

Opportunities *for*
Digital Startups and
Local Innovators
in Green Hydrogen
in South Africa

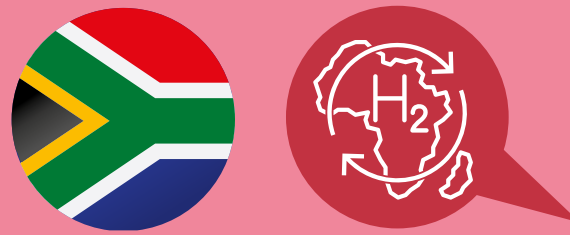




Summary

The potential in the green hydrogen sector holds many opportunities for digital startups and innovators in South Africa. This situation is demonstrated by the attention to the sector and the number of startups already present along the green hydrogen value chain. However, while some ecosystem support is in place, systemic dynamics hinder further growth for startups. Insufficient green hydrogen skills and skills programmes, a lack of collaboration among startups and large corporations, and constrained access to finance are all barriers that limit growth.

This country brief outlines the climate for innovators in green hydrogen in South Africa, introduces some of the major players in the ecosystem and shares the recommendations to improve system dynamics for startups. These recommendations were gathered through a multi-stakeholder process called ii2030 (inclusive innovation 2030) to enable innovators to take advantage of opportunities in South Africa's green hydrogen sector.

