Public Consultation on response to the Review of the security of energy supply of Ireland's electricity and natural gas systems.

Response from: Hydrogen Ireland Association

Introduction

Hydrogen Ireland is an all-island association composed of academics, individuals, NGO's, students and small and large industrial partners from all over Ireland and the UK and a few from wider afield, so that it is an all-Island Association, but not limited by the island.

Hydrogen Ireland Association" aims to:

- Promote the role of hydrogen as a clean fuel and energy vector and related technologies in the energy, mobility, heat, domestic, industrial, and agricultural systems to enable them to become key components of our future low carbon economy on the island of Ireland (Northern Ireland and the Republic of Ireland)
- Contribute to the introduction of sustainable clean technologies and processes for the benefit of citizens and of all sectors of the economy through the promotion, use and development of safe hydrogen technology.

Hydrogen Ireland welcomes the opportunity to respond to the consultation on the security of energy supply of Ireland's electricity and natural gas systems.

Key points:

- Hydrogen will be a crucial component in Ireland's security of energy supply. It has a vital role to play in Ireland's decarbonisation objectives, whilst providing indigenous sources of energy across a range of sectors in the economy.
- Hydrogen Ireland fully supports Ireland's decarbonisaton plans and harnessing Ireland's significant wind resource for the production of renewable electricity. However, this resource requires storage in the form of green hydrogen. Energy storage needs are likely to be significantly greater in the future energy system due to the intermittency and seasonality of wind and solar resources.
- Ireland's security of energy supply policy must look beyond 2030. Whilst Hydrogen Ireland recognizes the need to address short term energy supply challenges, a longer-term view of Ireland's future energy system is needed.
- Ireland's need for a TWhr Energy Storage solution can be achieved through renewable gases such as green hydrogen. Ireland's electricity system is being developed

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around intermittent renewables. Therefore, we need to develop a system capable of storing energy for long periods of time and have access to low-carbon dispatchable energy i.e. via pipelines, when the sun isn't shining nor the wind blowing.

- We also need to plan for an energy system that can store the energy at times when there is more sunshine and wind than we need at that instant. Developing adequate storage for this excess energy could provide seasonal levels of zero carbon energy storage which is necessary for energy security and continuity of energy supplies. 90 days primary energy storage (best practice in EU) is equivalent to ~30TWh storage. This is equivalent to the storage capacity of >15,000 Turlough Hill pumped storage units).
- Whilst other renewable and short-term storage initiatives (such as short cycle batteries, etc.) can and will play an assisting role, to meet this scale, Ireland's energy system will require much larger scale storage solutions which could be achieved using hydrogen.
- From the **climate** perspective, green hydrogen can be used to replace fossil fuels in all sectors of the economy, to assist in the broad decarbonisation of the economy and in meeting Sectoral Emissions Ceiling, Carbon Budgets and ultimately the achievement of net-zero by 2050 at the latest. Ireland's security of supply policy must look beyond 2030.
- Ireland's unique offshore wind potential means we can become a **net exporter of energy** as hydrogen, and export green hydrogen to UK/EU markets through the repurposing of one of the existing natural gas interconnectors.
- Notwithstanding the solidarity mechanisms built into EU energy policy, Ireland must develop an enduring security of energy supply policy with sufficient indigenous storage.
- Gas supply mitigation measures including storage must be future proofed or 'hydrogen ready'. The 'hydrogen ready' label must be based on evidence, and in keeping with the objectives of RePOWER EU, should seek to "...solve the needs for the forthcoming decade, without leading to a lock-in of fossil fuels and stranded assets that inhibit the long-term transition to a climate-neutral economy."[1]

Risks

1. Are there any other security of supply risks that you can identify in addition to those set out in section 6?

The list of security of supply risks in section 6 is comprehensive. Whilst the supply risks have been suitably identified, if we are to achieve an affordable, secure, net-zero energy system by 2050 with short- and medium-term actions, the policy must also consider the effect of **not** meeting certain targets.

[1] RePowerEU resource.html (europa.eu)

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Whilst it succinctly addresses potential risks, in using scenario 5 as an example, the 30-day gas interruption assumes average winter conditions, but it fails to layer additional risks to analyse a confluence of concurrent events. For example, with respect to weather, in Q3 2021 when there was a period of up to 6 weeks of no wind in Ireland, no wind in GB and no wind in North-West Europe.

