

DSTI'S ROLE IN CONTRIBUTING TO THE SOUTH AFRICA'S HYDROGEN ECONOMY JOURNEY

Presenter:

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M *Making* < sure *it's* *possible*



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



☐ **Hydrogen South Africa Programme**

☐ Hydrogen Society Roadmap

DSTI MANDATE

- ❑ NDP identified STI as primary driver for economic growth, job creation and Socio economic reform.
- ❑ March 2019 White Paper on Science, Technology and Innovation (STI).
- ❑ Decadal Plan: Implementation plan for the 2019 White Paper on STI. (2022-2032 Plan)

STI Priorities:

- **Energy Innovation**
- Circular Economy
- Health Innovation



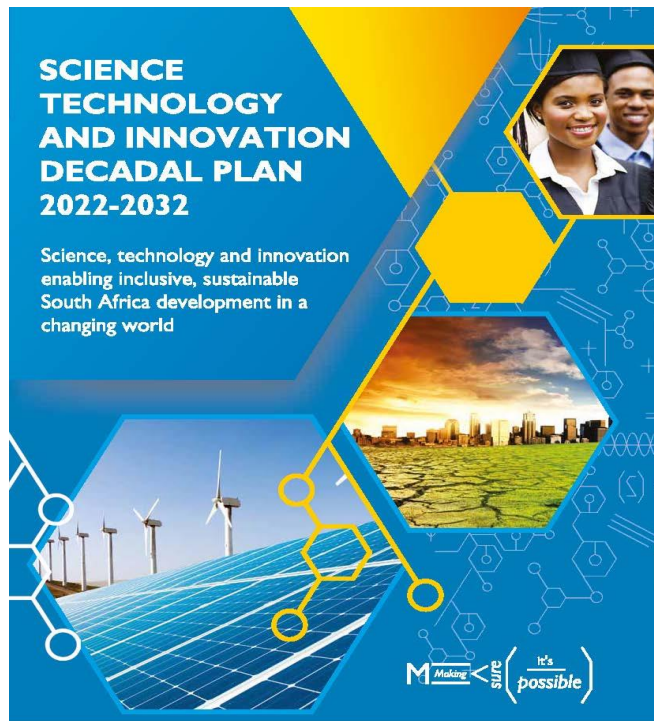
THE DECADAL PLAN

The Decadal Plan theme is:

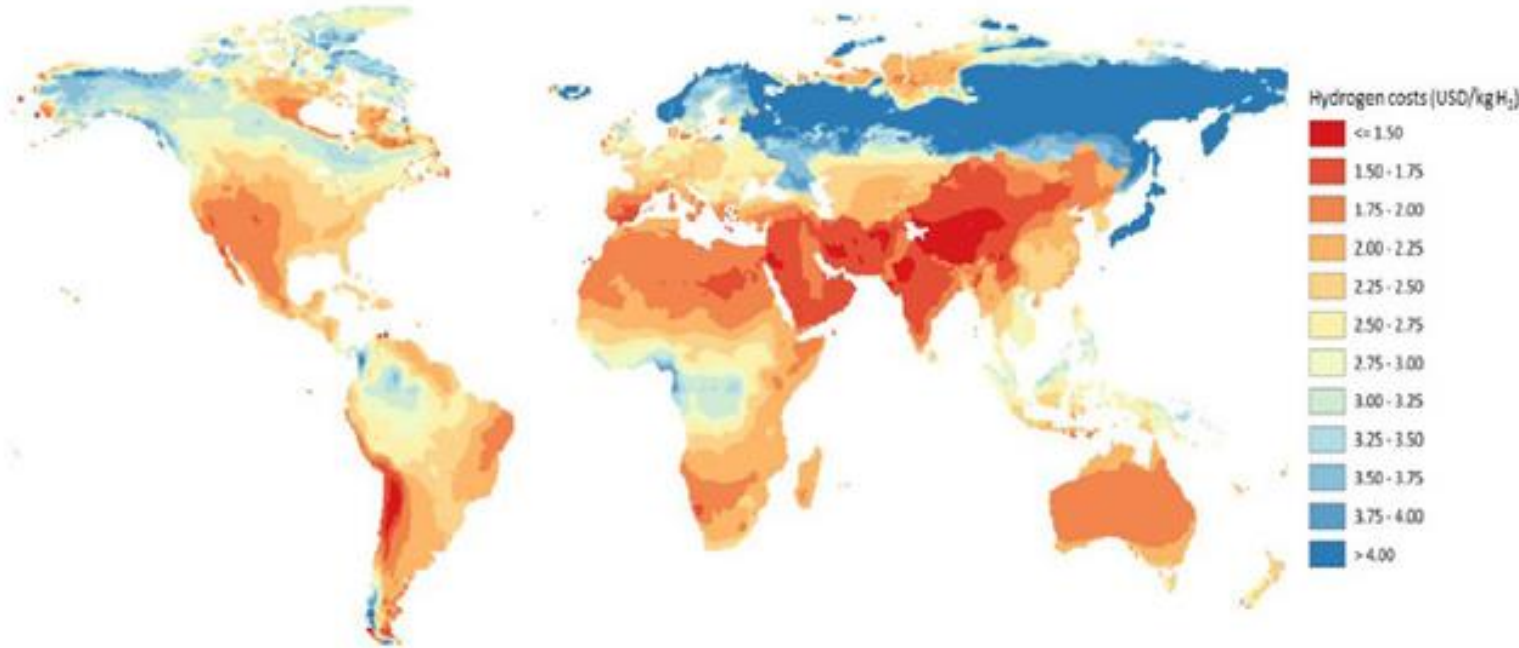
“deepening knowledge economy for enhanced socio-economic impact”

