugitive methane emissions.

The most readily available resource for biogas production in Ireland is likely to be grass silage, which will be co-digested with cattle slurry. However, AD predicated on increased grass or energy crop production has the potential for significant adverse impacts to climate and water quality as a result of the increased levels of fertiliser input needed to grow the silage. The Draft NBS failed to consider the high likelihood of chemical fertiliser dependence to produce the large quantities of silage needed as feedstock inputs for AD plants and the production of biomethane.

Peer-reviewed academic research[3] by Beausang et. al. on slurry to silage ratios in the feedstock for potential Irish AD plants finds that feedstocks using a 50/50 mix, with equal masses of slurry and silage, is liable to increase global warming relative to using fossil gas, due to AD methane losses. Additionally, it is also liable to increase ammonia emissions, due to spreading the resulting AD digestate fertiliser, thereby maintaining or even increasing pollution impacts on local air, land and waterways. Furthermore, assessments of biomethane potential by Teagasc, SEAI, GNI, and some energy experts, have repeatedly ignored or downplayed the danger that biomethane production could maintain or increase total nitrogen imports, which have already increased by 20% since 2010. Again, see Appendix 1 for further detail on the environmental and climate impacts of biomethane production.

Producing biomethane for energy generation also raises land use issues, given that the Draft NBS proposes a level of silage production which would amount to a land use change for 120,000 or 5% of available land. Insufficient consideration is given to the displacement impact of diverting the current use of 120,000 hectares of cattle grazing and silage feed grassland to biomethane production. The land area requirements are based on current average yields on Irish grassland farms in which case some displacement of livestock, possibly to housed cattle systems, is a likely consequence. One effect of this if it were not to be linked to a herd reduction would be a requirement for increased animal feed imports. Given GNI's reliance on the NBS and scaled-up biomethane production, these considerations are crucial.

As it stands, costly public investment in significantly scaling up biomethane production is liable to distract from the urgent need to transition away from fossil gas use and away from intensive dairy farming. The Draft NBS and the TYNDP appear to have been premised on the

[2] Grubert, E. 2020. At scale, renewable natural gas systems could be climate intensive: the influence of methane feedstock and leakage rates. Environmental Research Letters, 15, 084041. https://iopscience.iop.org/article/10.1088/1748-9326/ab9335/pdf

[3] Beausang, C., McDonnell, K., Murphy, F., 2021. Assessing the environmental sustainability of grass silage and cattle slurry for biogas production. Journal of Cleaner Production 298, 126838. https://doi.org/10.1016/j.jclepro.2021.126838

continuation of business-as-usual activities from these sectors - they presume the expansion of a biomethane production industry without serious critique or analysis.

The TYNDP also assumes that one of the optimal end uses of biomethane is grid injection. However, we submit that supplying biomethane (assuming it can actually be produced sustainably) to local off-grid industrial users would be far preferable to grid injection and the fossil gas lock-in that causes, provided it is used for electricity generation and is not mixed with fossil gas.

It is not An Taisce's view that there is no place for biomethane, however, issues such as additional scientific evidence on the potential environmental and climate pitfalls of biomethane production and the optimal end use of biomethane require very significant additional consideration. Furthermore, investment emphasis on biomethane risks spending large amounts of public money for little or no public good compared to alternatives for energy generation on land such as solar and wind that are liable to have higher energy output at less cost and with greater net climate benefit.

We would also refer the CRU to the EPA's submission on the Draft NBS, which also raises significant concerns.[4] The EPA are quite clear that far more accurate estimates of emission savings in the agricultural sector are required to assess the overall effectiveness of biomethane production. They also emphasise that biomethane production could easily result in intensification (greater chemical nitrogen use) of land to produce silage, so more N_2O and NH3 emissions and more nitrates pollution:

> *"Securing a reliable feedstock supply is fundamental to the viability of an AD project and obtaining a long-term supply contract from feedstock producers is critical. However, it is vital that activities associated with producing feedstocks don't themselves lead to an increase in farm intensification such as the increased use of chemical fertiliser which can ultimately impact on water quality. The use of cattle slurry (20% of all winter cattle slurry), which is currently an essential part of Nutrient Management Planning, could possibly also inadvertently result in an increased use of chemical fertiliser. There is also the risk of low intensity farmed land being converted to higher intensity grassland to supply several cuts of silage.*"

The TYNDP has failed to address these issues as well.

Notwithstanding the numerous outstanding scientific issues outlined above regarding the expansion of biomethane production, at the time of writing, the Draft National Biomethane Strategy has not yet been finalised, and as such the TYNDP's reliance on it is premature.

5.2 Hydrogen

The TYNDP also relies on the National Hydrogen Strategy, released in the summer of 2023. First, we would highlight that the potential future production and use of hydrogen at scale is still highly uncertain. The transition of a gas network to hydrogen use is very complex technically and procedurally, requiring significant resources and cost outlay. The feasibility,

[4] https://www.epa.ie/publications/corporate/submissions--position-papers/OES-EPA-Submission-on-Ireland%27s-Draft-National-Biomethane-Strategy-05Mar24.pdf

expense and impact of such complex infrastructural change in the context of the need for rapid decarbonisation requires more detailed assessment. Indeed, the TYNDP's strategic hydrogen development timeline (Figure 4.2 on p.23) lists production, transportation, storage and end-use elements which are not feasible until the mid-2030s. Multiple elements do not appear to be fully feasible until 2038-2050, if ever.

Second, any hydrogen production must be demonstrated to be genuinely sustainable – only green hydrogen has the potential for this. The green hydrogen production process requires renewable electricity for the electrolysis of water, and GNI does not appear to have assessed the renewable electricity demand associated with the hydrogen production it envisions. Failure to assess this risks there being insufficient renewable capacity to power electrolysis and subsequently potentially increased fossil fuel reliance, which is incompatible with Ireland's decarbonisation obligations. Cremonese et al. (2023)[5] highlight this potential conflict between the deployment of renewable energy for decarbonising local power grids versus using renewable energy to produce green hydrogen.

Third, if green hydrogen production is viable, the optimal use needs to be established. A detailed briefing paper on hydrogen by Climate Action Network (CAN) Europe[6] highlights the overarching points that:

> *"Given the very limited amount of truly sustainable, renewables-based hydrogen, only sectors and uses for which no other solutions are available should benefit from renewable gases. The use for hydrogen should always be considered after direct electrification with renewables and energy efficiency and energy saving measures".*

and

> *"Hydrogen should also not serve as an excuse to continue gas infrastructure development in a "business as usual mode" and create further stranded assets which will have to be borne by consumers."*

We would refer the CRU to the entirety of the CAN Europe paper, which details multiple potential issues with the production of hydrogen and its use in place of fossil fuels, including but not limited to:

- The preliminary need for "*ambitious energy demand reduction measures, modal shift and electrification*";
- The need to determine the optimal uses such as decarbonising high-temperature industrial processes, aviation, shipping, etc.;
- Additionality and impacts on renewables targets;
- Infrastructure impacts and costs;
- Governance and regulation;
- Market design, viability and regulation.

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[5] Cremonese et al. 2023. The sustainability of green hydrogen: An uncertain proposition. https://doi.org/10.1016/j.ijhydene.2023.01.350

[6] CAN Europe Position on Hydrogen: https://caneurope.org/content/uploads/2021/02/CAN-Europe_position-on-hydrogen_February-2021.pdf

These critical issues have not been assessed or addressed in the TYNDP.

