



# HYDROGEN INSIGHTS

Part 2



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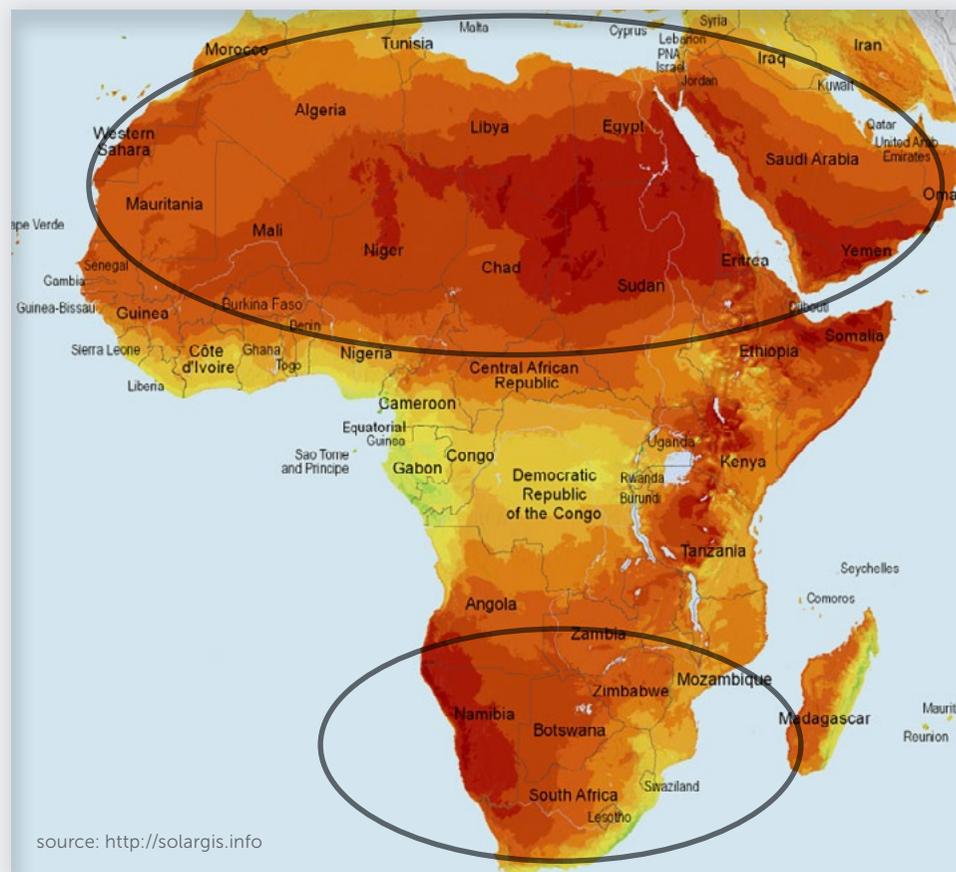
# AFRICA AND THE GLOBAL HYDROGEN ECONOMY

BY JACKWELL FERIS

As critical as clean hydrogen<sup>1</sup> is for the decarbonisation of the global economy by 2050, it must also form a key part of Africa's industrialisation efforts. Africa cannot afford to be left behind or to be merely a spectator in the new age of net zero industrialisation that will be necessary to achieve global climate change targets. With Africa being the continent with by far the lowest CO<sub>2</sub> and GHG emissions, accounting for between 2% to 3% of global GHG emissions (with South Africa accounting for about 33% of all GHG emissions in Sub-Saharan Africa), clean hydrogen presents a chance for Africa to be catapulted into prosperity through investment in the entire value chain of clean hydrogen.

This includes the production of green hydrogen from renewable sources; the production of PtX products from green hydrogen (ammonia, methanol etc); the production of hydrogen from repurposed existing fossil-fuel intense infrastructure; the development of storage and handling facilities for hydrogen; and the transportation infrastructure (pipelines, vessels) for conveying hydrogen products, including to end-use applications in existing and future industries (electric fuel cell vehicles, refuelling stations, and so on).

The development of the hydrogen economy in Africa will support effective, broad global decarbonisation, allow countries to meet their climate goals, and create sustainable economic growth for African countries and the rest of the world. There are enormous opportunities for Africa to be a key player in the clean hydrogen value chain, with several regions having the potential to develop into major global export hubs for hydrogen and other areas with the potential to provide domestic demand for end-use applications of hydrogen. Northern and Southern Africa have very favourable solar conditions for the production of green hydrogen, and countries in these regions (such as Namibia and South Africa in the south) are ideally situated to become export hubs for green hydrogen and PtX products.