Policy Intents:

- ☐ Improve inclusion and build more linkages across the NSI
- ☐ Increase support for and collaboration with the business sector
- ☐ Support commercialisation of publicly funded intellectual property
- ☐ Innovation to revitalise existing sectors
- ☐ Strengthen skills in the economy
- ☐ Expand internationalisation and science diplomacy.



SOUTH AFRICA'S COMPETITIVE ADVANTAGE



Renewable Energy Resources and Land



Existing Port Infrastructure



Platinum Group Metals -75% of global reserves

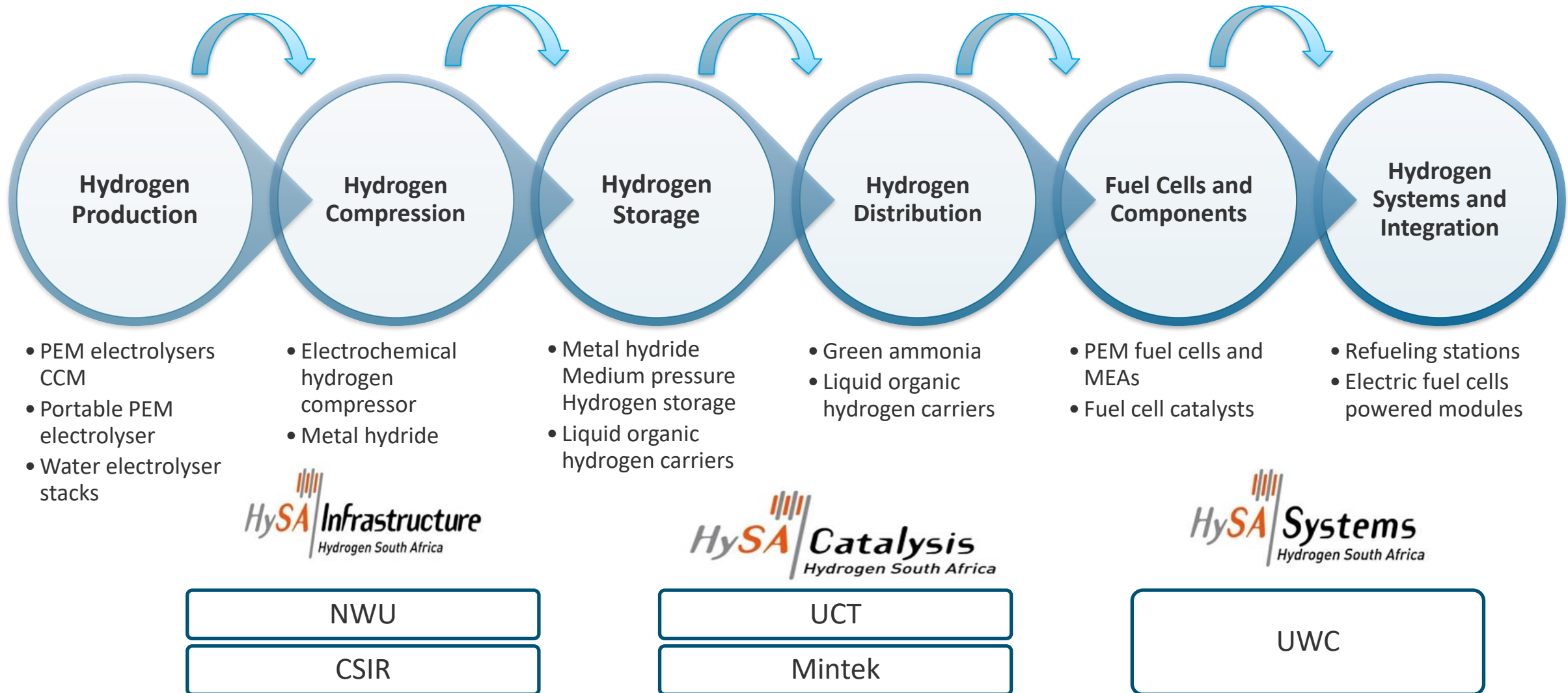
Other

- ☐ Fischer-Tropsch skills and capabilities
- ☐ Existing Hydrogen South Africa Programme
- ☐ Existing strategic trade partnerships with countries looking to import green hydrogen: Japan, South Korea and the European Union (EU).

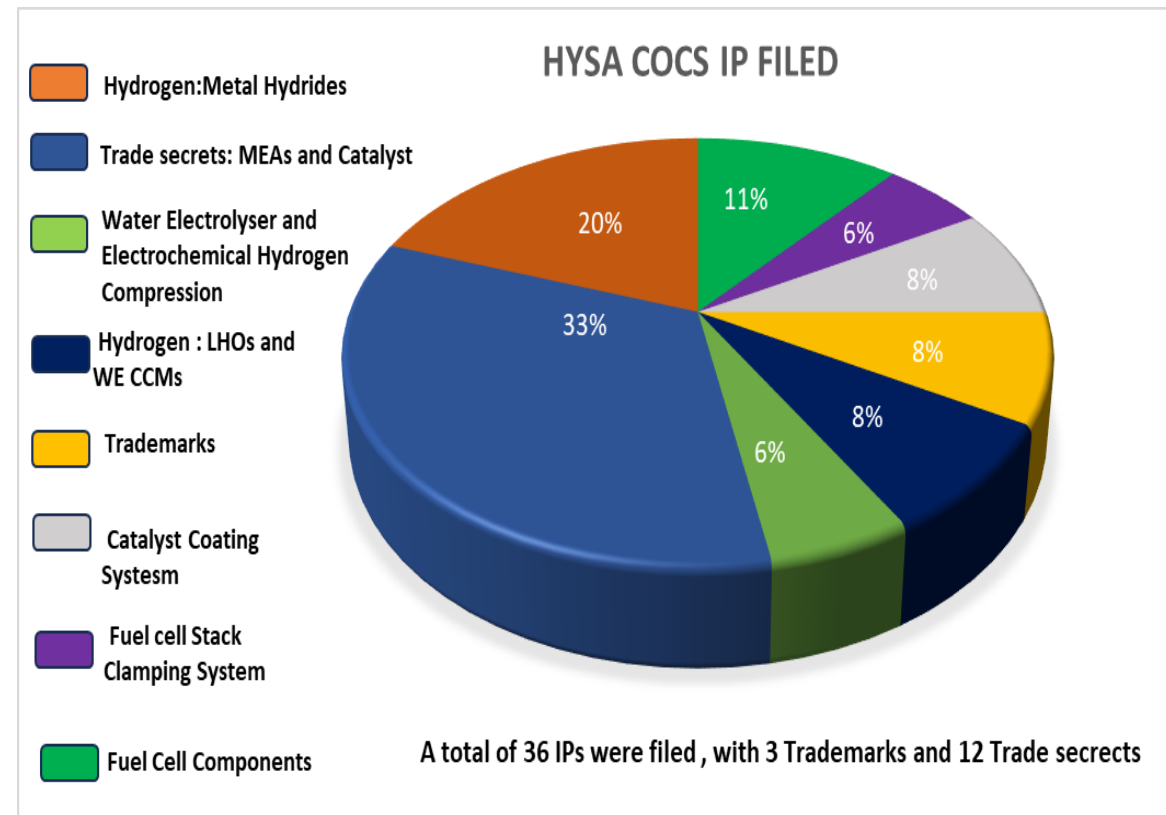
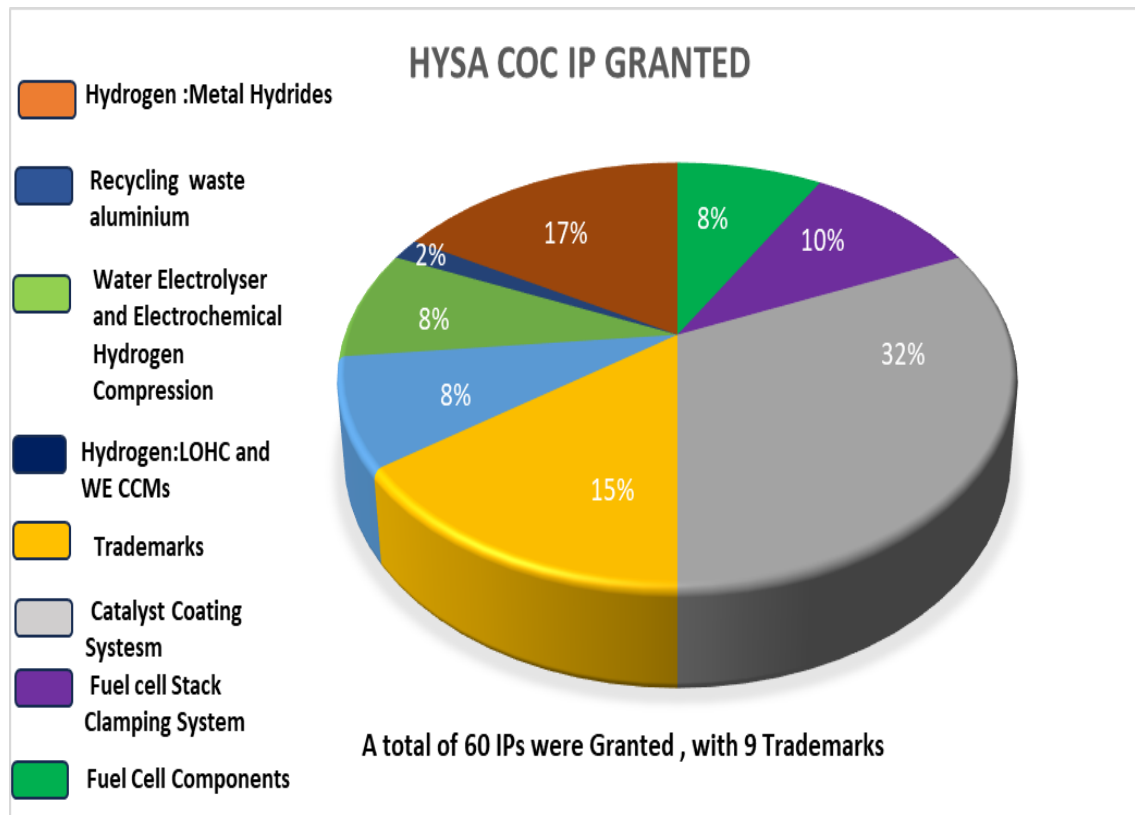
HYSA PROGRAMME: COMPETENCIES

