INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

IPHE Country Update Nov 2024 – Jun 2025: South Africa

Name	Dr Khavharendwe Rambau
Contact Information	Khavharendwe.rambau@dsti.gov.za
Covered Period	Nov 2024-May 2025

1. New Initiatives, Programs, and Policies on Hydrogen and Fuel Cells

Governance

- **Department of Trade Industry and Competition (DTIC)**
  Tax incentives: 150% tax incentive for manufacture of electric and hydrogen fuel cell cars
  Dec 2024: Taxation Laws Amendment Act No. 42 of 2024 – introduced at 150% tax incentive for manufacturing of electric and hydrogen powered vehicles; aimed at promoting the production of battery electric and hydrogen-powered vehicles in South Africa; linked to the transformation of the automotive manufacturing industry from the production of internal combustion engine vehicles to include the production of battery electric and hydrogen-powered vehicles as envisaged in the Electric Vehicles White Paper published in November 2024 (by the Department of Trade, Industry and Competition).

- **Department of Forestry, Fisheries and the Environment**
  Environmental Impact Assessment Guidelines for South Africa.
  The purpose of this Guideline is to offer insights into the main issues that may surface when undertaking an Environmental Authorisation (EA) process for a GH2/PtX project, and how these issues may be managed or resolved. The Guidelines comprises of four parts as follows:
  - Describes the GH2/PtX production process, constituent parts and
  - Development activities;
  - Outlines the pertinent Environmental Impact Assessment (EIA) regulatory requirements for GH2/PtX projects;
  - Provides guidance on planning and conducting the EIA process; and
  - Offers a suite of tools for practitioners to consider during the EIA.

New Initiatives

- **South African Green Hydrogen Potential Atlas**
  South African Green Hydrogen Potentials Atlas was developed by the Council for Scientific and Industrial Research (CSIR), an agency of the Department of Science, Technology and Innovation (DSTI), and GFA Consulting Group as part of the project 'Promoting a South African Green Hydrogen Economy (H2.SA)' implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. H2.SA supports the South African public and private sectors in realizing the potential of a sustainable green hydrogen economy for the country.

The atlas is the product of a multi-criteria analysis which considered spatially explicit key siting variables ("push"- and or "pull"-factors) that represent:
  - Environmental conditions and sensitivities;
  - Uses and users of the environment;
  - Requirements for GH2/PtX production.

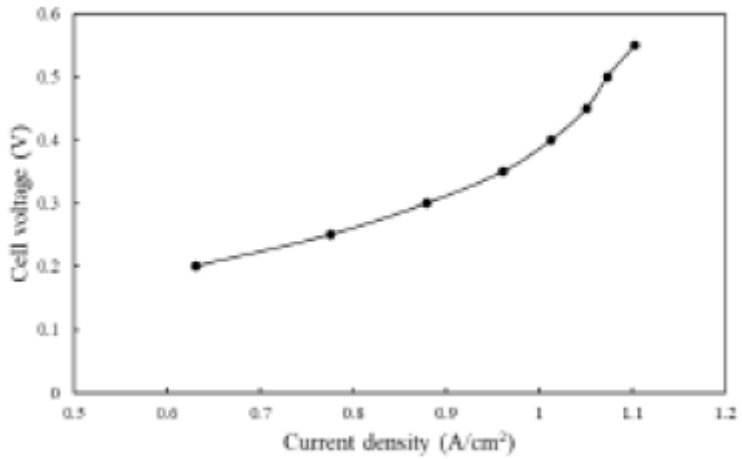
- **Regional Hydrogen Strategy**
  In 2025, the Western Cape Provincial Government launched the Western Cape Green Hydrogen Strategy and Roadmap.
  The specific goals of the Western Cape Green Hydrogen strategy are, by 2035, to:
  - Facilitate the generation and supply of 15 GW required for Green Hydrogen production in the Western Cape;
  - Support projects that generate their own power for electrolysis to meet the Western Cape's domestic green hydrogen demand, contributing significantly to hydrogen and hydrogen derivatives exported from the Western Cape;
  - Through excess supply capacity generated by Green Hydrogen electricity requirements, contribute towards the 1 800MW – 5 700 MW goal target of the Energy Priority Focus Area of the Growth for Jobs Strategy, in order to reduce reliance on energy from Eskom;
  - Utilise between 90kt and 132kt green hydrogen in hard-to-abate sectors in the province to reduce greenhouse gas emissions by 3.3Mt to 5 Mt of carbon dioxide equivalent (MtCO2e) per annum; and
  - Export between 300kt and 420kt green hydrogen as pure hydrogen or in derivative forms, such as green ammonia, methanol, or synthetic aviation fuel. This can happen both through bulk exports and through refuelling of international marine and aviation transport.