There is also a growing body of scientific evidence that hydrogen also acts as a greenhouse gas, thereby potentially reducing its climate benefit, even in the case of "green hydrogen". For example, a 2022 study by Ocko and Hamburg[7] finds:

> *"For the first time, we show the strong timescale dependence when evaluating the climate change mitigation potential of clean hydrogen alternatives, with the emission rate determining the scale of climate benefits or disbenefits. For example, green hydrogen applications with higher-end emission rates (10 %) may only cut climate impacts from fossil fuel technologies in half over the first 2 decades, which is far from the common perception that green hydrogen energy systems are climate neutral."*

Like the fugitive methane problems associated with biomethane production, hydrogen leaks are likely to be a problem, potentially even more so than methane due to the smaller molecule. A UK study on fugitive hydrogen emissions[8] examines this problem and also highlights the potential climate impacts:

> "*Hydrogen is likely to play a significant role in the decarbonisation of the UK's future energy system. However, there is an increasing body of evidence that hydrogen is itself an indirect greenhouse gas and recent research suggests that it has a Global Warming Potential 11 times that of carbon dioxide (over a 100-year time horizon). Hydrogen, by its nature, is hard to contain and understanding how much hydrogen could be emitted to the atmosphere in a future hydrogen energy system is important for policy development.*"

This is an area that requires significant further research, which as the UK study states, is important for policy development.

Ultimately, GNI has not demonstrated that the use of hydrogen as a gas grid decarbonisation tool is feasible or indeed the optimal use for hydrogen.

5.3 Renewable Gas Certification

Although legislation has already appointed GNI as the Issuing Body for Guarantees of Origin for gas produced from renewable sources, this is unacceptable in An Taisce's view, given that GNI has a vested interest in sustaining the viability of the gas grid. This interest is in conflict with independently governing the sustainability of biomethane or other "renewable" gases.

5.4 Conclusions on Biomethane and Hydrogen Reliance

Despite the TYNDP's heavy reliance on biomethane and hydrogen as "decarbonised" or "renewable gases" and as the key mechanisms to decarbonise the gas system, there is a

[7] Ocko, I.B. and Hamburg, S.P. (2022) "Climate consequences of hydrogen emissions": https://acp.copernicus.org/articles/22/9349/2022/
[8] Frazer-Nash Consultancy (2022) "Fugitive Hydrogen Emissions in a Future Hydrogen Economy": https://assets.publishing.service.gov.uk/media/624ec79cd3bf7f600d4055d1/fugitive-hydrogen-emissions-future-hydrogen-economy.pdf

complete lack of evidence that GNI has assessed the lifecycle impacts of these gases and whether or not they can actually be deemed to contribute to emissions reduction.

The TYNDP makes the following claim in section 1. It is representative of statements throughout the TYNDP that emissions will reduce on foot of increases in "renewable gas" in the network:

> *"Within the time horizon of the NDP, there is a strong drive towards displacing natural gas in the network with renewable gases such as biomethane and green hydrogen. All NDP scenarios forecast that annual natural gas demand will decrease between 2022/23 and 2031/32 while conversely* ***the volume of renewable gases is forecast to increase in all scenarios across the same period. Consequently, annual carbon emissions from the gas network also decrease in all NDP scenarios across the ten-year period."*** [Emphasis added]

Yet TYNDP wholly fails to assess the scientific evidence regarding the well-documented potential climate and environmental pitfalls of "renewable" gases. Therefore, we submit that the claim made repeatedly throughout the TYNDP that carbon emissions will decrease as a result of more "renewable gas" being brought into the network cannot be substantiated at this point.

It is also worth noting the Irish Academy of Engineering's 2018 report[9] on natural gas and Ireland's future energy security, which concludes that deployment of "renewable gases" remains uncertain and fraught with challenges:

> *"However, there are significant challenges to be overcome – planning and permitting, public acceptance, scale and costs of infrastructure needed, gas quality control etc. It is likely to take several decades to develop a large-scale renewable gas industry in Ireland. In the Academy's view, renewable gas will account for only a small part of Ireland's gas supply by 2040."*

Regarding the requirements for the content of the TYNDP, the CRU consultation document states the following:

> *"When drafting the TYNDP, the TSO is also required to make reasonable assumptions about the evolution of the production, supply, consumption, and exchanges with other countries, considering investment plans for regional and community-wide networks."*

It is our firm view that GNI has not made reasonable assumptions or carried out the modelling necessary to determine the actual decarbonisation benefits of biomethane and hydrogen. As discussed above and in the Appendix, serious scientific doubt remains about both.

[9] IAE (2018) Natural Gas: Essential for Ireland's Future Energy Security. Irish Academy of Engineering. Jul 2018.
http://iae.ie/wp-content/uploads/2018/08/IAE_Natural_Gas_Energy_Security.pdf

6. Sector-Specific Issues

6.1 Transport

As stated in section 6.5.4 (and Figure 6-13) of the TYNDP, transport-related gas demand is projected to rise over the Plan period in all three scenarios. GNI states that its vision is to provide Compressed Natural Gas (CNG) for Heavy Goods Vehicles (HGVs) and buses as a low-carbon solution to tackling emissions from the transport sector. They are seeking to deploy CNG fuelling stations nationwide and to convert these to blended biomethane fuelling stations. Here again, the TYNDP assumes that these are low- or zero-carbon solutions while ignoring scientific evidence concerning the climate risks of biomethane production (see the previous section of this submission on biomethane as well as the Appendix).

There is no climate mitigation case for promoting or developing compressed natural gas infrastructure. The use of CNG in transport will not achieve the level of emission cuts required in the transport sector. Developing CNG infrastructure would perpetrate the continued extraction and combustion of fossil gas, worsening lock-in, and impeding the alternative of electric transport from renewable energy generation.

We would highlight a statement in the European Commission's February 2024 review of Ireland's Draft National Energy and Climate Plan (NECP) which is highly relevant to the TYNDP's plan for the transport sector:

> *"A drawback of the plan is the reliance on natural gas for transport, which is not a low-GHG fuel, whose demand and assets shall not be incentivised, notably under the current geopolitical and energy framework. Biogas too would be more efficiently used in high efficiency cogeneration or hard-to-abate sectors where electrification is not possible, rather than for transport."*

Moreover, contrary to assertions by GNI, compressed natural gas (or bio-CNG vehicles) are not a clean solution for transport as reviews of the latest evidence show – they have high levels of fine and ultra-fine particle emissions, as well as high levels of ammonia emissions, which also contributes to particle pollution. Therefore, CNG (or bioCNG) should not be considered a clean or low emission technology.

6.2 Residential Heating

GNI claim that as they "decarbonise" the gas network with biomethane and hydrogen, the gas network will help in decarbonising the residential sector. In section 6.4.3 of the TYNDP they state that they will: "*promote renewable gases as a pathway for these existing homes to decarbonise*". More recent research and policy decisions show this to be a highly questionable claim for both "renewable gases," biomethane and hydrogen. In the USA, the Department of Energy made the very strong statement that "*evidence does not support view that existing gas network can safely handle blend of hydrogen and methane*", due to serious corrosion and leakage issues.[10]

[10] https://www.hydrogeninsight.com/industrial/evidence-does-not-support-view-that-existing-gas-network-can-safely-handle-blend-of-hydrogen-and-methane-says-us-government/2-1-1394325

In the UK a coalition of 20 organisations, including the UK Green Building Council, wrote a letter[11] to the Minister warning against gas industry recommendations concerning blending hydrogen into the gas grid. Specifically, they identified increased gas costs for consumers, delayed emissions mitigation '*as "hydrogen-ready boilers" will continue to burn fossil fuels for decades to come*', and hydrogen and fossil gas lock-in at the expense of genuine renewables investment in solar and wind.

