GATHERING PACE

Infrastructure Opportunities in the Hydrogen Economy

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QIC

Executive Summary

Ambitious decarbonisation targets are rapidly growing in focus across the globe. With the world hunting for a solution, hydrogen is increasingly being looked to as an enabler of the deep decarbonisation needed to move the dial.

But with the huge scale of investment required for a Hydrogen Economy over the coming decades, what's needed to make it a reality? And how do we get there?

Decarbonisation is no simple undertaking. While significant progress has been made globally to reduce carbon emissions from electricity generation, there has been very little progress in reducing carbon emissions from transport and heavy industrial uses. These sectors collectively account for over 40% of global greenhouse gas emissions.[1] Between 1990 to 2017, total emissions in the European Union reduced by more than 20%, but transport sector emissions actually increased by approximately 20%.[2]

These 'hard-to-decarbonise' sectors continue to rely on fossil fuels for heat, feedstock and for transport. And hydrogen is currently part of the problem. Hydrogen demand from industrial users has grown more than threefold since 1975,[3] but it is currently manufactured almost entirely from coal and natural gas. Production of hydrogen is currently responsible for around 830 million tonnes of CO2 emissions per year, which is equivalent to the carbon produced annually by the United Kingdom and Indonesia combined.[4]

The challenge is to transition to clean hydrogen, powered by low-cost, zero carbon sources and stored for use on demand. QIC expects that meeting this challenge will result in radical growth in adoption among industrial users and a broadening of hydrogen use into other 'hard-to-decarbonise' sectors such as long-haul and heavy transportation, building heating and long-term power storage.

The coming decade will be a period of enormous growth for the Hydrogen Economy, supported by a raft of global government policy announcements. The recent EU Green Deal states that hydrogen needs to become an intrinsic part of the integrated energy system by 2030, with at least 40GW of renewable hydrogen electrolysers to be installed.[5] This represents a huge gap in infrastructure to be filled – global installed electrolyser capacity was less than 1 MW in 2010 and only 25 MW in 2019.[6] In Australia, all State and Federal Governments are united in their support of the National Hydrogen Strategy, which also targets 2030 for the establishment of Australia as a leading global player in the production and export of renewable hydrogen.

1 International Energy Agency

2 Arregui, N & Jobst, A., "Seven Charts on Climate Policies for Key Sectors in the European Union". Published by the IMF: https://www.imf.org/en/News/Articles/2020/09/23/na092320-seven-charts-on-climate-policies-for-key-sectors-in-the-european-union

3 "The Future of Hydrogen". Accessed from IEA: https://www.iea.org/reports/the-future-of-hydrogen

4 "Hydrogen". Accessed from IEA: https://www.iea.org/fuels-and-technologies/hydrogen

5 "A hydrogen strategy for a climate-neutral Europe". Accessed from the European Union: https://ec.europa.eu/energy/sites/ener/files/hydrogen_strategy.pdf

6 "Hydrogen, June 2020". Accessed from IEA: https://www.iea.org/reports/hydrogen

QIC also expects exponential improvement in the cost-competitiveness of hydrogen applications over the coming decade. This will occur through the economies of scale from increased electrolyser production and hydrogen storage facilities, as well as continued cost reductions in renewable energy. By 2030, we foresee the Hydrogen Economy to be well established but still growing rapidly, driving the next significant leap forward in decarbonisation.

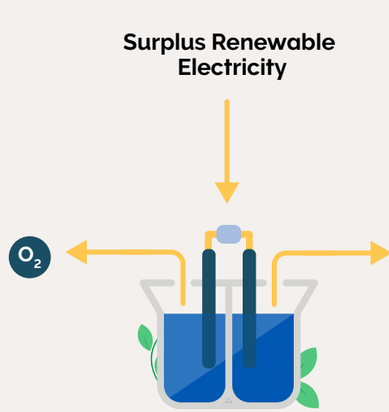
The upcoming period of intensive investment in hydrogen-related infrastructure presents strong opportunity for institutional investors seeking real assets with stable long-term cash flows. Up to US$3 trillion of infrastructure investment may be needed by 2030 (and up to US$20 trillion by 2050) to develop the Hydrogen Economy.[7]

QIC is actively preparing for this opportunity. It is well positioned to deliver and actively manage hydrogen-related infrastructure, with strong established relationships with leading global hydrogen players and early learnings already developed from pilot and commercial projects within existing portfolio companies. Examples include a Hydrogen Demonstration Plant in remote Western Australia which will integrate a hydrogen fuel cell into a microgrid, as well as the roll out of multiple hydrogen-powered forklifts by our portfolio company Generate Capital in the US.

Hydrogen has enormous potential to reduce global carbon emissions through its versatility in production methods and uses, and its ability to be transported and stored for extended periods. And while realisation of a Hydrogen Economy will take some time, progress is accelerating rapidly, driven in part by 'green' stimulus packages supporting the global recovery from COVID-19.

