



**PROGRESS MADE ON
THE IMPLEMENTATION
OF THE NATIONAL HYDROGEN
SOCIETY ROADMAP**

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M Making \langle sure \langle it's possible \rangle



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



TABLE OF CONTENTS

01 Hydrogen Society Roadmap Purpose and Vision

02 High-level outcomes of the HSRM

03 Key Actions and Milestones

04 Progress made in Implementing Priority Actions

05 Approved Strategic Integrated Projects

06 Catalytic projects in support of the HSRM

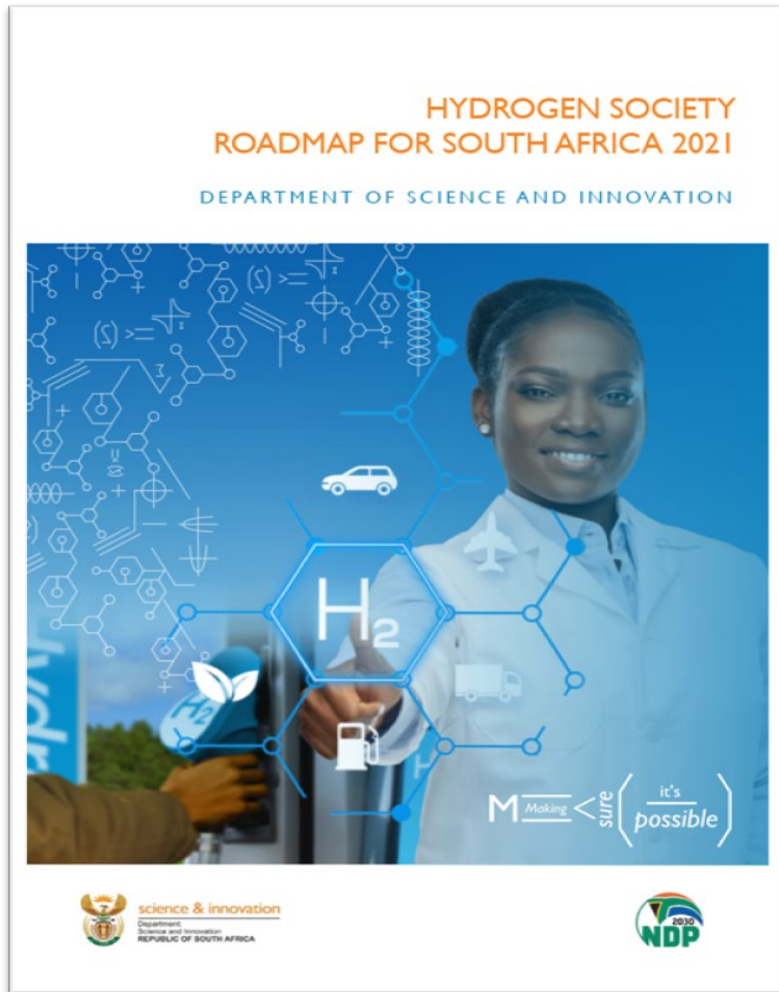
07 Green Hydrogen Economy Scenarios

08 Job creation in the All-Inclusive scenario

09 A Case for Localization

10 Key Messages

THE HYDROGEN SOCIETY ROADMAP



<https://www.dst.gov.za/index.php/resource-center/strategies-and-reports/3574-hydrogen-society-roadmap-for-south-africa-2021>



Vision

An inclusive, sustainable and competitive hydrogen economy by 2050 with the goal of achieving a Just and inclusive net zero carbon economic growth for societal wellbeing by 2050.



Purpose

To align stakeholders on a common vision on hydrogen related technologies in order to create an environment where investment decisions can be made to unlock the social economic benefits for the country.