The UK Government has already accepted these as serious issues and has already announced its support for banning gas and "hydrogen-ready" boilers in houses having found that there was "*no practical way to allow the installation of fossil fuel boilers while also delivering significant carbon savings*".[12] Electrification of home heating using heat pumps is being supported as far more effective in decarbonising home heating than the use of hydrogen.

6.3 Industrial and Commercial - Data Centres

The TYNDP projects that gas demand in the industrial and commercial sector will "*continue to increase in proportion with Gross Domestic Product (GDP)52 and in line with anticipated new connection numbers*" despite some offsetting via disconnections energy efficiency measures (section 6.4.2).

Data centres are one of the main categories of large energy users in the industrial and commercial sector, and as of 2022, they accounted for 18% of the country's total metered electricity use.[13] Their power consumption increased 400% between 2015 and 2022 and by 31% between 2021 and 2022 alone.[14] Despite the climate impacts of such significant power use, data centres are being considered on a case-by-case basis by planning authorities with wholly insufficient consideration of cumulative impacts to the climate and energy demand. No national level modelling has been done on the impact of existing, permitted and planned data centres on Ireland's energy demand and the related emissions.

In section 6.4.2 of the TYNDP, GNI indicates ongoing support for on-site gas-fired power generation for data centres:

> *"The Data Centre market continues to seek further growth in Ireland. New demand, which cannot be met solely by the current electricity grid is leading to some Data Centres taking the decision to complement finite electricity grid capacity connections with on-site electricity generation. Using natural gas to generate electricity onsite provides additional flexibility for developers to alleviate demand from the electrical grid in times of low renewable generation which mitigates putting further pressure on the electrical grid from an adequacy perspective."*

[11] https://www.e3g.org/wp-content/uploads/Grant-Shapps-Hydrogen-Champion-Report.docx.pdf
[12] https://www.theguardian.com/business/2023/dec/13/uk-government-backs-plan-ban-gas-hydrogen-ready-boilers-newbuilds2025#:~:text=The%20consultation%20rules%20out%20the%20use%20by%20housebuilders%20of%20all,also%20delivering%20significant%20carbon%20savings%E2%80%9D.
[13] https://www.cso.ie/en/releasesandpublications/ep/p-dcmec/datacentresmeteredelectricityconsumption2022/
[14] https://www.cso.ie/en/releasesandpublications/ep/pdcmec/Datacentresmeteredelectricityconsumption2022/keyfindings/

This practice of connecting data centres directly to the gas grid represents a commitment to fossil fuel emissions that is entirely incompatible with Ireland's climate obligations. No further permissions should be granted for data centres to establish fossil fuel powered generating systems in support of their activities.

The TYNDP goes on to state the following regarding decarbonisation:

> *"There is a clear preference for Data Centre developments that can demonstrate the additionality of their renewable energy use in Ireland and can demonstrate a clear pathway to decarbonise and ultimately provide net zero data services. Gas Networks Ireland believes that Data Centres connecting to the gas network could meet these principles through the use of biomethane and green hydrogen while simultaneously assisting in establishing indigenous renewable gas markets in Ireland."*

This advocates for the "decarbonisation" of data centre energy use via the use of biomethane and hydrogen. We have already critiqued both of these options earlier in this submission. GNI presents no modelling on the impacts of potential "renewable gas" use on data centre energy emissions.

Regarding the additionality point, the dramatic increase in energy demand due to data centre proliferation will dilute progress to Ireland's target of an 80% share of renewable energy by 2023 – the higher the total electricity demand, the more renewable capacity needed to reach the target. Therefore, the more energy intensive developments that come onstream, the more difficult it will be to reach that target. Even if a data centre is entirely powered by a new, dedicated renewable energy development, we would highlight that there is finite capacity for both terrestrial and marine renewable energy installations and the dilution issue remains.

The TYNDP cites the Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy. We would note, however, that despite the fact that the Strategy (per the TYNDP) "*set*[s] *out a series of principles to inform and guide decisions on future Data Centre development*", it was, erroneously in our view, not subject to Strategic Environmental Assessment. This is the only national level policy on data centre development, and it uncritically supports the continued growth of the sector while failing to address the climate impacts of data centre energy demand.

7. Conclusions

The determination of Ireland's future use of the fossil gas infrastructure needs to be compliant with EU Directives and policy as well as national law and policy (in particular the Climate Action and Low Carbon Development Act 2015, as amended). Moreover, it is crucial that national energy policy be determined independently of the national gas infrastructure provider, which has a vested interest in continued gas use.

We submit that the GNI TYNDP as drafted is not fit for purpose as it is not based on any independent assessment of the future of gas use, compliance with binding emissions reduction obligations, and sustainable biomethane and hydrogen production capacity. Even if biomethane and hydrogen could be guaranteed to be actually low- or zero-carbon, the

projected use of these "renewable gases" during the TYNDP period will do little to reduce fossil gas demand and is likely to be used as "greenwashing" for fossil gas use.

We also submit that the TYNDP is also currently failing to meet legal obligations under the Climate Action and Low Carbon Development Act 2015 (as amended), the Strategic Environmental Assessment Directive and the Habitats Directive. The consultation process also breaches Aarhus Convention requirements.

We therefore submit that the CRU should not approve the TYNDP 2023 as drafted and recommend that the following steps now be taken:

- Conduct an Appropriate Assessment screening (and full Stage 2 assessment if screened in) in line with Habitats Directive requirements;
- Conduct a Strategic Environmental Assessment screening (and likely full SEA) in line with Strategic Environmental Assessment Directive requirements;
- Conduct the whole-system modelling necessary to determine compliance with the significant level of emissions reduction needed to stay within the first two carbon budgets, 2021-2025 and 2026-2030, per the Climate Action and Low Carbon Development Act 2015 (as amended);
- Assess both the CRU's and GNI's compliance with s.15(1) of the Climate Action and Low Carbon Development Act 2015 (as amended);
- Conduct an Aarhus-compliant consultation on the TYNDP and the above listed screenings, assessments, modelling, etc.

We request that you acknowledge this submission and inform us of any decision(s) made.

Is muidne le meas,

Phoebe Duvall
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An Taisce – The National Trust for Ireland

Seán O'Callaghan
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An Taisce – The National Trust for Ireland

Appendix

An Taisce Submission on the Draft National Biomethane Strategy

5 March 2024

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Sent by email to: NationalBiomethaneStrategyConsultation@decc.gov.ie

5th March 2024

Re. Draft National Biomethane Strategy

An Taisce welcomes the opportunity to contribute to the consultation on the Draft National Biomethane Strategy (hereafter referred to as the Draft Strategy). In our view the questionnaire format is inadequate for this consultation, therefore we make the following full written submission.