QIC believes that targeted investment over the coming decade will see infrastructure investors well-prepared for transition to a hydrogen-powered future.

Surplus Renewable Electricity



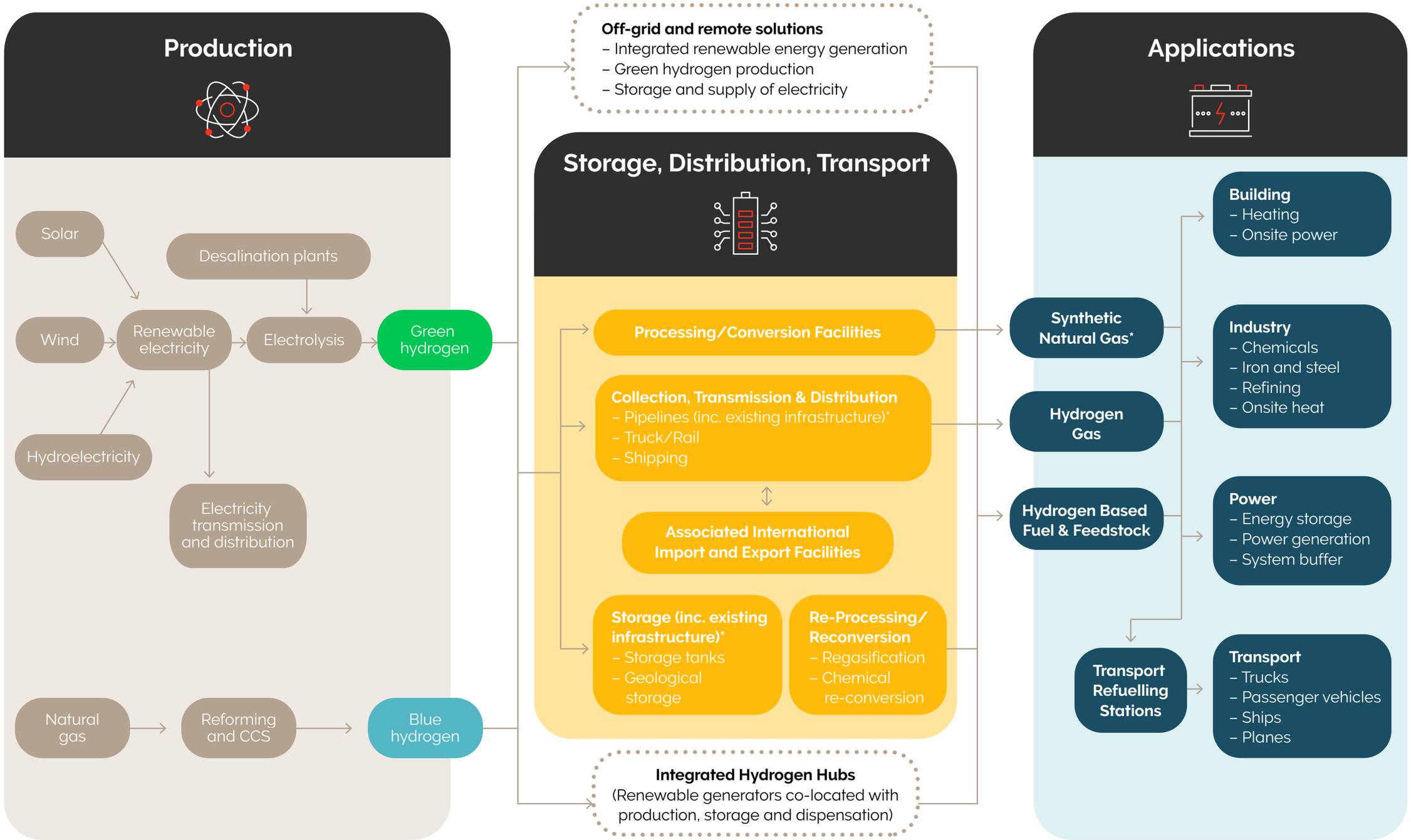
Power Electrolysis

Creates Renewable Hydrogen Gas

Figure 1: Producing 'green' hydrogen

7 Refer to section on: Assessing the potential scope of infrastructure investments for detailed cost estimates and sources

The Hydrogen Value Chain



*Hydrogen can be transported and stored using existing gas infrastructure, with limited adaptation required. Hydrogen can already be blended into existing gas infrastructure as a transition before potential longer-term conversion to 100% hydrogen. There is also optionality to convert hydrogen to synthetic natural gas by using captured carbon dioxide and a methanation reactor, which can provide additional flexibility in some contexts.

Figure 2: The Hydrogen Value Chain

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