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16 September 2025

Dear Hydrogen Economy Team,

We welcome the opportunity to respond to your consultation on the potential strategic and economic value of hydrogen blending into the GB gas transmission network (National Transmission System [NTS]) and lead options for its implementation, if enabled. Citizens Advice is responding as the statutory consumer advocate for energy consumers in Great Britain.

Executive summary

We generally agree with the technical assessment of blending up to 2%, 5%, and 20%, but have raised some concerns around consumer cost, equity and value for money. Industrial users may benefit directly but households risk indirect cost burdens without corresponding advantages. Blending also offers limited carbon reduction at high cost, which may shift focus from more effective decarbonisation options like electrification and energy efficiency.

We call for:

- Stronger protection frameworks to prevent unjustified cost pass-through to consumers.
- Greater transparency and detailed cost–benefit analysis before proceeding.
- A cautious approach to blending, limited to 2% or less, and only if consumer protections are in place.

We agree that blending should be seen as a transitional measure, not a long-term solution, so its implementation must not undermine progress toward fair, affordable, and effective decarbonisation.

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Responses to selected consultation questions

Question 1

a) Do you agree with the assessment of the impacts of blending up to 2%, 5% and 20% hydrogen by volume on NTS connected end users? Please provide evidence to support your response.

We broadly agree that the government's assessment captures the key technical risks and cost implications across the explored blending scenarios. However, we would like to emphasise the need for stronger consumer safeguards, transparency on cost recovery and clarity to prevent false consumer expectations.

While end users directly connected to the NTS e.g. power generators, industrial users, may benefit from slightly lower carbon emissions as immediate recipients of blended gas, the costs of the required equipment upgrades, site assessments are likely to be passed through to households and small businesses via wholesale market pricing mechanisms or capacity charges. In October 2023, Citizens Advice published a response to a DESNZ consultation on hydrogen blending into GB gas distribution networks, where we called for clear protections to prevent unjustified costs being socialised across energy bill-payers. Many households are already struggling to afford energy and any increase in system costs, including those from hydrogen blending, may worsen the situation if protective cost-allocation frameworks are not introduced. Without such frameworks, lower-income households may end up paying disproportionately for industrial decarbonisation pathways from which they may derive limited direct benefit.

In addition, hydrogen blending offers uncertain carbon reduction benefits for the general public at a significant cost. As our prior response highlighted, hydrogen use in domestic heating is less cost-effective than alternatives such as electrification, insulation, and heat pumps. Similarly, we are unsure of the economics of using hydrogen in power generation. We therefore urge the government to demonstrate strong value-for-money justification before moving forward with NTS blending, especially at higher blend levels. Investment should prioritise interventions that provide clear and immediate public benefits, not simply technological support for industrial sites or hydrogen producers. The consultation also mentions that detailed cost estimates for

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modifications and mitigations remain limited. We call for a comprehensive cost–benefit analysis, including wider distributional impacts, before any hydrogen blending at the transmission level is enabled.

We strongly support the call for site-specific assessments and early Original Equipment Manufacturers (OEM) engagement, as noted in the consultation, to avoid unexpected consumer cost burdens. We urge the government to publish detailed cost estimates and assumptions, in line with our previous calls for balanced and evidence-based information, to support stakeholder and local values decision-making.

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

We believe that the government's analysis should extend to broader cost allocation implications, market impacts and consumer equity, as well as clearer commitments to ensure consumer benefit. We are conscious that the cost of system and equipment upgrades or deblending may be passed through to energy consumers via the energy system, particularly if cost recovery mechanisms are unclear or inequitable. We propose that DESNZ models the distributional impacts on different household types, regions and energy bill segments, as recommended in our previous consultation submission. In addition, NTS-connected industrial clusters or regions may bear disproportionate transition costs, so any roll-out plan should include mitigation or support for communities in affected regions.