CEPA's assessment acknowledges it has been carried out under the assumption that the Government's renewable energy targets have been met and the electrification of demand and the delivery of renewable generation capacity by 2030 are broadly achieved. EirGrid's 2030 projections predict there will be significant new additional load from the heat and transport sectors as they are electrified, in line with government targets set out in the Climate Action Plan 2021. (Ireland Capacity Outlook 2022-2031, October 2022). However, it must be acknowledged that in the eventuality of rising electricity demand, if Ireland has not managed to meet its electrification targets, then Ireland will be even more reliant on gas.

The systemic risks associated with Ireland's planning regime, and the delays in the consenting and permitting timelines for the delivery of infrastructure cannot be ignored and should be highlighted as a potential risk. The European Commission in its annual 2022 Country Report – Ireland identified planning as a key issue:

> "Removing bottlenecks to the above investments will be necessary for reducing Ireland's dependence on fossil fuels. Challenges remain with the planning and permitting system, particularly the long timeframe in granting planning permission, which is also linked to the appeal procedures for planning applications. Advancing reforms in these areas would foster greater roll-out of renewables, thus helping diversify the energy mix."

In this context, planning applications for renewable energy projects that facilitate and provide equal access to decarbonising fuels and technologies including green hydrogen across all sectors of the economy should be encouraged by policy coherence measures. There is emerging evidence that projects that propose to facilitate and provide decarbonisation supports including green hydrogen to the communities that host renewable energy installations (wind, solar, electrolyser), are likely to be more acceptable than projects that do not offer such supports.

Notwithstanding the current complexities of the intergovernmental nature of agreements with the UK on gas interconnection, the vulnerabilities associated with curtailment in the UK gas market should have been modelled in greater detail.

Lastly, the threat and impact of cyber-attacks must be addressed in Ireland's security of supply policy. Following on from the recent experience of the ransom-ware attack on the Colonial Pipeline, the impact of gas interconnectors being shut off must be considered in the security of supply policy.[2]

[2] Colonial hack: How did cyber-attackers shut off pipeline? - BBC News

2. If there are other risks that you have identified, could you outline some mitigation options to address the risk(s)?

In order to provide an enduring long-term solution to security of energy supply, the policy must look beyond 2030, and provide a pathway to 2050. There will be a significant portion of the Irish economy reliant on hydrogen with a market of up to 90TWhs potentially in operation in the longer term.[3] It is essential to start planning for our longer-term energy security now. The decisions made for the 2025-2030 landscape need to have the longer-term landscape in mind and the approach should be to 'future proof' our decisions.

With respect to hydrogen, its unique role in supporting the transition to a net zero energy system, and the associated benefits in providing long-term and large-scale storage are overlooked. This is causing a risk. The storage potential of hydrogen is particularly beneficial to Ireland's renewable energy objectives as this will allow for the storage of renewable energy in large quantities, but also for long periods of time. Suitable geological opportunities exist offshore Ireland for large scale hydrogen storage and in depleted reservoirs or salt caverns. Several entities are progressing projects in this field.

As a result of the 2030-time horizon, the short-listed mitigation options fail to account for the **significant** potential of hydrogen in bolstering security of supply. The capability of national geological hydrogen storage scaled to between 10-22TWhrs would enable >90days of electricity backup (when the wind does not blow) and enable industry & transport to use it. The short-listed hydrogen related mitigation options (onshore energy storage, conversion of CCGT to hydrogen) fail to provide sufficient detail on how seasonal storage capabilities could be addressed. The next step of the security of supply policy consultation process should provide more detail on how this could be addressed, for example, in comparison to offshore underground storage. Offshore underground storage could provide seasonal levels of zero carbon energy storage which is necessary for energy security and continuity of energy supplies. The increased penetration of renewable electricity will further drive the need for seasonal storage. The forthcoming Hydrogen Strategy should include a target for hydrogen storage.

In order to develop a comprehensive response to the range security of supply challenges, the policy must take account of the cyber-attacks. A technical assessment is required to examine the scenarios to mitigate7-day, 30-day and 60-day gas interconnector outages.

