

Green Hydrogen (GH₂) Commercialisation in South Africa

A path towards industrialisation, decarbonisation and
socioeconomic upliftment for South Africa

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Presentation to : Green Hydrogen and PtX Conference



A solid historical base supports accelerated commercialisation

1

2007

Development of the **National Hydrogen and Fuel Cell Technology Strategy** by the Department of Science and Innovation and approval by Cabinet

2

2008-2018

Various demonstrator projects : an underground fuel cell powered mining locomotive, solar-to-hydrogen system, battery and fuel cell golf cart, fuel cell generator providing lights for the UWC Nature Reserve, fuel cells for power storage for homes and cellular phone tower base stations; a Hydrogen refueling station; and fuel cell powered forklift. Green Hydrogen fuel cell system with on-site production and storage and a Hydrogen in Mining test facility, Hydrogen production, Liquid Organic Hydrogen Carriers and the use of PGM catalysts for the production of Hydrogen. HySA demonstrated a 2.5kW fuel cell system at Poelano Secondary School

3

2020

The DSI, Hydrogen SA and North West University initiate a process with the South African government to develop a **Hydrogen Society Roadmap**.

4

JUNE 2021

Presidency announces that GH₂ has been identified as the first of five "**Big Frontier**" strategic investment opportunities

5

JULY 2021

The DTIC and IDC coordinated a joint approach to sector planning by establishing a **Green Hydrogen Panel**

6

NOVEMBER 2021

At COP 26 in Glasgow, Scotland, South Africa **mobilizes funding support** for the country's decarbonization

7

FEBRUARY 2022

The HSRM is released to the public marking a momentous milestone for South Africa's hydrogen industry development

8

OCTOBER 2022

The JET-IP was approved by Cabinet and presented at COP27

9

NOVEMBER 2022

Inaugural Green Hydrogen Conference held in Cape Town

10

NOVEMBER 2022

IDC and KfW sign MOU to deploy €23m of grant funds towards catalytic green hydrogen projects

11

DECEMBER 2022

Government gazette lists 20 green hydrogen projects with 9 of them being granted SIP status

12

DECEMBER 2022

GHCS released to the public for comment (Comments closed on 31 March 2023)



Global and local developments indicative of progress

- Inclusion of GH₂ in the JET-IP, this will be updated for COP28
- 19 projects included in Government gazette in December 2023 with 9 of them granted SIP status
- IDC and KfW sign MOU to deploy 23m euros of grant funds toward projects
- SA-H2 fund being developed with IDC, DBSA, Climate Fund Managers, Invest International and Sanlam – targeting \$1bn
- H2 Global RFI released in December 2022 (it is believed that projects have already being granted preferred bidder status)
- Transnet announces 3 parties to bid for the Boegoebaai Port development
- SABS convened a working committee to develop hydrogen standards for South Africa
- Japan revised targets increased to 3 million tons by 2030
- German cabinet doubled 2030 GH targets from 5 GW to 10 GW,
- US inflation reduction act and CBAM

The Opportunity presented by Green Hydrogen for South Africa

Why it is critical for South Africa to develop the GH₂ industry

Market driven commercialisation

Import Markets for GH₂ to 2050 will be the EU (2030: 20mtpa); Japan (2040: 12mtpa; South Korea (2050: 1.2 mtpa), the United Kingdom (2050: 0.7 mtpa).

Industrialisation opportunities

Value chain impact across multiple industries – renewable energy, steel, petrochemicals, transport, manufacturing, mining, construction, agriculture

Infrastructure build

GH₂ projects will serve as anchor demand to justify shared infra. investment, e.g., Boegoebaai port, accel. Northern Cape grid expansion, reskilling initiatives, etc

Decarbonisation

GH₂ can decarbonize much more than RE alone by replacing fossil fuel inputs in industrial processes; Last mile decarbonisation in hard to abate sectors

The GH₂ economy presents new economic, skills, employment and community opportunities for South Africa

GDP Increase of R100-R250bn, 1-3%



GH₂ value chain can drive industrialisation of heavy manuf. (e.g., green steel), petrochem (e.g., SAF, green MeOH and other PtX) to drive economic growth

650,000 to 1m new jobs



GH₂ value chain drive long-term net job creation in new green, and preserve jobs in at-risk industries (e.g., heavy man, petrochem)

BBBEE including community empowerment



Opportunity to empower previously disadvantaged people by taking ownership in new businesses and by providing new job opportunities. Communities can be empowered by shareholding in projects and by SMMEs contracting along the GH₂ value chain.

Gender equality and social inclusion



Opportunity to integrate gender equality through empowering women to take leadership roles in green industries as entrepreneurs and / or industry professionals



8 challenges must simultaneously be overcome for South Africa's GH₂ industry to materialise

Misconception that GH₂ is water intensive

Public awareness that projects are not water intensive; cost of water on GH₂ overall cost is minimal, leverage on desalination to provide water to communities

Water requirements

Green Premium

Cost of green products is at a premium compared to grey products

Utilise pricing subsidies to support export project business case

Target scale and learning rates will bring prices down successively

Transportation of GH₂ is very costly

GH₂ exports will be via conversion to ammonia; indications from SA commercial project pre-feasibility studies is that long distance transportation via ship is not a high cost Pipeline feasibility study for SA will provide more clarity on costs to transport hydrogen from the cost to inland via a hydrogen pipeline

