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Lifting the lid on the UK Hydrogen Strategy

How it stacks up against E3G's 'benchmarks for success'

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UK Hydrogen Strategy - overview

Clean, green hydrogen produced using renewable energy could play a key role in decarbonising certain important sectors of the economy, such as heavy industry and steel. The UK Government's new Hydrogen Strategy shows some welcome ambition, but must be followed through with clear governance mechanisms if the UK is to be an international leader.

The Strategy backs a 'twin track' of pursuing both clean green hydrogen and fossil-fuel based blue hydrogen. Clarity is now needed regarding how the transition towards zero emissions hydrogen will be managed, ensuring the proposed standard for 'low carbon' hydrogen is aligned with climate science. Clarity on measures to avoid a lock-in of high carbon jobs and infrastructure will also be essential to keep on track for climate targets and avoid stranded assets and jobs, for a just transition.

The Government has postponed certain key decisions until later down the line: including on blending hydrogen into the fossil gas grid, and the role of hydrogen for heating – including a potential nationwide roll-out of hydrogen ready boilers. Decision-making processes should be inclusive and transparent, taking a precautionary approach on areas where there remain many unknowns. Clarity is required in the forthcoming Heat & Buildings Strategy on where hydrogen will and won't likely make sense for heating our homes to avoid sub-optimal results for climate, consumers and communities.

This document looks under the bonnet of the new Strategy, considering how it weighs up against the expectations E3G set out early this year in its report [*Between hope and hype: a hydrogen vision for the UK.*](#)

UK Hydrogen Strategy - overview



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The table below shows how the Strategy stacks up against E3G’s benchmarks for success, using a traffic light system – with red indicating poor alignment, amber indicating a mixture of positive and negative, and green indicating a positive outcome. The table shows that while the Strategy contained some welcome conclusions, there remains room for improvement across the board – and some areas of significant concern.

E3G’s benchmark for success	Status
1. The UK should focus on green hydrogen to show climate leadership and make gains in the international innovation race.	●
2. The UK should set out a vision identifying where green hydrogen production and use is likely to add most value.	●
3. Governance mechanisms are needed for risk-managing delivery and avoiding a ‘lock in’ of fossil fuel derived energy sources.	●
4. Take a precautionary approach to scaling up hydrogen, rather than assuming its role.	●
5. Hydrogen pipelines should be built around secure hydrogen demand and supply.	●
6. For the decarbonisation of heat in buildings, the UK should focus on making rapid gains on energy efficiency, heat pumps and renewable heat networks.	●
7. A large focus on jobs, skills and supply chains is required to ensure a just transition and support the “levelling up” agenda.	●
8. The Government must promote evidence-based and society-wide decision making.	●

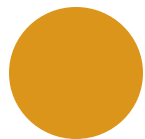


1. The UK should focus on green hydrogen to show climate leadership and make gains in the international innovation race.



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E3G's benchmark for success	How the Hydrogen Strategy stacks up and next steps
<p>The UK should focus on green hydrogen to show climate leadership and make gains in the international innovation race.</p> <p>Blue hydrogen is not zero emissions and should not be classed as 'low carbon'. We discourage the UK from taking a 'twin track' approach of pursuing both green and blue hydrogen. The UK can show leadership through introducing targets and standards which support green hydrogen and ensuring that public funding is only used to develop zero emissions fuel and technologies.</p>	<p>The UK has stuck with its proposed 'twin track' approach of supporting both blue and green hydrogen. This is despite a growing evidence base highlighting fossil fuel-based hydrogen is not zero emissions – and the Government's own recognition that the <i>"costs of electrolytic hydrogen are expected to decrease considerably... and in some cases could become cost-competitive with CCUS-enabled methane reformation as early as 2025."</i> The UK risks missing the opportunity to become an international leader on green hydrogen and has committed substantially less public funding to scaling green, compared to other countries.</p> <p>The Government is looking to <i>"develop further detail on our production strategy and twin track approach... by early 2022"</i>. What is urgently needed next is clear governance structures, including timelines and accountability mechanisms. The Government looks to consult on a 'low carbon' hydrogen standard, risking conflation of blue and green hydrogen if the bar is set too low and not aligned with net zero; and must be based on actual operational performance.</p> <p>Careful consideration is needed to ensure that costs are covered in a way that is fair for consumers and tax-payers – particularly the most vulnerable. There are concerns that a levy on gas bill could be regressive and unfair, particularly for households in areas where green hydrogen is likely to emerge as a long-term solution.</p> <p>The government should:</p> <ul style="list-style-type: none"> ➤ Urgently clarify the governance mechanisms for a smooth transition to fully zero emissions hydrogen; including the role for scaling renewables, efficiency and circular economy measures. ➤ Ensure the 'low carbon' standard is guided by robust climate science which fully assesses the lifecycle emissions of production; supporting growth in zero emissions hydrogen. There is a need to ensure interoperability with EU systems. ➤ The UK's forthcoming Green Taxonomy must be geared towards driving investment in the lowest emission hydrogen.