1. Premise and Objectives of the Draft Strategy & the Consultation Format

An Taisce notes a serious imbalance in the mix of stakeholders who contributed to the formation of the Draft Strategy in the first instance (see the Appendix to the Draft Strategy, 'Stakeholder Groups consulted with during the development of the Draft National Biomethane Strategy', pg. 38). Industry experts, developers, gas users, and State bodies were included, but environmental NGO representatives and environmental experts outside of government departments and sectoral agencies as well as those liable to be critical of the strategy – were excluded. Indeed, An Taisce wrote to both the Department of Environment, Climate and Communications and the Department of Agriculture, Food and the Marine in December 2023 on this issue, noting that "[s]uch bias seriously risks the appearance of regulatory capture of NBS [National Biomethane Strategy] development by vested interests".[1]

Similarly, the membership of the Biomethane Working Group fails to include any civil society representation outside of government departments and agencies with Government-appointed leadership, again risking groupthink.

Had such critical perspectives, like those of eNGOs, been included from the outset, issues such as the environmental and climate impacts of feedstocks and feedstock production, fugitive

[1] https://www.antaisce.org/letter-on-lack-of-consultation-for-national-biomethane-strategy

emissions, impacts of the use of digestate as fertiliser, transport emissions, and fossil gas lock-in could have been more thoroughly assessed at an early stage in the development of the Strategy. This input is vital given the substantial potential environmental and climate issues raised by the costly planned expansion of biomethane production as supported by the Draft Strategy.

The Government target of 5.7TWh of biomethane production per annum by 2030 pre-dates this Draft Strategy, and to meet this target, the Draft Strategy supports a plan to produce substantial amounts of biomethane primarily for injection into the existing natural gas grid (displacing around 10% of fossil gas in the gas supply) from a network of anaerobic digestion (AD) plants. The options given are 250 small plants, 90 large plants, or "economic deployment" of 140 larger and smaller plants.

Sustainability is misleadingly presented as merely one of five "key" "interlinking pillars" in the Draft Strategy, but, in fact, it is the crucial pillar on which all of the others depend. In An Taisce's opinion there has been a serious failure of due diligence in the sustainability assessment by the Biomethane Working Group. The imbalance in the stakeholder consultation crucially undermines the case for consideration of the other "pillars" towards an expansion of AD biomethane in Ireland on the basis of this Draft Strategy.

Under the Sustainability pillar, the Draft Strategy states that it aims to do the following:

- *Ensure the development of sustainable biomethane that contributes to the decarbonisation and climate neutral requirements of Ireland's energy, waste, and agriculture sectors;*
- *Ensure biomethane is produced in an environmentally sustainable manner achieving high standards for the protection of water, soil, biodiversity, and ecosystem services.*

These are ambitious and welcome objectives, yet An Taisce considers that the Draft Strategy as written cannot deliver on these without significant revision based on substantial additional analysis of the potential negative environmental and climate impacts of biomethane production that are evidenced in available expert scientific literature.

AD predicated on increased grass or energy crop production has the potential for significant adverse impacts to climate and water quality as a result of the increased levels of fertiliser input needed to grow the silage. With regard to the use of slurry, intensive cattle farming is also a major emitter of greenhouse gases. Any use of slurry for bioenergy production should not be reliant upon or drive further bovine agriculture intensification. This means that clear stated regulatory measures need to be set out in the Draft Strategy to prevent use of nitrogen fertiliser in growing silage for AD feedstock.

As it stands, costly public investment in AD biomethane is liable to distract from the urgent need to transition away from fossil gas use and away from intensive dairy farming. This Draft Strategy appears to have been premised on the continuation of business-as-usual activities from

these sectors - it presumes the expansion of a biomethane production industry without serious critique or analysis.

Similarly, the questions in the consultation survey accompanying the Draft Strategy are also largely based on assumptions that biomethane production *should* be significantly scaled up. This is not a valid basis for open consultation, which should always allow for evidenced contrary views. This submission addresses many of the topics covered in the survey questions, but it is our view that its questions are framed far too narrowly in the context of assumed biomethane industry expansion to allow for meaningful public engagement on the consultation.

It is not An Taisce's view that there is no place for biomethane, however, we would urge the Department to reconsider issues raised in this submission, such as additional scientific evidence on the potential environmental and climate pitfalls of biomethane production and the optimal end use of biomethane, before finalising the Strategy. Proceeding with the Strategy as-is seriously risks exacerbating the climate and environmental issues it aims to address. It also risks spending large amounts of public money for little or no public good compared to alternatives for energy generation on land such as solar and wind that are liable to have higher energy output at less cost and with greater net climate benefit.

2. End Uses of Biomethane and Lock-in to Fossil Gas Infrastructure

The framing of the Draft Strategy envisages locking-in the biomethane production process into existing gas infrastructure by injecting it into the gas grid to be mixed with fossil gas. Decarbonising the existing gas system is one of the main justifications provided in favour of upscaling the process. However, by seeking to maintain a form of gas dependency, the strategy runs counter to the goals of the Paris Agreement as well as European and national climate policy to phase out reliance on fossil fuels. This is a distraction from the urgent efforts required to transition towards renewable forms of energy production.

Biomethane cannot necessarily be labelled as "renewable gas" or a "zero-carbon rated fuel" due to the environmental risks associated with fugitive methane losses, the use of chemical fertiliser to produce silage and the ammonia emissions which can result from applying the by-product of the AD process, namely digestate.

The optimal end use of biomethane must be determined. Supplying biomethane to local off-grid industrial users would be far preferable to grid injection and the fossil gas lock-in that causes, provided it is used for electricity generation and is not mixed with fossil gas.

2.1 Biogas and natural gas usage in transport is not advised

The European Commission review of Ireland's Draft National Energy and Climate Plan (NECP), in February 2024, states that:

> *"A drawback of the plan is the reliance on natural gas for transport, which is not a low-GHG fuel, whose demand and assets shall not be incentivised, notably under the current geopolitical and energy framework. Biogas too would be more efficiently used in high efficiency cogeneration or hard-to-abate sectors where electrification is not possible, rather than for transport."*

Therefore, it is clear that the Commission are indicating that the Draft Strategy's proposed update, which "*will include further consideration of the role for alternative fuels such as Bio-CNG in transport"*, is liable to be a waste of time.

Moreover, contrary to assertions by Gas Networks Ireland, compressed natural gas (or bio-CNG vehicles are not a clean solution for transport as reviews of the latest evidence show.[2] They have high levels of fine and ultra-fine particle emissions, as well as large amounts of ammonia, which also contributes to particle pollution. Therefore, CNG (or bioCNG) cannot be considered a clean or low emission technology, so AD biogas or biomethane should not be used in transport.

3. Negative Environmental Impacts of Feedstocks

An Taisce submits that a far more detailed consideration of the proposed AD feedstock sources is needed prior to finalisation of the Draft Strategy. The consultation survey asks this question in relation to feedstocks:

> *"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 (page 21) that Ireland has ample supply of feedstock to deliver on the 5.7 TWh?*"

We consider that the approach taken in this question is highly premature. Before considering the adequacy of the supply, it must first be determined that proposed feedstocks are sustainable in the first instance and that their production will not exacerbate ongoing issues with greenhouse gas emissions, water quality deterioration, etc., some of the very problems the Draft Strategy purports to aim to address. The Draft Strategy has failed to thoroughly address and assess these issues.