The main opportunity for storage of energy in gaseous molecular form (including future hydrogen developments) is linked to the distinctive features and advantages compared to batteries and other

[3] SEAI, National Heat Study.

forms of electron storage, as shown in this Frontier Economics report: "*The Value of Gas Infrastructure in a Climate-Neutral Europe*".[4]

To cope with peak periods, storage facilities can be appropriately scaled, to address seasonal/annual storage needs required by the energy systems to address demand swings between e.g. summer/winter or across different years. This has the added benefit of protecting consumers from significant variations in gas prices.

Looking further ahead and embracing Ireland's significant plans for the development of wind as part of its decarbonisation plans, gas storage also provides the necessary infrastructure to support the development of green hydrogen in Ireland.

3. Are the five shock scenarios that were considered, and the additional scenarios related to the Russian invasion of Ukraine, sufficiently broad?

Future energy security reviews (indicated as every two years) should take account of the additional risks set out in response to question 1.

Both physical and geopolitical disruptions could have a material impact on gas supply to Ireland and the lack of in-situ large scale gas storage further exacerbates this situation. While the consultation paper identified 5 scenarios, Hydrogen Ireland believe that the timelines for each of these scenarios should be increased, potentially looking out to 60, 90 and 120 days.

Mitigation

4. Do you have any additional mitigation options that you think should be considered?

CEPA's findings did not short list the commercial operation of a gas storage facility, citing the impact on the future role of natural gas in the energy sector, potentially undermining Ireland's low carbon trajectory. However, this position overlooks the merits in identifying appropriate infrastructure and storage and ignores the scale of storage that will be needed transition to hydrogen and developing the hydrogen infrastructure necessary for both operational and strategic purposes. As outlined in REPowerEU,

> "*…[the] plan cannot work without a fast implementation of all Fit for 55 proposals and higher targets for renewables and energy efficiency. In the new reality, the EU's gas consumption will*

[4] https://www.frontier-economics.com/media/3120/value-of-gas-infrastructure-report.pdf

reduce at a faster pace, limiting the role of gas as a transitional fuel. However, shifting away from Russian fossil fuels will also require targeted investments for security of supply in gas infrastructure and very limited changes to oil infrastructure alongside large-scale investments in the electricity grid and an EU-wide hydrogen backbone."

In order to support the development of a hydrogen economy and energy security aspirations, it is clear that Ireland critically requires indigenous large scale underground gas storage capacity to ensure that its strategic energy reserves are located in country. In addition, access to UK and EU hydrogen networks could play a significant role here too. In general, when it comes to large scale gas storage, the underground gas storage (UGS) solution provides the following functions:

- Provides an additional supply source to ensure continuity in case of supply interruptions due to infrastructure unavailability or commodity shortages (strategic storage);
- Balances the seasonal summer/winter differences in demand and supply;
- Balances day-to-day and within-day variability in demand and supply;
- Contributes to reduce price spikes and volatility in both the gas and electricity markets;
- Supports the additional request of flexibility deriving from the penetration of RES generation as the most efficient and economic energy storage, enhancing the cross-sectoral gas and electricity optimization.

Underground gas storage is not a new concept for Ireland and indeed, the SW Kinsale gas storage facility (2.3 TWh) successfully operated offshore Cork from 2001 to 2016, when it was decommissioned as part of the larger decommissioning of the Kinsale Head producing gas fields. This storage facility provided gas storage, that amounted to c. 10% of the Irish electricity market, providing Ireland with a safe, reliable in-country storage facility that ensured that peak shaving and network support gas resources were in place to avoid supply disruptions and importantly, provided risk mitigation from significant price fluctuations.

As discussed, the development of natural gas storage will also provide the basic infrastructure that will support the expansion of green hydrogen, which in turn, supports the significant investments being made in renewable (wind and solar).

Domestic green hydrogen supply can solve Ireland's energy security by providing locally produced feedstock for dispatchable green power generation which can complement the intermittency of wind and solar, whilst also serving the 'hard to abate' decarbonisation goals in areas such as heavy goods transportation, heat intensive heavy industry and renewable heating obligations.

As noted above, given the scale of hydrogen storage that is needed, it is questionable whether it should operate on a state-only basis as fostering commercial gas storage could be a bridge to commercial hydrogen storage. Notwithstanding the need for energy security controls needed for

commercial gas storage so it is available when needed, it is important that we examine security of supply challenges through the lenses of the energy trilemma, such as the cost on consumers. A non-commercial asset that only operates at times of crises may be suboptimal from a cost perspective so another variation, i.e. commercial with some energy security controls (e.g. including a min. level of storage retention) might be a balanced approach that should at least not be ruled out for now. This is where a robust cost benefit analysis of the various options would assist in determining value for money to the consumer.

