Chris Gould
Energy Transition Lead

Hydrogen Economy Team
DESNZ
6th Floor,
3-8 Whitehall Place
London
SW1A 2AW

Fuels Industry UK
1 Castle Lane
London
SW1E 6DR

Direct telephone: 020 7269 7611
Switchboard: 020 7269 7600
Email: chris.gould@fuelsindustryuk.org

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By email to hydrogentransportandstorage@energysecurity.gov.uk

Hydrogen Blending into GB Gas Transmission Network

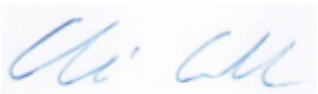
Dear Sir or Madam

Fuels Industry UK represents the seven main oil refining and marketing companies operating in the UK. The Fuels Industry UK member companies – bp, Essar, Esso Petroleum, Phillips 66, Prax Refining, Shell, and Valero – are together responsible for the sourcing and supply of product meeting over 87% of UK inland demand, accounting for over a third of total primary UK energy[1].

The refining and downstream oil sector is vital in supporting UK economic activity. It provides a secure supply of affordable energy for road and rail transport, aviation, and marine applications, as well as for commercial and domestic heating. It also supplies base fluids for use in lubricants, bitumen for use in road surfacing, and graphite for use in electric vehicle batteries and as electrodes in steel and aluminium manufacture.

Our response to the questions posed in the consultation is attached in Appendix A:

Yours sincerely



Chris Gould

[1] Based on the Department of Energy Security and Net Zero Digest of UK Energy Statistics 2024

Appendix A: Fuels Industry UK response

1.

a. Do you agree with the assessment of the impacts of blending up to 2%, 5% and 20% hydrogen by volume on NTS end users?

Agree with caveats

Transmission level blending may impact users and their ability to comply with the relevant Atmosphères Explosibles (ATEX) regulations [2], which is a significant step for many natural gas consumers. Refineries may also potentially understand that they do not have a compliance issue as they have hydrogen in their internal fuel systems, but this assumption may be incorrect. The safety regulation aspects of blending need to be considered, with either recognition of existing safety standards or agreed modification to safety standards (and consequent agreed updates to control of Major Accident Hazards (COMAH) [3] by the Health and Safety Executive (HSE) [4].

The firing of hydrogen into a mix may require burner modification for a typical gas turbine Combined Heat and Power (CHP) plant, as well as potentially significant post combustion modification for NOx control. This means that there are environmental regulatory issues associated with hydrogen blending, in addition to those described above.

Regulatory concerns may be lessened, but not eliminated, by the current "minded to" position to limit gas blending to 2% articulated Q5 below.

We note the additional work outlined in the Progressive Energy study, and the Arup survey who discussed the issues directly with potential end users of hydrogen blended natural gas. We agree that equipment modification is likely to be required, especially above certain hydrogen concentration levels; the need for this will be equipment and facility specific.

The concerns raised would appear to be valid, based on industry experience and reflect the technical challenges involved. Further, the timelines for compliance appear to be pragmatic and in line with industry experience.

b. Are there any further operational and/or financial impacts on end users we should consider? Please provide evidence to support your response.

We discussed the impacts on refining users in our response to the 2023 Consultation on hydrogen blending into the GB gas distribution networks [5].

We note the comments regarding the impact of hydrogen blending into the gas transmission network on the production of hydrogen through steam reforming, on Page 19 of the consultation document. This may not have been previously considered by industry, and the impact of which would need to be considered in more detail to ensure that there are no unintended consequences, particularly if higher blends of H2 are used. As well as the technical impacts on production, this could potentially lead to double counting of incentives for low carbon hydrogen production. These impacts need to be further considered and potentially addressed.

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[2] https://www.hse.gov.uk/fireandexplosion/atex.htm
[3] https://www.hse.gov.uk/comah/index.htm
[4] https://www.hse.gov.uk/
[5] https://www.fuelsindustryuk.org/media/iboj232h/hydrogen-blending-into-gas-networks.pdf

Most refineries in the UK have a Natural Gas connection with flow meter and online quality (Gas Chromatograph or GC) measurement. The capacity of the line and equipment may have to be calibrated and / or modified to enable accurate readings. Once inside the industrial complex it is unlikely that further mods will be required as refinery fuel gas systems can typically cope with a wide range of H2 concentrations, which is relatively stable in composition between 0%v to 70%v without changes to instruments, equipment, or settings of control and/or safeguarding systems.

Potential cost impacts will also depend on whether facilities are supplied by the "distribution" network, or the "national transportation" network.

However, the exact requirements to accommodate fixed or variable hydrogen blends are likely to vary by location depending on the existing infrastructure in place.

Typically increasing hydrogen requires changes to hazardous area classification that may require instrument / electrical changes. It may also require burner, air rate, abatement technology all that have significant lead time. Variability is a challenge in that all equipment is then required to operate over a wider range.

Industry is always grateful for certainty as far in advance as possible to adequately prepare and implement any changes which may be required.

2. Do you agree that if transmission blending is enabled and commercially supported by government, the most appropriate mechanism would be via the HPBM? Please provide evidence to support your response.

Agree

The Fuels Industry UK position on this has not changed from our response to the 2023 Consultation on hydrogen blending into the GB gas distribution networks.

We agree that if blending is enabled and commercially supported by government, then the most appropriate mechanism would be via the Hydrogen Production Business Models, but a small discount should be offered to the NG network operator on top, to incentivise the preferential use of H2 vs Nat Gas. If both are priced equally on a calorific basis, as established under the Low Carbon H2 Production Business Model, the Transport and Storage operators will have no incentive to choose H2 in place of NG, especially considering that some Capital Expenditure and may be Operational Expenditure (compression) may be required to inject the H2 into the NG network.