To the contrary, we submit that adverse environmental impacts will arise from the application of inorganic nitrogen fertiliser on land to produce silage. This produces excess nitrates which negatively impacts soils and nearby waterways and releases nitrous oxide and methane. The Draft Biomethane Strategy fails to consider the high likelihood of chemical fertiliser dependence to produce the large quantities of silage needed as feedstock inputs for AD plants and the production of biomethane. Consideration of the fertiliser input of this production is contradictory in the Draft Strategy. On the one hand it is stated that silage for biomethane should be

[2] Transport and Environment, 2020. Compressed natural gas vehicles are not a clean solution for transport: Review of the latest evidence shows high levels of particle emissions. https://www.transportenvironment.org/wp-content/uploads/2021/07/2020_06_TE_CNG_particle_report.pdf

produced with minimal chemical fertiliser. At the same time the objective of improving the efficiency of land already producing grass is advanced.

Without a clear action plan for reducing fertiliser inputs, the biomethane production process will significantly add to the existing pressures on Irish aquatic ecosystems. As a result, the circular economy justifications given throughout the Draft Strategy that biomethane will allow a redirecting of agricultural waste streams and byproducts will be null and void.

The most readily available resource for biogas production in Ireland is likely to be grass silage, which will be co-digested with cattle slurry. However, a peer-reviewed academic study[3] by Beausang et. al. of slurry to silage ratios in the feedstock for potential Irish AD plants finds that feedstocks using a 50/50 mix, with equal masses of slurry and silage, is liable to increase global warming relative to using fossil (natural) gas, due to AD methane losses. Additionally, it is also liable to increase ammonia emissions, due to spreading the resulting AD digestate fertiliser (see section 6 of this submission), thereby maintaining or even increasing pollution impacts on local air, land and waterways.

A warming analysis of this study's methane loss data[4] (see Section 4.3.7) combined with field-recorded AD loss rates shows that the actual warming up to the year 2050 is even worse than indicated using standard emission accounting. However, contrary to the peer-reviewed study of feedstock ratios, the SEAI Sustainable Bioenergy for Heat Study (p. 3) insists that a 50/50 slurry/silage AD feedstock mix is sustainable. While the Beausang study is referenced in the Draft Strategy, its key findings regarding the problems of a 50/50 feedstock mix are not discussed.

Regarding the use of cattle slurry, the Draft Strategy cites research by Teagasc stating: "*Slurry from 1.3 million cattle will be required to meet the 2030 target which represents approximately 20% of all winter cattle slurry produced in Ireland*". We submit that the reliance on large quantities of slurry as feedstock for the AD process used to produce biomethane could incentivise an increase in dairy herd numbers to cater to this need for slurry. The Draft Strategy could lock Ireland into requiring a certain level of bovine slurry, which could disincentivise any moves to diversify into tillage or horticulture, or other non-bovine land uses.

3.1 Need for Regulatory Limits on Total National Nitrogen

There is also a serious risk that total nitrogen use increases rather than decreasing as required by policy commitments.

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[3] Beausang, C., McDonnell, K., Murphy, F., 2021. Assessing the environmental sustainability of grass silage and cattle slurry for biogas production. Journal of Cleaner Production 298, 126838. https://doi.org/10.1016/j.jclepro.2021.126838

[4] Price, P., 2023. Carbon Budgets to Inform Climate Action: A society-wide, integrated GHG quota and accounting perspective. Climate Change Advisory Council Working Paper 19. https://www.climatecouncil.ie/councilpublications/councilworkingpaperseries/Paul%20R%20Price%20Working%20Paper%20No%2019.pdf

Nitrogen pollution from agricultural fertiliser application and cattle excretion is a major environmental issue such that policies in the EU and Ireland target reduction of total nitrogen farm inputs via fertiliser and feed. However, assessments of biomethane potential by Teagasc, SEAI, Gas Networks Ireland, and some energy experts, have repeatedly ignored or downplayed the danger that biomethane production could maintain or increase total nitrogen imports, which have already increased by 20% since 2010.

A primary academic reference for grass production for AD biomethane has been a UCD-Teagasc study[5] that relies on maximising nitrogen fertiliser inputs to land, but a simple calculation based on this article's tabulated data shows that the resulting projected increase in grass yield comes at a much reduced nitrogen use efficiency and uses more fertiliser.

The more recent SEAI-Teagasc research for the SEAI Heat Study[6] states that red clover mixes requiring low chemical nitrogen input can produce silage for AD. However, this advice will only be credibly applied if it can be shown that AD silage is actually being produced via very low nitrogen-input methods. This would be very difficult to monitor and ensure.

Moreover, regarding the recommended AD silage type, the SEAI Heat Study[7], p.52, states that "*the nitrogen requirements of the hybrid/red clover grass sward are estimated to be 90 kg N/ha [70], under half of that required for a standard ryegrass sward (195 kg N/ha)*". This is concerning because AD silage is recommended as a diversification from non-dairy cattle and sheep farming that currently have average nitrogen fertiliser inputs of only 50–55 kg N/ha and 38 kg N/ha[8], respectively. Therefore, even the chemical 90 kg N/ha input for the recommended hybrid red clover and rye-grass sward silage would greatly increase chemical nitrogen input on this land.

Therefore, strictly applied limits on total national reactive nitrogen imports, in both fertiliser and feed, are likely required, and with additional regulation by watershed to ensure water quality. Otherwise, it is all too likely that Ireland's total nitrogen use will not go down as much as required to align with EU Farm to Fork objectives.[9]

We would also highlight that only just over half of Ireland's waterbodies are deemed to be in a healthy ecological state under the Water Framework Directive (WFD). This means that we are at risk of not achieving good or better water quality status for all our waterbodies by 2027, which will contravene our obligation under the WFD. Given the existing pressures on our aquatic

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[5] McEniry, J., et. al., 2013. How much grassland biomass is available in Ireland in excess of livestock requirements? Irish Journal of Agricultural and Food Research 52, 1. http://www.jstor.org/stable/23631018

[6] SEAI, 2022. National Heat Study - Sustainable Bioenergy for Heat: Spatial Assessment of Resources and Evaluation of Costs and Greenhouse Gas Impacts. https://www.seai.ie/publications/Sustainable-Bioenergy-for-Heat.pdf

[7] SEAI, 2022. Sustainable Bioenergy for Heat: Spatial Assessment of Resources and Evaluation of Costs and Greenhouse Gas Impacts, National Heat Study. Sustainable Energy Authority Ireland (SEAI). https://www.seai.ie/publications/Sustainable-Bioenergy-for-Heat.pdf

[8] Murphy, P.N., Thomas, I., Buckley, C., Kelly, E., Dillon, E., Hennessy, T., 2019. AgriBenchmark: Benchmarking Sustainable Nutrient Management on Irish Farms (EPA Research Report No. 274). https://www.epa.ie/publications/research/waste/research-274.php

[9] https://food.ec.europa.eu/system/files/2020-05/f2f_action-plan_2020_strategy-info_en.pdf

ecosystems, it would be premature to push through a Biomethane Strategy which fails to carefully analyse the negative impacts of the fertiliser use required.

4. Suitability of Pasture Grazed System for AD Biomethane

4.1 Land use implications

In addition to the environmental issues with grass silage production as discussed above, the silage production proposed in the Draft Strategy would amount to a land use change for the 120,000 hectares (or 5% of available land) stated to be required to support the Strategy. To put the scale of this land use change in some context, Bord na Mona's total landholding is currently 80,000 hectares.

