

Promoting a South African Green Hydrogen Economy (H2.SA)

Capacity building and technical support for the establishment of a green hydrogen economy in South Africa

The challenge

Globally, the demand for green hydrogen (H₂) and green hydrogen-based Power-to-X products such as ammonia and synthetic jet fuels (PtX) is rising. To fulfil decarbonisation targets, many off-takers (e.g., EU and Japan) are willing to pay a premium price and to sign long-term supply agreements to stimulate H₂/PtX market development. Due to the outstanding potential of renewable energies (RE) and existing H₂ production facilities, South Africa is regarded as one of the main future suppliers of green H₂ products. Building a H₂ economy could open-up promising new export markets for South African companies, as well as domestic use opportunities. This could also lead to significant economic development and job creation while playing a role in supporting a just energy transition in the South African energy sector.

Despite the promising conditions available for the development of a H₂ economy in the country, certain challenges still exist. The development of a green H₂/PtX market requires a massive expansion of low-cost RE capacities. To this end, the project's focus is to ensure that existing market barriers are removed, that the political and regulatory frameworks are adjusted, and a far-reaching capacity building, skills development and training initiatives are implemented. Developing the H₂ economy in South Africa may also pose risks to the environment and society, which must be analysed, evaluated, and addressed.

The objective of H2.SA is to support the South African public and private sector to utilise the potential of a sustainable green H₂ economy for South Africa.

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| Project name | Promoting a South African Green Hydrogen Economy (H2.SA) |
| Commissioned by | Federal Ministry for Economic Cooperation and Development (BMZ) |
| Project region | South Africa |
| Lead executing agency | Investment and Infrastructure Office (IIO) within The Presidency |
| Duration | 08 / 2021– 12 / 2023 |
| Financial volume | |



Our approach

GIZ was commissioned by the BMZ to develop a concept for a green H₂ project in South Africa. Within this framework, H2.SA collaborates with state actors (e.g., IIO within The Presidency, the Department of Mineral Resources and Energy (DMRE), the Department of Trade Industry and Competition (DTIC), the Department of Science and Innovation (DSI)), and the national electricity utility Eskom to implement the necessary steps to build a green H₂ economy.

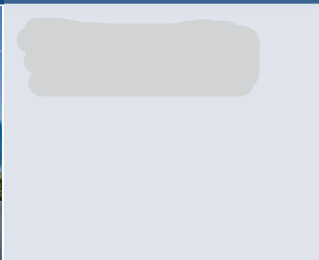
How it works

PtX products refer to synthetic fuels, such as carbon neutral synthetic kerosene, raw materials for the chemical industry or synthetic ammonia. To make PtX products, H₂ is obtained from water and power through electrolysis. For the H₂ to be green, the power must come from RE sources. By adding CO₂ or other carbon compounds, synthetic fuel resources and chemical materials such as methanol or kerosene can be produced.



Photo left: Liquid hydrogen in vessel for clean sea transportation on container ship with composite cryotank for cryogenic gases. © Alexander Kirch/Shutterstock

Photo right: Future of sustainable aviation fuels (Power to Liquid, PtL) which uses clean energy, hydrogen and carbon dioxide to chemically synthesise aviation fuel. © petrmlinak/Shutterstock



The project has four focal areas:

1 Strategy development and framework: South Africa will require cooperation and synchronisation between a variety of stakeholders to establish a green H₂ economy. For example, improved strategic and regulatory conditions could lead to the reduction of current existing market barriers for RE. A supportive regulatory framework will stimulate an investment friendly climate and provide clear guidelines for a green H₂ economy in the country.

2 Business development: To successfully establish a green H₂ economy in South Africa, a lot of questions need to be answered. For example, what is the size of the potential market for green H₂ derived products, what are the international standards and market requirements that potential exported products would need to comply with, and how can adequate investment be attracted? To answer these and many other questions, H2.SA will support the local public and private sector stakeholders in ways below:

- Provide an overview of potential H₂ applications including evaluation of economic viability and comparison with alternative solutions
- Conduct and publish studies for generic H₂/PtX business cases
- Support the DTIC in the development of a H₂ Industry Strategy
- Determine local content potential and business opportunities for small and medium-scale enterprises (e.g., component manufacturers, suppliers, project developers, engineering, and O&M service providers)

3 Research, innovation and training: Establishing a new sector requires skills and capacities. H2.SA will focus on identifying the skills required to service the H₂ sector and work towards ensuring the availability of these skills and capacities. The project will host a series of information events aimed at all levels of stakeholders as well as targeted training sessions for decision-makers. Apart from

general training and capacity building, H2.SA will provide support to research and innovation stakeholders to ensure an on-going development of research capabilities in the country.

4 Environmental and social sustainability: The production of green H₂ and PtX is not sustainable by default. In order to avoid or minimize negative environmental or social impacts, it is important to consider aspects related to e.g. water supply, land use, biodiversity, critical raw materials as well as quality of jobs, labour standards, health and safety or local access to energy. H2.SA will assess these sustainability dimensions for selected flagship projects, those insights will support strategic decision-making processes about the expansion planning of RE and the necessary infrastructure. Cooperation with participating institutions and stakeholders will focus on developing hands-on and solution-oriented approaches with the aim of addressing ecological and socio-economic challenges. Neighbouring communities and villages near large H₂/PtX plants should benefit within the framework of the benefit-sharing approach via job quotas, financial levies, or infrastructure. A special focus is on enhancing gender equality by the advancement of women in line with guidelines for gender-responsive planning, budgeting, monitoring, evaluation, and auditing.

Potential impacts

The market for green H₂ is expanding rapidly. The support from the H2.SA project will assist South Africa to capitalise on the excellent RE resources, available expertise, and well-developed infrastructure in the country to become a world leader in the supply of green H₂ products. A green H₂ economy will also assist with South Africa's own energy transition and support the policy objectives related to climate change and greenhouse gas reduction. Lastly, this will support the creation of much needed jobs and support economic transformation in South African communities.