

Valuation Methodologies for Hydrogen Plants: A Chartered Surveyor's Perspective



The UK's commitment to achieving net zero emissions by 2050 has placed hydrogen at the forefront of the energy transition. As a versatile energy carrier, hydrogen offers solutions for decarbonising hard-to-abate sectors, including industry, transport, and heating. However, as the sector evolves, the valuation of hydrogen plants remains a complex and crucial task for stakeholders, including developers, investors, and regulators. Chartered surveyors, guided by the Royal Institution of Chartered Surveyors (RICS), play a pivotal role in establishing robust and transparent valuation methodologies. This article explores the key methodologies for valuing hydrogen plants, considering the unique characteristics of this emerging asset class within the framework of UK law and policy.

MARKET CONTEXT

Hydrogen production can be categorised into three primary types: green hydrogen, blue hydrogen, and grey hydrogen. Green hydrogen is produced using electrolysis powered by renewable electricity, with no associated greenhouse gas emissions. Blue hydrogen, on the other hand, is produced from natural gas with carbon capture and storage (CCS) technology, while grey hydrogen is generated from fossil fuels without CCS, resulting in significant emissions.

The UK Government's Hydrogen Strategy, published in 2021, sets ambitious targets to achieve 10GW of low-carbon hydrogen production capacity by 2030, with at least half being green hydrogen. Policy measures such as the Net Zero Strategy and Contracts for Difference (CfDs) provide a framework for market development. Despite these efforts, uncertainties around regulation, pricing, and demand create significant challenges for valuation professionals attempting to assess the financial viability of hydrogen projects.

VALUATION CHALLENGES FOR HYDROGEN PLANTS

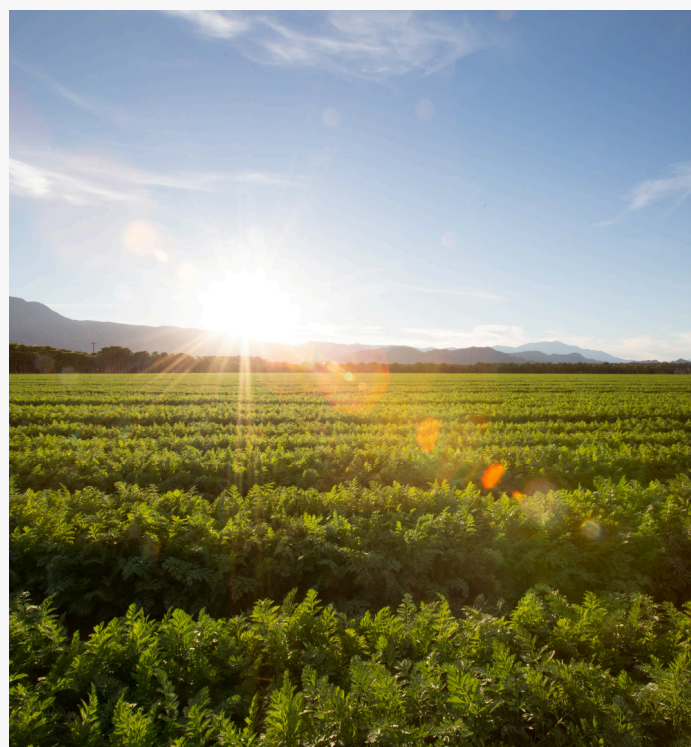
Valuing hydrogen plants presents unique and multifaceted challenges due to the rapidly evolving nature of the sector. Regulatory uncertainty is a key issue, with policies and subsidies for hydrogen production still in development. This lack of clarity in the regulatory landscape can significantly affect revenue projections and overall project feasibility, creating uncertainties that complicate the valuation process.

Market dynamics add further complexity, as hydrogen pricing remains unstandardised and comparable market data is often scarce due to the nascent stage of the industry. The absence of established benchmarks and limited transaction history make it challenging for valuers to accurately assess the intrinsic worth of hydrogen assets.

Technological risks also play a significant role, as rapid advancements in electrolyser technology and CCS capabilities may render some assets obsolete before they reach the end of their expected operational life.

For example, newer generations of electrolysers may significantly improve efficiency and reduce operational costs, potentially lowering the market competitiveness of older models. This impacts valuation assumptions by necessitating higher depreciation rates to account for accelerated obsolescence. Valuers must also consider the potential need for mid-life upgrades or retrofitting to keep facilities aligned with technological advancements, further influencing long-term cash flow projections and overall asset value.