HIGH LEVEL OUTCOMES OF THE HSRM

The implementation of the HSRM is expected to contribute to the goal of a just and inclusive net-zero carbon economic growth for societal wellbeing by 2050 through the following high-level outcomes:



Green and enhanced power sector and buildings

[16]

Lead Department: DMRE
Supported by: DPWI



Decarbonisation of transport sectors: heavy duty trucks, shipping, aviation and rail

[8]

Lead Department: DoT
Supported by: DTIC, DFFE



Creation of a manufacturing sector for hydrogen products and components

[9]

Lead Department: DSI
Supported by: DTIC, DMRE, DSBD



Decarbonisation of energy intensive industry : iron & steel, chemicals, mining, refineries, cement

[8]

Lead Department: DTIC
Supported by: DFFE, DMRE, DPE



Creation of an export market for green hydrogen and green ammonia

[9]

Lead Department: DTIC
Supported by: DIRCO, NT



Transition from grey to blue to green hydrogen

[20]

Lead: Presidency
Supported by: DSI, DMRE, DTIC, DIRCO, DFFE, DPE, DPWI

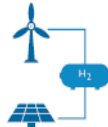
Ensure that Gender, Equality and Social Inclusion (GESI) are at the core of the transition to a low carbon economy to tackle the triple challenges of poverty, inequality and unemployment

KEY ACTIONS & MILESTONES

2021-2024

PRODUCTION

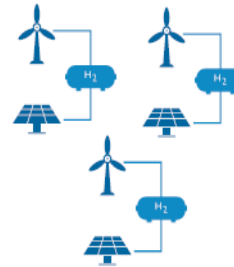
- Small scale electrolysis production
- At least 1MW GH2 production piloted



2025-2030

PRODUCTION

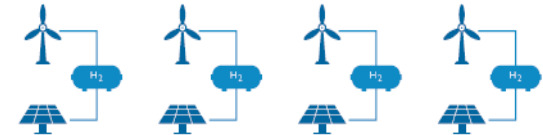
- 5GW electrolysis capacity under construction in NC
- 10GW electrolysis capacity deployed in NC by 2030
- 1.7GW electrolyser capacity deployed in H2 Valley by 2030
- At least 500kt H2 produced annually by 2030



2030-2040

PRODUCTION

- Increase electrolysis capacity to at least 15GW by 2040



USE

- At least 100 buses and trucks powered by H2 by 2025
- At least 20 forklifts converted to fuel cell power by 2025
- At least 5 refueling stations deployed by 2025
- Demonstration in power generation and stationary fuel cells in public buildings
- Industry demonstration including SAFs



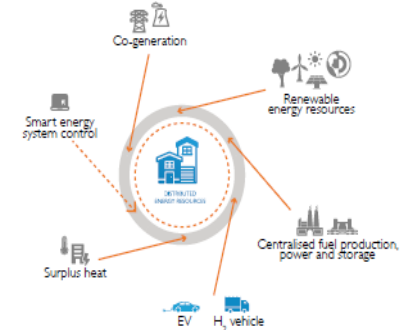
USE

- At least 500 buses and trucks powered by H2 by 2030
- Power generation in turbines using H2 and ammonia
- Sector coupling and use in transport, industry