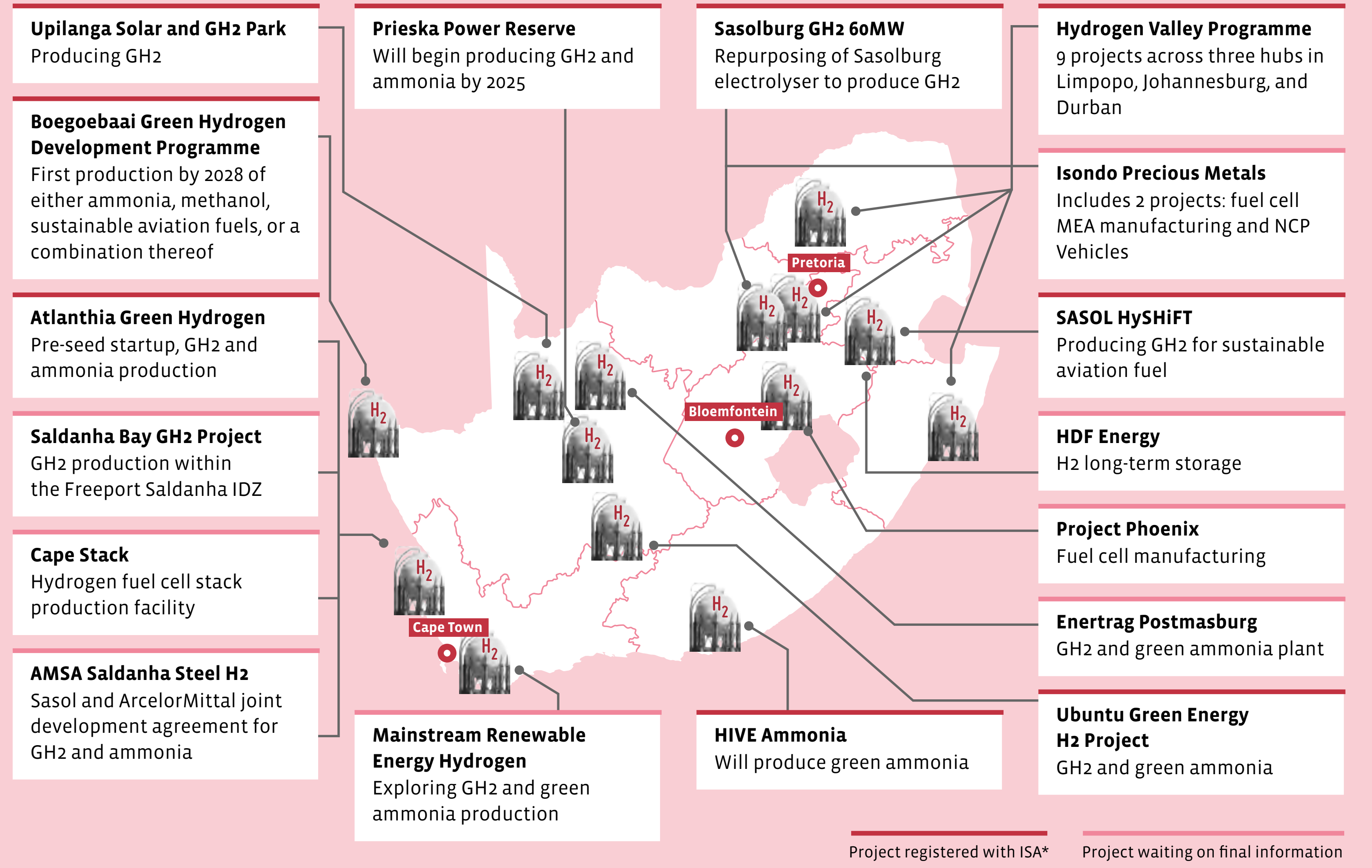


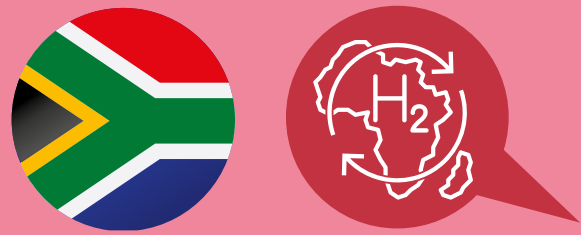
Background

South Africa has been an important regional player in the green hydrogen industry since the launch of the Hydrogen South Africa (HySA) programme in 2008. Since the publication of the South African Hydrogen Society Roadmap and the establishment of the South Africa Green Hydrogen Summit in 2022, the Green Hydrogen National Programme has announced 19 large-scale green hydrogen projects shown on the map on the right.

South Africa's access to natural energy resources and local deposits of platinum group metals, or PGMs, drive localisation and innovation in the sector. This is spurred by a high level of coordination and prioritisation of green hydrogen led by The Presidency and an incubation ecosystem fostered by the early establishment of HySA, as well as enthusiastic participation from universities.