2. The UK should set out a vision identifying where green hydrogen production and use is likely to add most value



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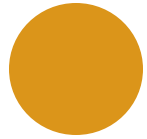
E3G’s benchmark for success	How the Hydrogen Strategy stacks up and next steps
<p>The UK should set out a vision identifying where green hydrogen production and use is likely to add most value, ensuring a cost-effective use of public funding. A system-wide stock-take can help establish where hydrogen adds the most value for jobs, productivity growth and climate – focused on sectors that do not have alternative decarbonisation options, and regions which have access to abundant renewable energy sources like offshore wind. This is mainly applicable to high temperature heat in industry, shipping and aviation, and long-duration storage in the power sector.</p>	<p>The Strategy contains welcome principles which recognise the need to take a holistic approach and provide long-term value for the taxpayer, while cutting emissions. There is recognition of a need for a systems approach, focusing on scaling production in industrial hubs. The document also sets out the sectors where hydrogen could add most value and includes nuanced language on others – such as heating – where the case is less certain.</p> <p>However, the door has been left open for decision-making on hydrogen which promotes uses that add least value for climate, consumers and taxpayers. Stronger signals of Government intent could steer private and public investments into areas which add more value.</p> <p>The Government has not clearly laid out how it will decide which sectors will benefit from the initial planned 5GW of production and has instead largely left this to be determined through industry trials and pilots. For example, while a growing body of evidence highlights that hydrogen for heating is not a resource-efficient solution for most of the country, ‘Project Union’ explores a <i>“National Grid project to repurpose around 25% of the current gas transmission pipelines and could carry at least a quarter of the UK’s current gas demand”</i>.</p> <ul style="list-style-type: none"> ➤ Aware of the risk of ‘picking winners’, the Government can play a stronger role in providing objective, science-based analysis to support the scaling of green hydrogen where it adds most value. ➤ The Heat & Buildings Strategy should be used to confirm where hydrogen for heating is –and isn’t likely to make sense – and rule out nationwide blending and roll-out of so-called hydrogen ready boilers, focusing on ‘zoning’ for heat decarbonisation instead. ➤ Government should offer Local Authorities independent scientific support to evaluate the suitability of scaling hydrogen production and consumption in their region.

3. Governance mechanisms are needed for risk-managing delivery and avoiding a ‘lock in’ of fossil fuel derived energy sources.



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<p>Governance mechanisms are needed for risk-managing delivery and avoiding a ‘lock in’ of fossil fuel derived energy sources.</p> <p>These should ensure a switch away from fossil-based fuels, and could include clear timelines and targets, transparency and accountability mechanisms, and regulations and standards which support a phase-out.</p>	<p>While recognising their importance, the Hydrogen Strategy does not set governance mechanisms for risk-managing delivery. It will instead <i>“finalise design of the UK standard for low carbon hydrogen”</i> and <i>“provide further detail on our production strategy and twin track approach”</i> by early 2022. It is essential that the bar is set high through these forthcoming documents to guide the UK towards a zero-emissions hydrogen economy.</p> <p>While recognising <i>“we will need to manage or mitigate the risk of stranded assets if pipelines developed for initial projects in the 2020s are not fit for purpose in the 2030s”</i>, no clarity is yet provided on how this will be done. Without these mechanisms, there is a risk industry and Government focus on <i>“testing and evidence-building”</i> with projects and technologies which could be stranded over time or contribute to a high-carbon lock-in if not properly managed.</p> <ul style="list-style-type: none"> ➤ Use future decision-making to cement strong governance mechanisms to prevent a high-carbon lock-in or stranded assets. This should include a robust, scientific and systems-based approach to evaluate where hydrogen is and is not needed; clear timelines for the transition for a fully zero emissions hydrogen economy; and accountability mechanisms to stay on track with timelines.