USE

- Sector coupling and full use in transport, industry and power



JOBS

- Upscaling of training and reskilling for new jobs



JOBS

- At least 20 000 jobs created annually by 2030



JOBS

- At least 30 000 jobs created annually by 2040



Establish targets and policy signals



Support demand creation



Mitigate investment risk



Harmonize standards and remove barriers



Promote Research, Development and Innovation



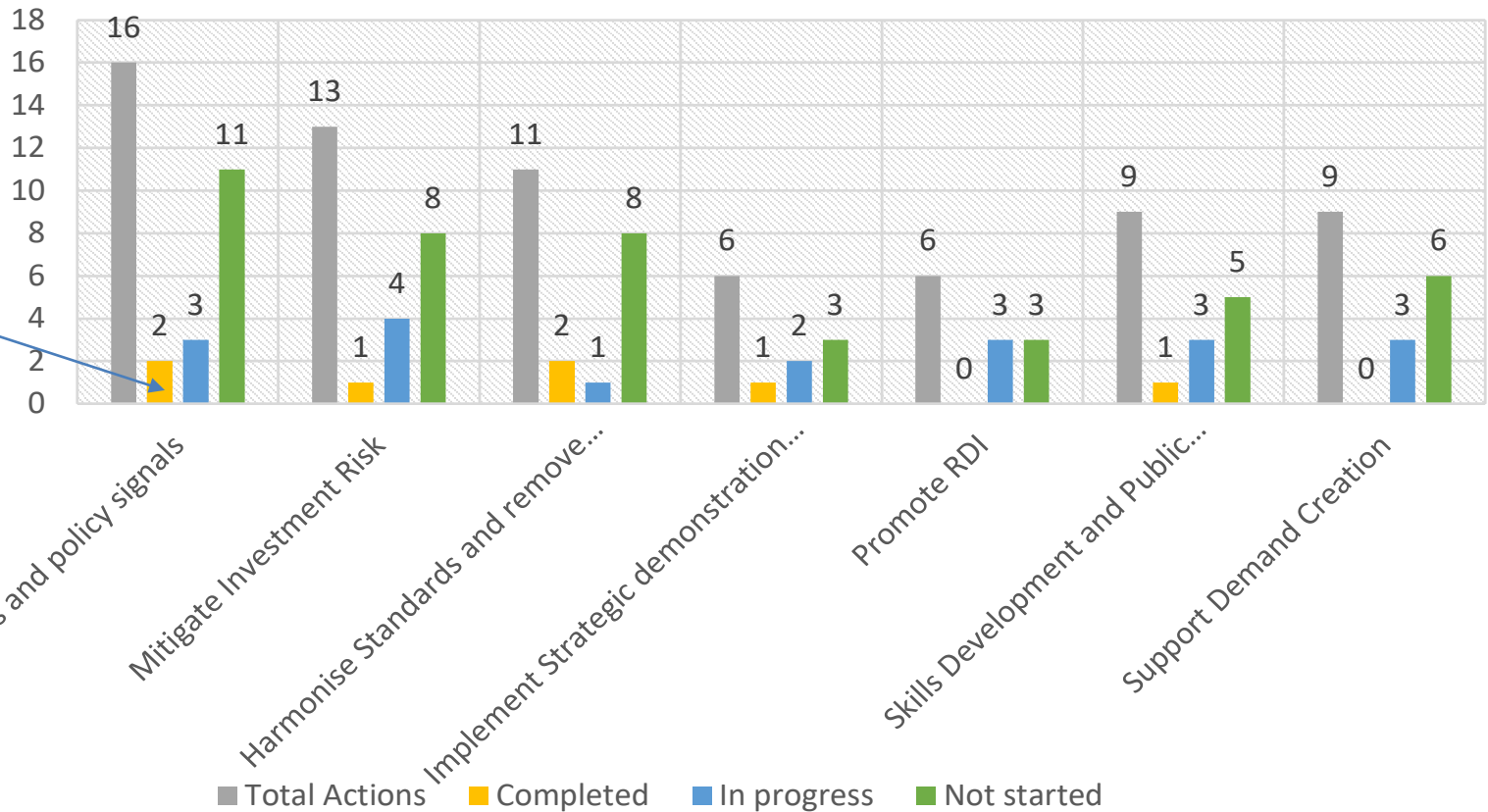
Strategic demonstration and deployment projects



Skills development and public awareness

PROGRESS MADE IN IMPLEMENTING THE PRIORITY ACTIONS BASED ON THE IEA FRAMEWORK

Progress Made in Implementing the HSRM Action Plan



Enabling Policy
Just Transition Framework, Green Hydrogen Commercialisation Strategy