These models are already becoming well established following approval in the Energy Bill and understood by stakeholders including potential producers, the government and the government appointed counterparty to manage the relevant contracts.

We agree that this approach minimises the administrative burden, which is rising significantly with the introduction of RTFO, SAF mandates, DFD's for grid suppliers, etc. and other government initiatives.

3. Do you agree with our minded to position to allow both the gas transmission network operator and gas shippers to purchase hydrogen produced for blending? Please provide evidence to support your response.

Agree

The Fuels Industry UK position on this has not changed from our response to the 2023 Consultation on hydrogen blending into the GB gas distribution networks.

We agree with the proposal set out in the consulta on that a flexible, hybrid, approach to allow gas distribution network operators and gas shippers to purchase hydrogen for blending is appropriate. This is in line with established processes for conventional gas in the distribution system and creates a level playing field for participants.

4. Do you agree that working within the current gas billing arrangements will not result in an increase in billable usage and gas bills for end users connected to the NTS, should transmission level blending be enabled by government? Please provide evidence to support your response.

Agree, with caveats

Fuels Industry UK agrees that the current billing arrangements will not result in an increase in billable usage.

However, this is contingent on the assertion in the consultation document being correct; that NTS connected sites have equipment such as gas chromatographs to measure the calorific value (CV) of the gas supplied in real time.

Without real time analytical capability, should the hydrogen content change then there will be a material change in CV; for example, if the hydrogen content changes from 20% to 0% then there will be a 14% reduction in energy content of the volume stated, which is an unacceptable difference.

Guidance should be provided on the design, maintenance and calibration of the gas chromatography equipment to ensure that it allows accurate CV measurement. A failure to have accurate equipment will lead to unacceptable inaccuracies in billable usage and gas bills.

5.

a. Do you agree with our minded to position to only consider further whether to support and enable transmission blending of up to 2% hydrogen by volume? Please provide evidence to support your response.

Agree, with caveats

This would seem to be an appropriate approach to take in the initial phase of hydrogen blending into the gas transmission network. It is also consistent with the approach taken in other jurisdictions.

However, this limit should be reviewed after a suitable period once operation is established, to ensure that it remains fit for purpose, is not unduly conservative and does not penalise the development of the low carbon hydrogen sector.

As we discuss in our response to the 2023 Consultation on hydrogen blending into the GB gas distribution networks, Fuels Industry UK view is that hydrogen blending is not a temporary solution and should not be limited in the longer term. By providing a permanent outlet into sections of the NG network which can cope with 20% hydrogen, the UK creates more stable demand which enable more de-risked low carbon hydrogen production projects to come online accelerating the development of the market.

b. Do you have any further concerns on enabling blending up to 2% hydrogen by volume into the NTS? Please provide evidence to support your response.

Yes

Transmission level blending may impact users and their ability to comply with the relevant Atmosphères Explosibles (ATEX) regulations [6], which is a significant step for many natural gas consumers. Refineries may also potentially understand that they do not have a compliance issue as they have hydrogen in their internal fuel systems, but this assumption may be incorrect. The safety regulation aspects of blending need to be considered, with either recognition of existing safety standards or agreed modification to safety standards (and consequent agreed updates to control of Major Accident Hazards (COMAH) [7] by the Health and Safety Executive (HSE) [8].

The firing of hydrogen into a mix may require burner modification for a typical gas turbine Combined Heat and Power (CHP) plant, as well as potentially significant post combustion modification for NOx control. This means that there are environmental regulatory issues associated with hydrogen blending, in addition to those described above.

Regulatory concerns may be lessened, but not eliminated, by the current “minded to” position to limit gas blending to 2%.

c. Is there a maximum level of blend that would be feasible with minimum modifications for sites connected to the NTS? Please provide evidence to support your response

We do not have a firm view on this question

The initial level of hydrogen blending should be low as sites will be impacted relatively early. Levels can then be increased further as experience develops, and regulatory requirements are understood and managed.

The maximum level should be set at a level that does requires potential recalibration of existing equipment, instead of the installation of replacement equipment.

[6] https://www.hse.gov.uk/fireandexplosion/atex.htm
[7] https://www.hse.gov.uk/comah/index.htm
[8] https://www.hse.gov.uk/

6.

a. We welcome feedback on the economic assessment presented and any further analysis on the costs and benefits of transmission blending.

We note the significant reduction in blended hydrogen to 2050 contained in Figure 3 of the consultation document. However, the basis for this reductio based on an overarching reduction in natural gas consumption, is unclear, making it difficult to comment on its veracity.

This assumes a certain level of uptake in solutions such as heat pumps for home heating, or electrification in industry. We note the 2024 National Audit Office report on this [9], indicating that uptake is significantly slower than expected and that government policy is overly ambitious.

The take up of low carbon electricity is also highly ambitious and needs to be delivered in line with the clean power action plan [10] in order to enable potential electrification options.

We also question how practical deblending would be in practice, especially if the hydrogen content of distributed natural gas is highly variable, leading to deblending equipment having to potentially start up and shut down. Such operation would be problematic at best, responding to operations outside the deblending equipment operators control and lead to increased operating costs which may not be considered at this time.

b. Please provide any additional information on the costs of any required modifications or mitigations required for NTS connected sites to be able to accommodate a blend of up to 2% hydrogen by volume. If you do not currently have this information, how long do you expect it take to assess what mitigations might be needed and what the costs of these could be?

Fuels Industry UK has no further information on the costs at this time.

[9] https://www.nao.org.uk/press-releases/low-heat-pump-uptake-slowing-progress-on-decarbonising-home-heating/
[10] https://www.gov.uk/government/publications/clean-power-2030-action-plan/clean-power-2030-action-plan-a-new-era-of-clean-electricity-main-report