GH2 Projects in South Africa



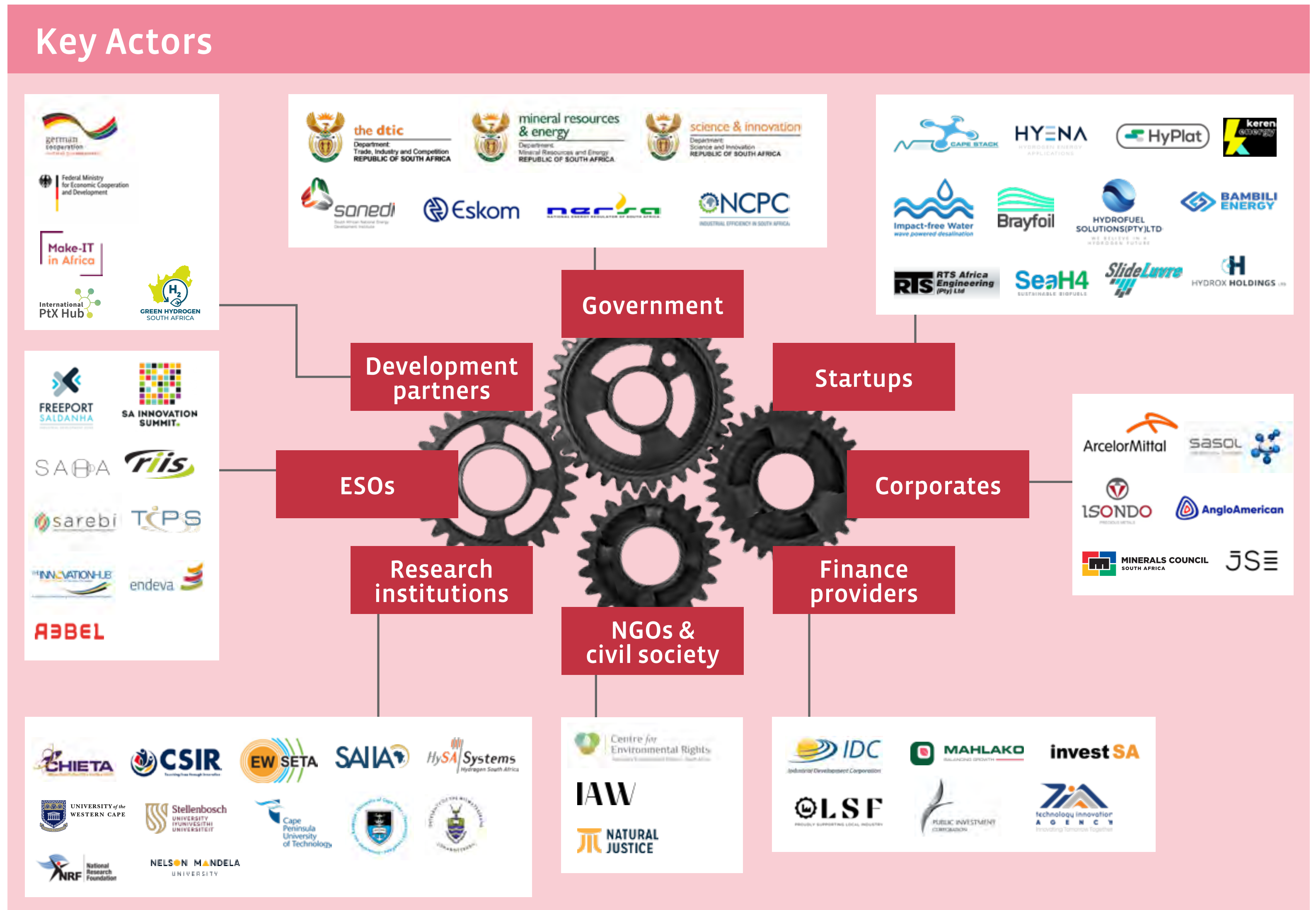


Actors

The stakeholder landscape in the green hydrogen sector is diverse in South Africa. Thus, this section is a non-exhaustive sample of organisations focusing on supporting innovation and startups in GH2.

The overview on the right shows some of the main actors in South Africa's green hydrogen sector.

Large players dominating the hydrogen landscape in South Africa include the energy company Sasol and the mining corporation Anglo American. As a large producer of grey hydrogen, Sasol already operates essential infrastructure that can be pivoted to the production of green hydrogen. Platinum group metals, highly critical as components in PEM electrolyzers and hydrogen fuel cells, are products of Anglo American. Large international corporations such as these drive infrastructure development in the country and can provide opportunities for collaboration with startups if leveraged properly.





Startups play a growing role in the sector. Due to a vital research and incubation system fostered by HySA and various universities, including Stellenbosch University and the Universities of Cape Town, Johannesburg and the Western Cape, there are robust opportunities to foster innovation, including through spin-off organisations. The HySA centres are supported by the Department of Science and Technology, and located at the North-West University, the Council for Scientific and Industrial Research, the University of Cape Town, South Africa's National Mineral Research Organisation and the University of the Western Cape. These institutions and partners collaborate with the HySA network to develop knowledge and technology to utilise PGMs across the hydrogen value chain, illuminating more opportunities for startups in the industry.

Startups and innovators are supported by organisations such as the Innovation Hub, the Saldanha Bay Innovation Campus, the Research Institute for Innovation and Sustainability, the Technology Innovation Agency and Sarebi, which encourage cleantech and hydrogen-specific startups. Other ecosystem support organisations

or associations related to the sector include the Southern African Development Community, the Black Energy Professionals Association, the South African Hydrogen Association, the South Africa Innovation Summit, the South African Institute of International Affairs, and the Centre for Environmental Rights and Natural Justice.

→ The graph on the next page shows the startups according to their place in the green hydrogen value chain.

SeaH4, Oceanergy, Hive Energy, SlideLurve, Keren Energy and Brayfoil Technologies transform renewable energy sources to power the production of green hydrogen. Atlanthia and Hydregen contribute to the production of green hydrogen along with Hydrox Holdings and Hydrofuel Solutions, which are involved particularly with electrolysis. Impact-Free Water is involved in the desalinisation side of hydrogen production. Companies such as Hyena Energy and Bambili Energy both use hydrogen for power generation, utilising fuel cell technology, while HyPlat and Cape Stack manufacture components of hydrogen fuel