<sup>1</sup> Clean hydrogen is hydrogen produced from a) fossil fuels with carbon-captured storage of the GHG emissions (so-called blue hydrogen) or b) electrolyzers powered by renewable electricity (so-called green hydrogen).



However, for that to happen African governments must make a concerted effort to ensure they have suitable policy and regulatory frameworks in place that make investment of significant capital in projects along the hydrogen value chain enticing. Clean hydrogen is considered to be the only scalable and cost-efficient energy vector to decarbonise hard to abate sectors (heavy industries, transportation and mobility) that require clean molecules as fuel or feedstock to substitute petroleum products and coal.

# Hydrogen holds the promise to decarbonize hard to abate sectors

## Upstream

How will existing value chains be disrupted?

## H2 Production

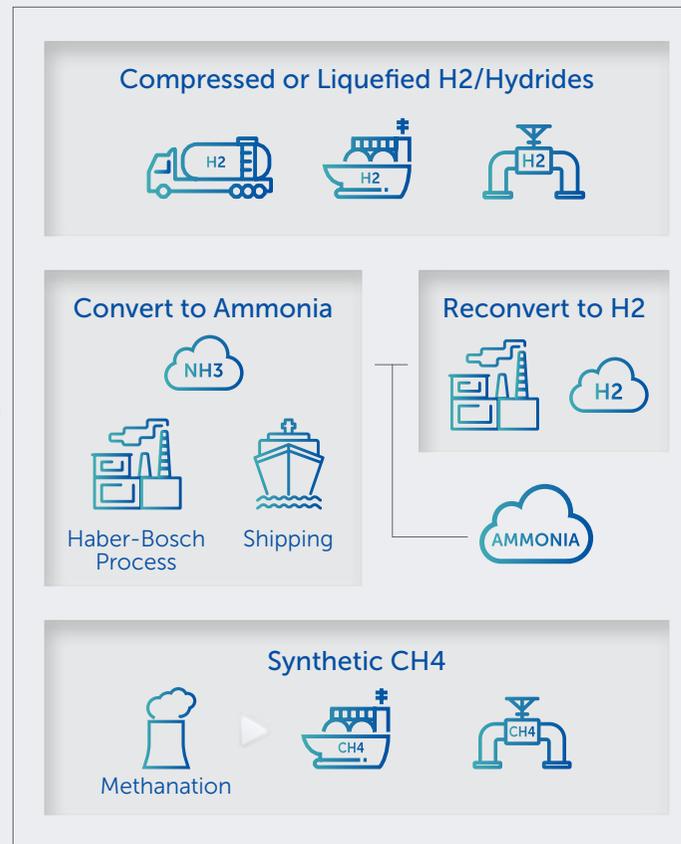
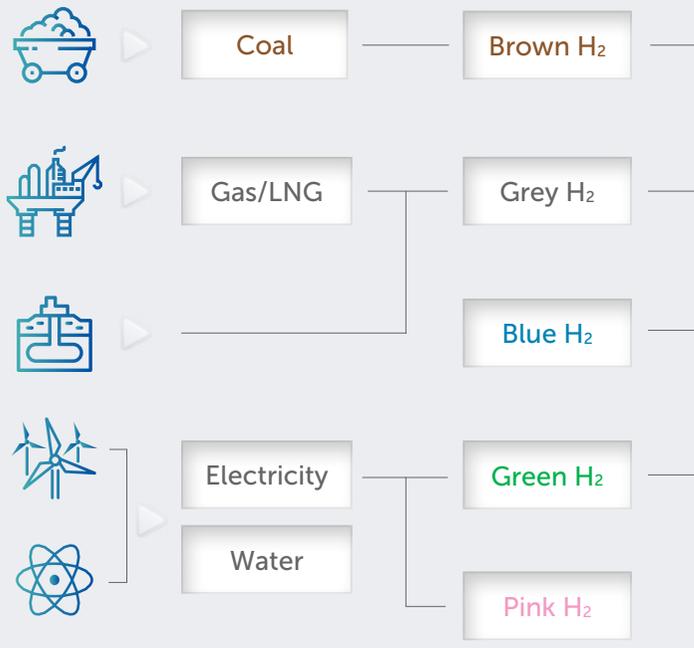
How competitive will each type of H2 be?

## Storage, Transport, Distribution

What will the future supply chains look like and what are the economics?

## End Use

What is the size of the future market H2?