Transportation costs

Awareness

Lack of understanding of the benefits and applications of GH₂
Awareness campaigns with NEDLAC, PCC, lobby groups ; JET-IP implementation plans will address knowledge sharing

Energy Security

GH₂ should not compete with energy crisis
Projects will come on line after energy crisis resolved, projects will feed into the grid, community mini grid opportunities

Funders risk averse due to tech & offtake uncertainty

\$100m of grant funding being sourced to overcome high development risk

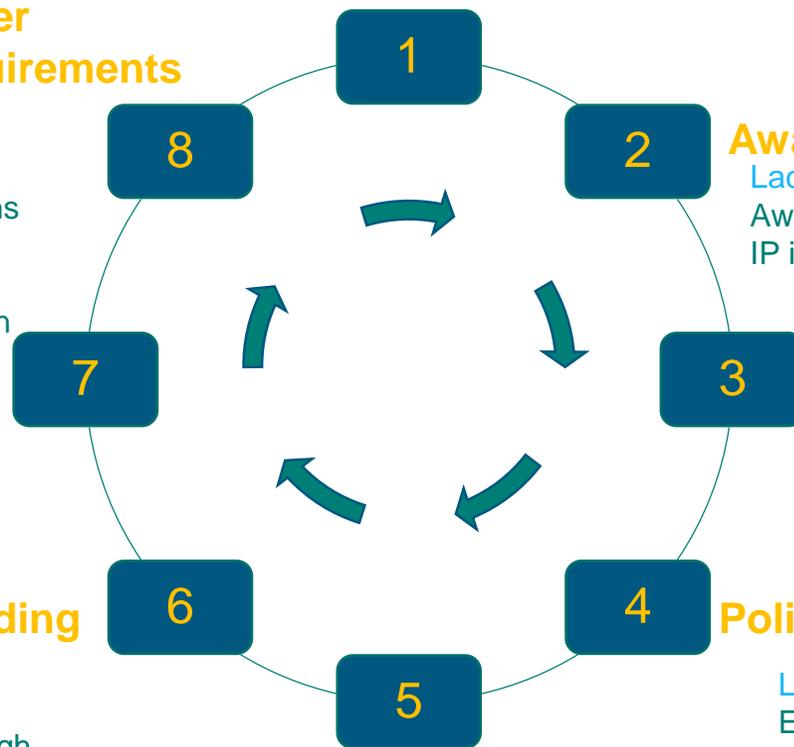
Funding

Policy Alignment

Lack of inter-government and private sector policy alignment
Expedite GHCS approval by Cabinet
Execute implementation plans in GHCS and JET-IP targeting policy alignment

Infrastructure Coordination

Lack of coordination on infrastructure plans for ports, pipelines, road and rail
TNPA coordinating ports work, pipeline study being initiated,





South Africa's approach is anchored on 6 elements

The successful implementation of the commercialisation strategy will depend on the execution of the six key elements :

<p>1</p> <p>TARGET EXPORTS</p> <p>Target exports of green hydrogen and green chemicals by leveraging on South Africa's proprietary Fischer Tropsch technology and utilising financing support mechanisms including grants, concessional debt and contract for difference/price subsidies to improve the financial viability of these projects</p>	<p>2</p> <p>STIMULATE DOMESTIC MARKET</p> <p>In parallel to the export strategy, develop projects along the value chain to stimulate demand for green hydrogen in South Africa. "Low hanging fruit" opportunities to be prioritised to provide confidence in the domestic market. Examples include green steel, hydrogen valley mobility programme and sustainable aviation fuel projects.</p>	<p>3</p> <p>SUPPORT LOCALISATION</p> <p>Develop local industrial capability to produce fuel cells, electrolyser, ammonia cracking and balance of plant equipment and components by leveraging on South Africa's PGM resources. Together with demand stimulation this will drive longer term GH₂ price reduction allowing penetration in various sectors.</p>	<p>4</p> <p>SECURE FINANCING</p> <p>"Crowd in" and secure funding from various sources and in various forms including grants, concessional debt and contract for differences.</p>	<p>5</p> <p>PROACTIVE SOCIO ECONOMIC DEVELOPMENT</p> <p>Maximise development impact (incl. skills and economic development and social inclusion).</p> <p>Ensure gender equality, BBBEE and community participation.</p> <p>Maximise job creation and alternative options for potential job losses.</p>
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ROLE OF GOVERNMENT IN POLICY AND REGULATORY SUPPORT

Position GH₂ as a key early contributor to decarbonization and a just transition in the country programme of work being collated by the JET-IP Task Team ensuring a fair proportion of climate finance is sourced to enable development of this industry.

Prioritize the execution of the green hydrogen commercialisation strategy and the development of a national GH₂ infrastructure plan

Drive the required policy and regulatory changes required to sustain long term growth of the new hydrogen industry.

Mobilise and coordinate the Government support required to support the development of this new industry for South Africa.



Conclusions and key take away

1 Action plan driven

The development of this new industry will be driven by the identified commercialisation action plans in the GHCS and will need support from multiple stakeholders in driving the actions identified

2 Move with speed

South Africa has hit the ground running but needs to move with speed to secure the export market off take

3 Co-dependency between the big projects and smaller stakeholders

Scale is important to get longer term price down

Support local entrepreneurs by supply chain integration with the large projects

4 Project development

Continue to support existing project being developed so that they can come on line in a few years when the market is ready

5 Address the enablers

- Work on policy and regulations, skills development, funding in parallel
- Work on incentives support for longer term ramp up
- Develop funding instruments