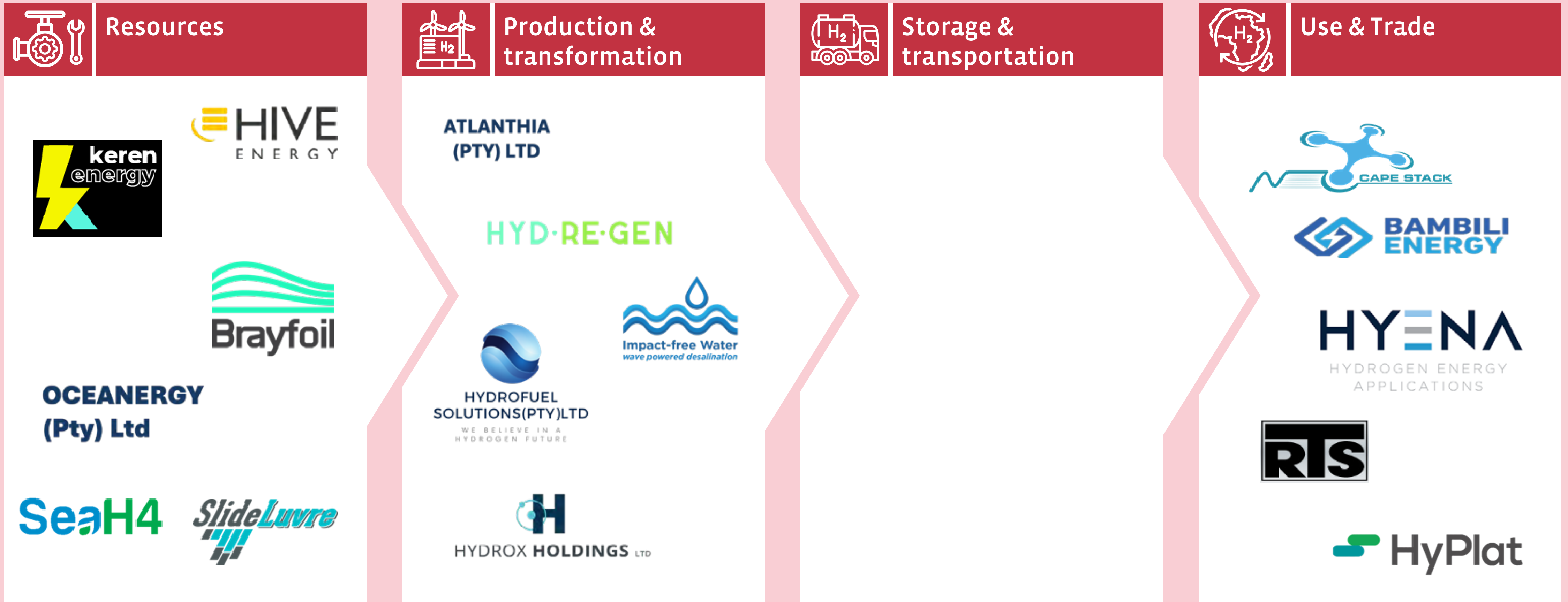
cells. RTS Africa Group is involved in a hydrogen fuel cell-powered truck and bus project.

Organisations such as the South African National Energy Development Institute (SANEDI), the Chemical Industries Education and Training Authority (CHIETA), the Energy & Water Sector Education Training Authority (EW SETA), the National Cleaner Production Centre (NCPC) and the National Research Foundation each have a mandate in skills development and contribute to skill building and capacity development in green hydrogen which aids startups in the sector. The Technology Innovation Agency, the Localisation Support Fund and the Industrial Development Corporation are among the entities providing finance for startups in green hydrogen.





Startups along the value chain





Green Hydrogen System Dynamics

At first sight, South Africa has a relatively advanced green hydrogen ecosystem. This is fostered by solid industry interest driven by local resources such as platinum group metals and robust access to renewable resources to supply clean energy. The government's early engagement with the establishment of HySA in 2008 also played a crucial role in developing a strong research and incubation ecosystem.