5. Which gas supply mitigation options, if any, should be considered for implementation?

Hydrogen Ireland agrees with the assertion that hydrogen and renewable gas in isolation will not be sufficient to mitigate against significant shock events in the short term. However, hydrogen will be an integral part of Ireland's secure net- zero carbon system of the future. There are several aspects that need to be addressed in order to develop an integrated, secure energy system capable of fitting in-to Ireland's statutory climate framework.

Security of supply will be bolstered by a mechanism to encourage investment in hydrogen production. This involved developing a scheme for capital funding for green hydrogen, or a subsidy per kg produced in the for fixed €/kg top up, awarded to specific production plants in line with the Climate, Energy and Environment Aid Guidelines.

Hydrogen production must be complemented by sufficient hydrogen storage. Hydrogen storage will include onshore storage for developing and ongoing use of hydrogen in all sectors of the economy. The use of both hydrogen gas and electricity in industry, transport, public and commercial services and buildings, residential buildings and agriculture will provide consumer choice and resilient routes to decarbonisation. The types of onshore hydrogen storage required for these sectors will require a range of storage and delivery solutions for different end uses of hydrogen gas. Energy security will also require large scale, long term of hydrogen.

Gas Infrastructure Europe's commissioned report "*Picturing the value of underground gas storage to the European hydrogen system*" highlights the vital need for underground storage in Europe. This report, published in June 2021, predates the Russian invasion of Ukraine, which further highlights the need for energy security in terms of strategic storage for both methane gas today, as well as the evolution to hydrogen storage in the future. A benefit of repurposing depleted gas fields include the reuse of existing assets, reuse of pipelines etc.

Following on from the recent revision of the EU Gas Security of Supply, underground gas storage is designated as critical infrastructure. This is defined as "an asset, system or part thereof located on EU territory, which is essential for the maintenance of vital societal functions, health, safety, security,

economic or well-being of people, and the disruption or destruction of which would have a significant impact on at least two Member States, as result of the failure to maintain those functions". Given this recent categorisation of underground gas storage, the role of underground storage facilities, suitable for repurposing for hydrogen storage, should be considered in Ireland's security of supply policy.
In looking beyond 2030, Ireland's regionally significant role in the EU context comes to the fore, including a vision of direct hydrogen pipelines to the continent. interconnector sourced (via a hydrogen pipeline direct to the continent). The European Hydrogen Backbone initiative aims to accelerate Europe's decarbonisation journey by defining the critical role of hydrogen infrastructure – based on existing and new pipelines – in enabling the development of a competitive, liquid, pan-European renewable and low-carbon hydrogen market. By 2040, it suggests one of the 2 Gas Networks Ireland owned interconnectors from the UK could be converted for 100% hydrogen transport and some relatively small-scale reconfiguration of the Dublin gas transmission network could enable local, scale, hydrogen – fired power generation. The other Moffat interconnector could sustain resilient supply to the remaining unconverted network and ultimately green hydrogen export to Great Britain or beyond repurposed pipelines may start to emerge between 2035 and 2040, including a connection to Moffat, enabling hydrogen to flow across the interconnector between GB and Ireland alongside natural gas flows.[5]

Development of Large Scale Subsurface Storage
Following on from the recent revision of the EU Gas Security of Supply, underground gas storage is designated as "critical infrastructure". This is defined as "*an asset, system or part thereof located on EU territory, which is essential for the maintenance of vital societal functions, health, safety, security, economic or well-being of people, and the disruption or destruction of which would have a significant impact on at least two Member States, as result of the failure to maintain those functions*". Given this recent categorisation of underground gas storage, the role of underground storage facilities, suitable for repurposing for future hydrogen storage, should be considered in Ireland's security of supply policy.

SEAI's "*Energy in Ireland 2021*" report provided a summary of Ireland's Total Primary Energy Requirement (TPER). As detailed in this report (and shown below), the predominant sources of energy consumption in Ireland were carbon-based.[6] Whilst the expansion of renewable electrification has made great strides over the past 2 decades, it must be noted electricity (generated from both carbon-based and renewable sources) still only represents c. 27% of TPER in 2020.