Insufficient consideration is given to the displacement impact of diverting the current use of 120,000 hectares of cattle grazing and silage feed grassland to biomethane production. The land area requirements are based on current average yields on Irish grassland farms in which case some displacement of livestock, possibly to housed cattle systems, is a likely consequence. One effect of this if it were not to be linked to a herd reduction would be a requirement for increased animal feed imports.

It is concerning that the Draft Strategy does not clearly ban the use of grain or maize in AD digestion. An assessment of the Draft Strategy in the Irish Farmers Journal stated that it "*makes no reference to using cereals or other crops for biomethane production, although these are set to be key feedstocks in projects already planned for Ireland*". If this is true then it directly undermines Ireland's food security by using tillage-quality land to grow crops wastefully for energy rather than food or feed. This would be directly contrary to the "cascading principle" made in the National Policy Statement on the Bioeconomy, as stated in the Draft Strategy.

Therefore the land-use implications of the Draft Strategy require significantly more detailed analyses, and regulatory safeguards are needed to ensure that tillage land is not lost, feed imports do not increase, cereal grains are not used for AD, and nitrogen fertiliser is not used.

4.2 Pollution swapping can cancel climate benefits; other options must be assessed

Also, particularly relevant to Ireland, Scott et al.[10] find that '*the effect of pollution swapping is clearly visible when comparing the nitrous oxide emissions that are highest for the Pasture Grazed system*'.

Pollution swapping is a common negative outcome of claimed climate solutions, whereby "savings" are asserted without clarifying negative trade-offs that reduce or cancel out any benefits, or even worsen the overall outcome. Since pasture grazed systems are the primary

[10] Scott, A. and Blanchard, R., 2021. The Role of Anaerobic Digestion in Reducing Dairy Farm Greenhouse Gas Emissions. Sustainability, 13(5), 2612. https://www.mdpi.com/2071-1050/13/5/2612

form of Irish dairy and beef agriculture, this study strongly suggests that large scale AD biomethane production is of limited potential at best for Irish climate action.

Assessing grass silage feedstock from permanent grassland (as envisaged by the Draft Strategy in Ireland), an AD biomethane assessment by the NGO FeedbackEU[11] referencing a European Commission assessment states that:

> *"From a climate perspective, biomethane from grass feedstock does not measure up to other uses of this land. Compared with grass-biomethane transport fuel, solar electricity generation can avoid 16 times more fossil energy and afforestation can mitigate 6 times more GHG per hectare of land occupied*".

The SEAI Heat Study Key Insights[12] and Teagasc MACC reports fail to include this essential comparison for renewable heat, that is: comparing the land, energy and emissions efficiency of biomethane and hydrogen use injected into the gas grid relative to that of using solar and wind generated electricity and heat pumps. **This appears to be a major due diligence assessment failure by these independent agencies.**

5. Fugitive Methane Emissions Can Easily Cancel Climate Benefits

An Taisce would highlight that scientifically reported field assessments show that anaerobic digesters suffer from significant fugitive emissions problems via methane leaks. The effect of the leakage of this potent greenhouse gas may greatly reduce or even negate the potential climate benefits of using biogas in place of fossil fuels. This issue requires much more detailed consideration in the Draft Strategy.

A highly relevant peer-reviewed journal paper by Scott et al. on The Role of Anaerobic Digestion in Reducing Dairy Farm Greenhouse Gas Emissions[13] uses standard climate accounting to assess AD biomethane from different dairy farm system options in Northern Ireland. Crucially, the study finds that small fugitive methane loss rates '*can wipe out any advantage*' of AD biomethane production.

Expert testimony to the Joint Oireachtas Committee on Environment and Climate Action[14] highlighted the need to address the issue of fugitive methane losses, stating that "*As methane loss may be the largest contributor to the carbon footprint of biogas production it would be important that biogas plants in Ireland monitor, report and address methane losses*"[15]. We submit that the Draft Strategy gives a wholly inadequate consideration to this issue, devoting

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[11] https://feedbackeurope.org/briefing-biomethane-target/

[12] SEAI, 2022. National Heat Study - Net Zero by 2050, Summary Report. https://www.seai.ie/publications/National-Heat-Study-Summary-Report.pdf

[13] Scott, A. and Blanchard, R., 2021. The Role of Anaerobic Digestion in Reducing Dairy Farm Greenhouse Gas Emissions. Sustainability, 13(5), 2612. https://www.mdpi.com/2071-1050/13/5/2612

[14] https://data.oireachtas.ie/ie/oireachtas/committee/dail/33/joint_committee_on_environment_and_climate_action/submissions/2022/2022-07-05_opening-statement-dr-ciara-beausang_en.pdf

[15] Ibid.

only two sentences to it. This is a major oversight given that methane is the most potent greenhouse gas and the ready availability of science showing unsustainable fugitive methane losses are observed in other jurisdictions.

Scientific assessments of AD biomethane repeatedly stress the importance of fugitive methane losses in leakage from AD plants and from digestate spreading that can cancel out much of the claimed climate benefits. Recent field measurements of multiple operational AD plants – in the UK,[16] by the Danish Energy Agency,[17] in addition to another study focusing on Denmark[18] and Belgium,[19] confirm that unsustainable levels of AD and digestate methane losses are common.

The observed average and upper rates are well above the base rate of 0.6% and the maximum of 2% indicated by the Teagasc MACC (p. 120).[20] Teagasc states that '*an increase in fugitive methane from 0.6% to 2% would halve the mitigation potential*', therefore if losses approached the field measurements indicating substantially higher average and high rates, this would likely wipe out much or all climate benefits of AD biomethane.

Regarding "Renewable Natural Gas" (RNG) – a common American industry term for AD biomethane – a journal article by Grubert[21] states that:

> *RNG is not inherently climate friendly. Based on consideration of both the source of methane used to produce RNG and the likely alternative fate of that methane, and using reasonable assumptions about likely system methane leakage, it is unlikely that an RNG system could deliver GHG-negative, or even zero GHG, energy at scale. …*
>
> *Under some system leakage rates that have been observed for biogas systems (Liebetrau et al 2017, Scheutz and Fredenslund 2019), RNG might not even meet the less stringent threshold of outperforming Fossil Natural Gas from a GHG perspective. …*
>
> *This work shows that RNG needs to be carefully evaluated in the context of expected long-run system conditions before it is adopted as a component of a zero GHG energy system, particularly given its potential for methane leakage-related climate pollution.*

Two mitigation measures are mentioned briefly in the Draft Strategy with no further elaboration, namely slurry storage at AD facilities and manure methane abatement additives. We submit that a much more detailed assessment of these mitigation measures is urgently required before

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[16] Bakkaloglu, S., et. al., 2021. Quantification of methane emissions from UK biogas plants. Waste Management, 124. https://www.sciencedirect.com/science/article/pii/S0956053X21000167

[17] https://ens.dk/presse/ny-rapport-om-metantab-fra-danske-biogasanlaeg

[18] Scheutz, C. and Fredenslund, A.M., 2019. Total methane emission rates and losses from 23 biogas plants. Waste Management, 97. http://www.sciencedirect.com/science/article/pii/S0956053X19304842

[19] Vergote, T.L.I., et. al., 2020. Monitoring methane and nitrous oxide emissions from digestate storage following manure mono-digestion. Biosystems Engineering, 196. https://www.sciencedirect.com/science/article/pii/S1537511020301240

[20] MACC 2023, Teagasc. https://www.teagasc.ie/media/website/environment/climate-action/climate-centre/MACC-2023.pdf

[21] Grubert, E. 2020. At scale, renewable natural gas systems could be climate intensive: the influence of methane feedstock and leakage rates. Environmental Research Letters, 15, 084041. https://iopscience.iop.org/article/10.1088/1748-9326/ab9335/pdf

proceeding with any biomethane strategy due to the degree of uncertainty involved. The Strategy's Working Group has advised that a Biomethane Charter be developed to outline the key requirements that the biomethane industry must adhere to. Monitoring and mitigating fugitive methane and ammonia emissions needs to be a key aspect of this.