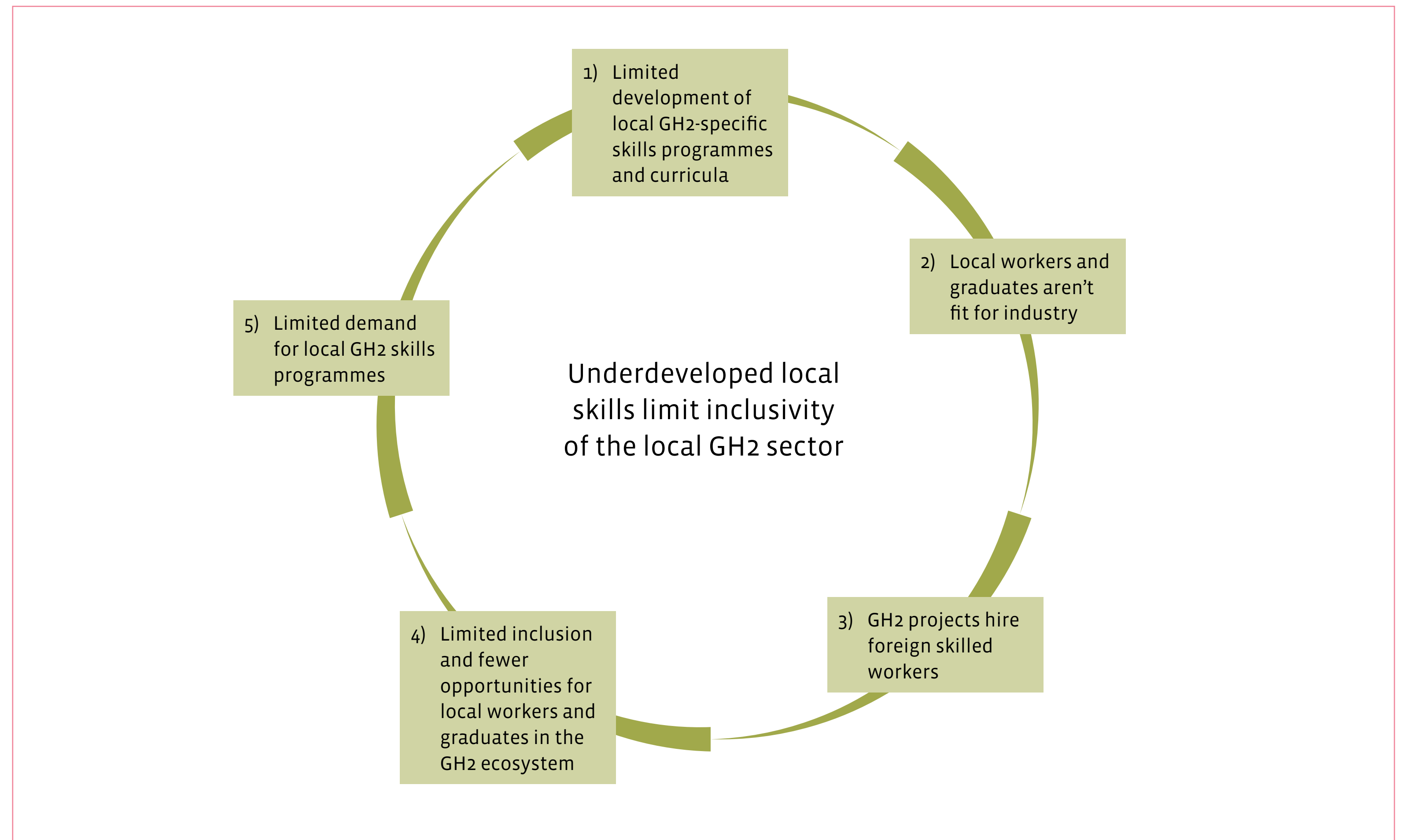
The two iiz030 expert consultations revealed however that the system is currently optimised to benefit larger players to the exclusion of startups and innovators. Small companies face challenges related to a limited skills pool, a lack of opportunities for collaboration with larger green hydrogen projects, and limited access to finance. These three themes – skills, finance and collaboration – define the three main dynamics we see hold opportunities for change to support startups and innovators in the system, as shown in the system map on the right.





Insufficient Green Hydrogen-Specific Skills

The first key dynamic in the South African green hydrogen ecosystem revolves around skills. (1) The South African ecosystem has limited green hydrogen-specific skills programmes and curricula. Because of the underdeveloped state of programming and curricula, (2) local graduates and skilled workers aren't fit for the industry, and (3) green hydrogen projects hire foreign skilled workers to fulfil the needed roles. This dynamic leads to (4) limited inclusion of local graduates and skilled workers and the exclusion of local communities from green hydrogen projects. When there are fewer opportunities for local graduates and skilled workers, there is less incentive to develop local green hydrogen-specific curricula and (5) limited demand for green hydrogen-specific programmes, which closes the loop of the dynamic and leads us back to (1). This vicious cycle of limited green hydrogen-specific training and a lack of skilled workers and graduates, adversely impacts startups, who require training themselves and need a diverse talent pool to hire from.





Recommendations for Skills Development

► **Develop Curricula**

Local experts recommended several solutions to ensure local workers and graduates are better positioned and fit for industry. The first proposed solution directly implicates the development of green hydrogen-specific TVET programmes.

This is in line with the Department of Science and Technology's approach for skills development in the green hydrogen sector. It must stressed that the TVET system would need substantial support to fulfill this role.

► **Support Matchmaking**

The second proposed solution is related to linking networks to help job seekers find jobs in the green hydrogen industry and create a more transparent job market.