Promoting the Development of Green Hydrogen
Current and future plans to increase renewable energy penetration (by onshore wind and solar, and by fixed and floating offshore wind announced by the Government in July 2022) will create the need for further baseload energy to support and back-up the electricity system. This is acknowledged by

[5] https://www.ehb.eu/files/downloads/ehb-report-220428-17h00-interactive-1.pdf
[6] https://www.seai.ie/publications/Energy-in-Ireland-2021_Final.pdf

the government as it looks to expand the fleet of gas fired power stations, thereby removing more carbon intensive power stations.

The future production of green hydrogen can also underpin dispatchable zero carbon power generation. Surplus green hydrogen can also be re-profiled and utilised for decarbonising the 'hard-to-abate' sectors, supplying green energy to those areas not directly served through the electricity market, as well as underpinning security of energy supply and supporting future export opportunities. As Wind Energy Ireland point out in their report "Seizing our Green Hydrogen Opportunity, green hydrogen can be central to creating a clean, decarbonised Irish economy by providing long-term energy storage for the decarbonising electricity market for when 'the wind isn't blowing and the sun isn't shining'.7

Energy storage in the form of green hydrogen can also provide the assurance that Ireland can guarantee a secure energy supply for its citizens and importantly, with even more ambitious wind energy resource targets being set, green hydrogen production and its storage can provide further market support against curtailment, thereby assisting in the economics of wind deployment. The successful acceleration of decarbonising the Irish electricity sector, will create a requirement to ensure that there is suitable "renewable" or "decarbonised" energy storage.

Hydrogen storage can play a critical role in providing future security of supply as natural gas storage currently does for much of Europe in the face of the Ukrainian crisis. Whilst interconnection provides for a diversification of supply, it is only in-country storage that can provide for a security of supply. Without the wind > green hydrogen > storage > power cycle, Ireland's considerable offshore wind resources cannot be developed due to both the intermittency and regionality of weather systems. Given Ireland's lack of indigenous oil/gas resources, it is only by developing its offshore wind resource and its green hydrogen capabilities that Ireland can gain both security of supply and energy independence and therefore, large scale molecular energy storage is critical.

Establish Minimum Storage Thresholds

Under the EU's Oil Stocks Directive (2009/119/EC), EU countries must maintain emergency stocks of crude oil and/or petroleum products equal to at least 90 days of net imports or 61 days of consumption, whichever is higher.8 Stocks must be readily available so that in the event of a crisis, they can be allocated quickly to where they are most needed. Ireland adheres to this EU Directive and so if follows that for any principal consumed energy, a similar 90 days of gas storage should apply. Today, Ireland has no operating gas storage facilities. Ireland's only underground gas storage facility (SW Kinsale) was closed in 2017 and its physical infrastructure is currently in the final stages of decommissioning and removal.

[7] 20220127-greenhydrogenactionreport-002.pdf (windenergyireland.com)

[8] https://energy.ec.europa.eu/topics/energy-security/eu-oil-stocks_en

Historically, Ireland has relied largely on "carbon-based" energy storage, including the storage of coal at Moneypoint (90 days), peat at ESB power stations (1 year), natural gas at SW Kinsale (90 days) and NORA's strategic oil reserves (90 days). In 2020, it is noteworthy that whilst 86% of TPER was fossil based (oil/gas/coal/peat), 96% of primary energy storage was "carbon -based".

Post-Brexit, Ireland also has its only gas inter-connection to a non-EU state (UK) which itself currently has only 5 days natural gas storage. In response to this storage crisis, the UK has recently sanctioned the reinstatement of the offshore North Sea Rough Gas Storage Facility, with the UK government intervening to assist in the purchase of the cushion gas required to make it operational. Rough will add just 9 additional days to UK storage capacity.

To ensure that the future Irish energy system is secure, reliable and resilient, Ireland needs to put in place a significant amount of large-scale energy storage capacity. There are a range of potential TPER scenarios for 2030, net zero electricity, net zero energy - all which generate substantial storage requirements.

Wind Energy Ireland's 0 by 50 report, identifies ~120 TWh primary energy in 2050. 90 days primary energy storage (best practice in EU) is equivalent to ~30 TWh storage.9 This is equivalent to the storage capacity of >15,000 Turlough Hill pumped storage units).