It is not at all evident that assessments underpinning the National Biomethane Strategy have carried out any such careful evaluation of the national system level fugitive methane or pollution swapping impacts of deploying large scale AD biomethane. This means that there is no strong evidence that supportive policies will achieve much if any climate benefit despite large public monies being invested.

6. High Ammonia Emissions from Digestate Application Can Be Expected

The byproduct of AD, digestate, is advocated throughout the document as a valuable bio-based fertiliser which can be used to replace chemical synthetic fertilisers in agricultural applications. However, research by Beausang et al.[22] found that the digestate from AD plants using high-silage feedstocks, such as the 50:50 mix by weight[23] mix recommended in the Draft Strategy, result in high terrestrial acidification *'due to the large contribution of ammonia emissions from the spreading of digestate'*.

Therefore, covering all digestate stores and Low Emission Slurry Spreading (LESS) techniques when spreading digestate must be required in any final Biomethane Strategy, otherwise residual ammonia emissions can occur which would completely offset the benefits of reducing chemical fertiliser use. These indirect effects of ammonia emissions from digestate application are not adequately addressed in the Biomethane Strategy document.

Excess ammonia emissions from digestate spreading can find their way back into soils and waterbodies in the form of gas or as ammonium in precipitation.[24] This can be highly detrimental to aquatic ecosystems by causing eutrophication due to excess nutrient deposition and the proliferation of algal blooms within the waterbody. This stifles the levels of oxygen and sunlight available to aquatic species and devastates biodiversity. Ammonia deposition can also enrich naturally nutrient poor habitats such as highly protected bogs and heaths, decimating the unique flora they maintain.[25] Consequently, this issue needs to be given careful consideration, which is lacking in the Draft Strategy.

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[22] Beausang, C., McDonnell, K., Murphy, F., 2021. Assessing the environmental sustainability of grass silage and cattle slurry for biogas production. Journal of Cleaner Production 298, 126838. https://doi.org/10.1016/j.jclepro.2021.126838

[23] Note that a 50:50 mix of slurry and silage by weight is close to the 0.2:0.8 slurry:silage mix on a Volatile Solid basis as used in Beausang et al. 2021. This high silage mix results in high terrestrial acidification potential.

[24] https://www.nnfcc.co.uk/files/mydocs/Ammonia%20I%20-%20AD%20and%20digestate%20management%20-%20October%202022.pdf

[25] Guthrie, S., et. al., 2018. The impact of ammonia emissions from agriculture on biodiversity. Rand Europe and the Royal Society. https://royalsociety.org/~/media/policy/projects/evidence-synthesis/Ammonia/Ammonia-report.pdf

6.1 Displacement of chemical nitrogen inputs by AD digestate is highly questionable

Without evidence, the Draft Strategy states the following regarding the use of nitrogen- and nutrient- rich digestate output from AD plants: "*Biobased fertiliser as a replacement for slurry and synthetic fertiliser would be less susceptible to run off into water courses*". This is a common assertion made by AD biomethane promoters, but no peer reviewed studies are being cited to back up this assertion – the lifecycle assessments (LCAs) shown in the Heat Study focus on GHG emissions rather than nitrogen. It appears to be a very doubtful claim simply because no new nitrogen is created in AD plants or in manure/slurry – the same is true for other key nutrients.

This reality is clearly described in the Oxford University assessment, *Grazed and Confused* which notes[26] in regard to manure:

> "*There is of course no magic. Animals do not bring new nitrogen into the system – they just move it about, and if we continue to eat them and their products, there is ultimately a net loss of nitrogen from the farming system. Ultimately, the nitrogen contained in the manure and urine* ***is less than what the land originally started with***." [bold emphasis as in original. p. 85, Garnett et al., 2017.]

The same is true for AD plants: they do not bring new nitrogen into the system – they just move it about, and if we were to use them and their products, all other things being equal, there is ultimately a net loss of nitrogen from the farming system, unless the national system is continually topped up with chemical, feed or atmospheric nitrogen inputs. Therefore, the argument that AD digestate somehow replaces such inputs appears to be highly misleading and likely false on a system-wide basis. If there is strong scientific evidence to the contrary, it must be presented.

7. "Green Gas Certification" Assessment and Governance Are Inadequate

In An Taisce's view the Draft Strategy's claim that the Green Gas Certification Scheme will ensure sustainability is insufficiently justified and the proposed governance system is inadequate.

First, there is ample scientific literature suggesting that solar PV would produce far more useable energy per hectare than bioenergy derived from grass, crops or animal waste. For example, Searchinger et al. 2017 finds that *"any "surplus" land could also provide the same energy and mitigate climate at least 100 times more if 1% were devoted to solar and the rest to*

[26] Garnett, T., Godde, C., et. al., 2017. Grazed and confused? Ruminating on cattle, grazing systems, methane, nitrous oxide, the soil carbon sequestration question – and what it all means for greenhouse gas emissions.Food Climate Research Network, Oxford Martin Programme on the Future of Food, Environmental Change Institute, University of Oxford. https://www.oxfordmartin.ox.ac.uk/downloads/reports/fcrn_gnc_report.pdf

carbon storage." This strongly suggests that any diversification for farmers should focus on solar PV and permanent (native) forestry, especially if diversification is being supported by "green" certification of any kind. The fact that this option has not been examined in the Draft Strategy is a major deficiency.

Second, the finding by Beausang et al.[27] that the 50:50 by weight slurry:silage AD feedstock mix recommended in the Draft Strategy is unsustainable due to high global warming and high terrestrial acidification undermines the entire basis for its claim that the Green Gas Certification Scheme will ensure sustainability. The SEAI Heat Study depends on this 50:50 mix, as do the source Teagasc modelling, SEAI mapping for silage and transport, and Ricardo RED II modelling implemented in the Navigant report[28]. Since the Beausang et al. findings indicate that this feedstock mix fails on sustainability criteria, especially due to fugitive methane emissions and increased ammonia emissions that are not sufficiently considered in these reports, these assessments must all be redone using a lower silage proportion. However, since feedstock mixes with a lower silage proportion have a lower biomethane output and so lower economic viability it appears very doubtful that biomethane production can be both environmentally sustainable and economically viable.

Third, although legislation has already appointed Gas Networks Ireland as the Issuing Body for Guarantees of Origin for Gas produced from renewable sources, in An Taisce's view this is unacceptable, given that Gas Networks Ireland has a vested interest in sustaining the viability of the gas grid and that this interest is in conflict with independently governing the sustainability of biomethane or biogas.

Lastly, if any biomethane that is not injected into the gas network is to be classified as "green" then a green certification will be needed and would be subject to the same concerns as listed above.