► **Promote Hiring Local Workers**

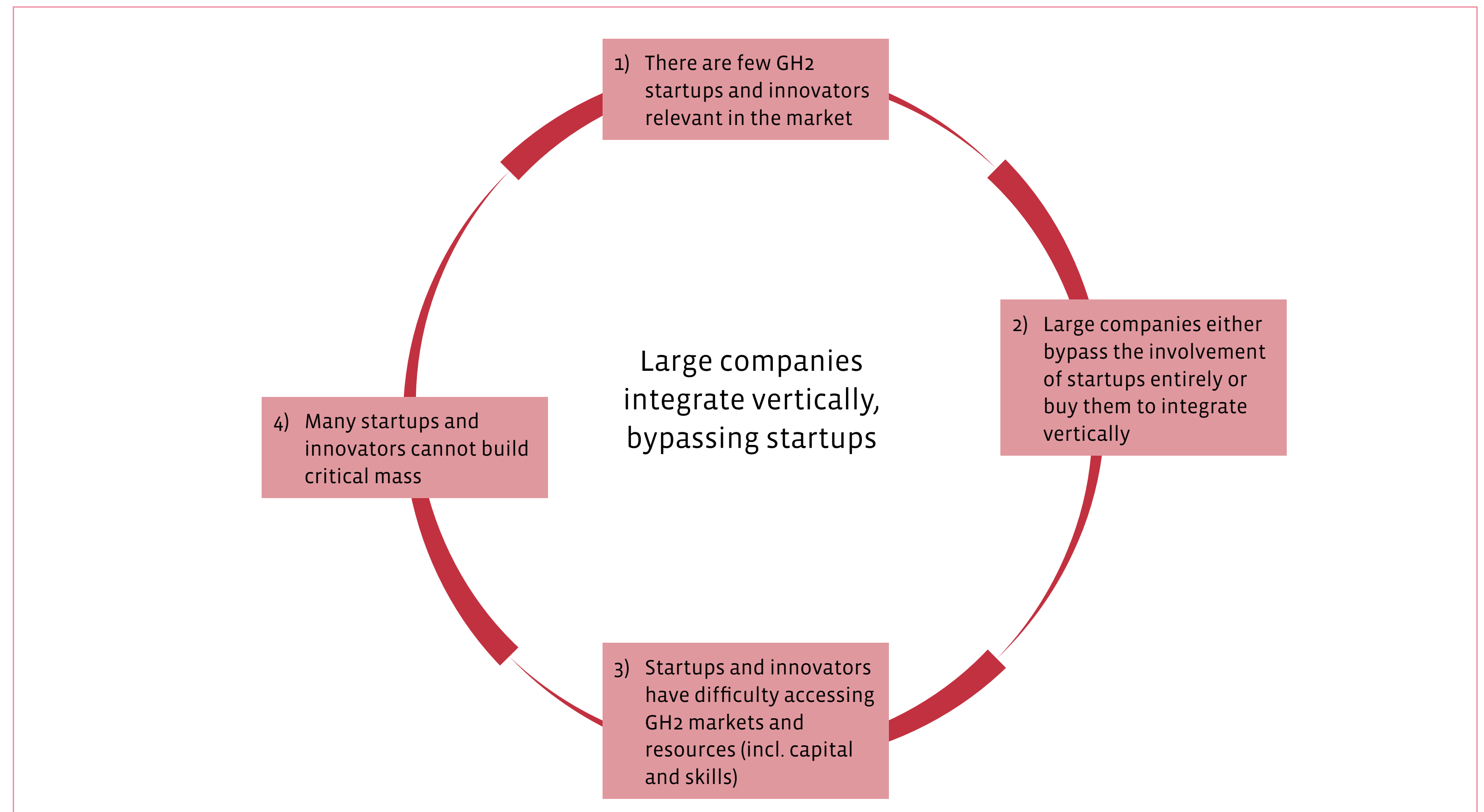
A solution to promote local hires for green hydrogen projects and corporations requires government funding for internship- and entry-level employees in the sector. A funded position would allow organisations to train staff in green hydrogen specialisations and incentivise students to pursue opportunities in the sector.

The funding of ten female Master student interns by GIZ H2.SA in collaboration with the Human Science Research Council is a step in the right direction.



Need for Greater Collaboration Between Large and Small Companies

The second key dynamic relates to the challenges around the collaboration (or lack thereof) with large players in the green hydrogen sector. There are (1) a few green hydrogen startups relevant in the market. Many lack the investment to grow or the certification and track record to partner with large companies. Thus, (2) large companies either bypass startups entirely or buy them out to integrate vertically. This is due to a lack of visibility of startups and transparency in the ecosystem. The vertical integration of large companies leads to (3) difficulty for startups in accessing markets and resources, including capital and skills. Because of this lack of resources, (4) many startups cannot build critical mass to advance, grow their innovation and expand their team sufficiently. Thus, (1) startups remain too small to be relevant for large players in green hydrogen.





Recommendations to Encourage Collaboration

▶ **Awareness Campaigns and Visibility**

Transparency and visibility are issues for startups in green hydrogen. Solutions could include the creation of a private sector-led marketplace of green hydrogen startups to increase their visibility. Along the same lines, experts proposed awareness campaigns to promote startups and innovators.

▶ **Increase Collaboration Readiness**

One solution could be to improve collaboration readiness for both parties. This may include improving entrepreneurial and negotiation skills, for example. In addition, experts noted that buying out startups is one way to collaborate with innovators. Startups should be informed of and prepared for this to be able to negotiate fairly and effectively.