UPSTREAM R&D

DOWNSTREAM R&D

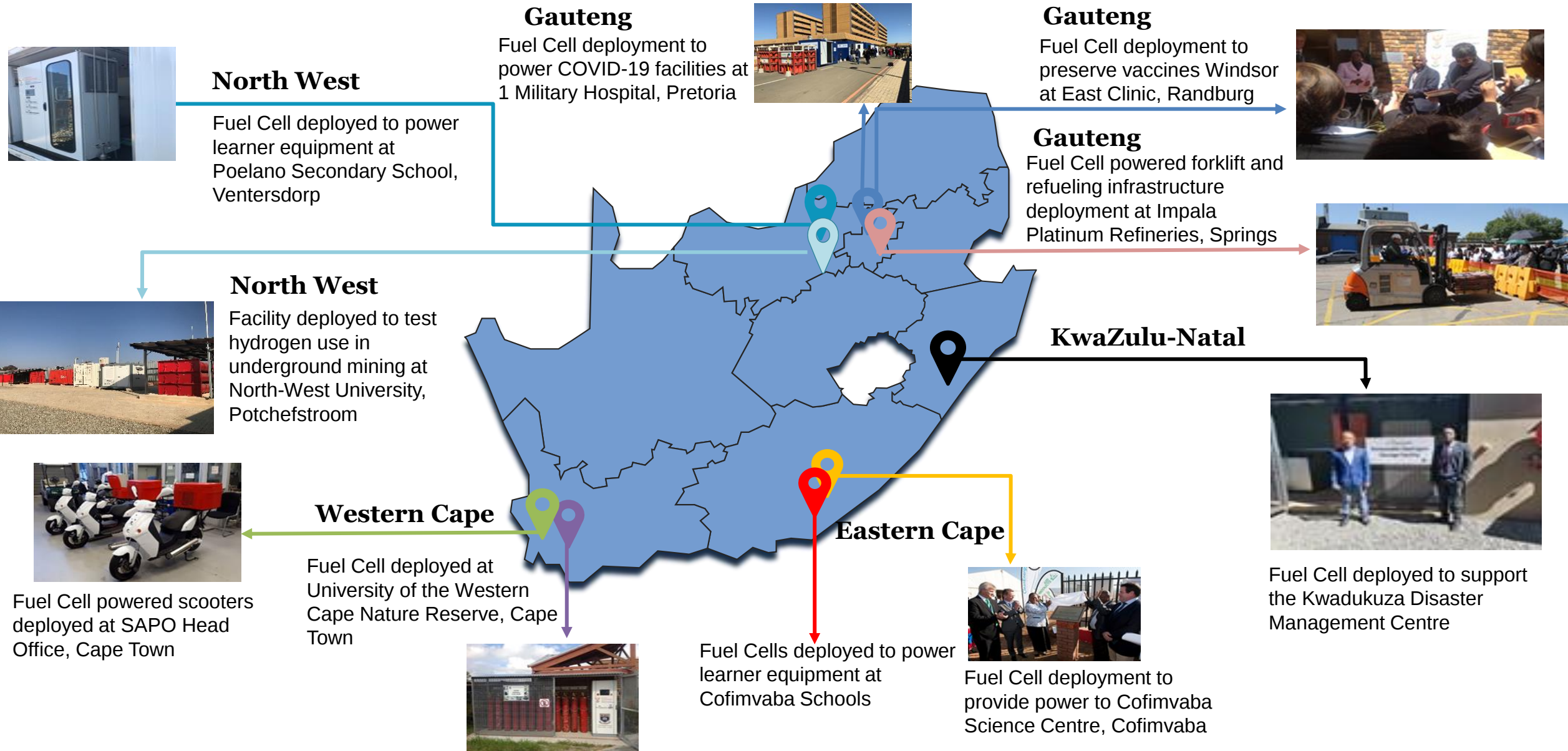


IP GENERATED ALONG THE HYDROGEN AND FUEL CELL VALUE CHAINS

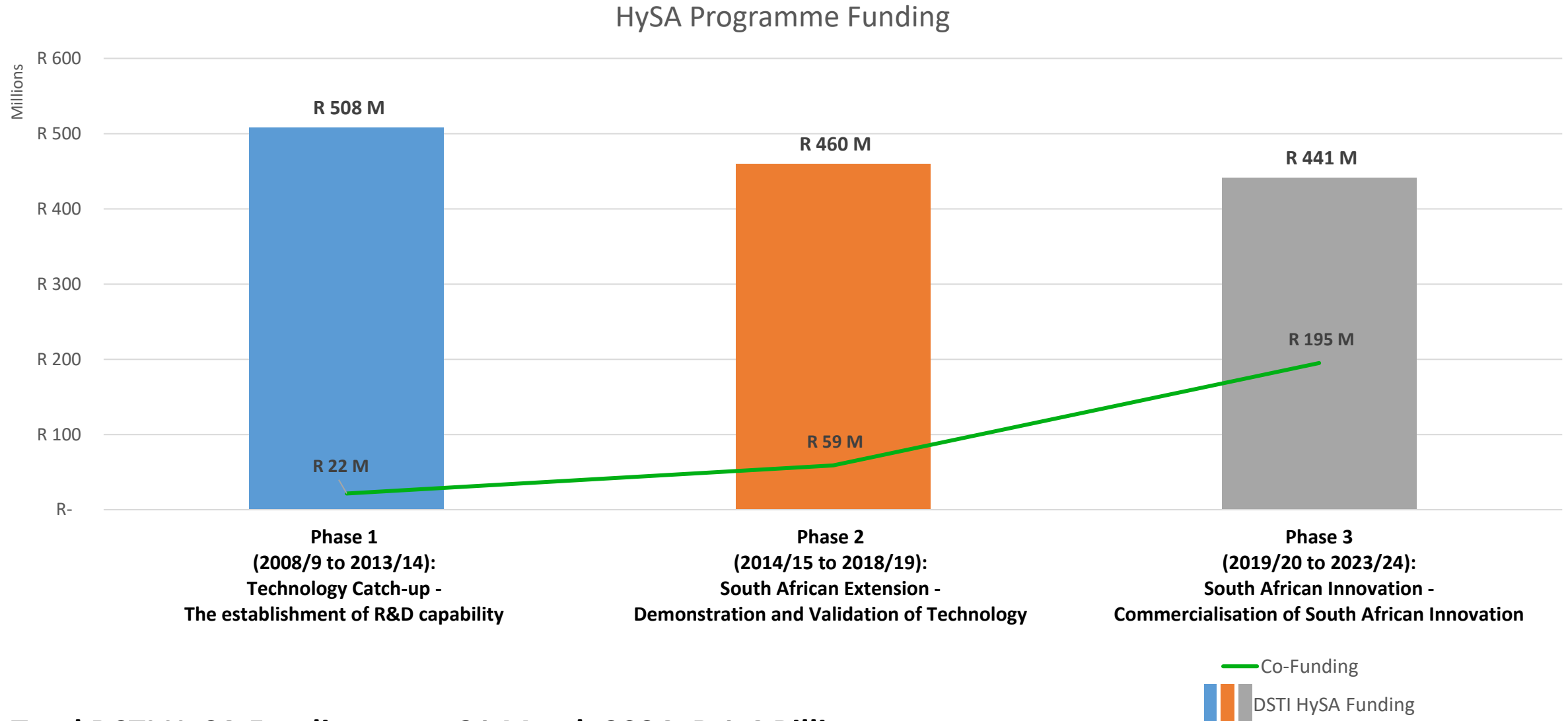


- Granted or filed in 14 countries including South Africa
- 70% of IPs linked to Commercial products

DEPLOYMENTS FROM HYSA PROGRAMME



HYSA FUNDING FOR THE THREE PHASES



- ❑ Total DSTI HySA Funding up to 31 March 2024: R 1.4 Billion
- ❑ Total HySA Co-Funding up to 31 March 2024: R 275.5 Million

HYSA PATHS TO COMMERCIALISATION

- ❑ **Establishment of the Energy Secretariat:** A platform that allows for both private and public sectors to participate in the energy RDI Flagship Programmes supported by the DSTI.
 - **Call for Proposals:** Dedicated funding mechanism to promote the deployment of large-scale demonstration projects through the establishment of partnerships across the public and private sectors.
 - ✓ Support Local manufacturing of components based on publicly financed intellectual property (IP), with an emphasis on the development of value-added components emanating from the four Energy RDI Flagship Programmes (including HySA);
 - ✓ Smart inbound technology transfer, where in its engagements with global original manufacturers, the DSTI has insisted on potential partners agreeing to integrate locally developed technologies into their commercial products; and
 - ✓ Co-development of technology where synergies exist and embracing inbound technology where local expertise does not exist.