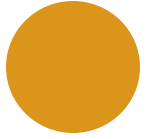


4. Take a precautionary approach to scaling up hydrogen, rather than assuming its role



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<p>Take a precautionary approach to scaling up hydrogen, rather than assuming its role.</p> <p>Given the unknowns around the future role of hydrogen, particularly for home heating, it is important not to encourage investment in equipment and infrastructure that may not have a role in net zero. Nationwide ‘blending’ of fossil gas and hydrogen is not appropriate, nor is a nationwide mandate on hydrogen ready boilers.</p>	<p>While the Strategy recognises we do not yet have the full evidence base needed to make long-term decisions on the role of hydrogen in all sectors – including heating or long duration storage – the Government has left the door open, rather than taking a firmly precautionary approach to ensure households and taxpayers are not left funding technologies which might be less relevant for achieving net zero. For example, despite acknowledging that further information is needed regarding the feasibility, safety and value for money presented by hydrogen for heating and blending of hydrogen into the gas grid, the Government will this year consult on a mandate to switch new boilers to become hydrogen ready through consultations, as well as exploring hydrogen blending into gas networks. This could prove stranded if a household purchases a hydrogen-ready boiler when they live in a region highly unlikely to be serviced by green hydrogen.</p> <ul style="list-style-type: none"> ➤ The Government can adopt a firmer precautionary approach, ensuring that industry, customers and taxpayers do not pay for technologies which are unlikely to have a role to play in a net zero future. For example, a hydrogen-ready boiler mandate could potentially be applied to hybrid heat pump / boiler systems or be applied in zones near industrial clusters. ➤ The Heat & Buildings Strategy should be used to confirm where hydrogen for heating is and isn’t likely to occur – and rule out nationwide blending and roll-out of hydrogen ready boilers.



5. Hydrogen pipelines should be built around secure hydrogen demand and supply



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<p>Hydrogen pipelines should be built around secure hydrogen demand and supply; not around the question of how existing gas assets can best be kept functioning. The future hydrogen grid is likely to be significantly different than today's gas grid, clustered around industrial end users rather than nationwide.</p>	<p>The Strategy provides mixed messaging regarding how it will grow the hydrogen market. On the one hand, it notes <i>“in designing policy, it will be important to not create market distortions that would overly incentivise hydrogen relative to other decarbonisation routes.”</i> The strategy also recognises the likely strategic importance of industrial clusters.</p> <p>The Strategy recognises that <i>“while there may be efficiencies in repurposing parts of the gas network, this may not be appropriate for all parts of the country or for all end users.”</i> However, it also considers how actions such as blending hydrogen into the gas grid could help boost demand for hydrogen – looking towards the possibility of 20% blending into the gas grid. We note that for full decarbonisation, this would need to rise to 100% green hydrogen over time – with a risk of asset stranding if this cannot be achieved.</p> <ul style="list-style-type: none"> ➤ The focus on exploring blending as an option to scale demand runs completely counter to the need for a smart and efficient energy system to achieve net zero. An objective, scientific examination of the future of the UK’s gas infrastructure is required before decisions are made, informing the <i>Call for Evidence on the future of the gas system</i> later this year.

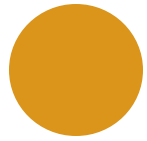


6. For the decarbonisation of heat in buildings, the UK should focus on making rapid gains on energy efficiency, heat pumps and renewable heat networks.



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<p>For the decarbonisation of heat in buildings, the UK should focus on making rapid gains on energy efficiency, heat pumps and renewable heat networks. A growing body of evidence suggests that green hydrogen for heating is likely to only play a small role in industrial clusters where there is a surplus. Waiting for long-term progress on hydrogen must not act as a blocker to action that can be taken today. Hydrogen gas would, at present rates, be about twice as expensive as natural gas, and new evidence suggests hydrogen-dominated heating would cost consumers 73% more compared to pathways relying on district heating and heat pumps.</p>	<p>The Hydrogen Strategy contains welcome recognition of the fact we need to avoid delay of near-term action to get on track for climate and fuel poverty targets and highlights the important role of heat pumps and heat networks for getting on track this decade. It also notes a need for caution <i>“Before hydrogen for heating can be considered as a potential option to decarbonise heat in buildings, we need to generate further evidence on the costs, benefits, safety, feasibility, air quality impacts and consumer experience of using low carbon hydrogen for heating relative to other more established heat decarbonisation technologies.”</i></p> <p>Despite this, the Strategy leaves the door ajar for a nation-wide roll out of hydrogen-ready boilers and contains some bullish language around their potential use. The Government aims to consult <i>“later this year on the case for enabling, or requiring, new natural gas boilers to be easily convertible to use hydrogen (‘hydrogen-ready’) by 2026.”</i> It is also <i>“accelerating work to consider how a market for hydrogen heating could operate, recognising the need to start adapting legislative and regulatory frameworks in advance of any strategic decisions being made on the role of hydrogen in heat.”</i> Thus, there are mixed signals to households and industry: for example, the BEIS press release mentions 3 million homes to be powered by hydrogen every year by 2030 whereas the Strategy says less than 70,000 homes by 2030.</p> <ul style="list-style-type: none"> ➤ The Heat & Buildings Strategy should be used to confirm where hydrogen for heating is and isn’t likely to occur – and rule out nationwide blending and roll-out of hydrogen ready boilers. ➤ A clear, strong communications campaign is needed to accompany the Heat & Buildings Strategy, saying that households and businesses should not delay action and investment on readily available clean heat solutions, such as heat pumps and heat networks.