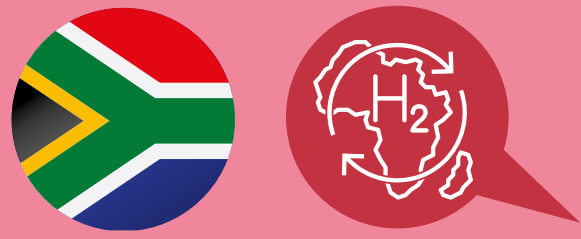
▶ **Support Success in Domestic Markets**

To support access to domestic markets, one solution might require quotas for local procurement to ensure South African businesses have a greater share of involvement in green hydrogen projects.

▶ **Support Access to International Markets**

To promote the export of green hydrogen and its derivatives, especially green ammonia and fertilizer to the rest of Africa, the South African value chain and its companies should fully utilize the trade regimes of COMESA and AfCFTA.

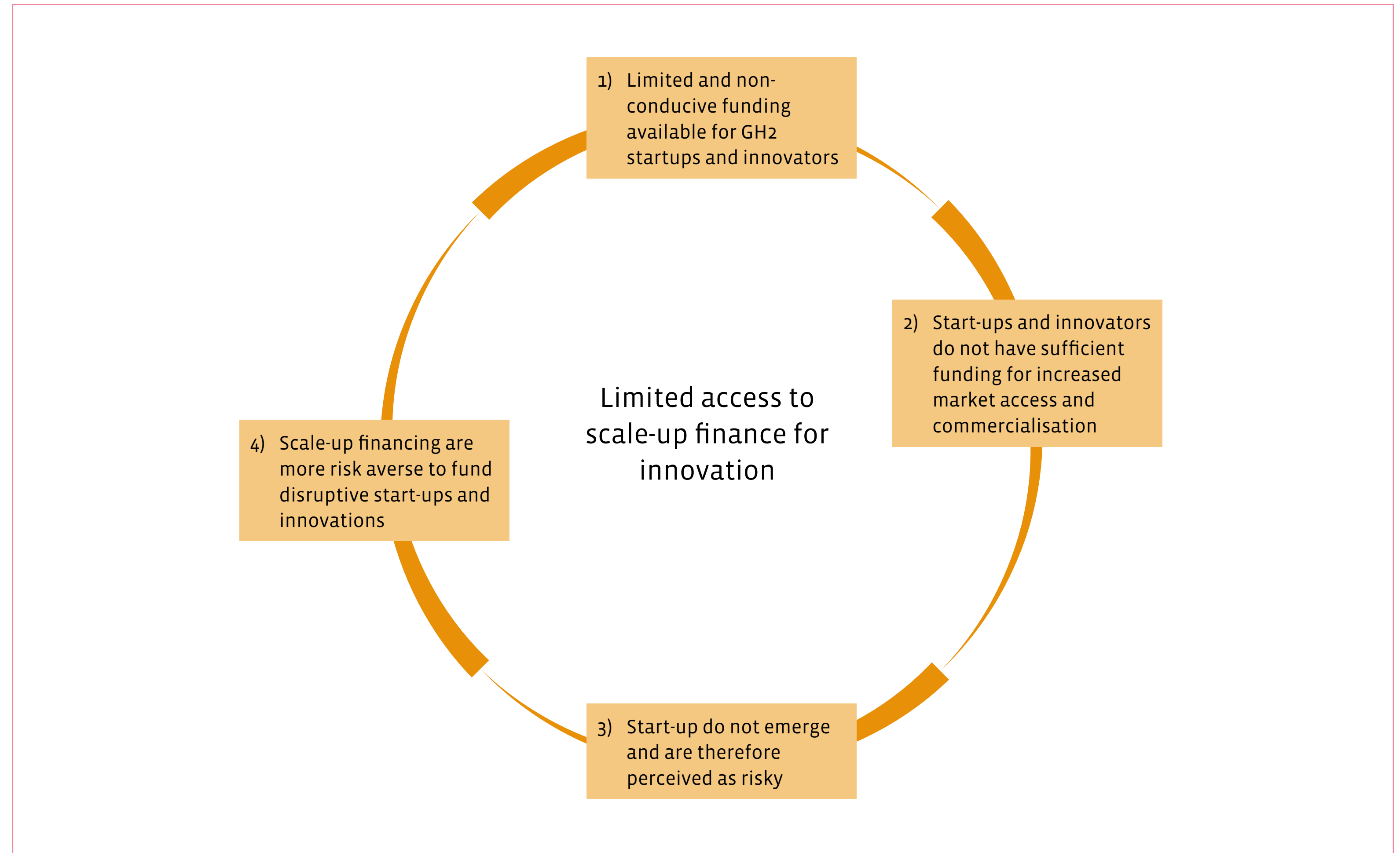
For potential export to Europe, startups need to ensure compliance with European procurement, certification and documentation rules to maximize offtake and trade between continents.