2. Hydrogen and Fuel Cell R&D Update

Update on the Hydrogen South Africa (HySA) Centres of Competence (HySA Catalysis, HySA Infrastructure and HySA Systems)

HySA Infrastructure

- A catalyst-coated membrane for EHC (electrochemical Hydrogen Compression) by HySA Infrastructure at North West University (NWU) demonstrated outstanding current density performance. Performance of HySA Infrastructure (NWU)'s catalyst coated membrane (CCM) as a function of cell voltage and current density for hydrogen pumping by electrochemical hydrogen compression.



The HySA Catalysis

- HySA Catalysis released four new catalyst prototypes (two for electrolyser and two for fuel cell application) and two catalyst coated membrane prototypes for electrolyser application. Laboratory scale iridium based electrolyser catalyst prototype matches commercial benchmarks in mass-specific OER activity at 1.525 V vs. RHE (51 A gIr^{-1}). It demonstrates exceptional durability and electrochemical stability while achieving a 93% reduction in iridium content compared to commercial alternatives. A laboratory-sized prototype for the synthesis of a catalyst oxide support was released for application in developing of iridium-supported catalyst. Electrolyser CCM prototypes featuring in house developed iridium oxide catalysts achieved performance comparable to a commercial benchmark across low and high current densities. In addition, an electrochemical model prototype was designed at UCT to predict the kinetic performance of a pressurised PEMWE under varying pressures. Combining theoretical and experimental approaches, it outperforms conventional models, demonstrating lower-than-expected energy use for PEMWE pressurisation and improved predictive accuracy across all operational modes.

- Platalite®-HTK50 catalyst, a heat-stabilised catalyst designed to maintain excellent Pt dispersion at intermediate to high Pt loadings was successfully scaled to 1 kg/batch and has been added to Mintek's suite of catalyst formulations. The heat stabilisation treatment enhances durability compared to standard catalysts, particularly under load cycling conditions. The Platalite®-HTK50 catalyst is suitable for use as both an anode and cathode catalyst in PEMFCs, as well as a cathode catalyst in electrolysers.

- MACol-K60 catalyst, a catalyst produced utilising a microwave-assisted colloidal method for exceptional Pt metal dispersion even at high PGM loading, ensuring superior performance in PEM fuel cells as both anode and cathode electrocatalysts. Additionally, it excels in PEM electrolysers as a highly effective HER catalyst on the cathode. The microwave-assisted polyol method offers notable advantages in terms of scalability and energy efficiency. The synthesis requires only 2–5 minutes in a microwave oven, significantly reducing energy consumption.

3. Demonstration, Deployments, and Workforce Developments Update

3.1 Demonstration and Deployments

HySA Infrastructure

- HySA Infrastructure (NWU) has developed mobile generating and refuelling system for Toyota South Africa and successfully ached Factory Acceptance Test recently. HySA Infrastructure has developed and successfully commissioned **Gen-3 TOYOTA REFUELING GEN 3 SYSTEM**. The refueller consist of two independent fully automated containerised hydrogen production system (HPS), and hydrogen storage and refuelling system (HSRS). The hydrogen production system produces and compress hydrogen to 200 barg, and hydrogen is stored in the separate hydrogen storage and refuelling system for refuelling at up to 500 Bar. Both systems are transportable and can operate independently.

Table 1: System specification for the Hydrogen Production System

Hydrogen Production	System power rating	Hydrogen purity requirement	Mobility	Maximum output Generation pressure
2.2 kg/day	220 Vac 7.5KW	SAE-J2719	System to be transportable by Hino flat-bed truck	200 barg

Table 2: System specification for Hydrogen Storage and Refuelling System

Hydrogen Storage Capacity	Refuelling program Designation	Target Refuelling pressure	Refuelling protocol type	Fuelling rates
6 x Type-4 composite cylinders Total H_2 = 30kg	H-35 Ambient	350 Barg	Ambient temperature-based refuelling with infrared communication (SAE-J2601)	1-4 MPa/min

Update on Green Hydrogen National Programme (Strategic Integrated Projects (SIPs))

Following the Cabinet approvals of the Hydrogen Society Roadmap (HSRM) in September 2021 and the Green Hydrogen Commercialisation Strategy in December 2022, South Africa aims to produce 500 kilo tonnes of green hydrogen annually by 2030, supported by the implementation of the SIPs and aimed at positioning itself as a leader in this emerging market. SIPs are large-scale infrastructure investments in South Africa, focusing on improving the quality of life for all citizens. These projects are designated under the Infrastructure Development Act (IDA), and aim to streamline the approval process for projects of significant economic or social importance.