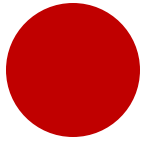


7. A large focus on jobs, skills and supply chains is required to ensure a just transition and support the “levelling up” agenda



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<p>A large focus on jobs, skills and supply chains is required to ensure a just transition and support the “levelling up” agenda to reduce regional inequalities. The UK must focus on supporting new green skills and jobs to address transition risks as the country phases out fossil gas energy and infrastructure, engaging closely with workers and unions.</p>	<p>The Strategy contains a welcome focus on skills, jobs and retraining. It states: <i>“we will work with industry, trade unions, the devolved administrations, local authorities, and enterprise agencies to support sustained and quality jobs and ensure that there is effective and targeted investment in relevant skills”</i>. Also welcome is the reference to a just transition – with hydrogen seen as providing an <i>“opportunity for those who have previously worked or are currently working in high carbon sectors to transition to support the green industrial revolution”</i>. More details will be set out in the Hydrogen Sector Development Action Plan by early 2022. The devil will be in the detail to ensure that jobs in green hydrogen are secure and attractive.</p> <p>Secure governance mechanisms overseeing the transition to zero emissions hydrogen will be essential to prevent a risk of locking in high carbon infrastructure and jobs – or on the other hand, stranded assets – if the UK is too bullish on blue hydrogen. This could be costly to unpick, and present further challenges for achieving a just transition.</p> <ul style="list-style-type: none"> ➤ The Government should engage closely with workers, unions and communities as it develops the Hydrogen Sector Development Action Plan to ensure hydrogen jobs are secure, sustainable for the long-term, and with attractive working conditions. ➤ Considerations of job security and preventing risks of asset stranding must be central as the Government sets out how it will manage to shift from blue to green hydrogen.



8. The Government must promote evidence-based and society-wide decision making.



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<p>The Government must promote evidence-based and society-wide decision making.</p> <p>This requires including all sectors of society in decision-making and advisory bodies such as the Hydrogen Advisory Council and rooting choices in independent science. The Government should engage the most vulnerable workers and households to ensure the approach works for everyone, as well as ensuring a central role for Local Authorities and city councils.</p>	<p>Industry will have an important role to play in delivering the clean hydrogen economy of the future. However, this must be balanced with robust science, as well as the interests of workers, households and civil society. There is a very high level of industry influence in the Strategy, which is described as having been <i>“developed in collaboration with industry through the Hydrogen Advisory Council”</i> – the latter of which is co-chaired by Shell. Meanwhile, in the Government’s timeline, there is no plan to fully engage with civil society or regional stakeholders until the mid-2020s. There is reference to reporting, and recognition that the strategy should be <i>“cost effective for the taxpayer”</i> – although without clarity on how this will be calculated. Currently, the Strategy allows industry to lead the way in certain instances, with the Government following from behind.</p> <ul style="list-style-type: none"> ➤ The Government must rapidly develop a new engagement mechanism to better reflect scientists, communities, workers, civil society and consumer interest organisations in decision-making procedures. ➤ Clarity over the parameters used for critical decisions, such as on blending and heating, should be provided. ➤ It is essential that the costs are distributed fairly, rather than a blanket levy on gas users across the country – which could risk exacerbating fuel poverty.



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About E3G

E3G is an independent climate change think tank accelerating the transition to a climate safe world.

E3G builds cross-sectoral coalitions to achieve carefully defined outcomes, chosen for their capacity to leverage change. E3G works closely with like-minded partners in government, politics, business, civil society, science, the media, public interest foundations and elsewhere. In 2018, for the third year running, E3G was ranked the fifth most globally influential environmental think tank.

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