Furthermore, revenue volatility, driven by the sector's dependence on renewable energy inputs and fluctuating energy prices, complicates financial forecasting and valuation. The inherent variability in input costs and revenue streams creates challenges in predicting the long-term financial performance of hydrogen plants, which is crucial for accurate valuations.



REGULATORY AND POLICY CONSIDERATIONS

In England and Wales, the regulatory landscape for hydrogen is rapidly evolving, presenting both opportunities and challenges for valuation professionals. Key considerations include licensing and compliance requirements, which are critical for ensuring that hydrogen production and storage facilities meet stringent environmental and safety standards. Compliance with these regulations is essential to mitigate operational risks and ensure the long-term viability of hydrogen projects.

Furthermore, the impact of government support mechanisms, such as Contracts for Difference, Renewable Transport Fuel Obligation credits, and grants under the Net Zero Hydrogen Fund, must be carefully evaluated and incorporated into the valuation process. These policy incentives can significantly influence the financial feasibility and revenue projections of hydrogen plants, and their inclusion is crucial for accurately assessing the overall investment potential.

Additionally, land use and planning regulations play a pivotal role in the valuation of hydrogen infrastructure. Understanding the local planning requirements, including environmental impact assessments and community engagement obligations, is essential for chartered surveyors to accurately assess the development constraints and opportunities associated with hydrogen projects. These considerations are instrumental in ensuring that valuations reflect the real-world challenges and potential benefits inherent in the deployment of hydrogen infrastructure within the local context.

VALUATION METHODOLOGIES

Chartered surveyors employ a range of valuation methodologies tailored to the unique characteristics of hydrogen assets. The cost approach, a widely used method, estimates a plant's value based on the cost of land acquisition, construction, and equipment. Adjustments for depreciation and obsolescence are critical, particularly for highly technical hydrogen facilities. Factors like proximity to renewable energy sources, access to existing infrastructure, and availability of skilled labour can significantly influence costs and must be carefully evaluated.

The income approach offers another robust methodology, relying on discounted cash flow (DCF) analysis to project revenues and expenses over the plant's operational life. This approach requires careful forecasting of hydrogen demand, market pricing, operational and maintenance costs, and financial impacts of policy measures such as CfDs and Renewable Transport Fuel Obligation credits. Given the inherent uncertainties in the hydrogen sector, sensitivity analysis is essential to account for fluctuations in input energy costs and carbon pricing.

The market comparison approach, while valuable in principle, faces limitations due to the lack of directly comparable transactions in the nascent hydrogen market. This method relies on data from similar assets that have recently transacted, with adjustments made for differences in location, capacity, and technological features. However, as pilot projects and commercial-scale hydrogen facilities increase, transaction data will become more accessible, gradually improving the reliability and applicability of this approach. This evolution highlights the need for valuers to remain adaptive, leveraging emerging datasets to enhance precision in market comparisons. As the hydrogen market matures and transaction data becomes more accessible, this approach is likely to become increasingly reliable.

SUGGESTED VALUATION METHODOLOGY

Given the current stage of the hydrogen market, the income approach offers the most robust framework for valuation, especially for operational plants. By focusing on the projected cash flows generated by hydrogen production and accounting for costs, market dynamics, and policy incentives, this method provides a comprehensive view of a plant's financial viability.

To demonstrate this methodology, consider a hypothetical green hydrogen plant producing 10,000 tonnes of hydrogen annually. The plant's operational costs include electricity input, maintenance, and labour, while revenues are derived from hydrogen sales and policy incentives such as CfDs.

Hypothetical Valuation Exercise:

Revenue Projections:

- Hydrogen sales price: £3 per kilogram. This price reflects a conservative estimate, aligning with current market data for green hydrogen pricing in the UK, typically ranging between £2 and £5 per kilogram.
- Annual production: 10,000 tonnes (10,000,000 kilograms). This figure represents a medium-sized plant, consistent with production scales seen in commercial pilot projects.
- Annual revenue: £30,000,000.

Operational Costs:

- Electricity cost: £15,000,000 annually. Assumes energy consumption of approximately 50 kWh per kilogram of hydrogen and an electricity cost of £0.30 per kWh, based on renewable energy tariffs.
- Maintenance and labour: £4,000,000 annually. Derived from industry benchmarks for comparable energy infrastructure projects, accounting for skilled labour and regular equipment maintenance.
- Total costs: £19,000,000 annually.

Net Cash Flow:

- Annual net cash flow: £11,000,000 (£30,000,000 revenue - £19,000,000 costs).