HYSA STRATEGIC PARTNERSHIPS ACROSS VARIOUS SECTORS

Academia / Science Councils



Government / Parastatal



Industry / Business

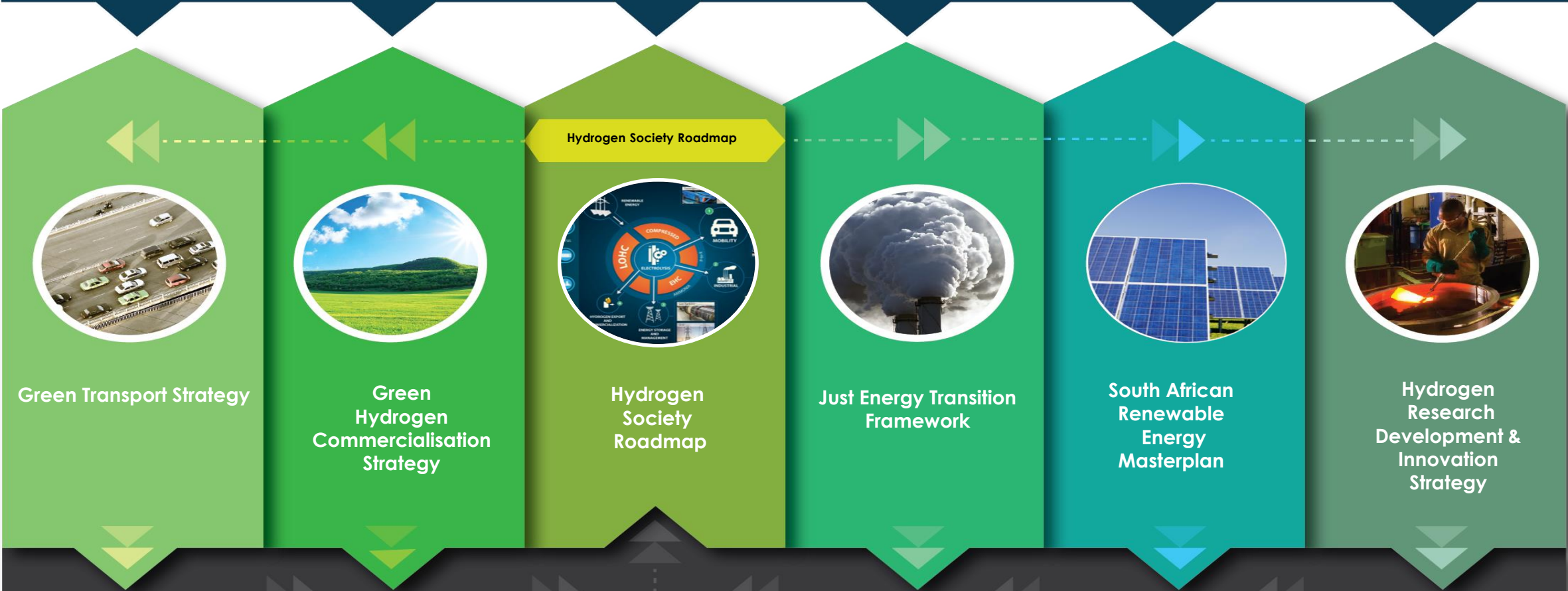


☐ Hydrogen South Africa Programme

☐ **Hydrogen Society Roadmap**

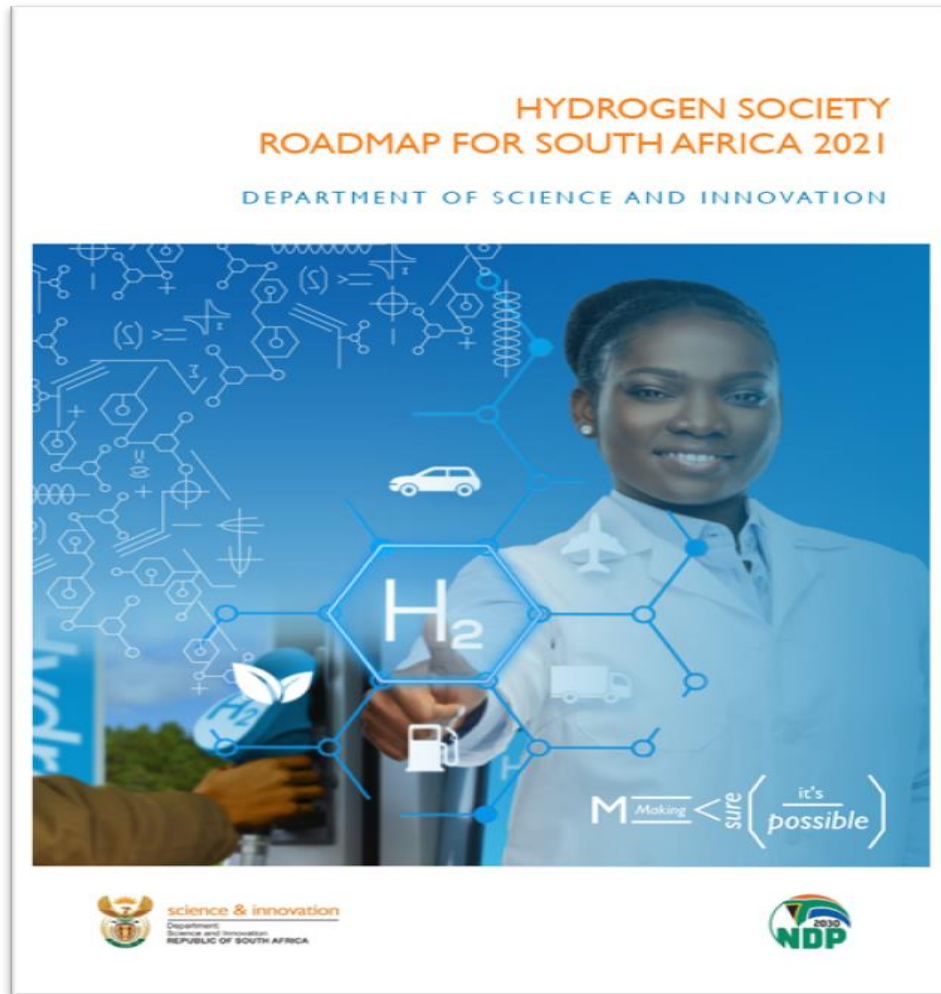
POLICIES THAT SUPPORT A JUST ENERGY TRANSITION

SOUTH AFRICAN ECONOMIC RECONSTRUCTION AND RECOVERY PLAN & NATIONAL DEVELOPMENT PLAN



The Hydrogen Society Roadmap seeks the effective integration of hydrogen related technologies in various sectors of the economy/society to foster inclusive growth and help reduce poverty and inequality

THE HYDROGEN SOCIETY ROADMAP (HSRM)



<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.

