

HySaaS: Securing Social Licence for Hydrogen Storage and Distribution in South Yorkshire

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Challenge Statement

South Yorkshire is emerging as a key region in the UK's hydrogen economy, supported by investment across the wider Yorkshire and Humber industrial cluster in production. While hydrogen is widely recognised as essential to industrial decarbonisation, its successful deployment depends not only on technical feasibility and cost reduction, but on societal and institutional readiness. Hydrogen storage and road-based distribution systems will operate within industrial estates, logistics corridors and alongside residential communities. This makes public confidence, emergency preparedness and regulatory clarity critical to delivery. However, the existing evidence base is heavily weighted toward techno-economic modelling and carbon intensity analysis, with comparatively limited research examining multi-stakeholder social acceptance, particularly for storage and transport infrastructure. Existing studies often focus solely on general public opinion and overlook the perspectives of industry actors and emergency responders. This creates a regional evidence gap at a time when South Yorkshire must ensure hydrogen deployment proceeds in a way that maintains trust, supports a just transition and

avoids infrastructure resistance that could delay investment.

Research Response

This project responded directly to the regional challenge by providing a structured, multi-stakeholder assessment of social acceptance focused specifically on hydrogen storage and distribution, the parts of the value chain most visible to communities and emergency responders.

Using a mixed-method approach, the research engaged:

- Industry value chain actors
- A nationally representative public sample
- The fire service

The aims were to:

- Assess industry appetite for service-based hydrogen storage models
- Evaluate public attitudes, including the effect of local proximity
- Understand emergency responder

- Generate evidence-based recommendations to support safe and scalable hydrogen deployment in South Yorkshire

The research found that acceptance of hydrogen storage and distribution is broadly positive but strongly conditioned by perceptions of safety and risk. Across all stakeholder groups, safety emerged as the dominant determinant of acceptance. Industry stakeholders emphasised clear responsibility boundaries between service providers and asset users, regulatory compliance and predictive monitoring systems. Public respondents frequently associated hydrogen with “flammable” and “explosive,” demonstrating that perceived technological risk remains influential despite recognition of hydrogen’s environmental benefits. Fire service representatives highlighted operational challenges including invisible flames and high-pressure systems.

additional monitoring systems would increase their comfort with hydrogen storage and distribution. This suggests that visible, data-driven safety mechanisms can materially improve acceptance.

Important divergences were also identified. Industry actors and emergency responders expressed confidence in regulatory frameworks, whereas public respondents demonstrated persistent technological risk concerns. Support was strongest at national level but declined when infrastructure was framed locally, highlighting proximity-based hesitation. Visual design of transport trailers also influenced public comfort levels.

a structured multi-stakeholder engagement framework informed by social life cycle assessment (S-LCA)' principles, and a nationally representative survey dataset.

The findings suggest that hydrogen storage and distribution can secure social licence if deployment is treated as a governance and trust challenge as much as a technical one.

- Prioritise visible and transparent safety mechanisms, including real-time monitoring and clear reporting
- Embed early collaboration with fire and rescue services, including hydrogen-specific training
- Adopt proactive, place-based engagement strategies to address proximity concerns
- Promote standardisation across storage systems and operating procedures
- Ensure clarity in responsibility-sharing within service-based models

Further research should track how public attitudes evolve as hydrogen infrastructure becomes more visible and explore how monitoring data can be translated into meaningful public-facing safety indicators. Collaboration opportunities have emerged across emergency services, insurers, planners and infrastructure developers to support an interdisciplinary, durable hydrogen transition.