On deblending, from a consumer protection and fairness perspective, its deployment raises concerns about cost, equity, technology readiness and access. As noted in the consultation, hydrogen deblending is currently rated at Technology Readiness Level 4, meaning that it is still at an early development stage. Large-scale deployment, particularly at the national transmission level, would be both technically complex and capital-intensive. According to feasibility studies referenced in the consultation (e.g. NGT's Hydrogen Deblending Phase 2), costs rise significantly when targeting lower hydrogen concentrations (e.g. to meet the GS(M)R limit of 0.1%). This makes deblending economically unviable for most sites without substantial investment support, and unsuitable for a widespread rollout in the near term.

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If deblending is needed to protect specific industrial or power generation processes, there is a real risk that wider energy consumers will be required to subsidise these costs through gas network charges or other market mechanisms. From a Citizens Advice perspective, it is unfair for consumers, particularly low-income households, to support the cost of enabling decarbonisation in sectors that may not provide them with direct benefits. This echoes our stance in the 2023 consultation, where we warned against shifting infrastructure adaptation costs onto general consumer bills without strong justification and clear cost controls.

Many end users surveyed indicated that they are uncertain whether deblending is technically feasible or cost-effective at their site, in part because OEMs have not yet offered fully commercialised solutions. We recommend that deblending not be relied upon as a primary mitigation measure for hydrogen blending rollouts until it is commercially mature, widely available, and cost-effectiveness is proven.

3. Do you agree with our minded-to position, if blending were enabled, to allow both the gas transmission network operator and gas shippers to purchase hydrogen produced for blending?

We are supportive of a hybrid buying model in which both the NGT and gas shippers could purchase low-carbon hydrogen for blending. We would however, like to see strong mechanisms and governance to protect consumers. In our previous consultation response, we raised concerns that blending could place financial risk and cost on consumers while reducing public trust in the energy transition if not carefully regulated. We believe that these concerns are equally relevant at the transmission level.

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?

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Blending of up to 20% could still raise consumer bills due to lower calorific content, requiring greater volumes to deliver the same heat. Therefore, while the billing systems measure energy delivered (in kWh), hydrogen's lower calorific value means higher volumetric delivery may indirectly increase cost unless pricing safeguards exist and the lower calorific value is accurately captured. We recommend that the government publish further robust modelling and consumer impact assessments, including:

- Effects on vulnerable or fuel-poor households.
- Scenarios where the hydrogen price exceeds or is subsidised relative to methane.

Question 5

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

We broadly support the government's evidence-based approach to considering hydrogen blending in the gas transmission system up to a maximum of 2% hydrogen by volume. We would like to see further assessment of its consumer impact and system costs and how hydrogen blending can support the country's long-term decarbonisation goals. It is necessary to ensure that household affordability is continuously reviewed and that consumer interests are protected throughout.

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.

While we acknowledge that blending up to 2% hydrogen is technically feasible, we have concerns in the following areas:

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- Consumer bill impacts and equity: Distributional impacts must be assessed and it must be clear who pays and who benefits before a blending solution will be implemented. Households may not directly benefit from blending, yet still bear indirect costs.
- Operational risks: The Arup study highlighted that even a 2% blend can pose operational issues due to blend variability, especially for users with sensitive equipment or combustion processes. For gas storage sites, hydrogen blending can reduce storage capacity and affect deliverability, which could impact system resilience during high-demand periods.

- Risk of decarbonisation delay: There is a risk that enabling blending, even at low levels, could be misinterpreted as a long-term decarbonisation solution, delaying more effective structural changes, i.e. electrification of heating. The consultation makes it clear that blending should be seen only as a temporary, transitional tool, not a long-term strategy.

Question 6

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

We are generally supportive of the economic analysis presented in the consultation.

However, our main concern is the distributional impacts of transmission blending as the costs fall on NTS-connected users, many of whom will pass those costs through to consumers (e.g. through electricity prices). Many NTS users will require costly upgrades, and these costs are not yet fully understood.

In addition, we agree that more evidence is required to support that end consumers will benefit from 2% blending, especially if it is only a temporary solution. Given the declining use of natural gas over time, there is a risk that blending-related infrastructure will become stranded, creating long-term liabilities for consumers.

We urge the government to provide more evidence and a value-for-money comparison between hydrogen blending and other decarbonisation pathways.

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Yours sincerely

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