Whilst other renewable and short-term storage initiatives (such as short cycle batteries, flywheels, micro hydro-power etc.) can and will play an assisting role, Ireland's energy system will require much larger scale storage solutions to address the intermittency of renewable power, as well as the plans for significant green hydrogen that will be produced as a result of material increases in offshore wind power over the coming decades. Such large-scale energy storage can only take the form of underground natural gas storage, which has the flexibility to migrate via blending to green hydrogen storage as green hydrogen production increases.

It is common (and best) practice in mainland Europe to have c. 90 days (heating season) of annual gas consumption stored in underground geological formations, and in the amended Gas Security of Supply Regulation to address security of supply arising from the Ukrainian crisis, further measures for EU states to fill their gas storage facilities were implemented. These new rules require the EU Member States to fill storage facilities to 80% of capacity by November 2022 and to 90% in the years thereafter. REPowerEU recommends that members states carry at least 90 days of storage. As stated above, Ireland already does this for oil reserves but to adhere to EU guidelines, 90 days of molecular storage (natural gas and green hydrogen) should be implemented. Based on forecast TPER, this would represent upwards of **30 TWh of energy storage** in the short term.

[9] https://windenergyireland.com/images/files/our-climate-neutral-future-0by50-final-report.pdf

6. Which electricity supply mitigation options, if any, should be considered for implementation?

Plans to increase renewable penetration (by onshore wind and solar, and by fixed and floating offshore wind announced by the Government in July 2022) will create the need for further baseload green energy to support the electricity system. Zero carbon, dispatchable generation is required for a secure, resilient net zero economy. The **conversion of an existing CCGT to hydrogen** should be a priority and consideration must be granted to the fact that two biggest manufacturers of generation equipment are offering blended and 100% hydrogen fuelled gas turbines. While the cost of electricity delivered through this method is high, a study by the FCH JU assumed that Ireland will be one of the early adopters of hydrogen power generation.[10]

However, it goes beyond just the conversion of existing CCGT. Always available zero carbon generation, powered by green hydrogen, of sufficient capacity and with sufficient access to green hydrogen to provide production backup to intermittent renewables for the production of electricity must be considered in Ireland's Security of Supply policy. Experience has shown providing backup to intermittent renewables can be required for extended periods of time. In August / September 2021, there was a 6-week window with limited wind energy production. Analysis of individual wind farms in the UK indicates an annual average wind capacity factor of 50%[11]. This zero-carbon fleet is likely to combine both hydrogen compatible gas turbines and hydrogen fuel cells. This is because Ireland's net zero electricity system will require zero carbon, hydrogen fuelled dispatchable generation, zero carbon energy storage and direct use for zero carbon dispatchable power generation (where the hydrogen is produced, stored or piped in via dedicated hydrogen networks and reconverted to electricity on site). As has been evidenced in the past year, natural gas is a proxy for electricity in Ireland given the central role of gas fired power generation. That role is set to grow given the recent CRU capacity auctions to enlarge the CCGT fleet together with GNI predictions of up to 40% increase in peak gas demand in Ireland over the next five years.

The storage of gas (be it natural gas today or green hydrogen in the future) can therefore be considered as a potential bunker for power generation once it is located proximate, or has direct access, to power stations.

7. What measures should be considered on the demand side to support security of supply of electricity and gas?

Diversification of electricity and green hydrogen fuel use across all sectors of the economy will help to support the development of infrastructure and reduce costs, and increase resilience in climate change

[10] FCHJU | Opportunities for Hydrogen Energy Technologies Considering the National Energy & Climate Plans https://www.fch.europa.eu/sites/default/files/file_attach/Brochure%20FCH%20Ireland%20%28ID%209473093%29.pdf

[11] See UK offshore wind capacity factors – Energy Numbers

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adaptation as well as mitigation. Incentivising all end uses of green hydrogen in Ireland needs to be facilitated within the framework of the Hydrogen Strategy for Ireland.

The annual hydrogen demand required to replace current use of fossil fuels and to comply with the 2030 greenhouse gas emission ceilings for all Group 1 Sectors of the economy combined, has been calculated by Hydrogen Ireland at 1 Megatonne. Additional storage of 0.25 Megatonne (250kt) of green hydrogen is recommended to provide energy security.