### CHEMICALS

- Methanol
- Ammonia
- Chemical products



### INDUSTRY

- Refineries
- Steel
- Cement



### RESIDENTIAL/COMMERCIAL

- H<sub>2</sub> blending to gas systems
- CHP



### MOBILITY/TRANSPORT

- Fuel cell EVs
- Filling stations
- Marine fuels

Globally, industrial players across the value chain are willing and eager to invest in and scale hydrogen to achieve cost parity with carbon intense fuels, with governments across the world recognising hydrogen's critical contribution to decarbonisation. As of 31 October 2021<sup>2</sup> more than 30 countries have developed or were preparing hydrogen strategies. South Africa launched its HSRM on 17 February 2022, with several other Africa countries planning to release their hydrogen strategies sometime during 2022, while others, such as Kenya, are in the early stages of developing theirs.

Countries like Morocco and Namibia have been identified as potential major exporters of green hydrogen. The Moroccan and Namibian Governments, with support from the private sector (foreign and domestic), have put in concerted efforts to make that a reality. Judging by the strategies and growing bilateral agreements Namibia has concluded with Germany, the Netherlands and Belgium, the Namibian Government is serious about positioning the country as a green hydrogen export hub. South Africa also has the ability to become an exporter of green hydrogen (from the Boegoe Bay region) using its domestic industrial and manufacturing base as the catalyst for the development of a clean hydrogen economy, as outlined in the HSRM. The South African domestic market also has the potential to provide sufficient demand for

the development of a robust hydrogen value chain (as highlighted in the Hydrogen Valley Feasibility Report released in September 2021 and the HSRM). In this publication we unpack South Africa's position around the hydrogen economy looking at:

- South Africa's international climate change commitments, COP26, and their link to hydrogen;
- an overview of South Africa's legal framework as an enabler of hydrogen project development;
- environmental permit requirements and potential hurdles;
- environmental benefits, opportunities and risks related to hydrogen production, use and distribution; and
- ESG objectives and green financing in relation to hydrogen opportunities.

In addition to these regions in Africa that are actively pursuing the development of hydrogen strategies for future policy and regulatory development, the entire continent must benefit from the hydrogen economy. In that regard, in this publication we also look at the efforts in Kenya where we consider the following:

- Kenya's potential for green hydrogen production; and
- Kenya's steps towards green hydrogen production.

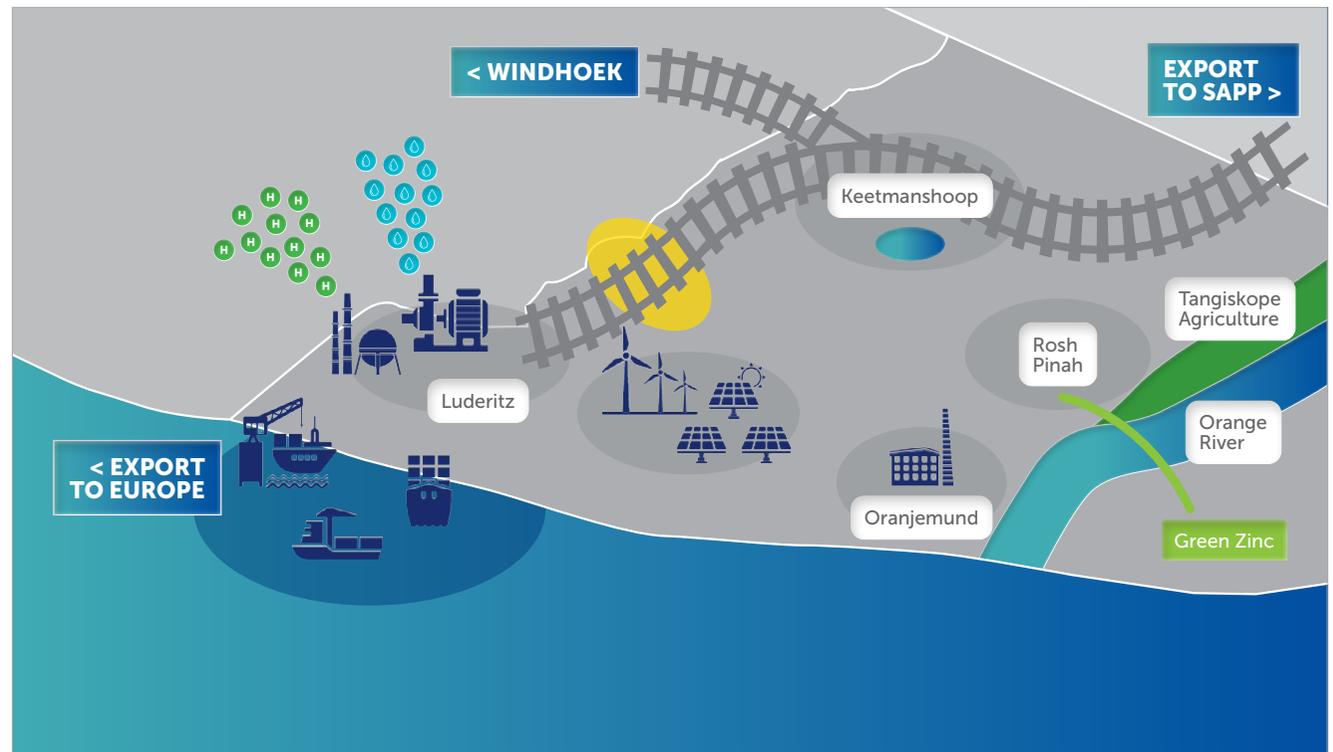
As such, it is imperative that Africa develops a continental hydrogen roadmap (similar to what Europe has done) that identifies the opportunities hydrogen holds for intra-Africa trade in order to facilitate the harmonisation of regional and domestic economic strategies, policies and regulatory frameworks around hydrogen to mitigate against the risk of developing a fragmented hydrogen value chain in Africa. A hydrogen roadmap for Africa will need to consider:

- Northern and Southern Africa becoming cost-competitive exporters of green hydrogen to regions such as Europe and Asia. Morocco and Namibia could achieve this by 2030, with countries like South Africa also potentially developing as a hedge market for green hydrogen exports, with the ability to serve both exports and domestic demand.
- Being self-sufficient to supply the growing African market and the developing of linkages (intra-Africa transportation, storage and handling), and other necessary infrastructure in various regions on the continent that allows for private sector investors and traders to take full advantage of the African Continental Free Trade Area (AfCFTA) in the production, supply and sale of clean hydrogen and PtX goods on a cost-competitive basis to existing and future African heavy industries (chemicals, automotive, aviation, steel and cement). For that, the development of integrated infrastructure for the transportation, storage and handling of hydrogen and PtX products in all the regions in Africa will be critical.

<sup>2</sup> International Renewable Energy Agency: Geopolitics of the Energy Transformation – The Hydrogen Factor, January 2022.

With the world's eyes firmly on clean hydrogen, the time to focus on the development of hydrogen projects in the entire value chain is now. The following are the most important levers to fully unlock the hydrogen economy:

- Creating demand for clean hydrogen. For countries geared towards exports, like Namibia, the demand will initially come from European industrial users and the initiatives driven by the Namibian government with countries such as Germany, the Netherlands and Belgium. There is potential to also supply industries in South Africa. For South Africa, there is local demand through industries that must decarbonise and a potential export market in the Northern Cape for green hydrogen.
- Creating access for clean hydrogen to reach the demand centres. Investment in infrastructure in the form of deep-water ports, rail, renewal electricity installations, electrolysers and desalination plants must be developed to enable end-user access to hydrogen. The Southern Corridor project, in Lüderitz, Namibia is one of the Namibian Government's most ambitious green hydrogen export projects and involves the planned development of an integrated hydrogen production facility for, amongst other things, exporting to Europe.



- Lower the cost of production of hydrogen. Over time green hydrogen production will become cost competitive, however that can only be achieved by accelerating the scaling up of clean hydrogen deployment globally. The planned projects in Morocco, Egypt, Namibia and South Africa will contribute to the cost-competitiveness of clean hydrogen.

The right policy and regulatory framework in African jurisdictions actively seeking to play a leading role in the clean hydrogen economy are imperative for the deployment of significant capital investment for the development of large-scale infrastructure focused on the hydrogen economy to unlock the international trade of green hydrogen and PtX products. In the next section we explore what it means to have the right policy and regulatory framework.

# Acronyms

AfCFTA	African Continental Free Trade Area
CfD	Contract for Difference
COP26	The 26 <sup>th</sup> UN Climate Change Conference of the Parties
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EPRA	Energy and Petroleum Regulatory Authority
ESG	Environmental, Social and Governance
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HSRM	Hydrogen Society Roadmap for South Africa
IRENA	International Renewable Energy Agency
MENWA	National Environmental Management: Waste Act 59 of 2008
NDC	Nationally Determined Contribution
NEMA	National Environmental Management Act 107 of 1998
NEMAQA	National Environmental Management Act: Air Quality Act 39 of 2004
NWA	National Water Act 36 of 1998
PtX	Power to X
SEMA	Specific Environmental Management Acts
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value-added Tax
WUL	Water Use Licence

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