Discount Rate and Valuation:

- Discount rate: 8%. This rate reflects the cost of capital for infrastructure projects in emerging sectors, balancing risks from policy uncertainty, market dynamics, and technological development.
- Net Present Value (NPV) over 20 years: approximately £136,000,000. This assumes a stable operational lifespan and consistent revenue generation.

This valuation reflects the plant's profitability and viability under current market and policy conditions. The chosen inputs align with market realities, operational considerations, and investor expectations. Adjustments can be made to account for scenarios such as price fluctuations, technological advancements, or changes in policy incentives.

LAND AND RENT VALUATION FOR HYDROGEN PLANTS

An important consideration for hydrogen plants is the cost of land or the rent payable for leasing land to construct the facility. For this analysis, a 10-acre site has been selected as a representative size. This assumption reflects typical space requirements for a medium-sized hydrogen plant, including production facilities, storage tanks, access roads, and ancillary infrastructure. Industry examples include operational green hydrogen projects in the UK, where similar-scale facilities, such as pilot projects in Teesside and the Humber region, have demonstrated efficient production and integration with renewable energy sources. These examples provide a practical benchmark for estimating land requirements.

To estimate potential rent, the following framework is suggested:

1 Market Comparisons

Comparable land used for industrial purposes, renewable energy projects, or similar infrastructure developments can provide a baseline for rental valuation. For instance, land near existing wind farms or grid connections might attract premiums. The use of market comparisons is supported by evidence from industrial land transactions in renewable energy zones, where demand has consistently led to competitive pricing.

2 Land Value Multipliers

Adjust for factors such as planning permissions, environmental constraints, and proximity to resources. In high-demand areas, these adjustments can significantly increase the rental value. This is justified by planning requirements and locational advantages, as demonstrated in similar infrastructure projects like wind farms and grid-connected industrial hubs.

3 Yield Analysis

Rental value can be derived from the land's capital value by applying an appropriate yield. For example, if industrial land is valued at £500,000 per acre and yields in the region are 5%, annual rent per acre would be £25,000. Yield selection is based on industrial land trends, which typically range from 4% to 6% in renewable and industrial sectors, providing a balanced perspective.

Hypothetical Land Rent Valuation:

- Land Requirement: A 10-acre site.
- Capital Value: £500,000 per acre (industrial land near renewable energy infrastructure). This capital value reflects recent transactions in industrial zones with proximity to renewable resources.
- Yield: 5%. The selected yield aligns with market trends for land in industrial and energy sectors, adjusted for project-specific risks and opportunities.
- Annual Rent Calculation: $10 \text{ acres} \times £500,000 \times 5\% = £250,000$.

This suggests an annual rent of £250,000 for a 10-acre site. Adjustments may apply based on specific local factors, such as higher competition for land near renewable energy hubs or incentives offered by local authorities to attract investment in hydrogen projects. The justification for these inputs is grounded in observed industrial land values and yields across regions prioritising renewable energy infrastructure.

These rent considerations form an integral part of the overall valuation process, ensuring a comprehensive understanding of both operational and locational costs.

FUTURE OUTLOOK

As the hydrogen market matures, valuation practices will need to evolve to keep pace with the industry's rapid advancements. The standardization of benchmarks and the establishment of best practices will be essential for enhancing the consistency and reliability of valuations. Improved access to comprehensive market data and a growing pool of transaction records will further strengthen the accuracy of valuation methodologies, particularly the market comparison approach.

Technological integration is another key trend, with valuations increasingly accounting for the interoperability of hydrogen plants with renewable energy systems, energy storage solutions, and other complementary sectors. This holistic view will be crucial for capturing the full value proposition of hydrogen infrastructure. Chartered surveyors have a unique opportunity to contribute their specialised expertise to this dynamic and multifaceted field, shaping valuation practices that support the sustainable growth of the hydrogen economy. Collaborative efforts between industry stakeholders, regulatory bodies, and professional organizations like RICS will be essential for ensuring accurate, equitable, and future-proof valuations that unlock the full potential of hydrogen investments.



CONCLUSION

The valuation of hydrogen plants is a complex and multifaceted task that lies at the heart of investment and development decisions within the UK's burgeoning hydrogen economy. By employing robust, well-informed methodologies and diligently integrating key environmental, social, and governance considerations, chartered surveyors can provide the clarity, insight, and confidence needed to support the successful and sustainable growth of this critical sector. As the hydrogen industry rapidly evolves, adaptability, continuous learning, and collaborative engagement between industry stakeholders, regulatory bodies, and professional organizations will remain essential for chartered surveyors to deliver effective, future-proof valuation solutions that unlock the full potential of hydrogen investments.

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