Approval of SIPs
Nine (9) projects registered

New catalytic projects
Sasolburg, Saldanha Bay

APPROVED STRATEGIC INTEGRATED PROJECTS

Projects are recognized for their economic and social significance

- a. The Prieska Power Reserve in the Northern Cape
- b. The Ubuntu Green Energy Hydrogen Project in Northern Cape
- c. Boegoebaai Green Hydrogen Development Programme in the Northern Cape
- d. Atlanthia Green Hydrogen in the Western Cape
- e. Upilanga Solar and Green Hydrogen Park in the Northern Cape
- f. Sasolburg Green Hydrogen Programme in the Free State
- g. SASOL HySHiFT (Secunda) in Mpumalanga
- h. HIVE Ammonia in the Eastern Cape
- i. Hydrogen Valley Programme of Anglo-American and their JV Partners (9 projects) along the Limpopo, Gauteng to KwaZulu-Natal Corridor

SIPs benefit from:

- Better Coordination
- Better access to resources through prioritization
- Faster Environmental approvals

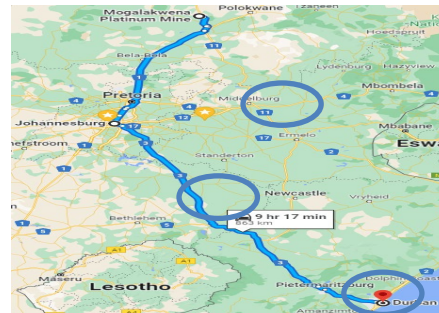
CATALYTIC PROJECTS FROM THE HSRM AND EXPECTED OUTCOMES

CoalCO2-X™



- Coal fired flue gas conversion and use
- Local production of fertiliser salts and other chemicals,
- New economic opportunities to support just transition
- Emissions reduction.

Platinum Valley



- Green hydrogen production and application hubs
- Decarbonisation of transport
- GDP contribution: USD3.9 bn to USD8.8 bn by 2050.
- 14 000 to 32 000 jobs per year by 2030.

Boegoebaai SEZ



- Green Hydrogen and Green Ammonia for domestic use and for export
- Electrolyser Park
- Solar, wind and battery Park.

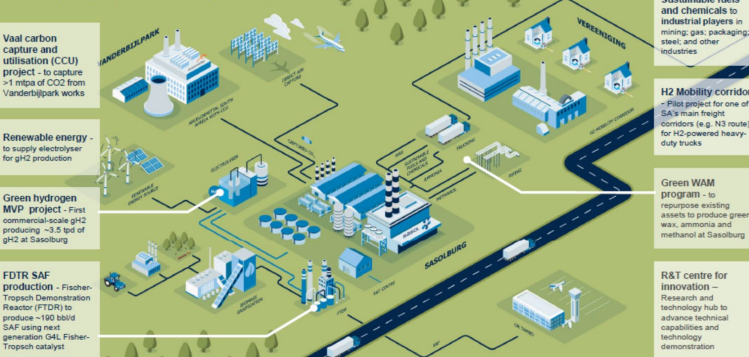
Sustainable Aviation Fuels



- Local production of aviation fuels for domestic use and export
- Decarbonisation of the aviation sector
- Sasol Secunda as Hub.

Sasolburg Green Hydrogen Hub

Converting CO2 into sustainable fuels to enable decarbonisation of other resident industrial players, supporting a Just Transition to a greener economy



- Carbon dioxide capture from Vanderbijlpark steel plant
- Sustainable carbon for aviation fuels production
- Research & innovation centre for technology testing and validation