Table 3: Summary of progress made on the implementation of the SIPs

Project Name	Short Description	Project Phase
AMSA Saldanha Hydrogen Direct Reduced Iron (DRI)	Green Steel Production	Pre-Feasibility
Atlanthia Green Hydrogen	Green Hydrogen and Ammonia Production	Pre-Feasibility
Benguela Renewable PtX	e-Fuel production	Pre-Feasibility
Boegoebaai Green Hydrogen Development Programme	Green hydrogen and green hydrogen derivatives production	Pre-Feasibility
Dreamworks Haven Green Hydrogen Project	Green hydrogen production	Pre-Feasibility
ELIDZ Green Hygrogen	Green hydrogen production	Pre-Feasibility
HIVE COEGA Green Ammonia	Green hydrogen and green ammonia production	Bankable Feasibility
Hydrogen Valley Programme of Anglo-American	Nine pilot projects in transport (mining trucks, heavy duty freight, buses), industrial (ammonia/chemicals) and buildings (fuel cell power) sectors	Pre-Feasibility
Isondo Precious Metal (MEA)	Membrane Electrode Assembly (MEA) Manufacturing	Execution
Keren Hydrogen Project Scorpion	Green hydrogen production	Bankable Feasibility
Koegas Green Hydrogen Project	Green hydrogen production	Pre-Feasibility
Phelan Green Hydrogen	Green hydrogen and green ammonia production	Pre-Feasibility
Renewstable Mpumalanga	Non-intermittent renewable, stable and baseload power and long-term hydrogen storage	Pre-Feasibility
SASOL HySHiFT (Secunda)	Sustainable Aviation Fuels (SAF) production	Bankable Feasibility
Sasolburg Green Hydrogen Programme	Green hydrogen production	Pre-Feasibility
The Prieska Power Reserve	Green hydrogen and green ammonia production	Bankable Feasibility
The Ubuntu Green Energy Hydrogen Project	Green hydrogen production	Pre-Feasibility
Upilanga Solar and Green Hydrogen Park	Green hydrogen production	Bankable Feasibility

3.2 Workforce Developments

- **HySA Workforce for 2024/25 Financial year**

  The HySA Centres of Competences supported a total of 35 Postgraduate students (MSc and PhD students) nine (9) interns from Technical and Vocational Education and Training (TVET) and Universities of Technology (UoTs), and 16 technicians within the Hydrogen and Fuel Cell technology sector.

- **South African Just Energy Transition (JET) Investment Plan Work**
  Work estimation: Developed as part of the JET Skilling for Employment Program (JET SEP), a multi-stakeholder and collaborative initiative led by the National Business Initiative (NBI) coordinates private sector contributions to realising the skills chapter in the JET Implementation Plan, with a focus on inclusive workforce development and sustainable job creation

4. Events and Solicitations

4.1 G20

- **African Green Hydrogen Summit**
  South Africa currently holds the Presidency of the G20. As part of this leadership, the African Green Hydrogen Summit (AGHS), scheduled to take place from 12 to 13 June 2025, will stand out as one of the flagship G20-aligned side events focusing on green hydrogen. Building on the success of the 2022 and 2023 South African Green Hydrogen Summits, AGHS 2025 expands the dialogue across the continent, in alignment with Africa's broader green industrialisation and sustainability objectives.

  The Summit will spotlight Africa's immense potential to become a global leader in green hydrogen production, while unlocking critical investment opportunities and fostering strategic partnerships. The event will be hosted by the Minister of Electricity and Energy, Dr Kgosientsho Ramokgopa, and will feature opening remarks by the President of the Republic of South Africa, His Excellency President Cyril Ramaphosa. A number of African Ministers are also expected to participate, lending their voices to support the African Union's Green Hydrogen Strategy and sharing national insights on advancing the hydrogen economy across the continent.

- **Energy Transition Working Group**

4.2 Other Hydrogen Events

- **DEVAC Hydrogen-H Indaba:17-18 September 2025**
  Platform for hydrogen project developments and investment opportunities where industry experts from government institutions, key private sector companies, international investors are brought together to engage on solutions to unlock Africa's green hydrogen potential.

