This submission addresses topics related to hydrogen and power-to-gas technologies and their roles as important and strategic vectors in future gas network infrastructure and policy documents.

Introduction:

Fuel cells, hydrogen and power-to-gas technologies have been identified as key vectors for energy and transport applications from the perspective of meeting Europe's environmental, energy and economic challenges. Adoption of these vectors has been included in the European Strategic Energy Technologies Plan (SET Plan) adopted by the European Council which itself is in line with the European Commission's "Energy for a Changing World – An Energy Policy for Europe", the goals of the Lisbon Strategy and the European Transport Technology Plan.

The Energy Union strategy has five closely related dimensions, namely:

- Energy Security, Solidarity & Trust
- A fully integrated European Energy Market
- Energy Efficiency Contributing to Moderation of Demand
- Decarbonising the Economy
- Research, Innovation & Competitiveness

As such, development of Ireland's gas network must proceed from a place whereby equality of opportunity for all approved EC paths are provided for.

Overview of Current Hydrogen Projects in Europe:

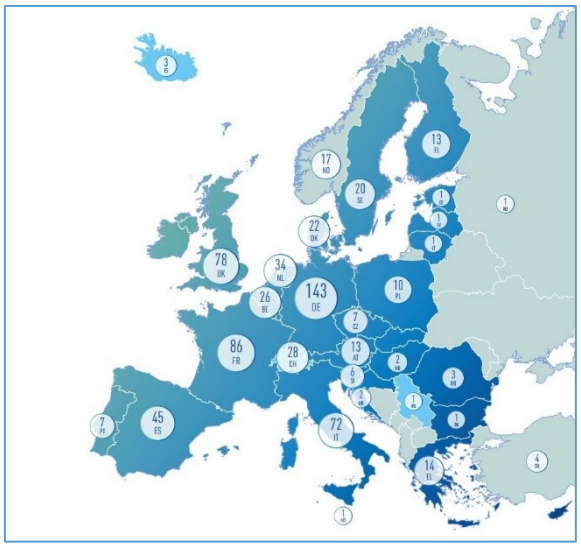

Figure 1. Current Hydrogen Related Projects in Europe

From the image above it can be seen that there is considerable progress being achieved in areas related to hydrogen technologies in all countries in the EU, except for Ireland. In the long term, this can only have a negative effect on Ireland's economic, environmental and social advancement and as such, this area requires development. Many of the EU projects are closely related to Gas Networks Ireland's "Network Development Plan 2017", except hydrogen, rather than natural gas, is the prioritised fuel.

Below we list just a few of many EU projects which are currently in progress and these listed projects will act as reference guides to Ireland's gas network development:

BioROBURplus:
This project produces 99.9% hydrogen from different biogas types. Very similar to the renewable gas projects referenced in GNI's Network Development Plan 2017, this project can require access to the gas distribution network so that extremely clean hydrogen can be injected into the network.

CH2P:
This project aims to build a transition technology for early hydrogen transport infrastructure deployment. This unit is used to create hydrogen and electricity from natural gas and runs at efficiencies up to 90%. It produces hydrogen with purity of 99.999% and CO levels lower than 200ppb. Again, similar to GNI's Network Development Plan 2017 in which they use CNG, this technology can be similarly used to fuel (albeit much cleaner) buses along major transport arteries.

DEMO4GRID:
This project is aimed at providing grid balancing services in real operational and market conditions. The technology is as state-of-the-art large-scale rapid response electrolysis which can supply grid balancing services and can supply hydrogen markets.
In response to the ever growing installed capacity of wind energy in Ireland and the risk that EU ETS markets will result in a GB→Ireland flow on the EWIC from 2020, there will be an increasing requirement to prevent curtailment and to instead, where possible, transform electricity into hydrogen gas which can be used as a energy storage medium for use at a later date, or for immediate use in industry or transport.

HYLAW:
This project is aimed at ensuring the existing legal framework and administrative processes (LAPs), covering areas such a planning safety, installation and operation are systematically identified in 18 national legal systems.
BGN as part of their development plan should consider best practice in the areas of hydrogen technologies from EU member states who currently have significant experience in managing and planning for increased hydrogen content in their networks.

JIVE:
JIVE will pave the way to commercialisation by addressing these issues through the deployment of 142 fuel cell buses across 9 locations. As mentioned previously; joint planning of both CNG and hydrogen may need to be considered.

QUALYGRIDS:
The overall objective of the QualyGridS project is the establishing of standardized tests for electrolysers performing electrical grid services. Similar to renewable gas, the ability for the gas network to accept pure hydrogen at varying locations along the distribution network will be essential to allowing such technologies to be implemented.

PACE:
PACE is a major initiative aimed at ensuring the European micro CHP sector makes the next move to mass market commercialisation. The project will deploy a total of 2,650 new fuel cell micro CHP units with real customers and monitor them for an extended period.
This technology is already nearing approval for installation in residential and commercial settings. As a result, we can see that BGN will themselves be required in the near future to begin installing such units.

In summary, hydrogen is currently being deployed across all traditional natural gas networks – whether it be large scale hydrogen injection resulting from grid balancing, or high efficiency CHP (using reforming) in residential and commercial properties. Planned upgrades to the network must now include hydrogen as a new factor, and for the existing network, extensive study needs to be completed to understand the network's current status in relation to its ability to accept hydrogen.

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