

South Africa's green hydrogen potential

By [Kieran Whyte](#)

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South Africa's Hydrogen Society Roadmap explains how the country's resources, including reliable sources of renewable energy, and its ample supply of platinum group metals (PGM), can be effectively harnessed to produce green hydrogen.



Kieran Whyte, partner and head of the energy, mining and infrastructure practice, Baker McKenzie in Johannesburg.

The process of creating policy for the green hydrogen market began with the Green Hydrogen Atlas-Africa initiative in July 2020. As part of this, the roadmap is intended to provide a guide for the country's transition to a hydrogen-based energy system. It will be a policy document outlining the costs, challenges, gaps, benefits and potential of green hydrogen, with the aim of eventually incorporating this into the country's renewable energy plan.

The [Shaping Tomorrow's Global Hydrogen Market report](#) outlines how, despite regulatory challenges, legal complexity and the current lack of incentives to invest in decarbonised hydrogen without government support, important opportunities exist for businesses seeking to reap first-mover advantages.

South Africa's green hydrogen potential could produce significant advantages for investors and the country, but legal certainty is needed, and infrastructure shortfalls must be addressed.

Global decarbonisation initiatives

While it is still early in the process, transactions have begun around the world and investors are starting to look at what governments are doing to support hydrogen initiatives. As such, the roadmap is eagerly anticipated by the energy sector.

According to the report, countries have been rapidly concluding that a successful decarbonisation path cannot solely rely on renewable electricity and that a zero-carbon hydrogen solution is needed, and how governments around the world are supporting decarbonised hydrogen, as they did with renewables, to drive down cost. .

Hydrogen-related research and development (R&D) budgets in China, the EU and Australia are on the rise. In 2018, funding for hydrogen-related technology research and pilots increased by 8%, representing more than 50 billion in USD equivalent. This rise in global R&D funding can be largely attributed to an increase in spending from China, whose budget almost quintupled in only three years.

This year, the European Union is expected to institute a long-lasting and ambitious hydrogen research programme as part of its Horizon Europe, including a new European Partnership for hydrogen. This partnership is, in essence, an R&D association specifically dedicated to hydrogen research and whose objective is to address “Market failure for first movers”.

Australia adopted a National Hydrogen Strategy in 2019, which sets a path to build Australia’s hydrogen industry. The government plans to accelerate the commercialisation of hydrogen, reduce technical uncertainties and build up its domestic supply chains and production capabilities. The Australian Renewable Energy Agency (ArenA) has identified renewable hydrogen as one of its three investment priorities.

In 2019, Japan adopted a new strategic roadmap for hydrogen making the development of hydrogen technology one of its centrepieces and is working toward decreasing the cost of decarbonised hydrogen production tenfold by 2050. Also, in 2019, South Korea announced its Hydrogen Economy Roadmap and Ulsan’s Future Energy Strategy, with a primary focus on leading the hydrogen vehicles and fuel cell industry as well as establishing a system for hydrogen production and distribution.

Hydrogen is considered to be essential in South Africa’s new energy mix, due to its important role in combatting climate change and delivering on decarbonisation targets.

Meeting Paris Accord objectives

There is a growing consensus among academia, industry and political leaders that a decarbonisation path based quasi-exclusively on electricity networks (an electricity-only model) is unrealistic and would be too expensive. Deep decarbonisation will require hydrogen to satisfy current industrial demand; no molecules, no deep decarbonisation.

Clean hydrogen also allows countries to meet the goals outlined in the Paris Climate Agreement, as such hydrogen is the way for countries to reduce emissions and to limit global warming to well below 2 degrees Celsius.

Within just a few decades, all the world’s energy needs, electricity, industry, transport, buildings and agriculture, will have to come from carbon-free sources. This will require huge changes in little more than a single generation, and will need innovative solutions, technologies and policies. Hydrogen will play a crucial role in making this fundamental change to the globe’s energy systems.

The current hydrogen market is already big and growing, with total demand listed in the report at around 115-million metric tons in 2018, representing \$135.5bn. Hydrogen also holds long-term promise and is expected to reach \$25bn by 2030. Future applications include road transport, maritime and air transports, buildings and energy-intensive industries.

South African scenario

South Africa has an excellent renewable energy capacity, especially in wind and solar, which can be used to generate the energy needed to split water into hydrogen and oxygen. However, the current renewable energy programme will have to be

upscaled to increase capacity.

Additionally, clear policy and a regulatory environment that encourages investment will enable South Africa to be part of this energy transition and benefit considerably from exporting green hydrogen to other parts of the world. Green hydrogen could also be utilised to grow South African's clean energy supply via a decarbonised energy system.

To export green hydrogen, South Africa needs to develop the infrastructure necessary to store and transport the product. And while capital outlay and investment are needed, jobs could also be created by new income generating ventures.

So far, developments in the hydrogen market in South Africa have most come through the mining sector. The country's ample supply of PGMs can act as catalysts during the electrolysis process that converts water into hydrogen and oxygen. As such, a zero-carbon hydrogen solution is one of the key evolving end-uses for PGMs

New solutions are urgently needed to address Africa's power crisis and boost its post-pandemic recovery. Such solutions must consider the energy transition and the global drive towards a decentralised, decarbonised and secure energy supply that addresses climate change and stimulates economic growth. Green hydrogen can lower energy costs, increase the power system's flexibility and facilitate the decarbonization of African industries. Its benefits are ample and the opportunities it will create, not only for South Africa but other African countries, look very promising.

ABOUT THE AUTHOR

Kieran Whyte is a partner and head of the energy, mining and infrastructure practice at Baker McKenzie in Johannesburg,

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