Financing

The third and final key dynamic identified for startups in the green hydrogen ecosystem is finance. Financing investments and working capital is a perpetual hurdle for startups in general. This is especially true in green hydrogen, which often requires longer timelines, more expensive equipment and more innovative technology, which investors perceive as more of a risk. In South Africa, we see (1) limited and non-conducive funding available for green hydrogen startups and innovators. Because of this, (2) startups and innovators do not have sufficient funding for increased market access and commercialisation, and (3) fewer startups emerge and are therefore perceived as risky. When few startups are in the space, (4) scale-up financing is more risk-averse to fund disruptive startups and innovators.

Herein lies the the paradox for the startup ecosystem: When fewer startups exist in the sector, it is more difficult for them to receive financing. When there is little finance for startups in a sector, there are fewer and less successful startups.





Recommendations to Provide Financial Resources

► **Provide Finance for Different Life Cycle Stages**

The first proposal was to create and encourage financing for different activities to address limited funding for green hydrogen startups. This could include funding for feasibility studies, production costs, technology investment, securing offtake agreements, etc. Offering funding for different stages of a startup would increase the relevance of funding.

► **Improve Pitching Skills**

One solution relates to establishing a support unit that could help fund-seekers improve their applications' quality. This basic yet essential and ever-present skill can challenge startups, especially those at earlier stages or in more innovative spaces.

► **Online Funding Directory**

One solution proposed is an interactive portal and directory to inform startups and innovators of the various programming, processes and funding options available.

Related to the idea of a portal or directory for startup support options, experts encourage raising awareness of different funding options that the Technology Innovation Agency already has for green hydrogen startups, including SME and venture capitalist funding and other instruments.

► **Support Research and Spin-Offs**

There is a clear linkage between research institutions and startups, which can be facilitated by and spun off from the research institutions. The research institutions can identify niches for startups to encourage the emergence of successful business models.

Additionally, one solution was to bring diverse players on board in research, including the Department of Energy, to prepare startups for the market and decrease their investment risk.

► **Establish a Fund**

Another proposal encourages the government to de-risk some of the funding, as free-market options are currently limited.



Green Hydrogen Innovation Hub

During a co-creation workshop in Cape Town in June 2023, 18 organisations* collaborated to co-create a systemic solution enabling startups to grasp opportunities in the green hydrogen sector. They developed a concept for the Green Hydrogen (GH₂) Innovation Hub, a one-stop shop for green hydrogen innovation.

The activities of the hub should include:

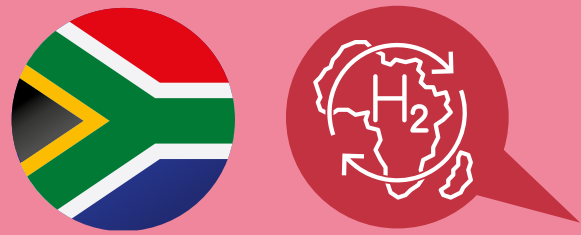
- **Ideation and Incubation:** Supporting startups through thought partnership to define and build on bright ideas and develop business skill sets to commercialise them.
- **Enabling infrastructure:** Providing startups with collaborative working space and access to necessary digital and physical platforms to enable their businesses to thrive.
- **Research, Development, and Innovation:** Providing startups with access to state-of-the-

art RD&I facilities to test, optimise, register and commercialise their innovations.

- **Knowledge and expertise:** Providing startups priority access to global and local thought leadership, research outcomes, and expertise through seminars, webinars, mentorship and other dissemination channels.
- **Networks and access to market:** Establishing a network of ecosystem actors from government, the private sector, and academia to build collaboration. Establishing strong partnerships with startups and IDZ tenants and enabling access to port infrastructure.
- **Acceleration and growth capital:** Supporting startups to grow and scale their businesses through acceleration programmes and facilitating access to growth capital. A longer-term view of establishing an IC fund to leverage pipeline of startups.

If you are interested in contributing to the Green Hydrogen Innovation Hub and like to be involved in the project's planning and implementation, don't hesitate to contact Endeava at info@endeva.org for more information.





About ii2030

ii2030 is a catalytic process that begins with a problem and an opportunity and ends with the implementation of the prototype of a systemic solution. It catalyzes collaboration amongst innovators from corporates, startups, the public sector, NGOs and science. Solutions are developed in tracks around tech-based opportunities. ii2030 is an impactful, action oriented collaborative process.

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More information at
www.ii2030.com

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Imprint

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