8. Do you have any views on how the mitigation options should be implemented?

Mitigation options need to be facilitated within the framework of the Hydrogen Strategy for Ireland. The measures recommended by Hydrogen Ireland to establish a market for green hydrogen, create the right environment for investment, and enable the development of dedicated infrastructure, including for trade with third countries, within the new EU Framework and Hydrogen Strategy for a climate-neutral Europe (see Table 1), demonstrate a commitment to the development of green hydrogen in Ireland.

Table 1. **Measures recommended by Hydrogen Ireland to establish a market for green hydrogen create the right environment for investment, and enable the development of dedicated infrastructure, including for trade with third countries, within the new EU Framework and Hydrogen Strategy for a climate-neutral Europe.**

Measure 1. Hydrogen Strategy Policy Statement
It is recommended that the indigenous production of hydrogen to meet existing and future hydrogen demand be met by electrolysis using renewable energy (wind, hydro, solar, and other renewables), producing clean green hydrogen to replace fossil fuels, facilitate participation in decarbonisation effort nationally, and producing additional green hydrogen for export
Measure 2. Governance
Ireland should develop a flexible, integrated, and results-based governance structure to implement the Hydrogen Strategy for Ireland, including roles and responsibilities in ensuring policy coherence, strategic management, plan and project implementation, co-ordination and support for research and advisory functions, and in the provision of accessible information for citizens and all stakeholders in public-private partnership endeavour for a climate-neutral Europe
Measure 3. Regulatory Measures
1. Transposing of EU Legislative, regulatory and standardisation measures into national legislation 2. Continuous review of interactions of Hydrogen Strategy with Climate Action Planning and implementation of measures

3. Annual audit of decarbonising actions in relation to carbon budgets, Climate Action Plan update including update of 4. Identifying all relevant Government Departments, State and Semi-state Agencies including planning, regulation and certification agencies relevant to governance of the Hydrogen Strategy, and other stakeholders in a public-private partnership endeavour 5. Defining and reviewing governance roles in the context of new and emerging EU legislative and regulatory measures and guidelines; ensuring that agencies are adequately resourced to carry out all required actions and functions
Measure 4. Certification and Guarantees of Origin for hydrogen
Measure 4.1. Identify and resource the Competent Authority and all relevant agencies in Ireland that will have a role in the certification and provision of Guarantees of Origin for hydrogen
Measure 4.2. Establish the National Hydrogen Registry for Ireland Identify, resource and advertise the agencies to be responsible for operating and maintaining the National Hydrogen Registry for Ireland. These agencies will need to be adequately resourced to undertake a new work package required to implement in important part of the Hydrogen Strategy in Ireland, to establish, operate and maintain the National Hydrogen Registry, to interface with the CertifHy European issuing body and registry, and to ensure continuous alignment with the regulatory and standardisation environment for green hydrogen production in Ireland within the EU regulatory framework and Hydrogen Strategy
Measure 4.3. Certification and Guarantee of Origin of green clean hydrogen produced in Ireland in compliance with the CertifHy™ GO scheme: 1. Identify, resource and advertise the agency/agencies to be responsible for operating and maintaining the *Guarantee of Origin for green and low carbon hydrogen produced in Ireland* 2. **Auditors** will ensure that the hydrogen producers (production devices) comply with the CertifHy™ GO Scheme requirements. The auditors are part of a **Certification body**, which has a relevant accreditation to perform this activity 3. The **Accreditation body** (a member of the International Accreditation Forum) controls the quality assurance system of the Certification body. It increases trust in conformity assessment by ensuring that certification bodies have the technical capacity to perform their duties.
Measure 4.4. Hydrogen Certification and Guarantee of Origin - Hydrogen import Policy Coherence Actions: It is recommended that the indigenous production of hydrogen to meet existing and future hydrogen demand be met by electrolysis using renewable energy (wind, hydro, solar, and other