- **2nd Southern African Hydrogen and Fuel Cell Conference:7-8 April 2025**
  This conference was organized by the Southern African Institute of Mining and Metallurgy (SAIMM), a professional institute focusing on mining, metallurgy, and related sectors. The primary purpose of the 2nd Hydrogen and Fuel Cells Conference was to advance green hydrogen technologies in Southern Africa and the global community by showcasing the potential of renewable and sustainable technologies and addressing emerging challenges. This was achieved through the exploration of hydrogen production, storage, and utilization using fuel cells, facilitated by engagement with industry, academia, and government stakeholders. The conference provided a platform for high-level knowledge exchange and networking opportunities with various experts in the field.
  The two-day event featured high-level scientific talks and poster presentations, complemented by keynote and plenary sessions covering country overviews and insights into the status of leading and major players in both the Southern African and global hydrogen landscape.

- **Regional: Global African Hydrogen Summit: 9-11 September 2025**
  The Global African Hydrogen Summit (GAH2S) 2025 is scheduled to take place from 9 to 11 September 2025 in Windhoek, Namibia. Hosted under the patronage of the Government of Namibia and endorsed by the Ministry of Mines & Energy, the summit is organized in partnership with the Namibia Investment Promotion and Development Board (NIPDB) and supported by the Namibia Green Hydrogen Council and the Namibia Green Hydrogen Programme (NGH2P)

5. Investments: Government and Collaborative Hydrogen and Fuel Cell Funding

- **Transnet Green Hydrogen for Freight Trains**
  Transnet, South Africa's state-owned freight and logistics company, the custodian of South Africa's rail, port and pipeline infrastructure, signed a Memorandum of Cooperation (MOC) with Africa GreenCo Group, through its South Africa-based operating company GreenCo Power Services. The two will collaborate on a study to establish the techno-commercial viability of green hydrogen to power freight trains in South Africa, as well as a preliminary project design and parameters of a GH2 Pilot Project. This project will be supported by a grant provided by the Private Infrastructure Development Group (PIDG) Technical Assistance (PIDG-TA), a key financial organisation funding, inter alia, innovative infrastructure developments in sub-Saharan Africa that is actively involved in green energy transition projects.

- **EU Grant on Green Hydrogen and Supporting the decarbonization of Transnet**
  The European Union has allocated two grants totalling R628 million (approximately €32 million or $35 million) to support South Africa's green hydrogen initiatives, with a significant portion directed towards Transnet's development efforts. R490 million (€25 million) grant is aimed at bolstering South Africa's green hydrogen value chain. This grant is expected to leverage an additional R10 billion in private and public sector investments. The funding will support various stages of the hydrogen value chain, including production, transportation, storage, and downstream industries.

R138 million (€7 million) grant has been allocated for Transnet, designed to assist Transnet in its turnaround strategy. The funds will facilitate the green transformation of Transnet's core operational areas, encompassing ports, rail, pipelines, engineering, and related facilities. This initiative aligns with Transnet's goal to achieve net-zero emissions by 2040 and supports the development of a green hydrogen ecosystem in South Africa.

- In March 2025, the EU announced that it would financially support green hydrogen projects in South Africa as part of a €4.7bn Global Gateway Investment Package. Most of this funding (€4.4bn) will go towards "supporting a clean and just energy transition in the country", including the production and export to Europe of green hydrogen and platinum group metals used in PEM electrolysers. This investment package consists of EU grants (€303m), leveraging loans from the European financial institutions (€4.4bn) and South Africa's development banks to support strategic value chain.

6. Regulations, Codes & Standards, and Safety Update

A green Hydrogen Study supported by GIZ: Supporting Sustainable Hydrogen Development: The Role of Technical Standards, Regulation and Sustainability Certification.

The policy brief outlines the importance of regulation, technical standards, and sustainability certification in advancing the green hydrogen economy. As South Africa positions itself for export opportunities, standards and certification play a critical role in facilitating green hydrogen trade. While existing structures like the South African Bureau of Standards Technical Committee 197 are already working on developing relevant standards, the brief further recommends short-, medium-, and long-term actions that government entities in South Africa could pursue to enhance their readiness for the green hydrogen economy.

Examples of hydrogen-specific standards include:

- **ISO 22734:2019:** Specifies requirements for hydrogen production by electrolysis, supporting safe and efficient green hydrogen production.
- **ISO 19980-1:2020:** Provides guidelines for hydrogen refuelling stations, including design, installation, and operational safety.

Examples of non-hydrogen-specific standards:

- **SANS 347**: Governs the classification and safety of pressure equipment, which applies to pressurised hydrogen storage systems.
- **SANS 10108:** Outlines requirements for hazardous area classification, relevant to hydrogen storage and production facilities.

Notably, the SABS has adopted certain hydrogen-specific standards as national standards. For example, SANS 62282-4-101 covers fuel cell technologies and SANS 23828: 2010 covers the safety of hydrogen powered vehicles. These standards are steps towards establishing a comprehensive national framework for hydrogen safety and quality in South Africa.