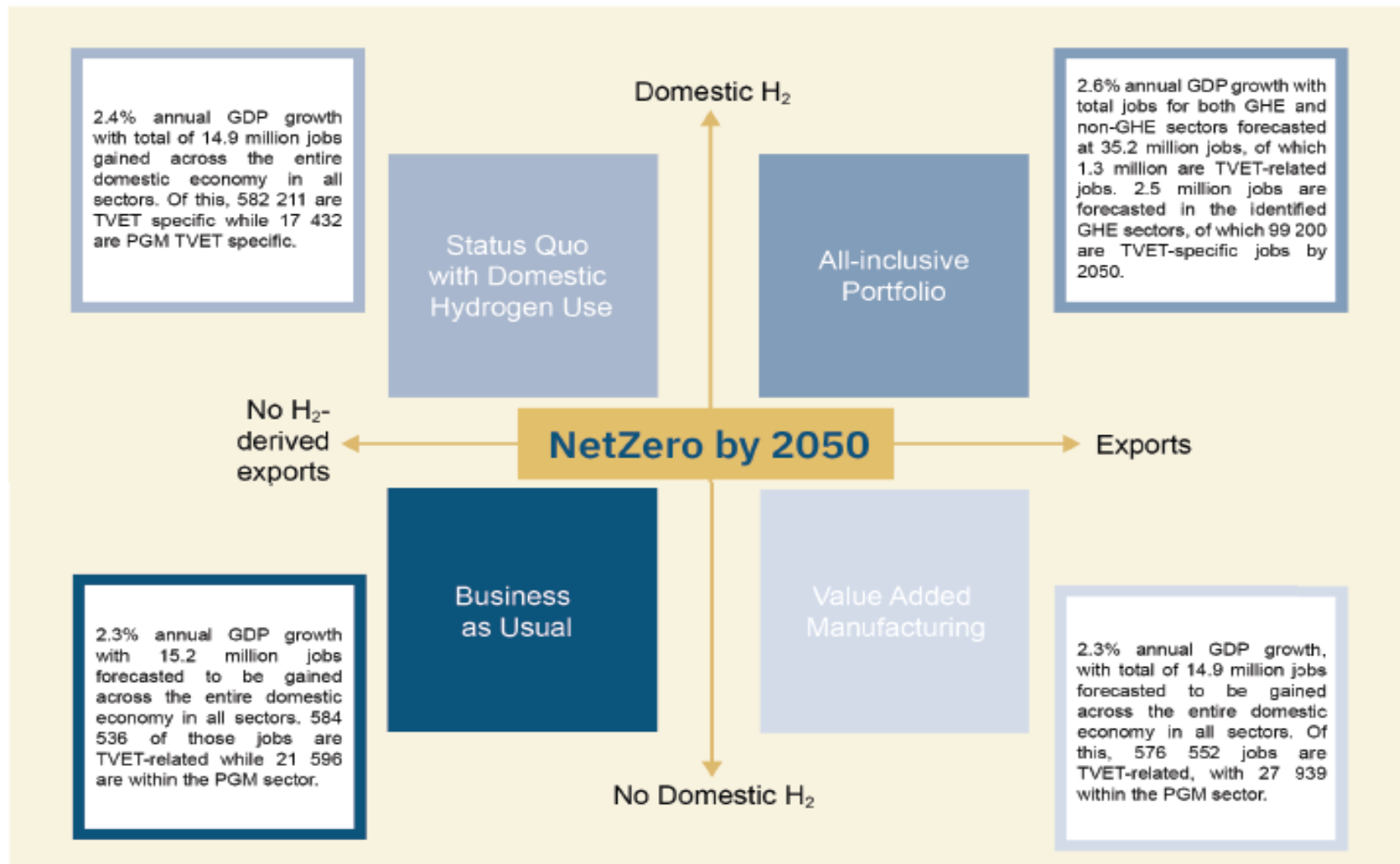
Saldanha green hydrogen and derivatives hub

Developing a world-class, globally competitive, structurally advantaged green hydrogen and derivatives production hub to decarbonize local and international industry



- Resuscitation of mothballed Saldanha steel works
- Green hydrogen production of 105 000 tonnes per yr. for green steel production