8. Additional Considerations

8.1 "Avoided" emissions are only of value if mitigation targets are met

As seen over the past three years, fossil ("natural") gas prices are subject to dramatic fluctuations due to geopolitical events, therefore the gas prices used in most AD biomethane mitigation assessments are speculative or notional at best. Waste management arguments advocating AD to process dairy manure and slaughter waste (possibly including male calves) do not align with mitigation objectives if agricultural emissions do not go down in line with sectoral emissions ceilings. Otherwise, the Draft Strategy objective to 'valorise waste streams' is likely

[27] Beausang, C., McDonnell, K., Murphy, F., 2021. Assessing the environmental sustainability of grass silage and cattle slurry for biogas production. Journal of Cleaner Production 298, 126838. https://doi.org/10.1016/j.jclepro.2021.126838

[28] SEAI, 2019. Sustainability Criteria Options and Impacts for Irish Bioenergy Resources. Sustainable Energy Authority Ireland. https://www.seai.ie/publications/Sustainable-Bioenergy-for-Heat.pdf

only to excuse an additional cash flow that will help to maintain business-as-usual high-emitting dairy and beef farming, thereby undermining rather than assisting with climate action.

Moreover, the basis of "avoided emissions" in mitigation assessments rests on highly questionable assumptions including, the false presumption that bioenergy production from biomass is inherently carbon neutral[29]. Likewise, it is wrong to imply that biomethane production is environmentally unproblematic[30]. This Draft Strategy fails to make it clear that emissions can only be meaningfully "avoided" within a pathway aligned with a fair share Paris Agreement commitment if Ireland's legally binding carbon budgets and constituent sectoral ceilings are being met, which is not the case.

8.2 AD system transport requirements are not quantified

The Draft Strategy's plan to dramatically increase biomethane production will likely require substantial heavy transport to move slurry and silage from farms to large AD plants, to carry pressurised methane gas to gas grid injection points, and to carry digestate fertiliser back to farms. The Draft Strategy does note that 'truck and trailer' transport and 'virtual pipelines' for the transport of gas are less sustainable and more costly than direct grid injection but also that these will likely be required given the location of the potential AD plants and the existing gas network. The potential impacts of these various transport requirements are not adequately addressed nor quantified in the Draft Strategy.

The Draft Strategy states that renewable gas certification schemes will include assessment of transport requirements, yet no further detail on this is provided. We submit that consideration of the transportation issues cannot be left to renewable gas certifications (also see An Taisce's comments on those certification schemes in the Renewable Gas Certifications section above) – it needs to be evaluated in the consideration of the Draft Strategy's viability overall.

8.3 AD biomethane is a high-cost energy source

The SEAI Heat Study states that biomethane 'can be a competitive option if the costs and benefits are shared across all gas grid users', but the new Strategy fails to spell out how this will be achieved. Instead, a few powerful gas users and biomethane supply chain interests are likely to benefit most and any financial benefits to the public remain unclear, so they urgently require clarification. Until such clarification, by SEAI's definition, biomethane will not be competitive or beneficial.

Noting the crucial importance of regional and national system analysis, a European Commission biomethane assessment (p. 237) states[31]:

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[29] Feedback Global, 2020. Bad Energy: Defining the true role of biogas in a net zero future. https://feedbackglobal.org/wp-content/uploads/2020/09/Feedback-2020-Bad-Energy-report.pdf

[30] https://feedbackeurope.org/biomethane-target-an-environmental-disaster-in-the-making/

[31] European Commission, Directorate General for Energy, et. al. 2021. Assistance to assessing options improving market conditions for bio-methane and gas market rules: Final report.

> *"It is important to bear in mind that direct local use of biogas for electricity/heat production is in several cases (if there is local heat need) less costly than converting it into biomethane. Biomethane counts among one of the most expensive RES options (also compared to wind, solar etc.). Covering heat demand by heat pumps is in many cases a more cost-efficient solution than using expensive biomethane to generate heat. Hence, a system approach should be favoured compared to policies focusing on a specific vector."*

This strongly suggests that Ireland's emphasis on using biomethane in "renewable" heat production via the existing gas grid and claimed renewable gas credits is misguided, as electrifying heat delivery via heat pumps and the rapidly decarbonising electricity grid is liable to be far less expensive.

8.4 Potential unintended consequences must be assessed

The Government, its departments and assessing agencies do not appear to have evaluated the danger of unintended consequences from large scale AD biomethane roll-out. In California, the programme of paying for biomethane renewable gas credits from AD has come under serious expert critique for spurious emissions accounting[32] and US dairy industry observers note[33] that *"the returns from energy generated by large farms may accelerate the growth of the mega-dairy farms*".

8.5 Need for planning guidelines

The Draft Strategy states: "*The Department of Agriculture, Food and the Marine together with the Department of Housing, Local Government and Heritage will develop a standardised code of practice for local authorities to be followed when assessing an AD and biorefining planning application*". We consider that such guidance for planning authorities is urgently required, particularly in light of the fact that many AD facilities already have gone through or are currently going through the planning process. The guidance must be based on the best available scientific evidence and address issues raised in this submission, including feedstock sustainability assessment (including the impacts to climate and water from the fertiliser use needed to support silage production, which is an indirect impact of AD development) and control of fugitive methane emissions.

We note that any planning guidelines in relation to AD developments will likely require Strategic Environmental Assessment (SEA) (and least screening for SEA) as they will provide frameworks for the granting of planning consents. Regardless of whether or not any such guidelines or codes of practice do not end up falling under the ambit of SEA, we very strongly recommend that broad and early public consultation be provided for.

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[32] https://insideclimatenews.org/news/30122023/milking-it-california-overstating-climate-benefit-dairy-manure-methane-digesters/

[33] https://hoards.com/article-30925-energy-revenue-could-be-a-game-changer-for-dairy-farms.html

9. Conclusion

An Taisce submits that the Draft Strategy as presented is inadequate for all of the reasons set out above. The consultation was restricted and the Draft does not present quantitative or governance clarity, only a vague framework of AD expansion without any defined regulatory oversight for monitoring, verification and reporting. Therefore no meaningful assessment of it can be undertaken. It is crucial that any Draft Strategy document substantively addresses each of the above issues. Moreover, it is essential that it clearly sets out its quantitative and regulatory basis.

A full environmental, climate, economic and land use comparison of using solar and wind instead of AD biomethane within a national low-carbon transition is required to show that the planned AD biomethane network expansion is justified. We also recommend that an independent risk assessment of the proposed biomethane expansion is carried out.

A Draft Strategy requires explicit scenario assumptions, a detailed independent MRV (monitoring, reporting, and verification) regulatory structure, and projected pathway annual national data up to 2050: for land use, agricultural production (milk, cattle, sheep), AD silage area and nutrient requirement), biomethane production, trucking fuel use (to and from AD plants, to and from farms and gas grid injection), and total national chemical nitrogen use (overall and for AD silage).

Moreover, to avoid farm or regional agricultural intensification, monitored and enforced nitrogen and phosphorus budgets for each river basin are required to limit total nutrient inputs within annual environmental pollution limits for each river basin. These budgets must include all annual nutrient inputs including chemical fertilisers, organic inputs (slurry, urine, manure), animal feed, and atmospheric nitrogen fixation (via clovers and multi-species swards).

In An Taisce's view this Draft Strategy consultation should be paused and only reissued when all required scientific, quantitative and governance information can be presented sufficiently clearly to enable a meaningful assessment by the public and independent experts. Such clarity is legally required for public participation under EU law, under the Aarhus convention and within the National Energy and Climate Plan.