renewables), producing clean green hydrogen to replace fossil fuels, facilitate participation in decarbonisation effort nationally, and producing additional green hydrogen for export. Currently, Ireland imports non-renewable fossil fuel-based hydrogen for use in industry, including oil refining and pharmaceuticals. Hydrogen is a raw material for ammonia production in fertilisers for use in the agriculture sector. Non-renewable hydrogen plays a key role in the production of low carbon liquid biofuels used primarily in the transport sector. Ensure that the update to the Biofuels Obligation Scheme (BOS) provides adequate support for green hydrogen production. It is recommended that all non-renewable hydrogen imports to Ireland are recorded as such in the National Hydrogen Registry, and that the Hydrogen Strategy and Climate Action Plan both develop and implement actions to eliminate use of non-renewable hydrogen in all sectors of the economy in Ireland and replace it with Certified GO green hydrogen produced in Ireland, with full audit and traceability of actions in the National Hydrogen Registry and it's interactions with the CertifHy Registry.
Measure 4.5. Hydrogen Certification and Guarantee of Origin – accounting for potential future hydrogen blending in the natural gas interconnector between Ireland and the UK It will be necessary to develop an agreed methodology for registering and accounting for the greenhouse gas (GHG) intensity of gas transmission in the gas interconnector between Ireland and the UK, including reference to the origin of any hydrogen blended into natural gas.
Measure 5. Interaction of Hydrogen Strategy with Climate Action Plan
Measure 5.1 Update the Terms of Reference of the Climate Change Advisory Council to include analysis of the implementation of the Hydrogen Strategy in Ireland in its annual reporting and include recommendations on measures to further promote and support the production, transmission and use of green hydrogen to assist in meeting progressing decarbonisation, and re-adjust or refocus actions to ensure that decarbonisation targets are achieved.

Policy Measures

9. Do you support the policy measures proposed in section 8 of the consultation paper?

There are additional policy measures that should be considered in the development of Ireland's security of supply policy, including existing and forthcoming EU policy and legislation. Ireland needs a future-proofed security of supply policy focused on facilitation a broad range of objectives, including

Fit for 55 and EU Gas Package proposals. The resulting framework should not create a policy that results in stranded assets and should adhere to the principles of the Taxonomy.

- **Revisions to the Security of Gas Supply regulation:** Ireland is at a disadvantage when it comes to gas storage and has a derogation from meeting the storage requirements of the amended Gas Security of Supply Regulation. As noted in response to question 4, the recent designation of underground gas storage as critical infrastructure should influence Ireland's thinking on this. Not only in terms of gas storage, but with a view to developing future strategic and operational infrastructure to support the net zero carbon energy system through hydrogen storage.

- **The proposed Gas Package (EU Hydrogen and Decarbonised Gas Market Package)** aims to develop a legislative and regulatory framework to encourage low carbon and renewable gases such as hydrogen.

- **RePowerEU** dramatically raised the EU's hydrogen targets. While the initial "Fit for 55" target for 2030 was set at 5.6 Mt, the new REPowerEU strategy has increased the target to 20 Mt, to replace 50 bcm of Russian gas. That means, the use of hydrogen in industrial heat is planned to increase 4.5-fold compared to the already ambitious "Fit for 55" targets, and a more than 2.5-fold increase is planned for transport.

- **Proposals for a EU Hydrogen and Decarbonised Gas Market Package (Gas Package):** At its core, the objective of the gas package is to develop "*dedicated infrastructure, as well as efficient markets. It will remove barriers to decarbonisation and create the conditions for a more cost-effective transition*." This must be considered when key decisions are being made in the investment of strategic infrastructure development.
    - It notes importance of avoiding stranded assets in the clean energy transition and the goal of reducing the dependency of the Union to external fossil fuels providers. (Recital 69, Regulation)
    - LNG and storage system operators shall, at least every two years, assess market demand for new investment allowing the use of renewable and low carbon gases in the facilities. When planning new investments, LNG and storage system operators shall assess market demand and take security of supply into account. (Article 8, Regulation)

10. What further tools and measures do you think would contribute the most to Ireland's energy security of supply?

The Government should address some of the internal barriers to the timely development of electricity generation and energy infrastructure, such as developing grid infrastructure, addressing planning

/delays and adequately resourcing government departments to progress the renewable energy sector.

The next iteration of the Climate Action Plan should promote the use of renewable green hydrogen to assist in decarbonising all sectors of the economy, including its role as a zero-carbon fuel for power generation, decarbonising transport (long distance, shipping, aviation) and industrial processes.

Whilst keeping the fundamental objective of transitioning to hydrogen storage in the next ten years, the nature of the gas storage market should not be overlooked. In many countries in the EU, the gas storage market is a regulated asset business, thereby providing the state with control of the assets, whilst also opening it up for third party access. For example, the Italian gas storage market contain a volume of 'strategic gas' which is always first available to the state to be drawn down in an emergency.

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