SCENARIOS FOR A GREEN HYDROGEN ECONOMY IN SOUTH AFRICA



THE ALL INCLUSIVE PORTFOLIO

Sector	Jobs 2030	Jobs 2040	Jobs 2050	TVET jobs 2030	TVET jobs 2040	TVET jobs 2050
Iron & steel	224 000	581 000	918 000	6 500	16 900	26 600
PGM mining	161 000	188 000	706 000	7 300	8 500	31 900
Power generation ^a	77 000	140 000	212 000	6 000	11 000	16 600
Fuel cells	<1 000	28 000	302 000	<100	900	9 700
Electrolysers	2 000	30 000	283 000	100	1 000	9 100
Ammonia	5 000	34 000	66 000	200	1 500	3 000
GH ₂ production	1 000	26 000	52 000	<100	1 200	2 300
SUBTOTAL for GHE sectors^b	470 000	1 027 000	2 539 000	20 300	41 000	99 200
Compared with South African economy at large						
TOTAL all sectors, (entire SA economy)^c	19 899 000^d	26 727 000^e	35 215 000^f	774 000	1 035 000	1 361 000

- a Numbers for power generation exclude thermal coal power generation, which employs resp. 11 (2030), 6 (2040), and 1 (2050) thousand persons, of which 0.9 (2030), 0.4 (2040), and 0.1 (2050) thousand were TVET-educated in the All-inclusive Portfolio.
- b For 2020 we estimate that the mentioned 7 sectors (with power generation excl. thermal coal) employed 327 thousand people, of which 14.6 thousand were TVET-educated (for 2019 these numbers were respectively 388 and 17.4 thousand).
- c The Total all sectors jobs refers to the entire SA economy and not only green hydrogen economy jobs. In 2020 the entire South African economy employed about 15.6 million people, of which about 610 thousand were TVET-educated.
- d Total all full-time equivalent jobs (including TVET) in the entire South African economy by 2030.
- e Total all full-time equivalent jobs (including TVET) in the entire South African economy by 2040.
- f Total all full-time equivalent jobs (including TVET) in the entire South African economy by 2050.

Source: Fadiel Ahjum et al., "Green Hydrogen and TVET Employment Prospects: An Assessment in a Context of Ambitious Decarbonisation for South Africa Towards 2050" (Working Paper, SAIIA-UK PACT and University of Cape Town, 2021)

CASE FOR LOCALISATION

- ❑ **Government has supported the development of IP in key components such as:**
 - PGM based catalysts for fuel cells and electrolysers.
 - Membrane electrode assemblies (MEAs) for fuel cells and electrolysers used in green hydrogen production.
- ❑ **Commercialisation will be enhanced by the integration of the locally developed IP in all the projects, which would:**
 - Stimulate the local production of the balance of plant to support systems deployed locally and create more jobs in supporting industries.
 - Give higher reliability of the systems because of available local maintenance and support, as some of the systems will operate for >10 yrs.
 - Flexibility to modify systems for continued use, even after the systems have been phased out by original equipment manufacturers. MEAs are the most likely components to be replaced in the systems.
 - South Africa would be able to manufacture systems that are more adaptable to the local conditions and those found in the rest of the continent.

KEY MESSAGES

- ❑ South Africa aims to use its mineral endowment, renewable energy assets, land availability and local industry capabilities to create a globally competitive Hydrogen Economy as part of its Economic Reconstruction and Recovery Plan.
- ❑ In line with the JET-IP, South Africa can be rebranded as a destination for Sustainable Investment that incorporates environmental, societal and good governance (ESG) principles.
- ❑ Gender, Equality and Social Inclusion are at the core of the transition to a low carbon economy to tackle the triple challenges of poverty, inequality and unemployment.
- ❑ The approval by Cabinet to extend the Hydrogen South Africa RDI Programme is an indication that South Africa remains committed to contribute to the growth of the Global Hydrogen Economy
- ❑ Government has initiated engagements with private sector and international partners to design appropriate operating models for the effective implementation of the Hydrogen Society Roadmap.



1 Military Hospital Deployment August 2020



South African Post Office Fuel Cell
powered scooters, 2019



Anglo American Platinum Fuel
Cell powered Truck 2022

**Ro livhuwa
Siyabonga
Re a leboga
Ha khensa
Siyathokoza
Enkosi
Dankie
Thank you**