Position Paper
HYDROGEN

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Aberdeen Renewable Energy Group

Hydrogen: Hype or a Critical Piece of the Net Zero Puzzle?
Recent critiques have questioned the viability of hydrogen as a renewable energy solution, arguing that it is inefficient, over-hyped, and mis-used in public policy. While these concerns about hydrogen's limitations are valid, particularly in comparison to the direct use of electrification, the broader picture is more complex - and more hopeful.

Hydrogen's Role: Not a Silver Bullet, But a Strategic Tool
The use of hydrogen for energy or in industry, is not a panacea, nor should it be treated as such. However, dismissing it outright risks overlooking its strategic value in a diversified, resilient, and decarbonised energy system. The European Union's energy hierarchy - prioritising efficiency, electrification, and then low-carbon fuels - does not exclude hydrogen; it defines its appropriate role.

Hydrogen is a vital part of the UK's journey to net zero CO2 emissions - offering solutions where electrification alone cannot reach.

Hydrogen is particularly valuable in:

- **Hard-to-electrify sectors** like heavy industry (*e.g., steelmaking, glassmaking, petro-chemical and ammonia production*),
- **Heavy-duty transport** (*e.g., shipping, aviation, heavy transport, remote location plant*),
- **Long-duration/Seasonal energy storage and supply**, where battery storage is impractical,
- **Grid balancing in high-renewable systems**, when wind and solar are insufficient.

Efficiency vs System Value
It is undoubted that the generation and use of hydrogen in energy systems is less efficient than direct electrification. But efficiency is not the only metric that matters. System value - including flexibility, storage, and resilience - must also be considered. For example, during periods of excess wind and curtailment, due to electricity network constraints, hydrogen can store surplus renewable electricity over weeks or months, something batteries cannot do cost-effectively at scale. With sufficient scale to drive down cost for hydrogen, this provides a significant growth, security and employment opportunity for Scotland.

Moreover, electrification is not always feasible. Retrofitting every building with a heat pump is not always practical or affordable, especially in older housing stock. Hydrogen-ready boilers may offer a transitional or hybrid solution in some contexts.

Safety and Infrastructure: Manageable Challenges
Hydrogen's safety risks are real, but manageable. The gas industry has decades of experience handling flammable gases. With rigorous testing, proper regulation, training, and infrastructure upgrades, all underway, hydrogen can be safely integrated into existing systems - just as natural gas once was.

Public Investment: Risk or Opportunity?
Critics point to hydrogen buses or heating trials as poor investments. Innovation does require experimentation. Not every pilot will succeed, but each provides valuable data and therefore insight. The Fife H100 hydrogen heating trial, for instance, is not about mass rollout - it is about understanding feasibility, public acceptance, and technical integration. The EU's strategy for energy system integration highlights that *"some categories of energy demand are difficult to electrify and require indirect electrification through conversion of electricity into fuels, such as hydrogen."*

The UK government has a clear view on the role that hydrogen plays, referencing the Spending Review 2025, and is investing in hydrogen production projects, under the Hydrogen Allocation Rounds (*HAR1 & 2, so far*). Projects such as Cromarty and Whitelee in Scotland were awarded contracts in the first Hydrogen Allocation Round but have been challenged on cost and demand. Eight additional projects in Scotland have been shortlisted in the second allocation round, with two recenty cancelled, the remaining six are expected to be awarded contracts in Q1 2026. Pace and cost overruns continue to be concerns These projects and the number of companies indicating they are already working in the hydrogen sector, or have transferrable skills, should act as a catalyst for the sector.

Updated Industrial and Hydrogen Strategies (*expected Q4 2025*), will outline the UK Government's aims for the role of hydrogen in the economy. The investment in producing hydrogen needs to be matched with offtake (*purchaser*) demand and investment in fuelling infrastructure, whether it be HGVs, transport, or shipping.

Growing developments in fuel cell units, liquid hydrogen storage and transport, hydrogen derivatives (ammonia/synthetic fuels), and hydrogen internal combustion engines by major industrial players continues.

Large hydrogen electrolyser installations will find the best technical and economic solutions through practical implementation and scaling operational experience, reducing cost. The focus is on developing hydrogen production capabilities, particularly in regions with existing expertise in the oil and gas sector, such as Aberdeen. These investments are part of the broader strategy to transition to clean energy and reduce reliance on fossil fuels, contributing to the UK's net zero goals.

Recent Activity in Scotland: Unlocking Hydrogen's Potential

Public funding in hydrogen is not about betting on one technology - it is about de-risking innovation, building supply chains, ensuring the UK and Scotland are not left behind in the global hydrogen economy. The TH2ISTLE Hydrogen Valley project is one example aligned with these aims - production, storage, distribution, and usage across multiple sectors. This process will take longer for hydrogen than it has for electrification.

Hydrogen transport via UK's hydrogen backbone, Project Union, will unlock the energy security and system flexibility benefits of hydrogen, enabling green hydrogen production in Scotland, transported to key industrial demand sites across the UK.

National Strategies: Building Resilience and Partnerships

China and India, followed by Korea and Japan, continue to develop technology, industry, and infrastructure aiming at hydrogen production of $2-3/kg, with long-term strategic planning, scale, security of supply and demand supporting direction to deliver.

In the EU, Germany continues its path for seeking reliable, sustainable supplies of green hydrogen, from multiple sources for its industry demand, developing the associated national infrastructure. These moves signal investment security, through sustainable, long-term demand, and a desire for stable partnerships.

A Call for Balanced, Evidence-Based Policy

Policy decisions need to be based on the pillars of sustainability: people, profit, and planet. The analysis must be holistic, not narrowly focused on efficiency alone. Hydrogen is not for everywhere or everything - but where it fits, it can be transformative.

Rather than framing the debate as hydrogen versus electricity, we should ask: *Where does hydrogen make the most sense, and how should we deploy it strategically and responsibly?*

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