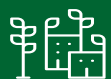


Purpose

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,

DTIC



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, DTIC

Supported by: DMRE



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

[8]

Lead Department: DTIC, DMRE

Supported by: DFFE, DPE



Creation of an export market for green hydrogen and green ammonia

[9]

Lead Department: DTIC, DIRCO

Supported by: NT, DPWI



Transition from grey to blue to green hydrogen

[20]

Lead: Presidency, DIRCO

Supported by: DSI, DMRE, DTIC, 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

PLATINUM VALLEY CORRIDOR: HYDROGEN VALLEY CORRIDOR

- ❑ PVI has identified nine catalytic projects in the mobility, industrial and buildings sectors.
- ❑ Approximately \$1.2 billion to implement, with a projected hydrogen demand along the corridor reaching up to 185 000 tonnes of hydrogen by 2030.
- ❑ **Project Rhynbow:** aimed at catalysing the scale-up of South Africa's green hydrogen economy through mobility.
 - Develop a scale-shared H₂ infrastructure
 - Utilise PGMs and develop adjacent manufacturing hubs



COALCO2-X PROGRAMME- CARBON CAPTURE AND USE



Decarbonisation of heavy-duty Trucks



Kelvin Power Demonstration:
March 2024 (CO₂ and SO₂ were captured and converted to Ammonium Bicarbonate, Sulphuric Acid and Ammonium Sulphate)



PPC Dwaalboom:
January 2023 (CO₂ was captured and converted to fertiliser salt)

Scale Up planned at an Eskom Power Station



Decarbonisation of Energy Intensive Industry through Carbon Capture and Use

DECARBONISATION OF TRANSPORT SECTOR



- ❑ A refuelling station for fuel cell vehicles at HySA Infrastructure (NWU) used to refuel the first hydrogen fuel cell vehicles from Toyota.
- ❑ HySA Infrastructure (NWU) has received R19 million from Toyota to develop a mobile refuelling station, indicating a strengthening of the partnership with the OEMs.
- ❑ Completed and waiting for Ministerial directive for launch.

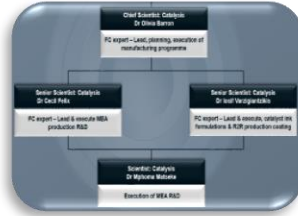
CREATION OF A MANUFACTURING SECTOR FOR HYDROGEN PRODUCTS AND COMPONENTS

Mintek Catalyst & MEA Manufacturing

MEA production



R&D low volume (x 10's)



4 additional MEA & FC experts in place.



Lab renovated to house intermediate volume MEA production equipment: Roll-2-Roll coater installed in temporary facility



Renovation at Mintek to house FC manufacturing



Potential High-volume MEA production (x 100 000's)

2022

2023

2024

2025

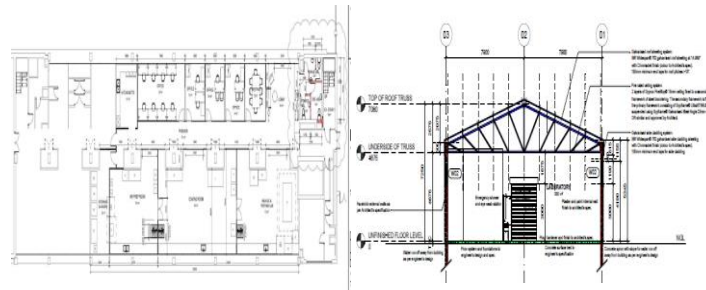
2028

2030+

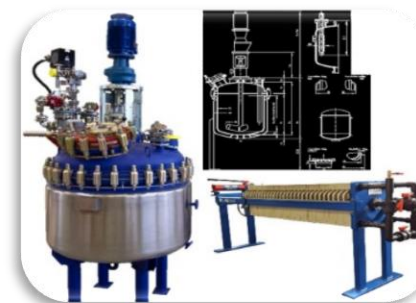
Catalyst production



Low volume Commercial Production (1 kg batch)



1 Catalyst and 1 MEA prototyping facility in process. Facilities design and plans completed
95 % of large volume manufacturing equipment procured

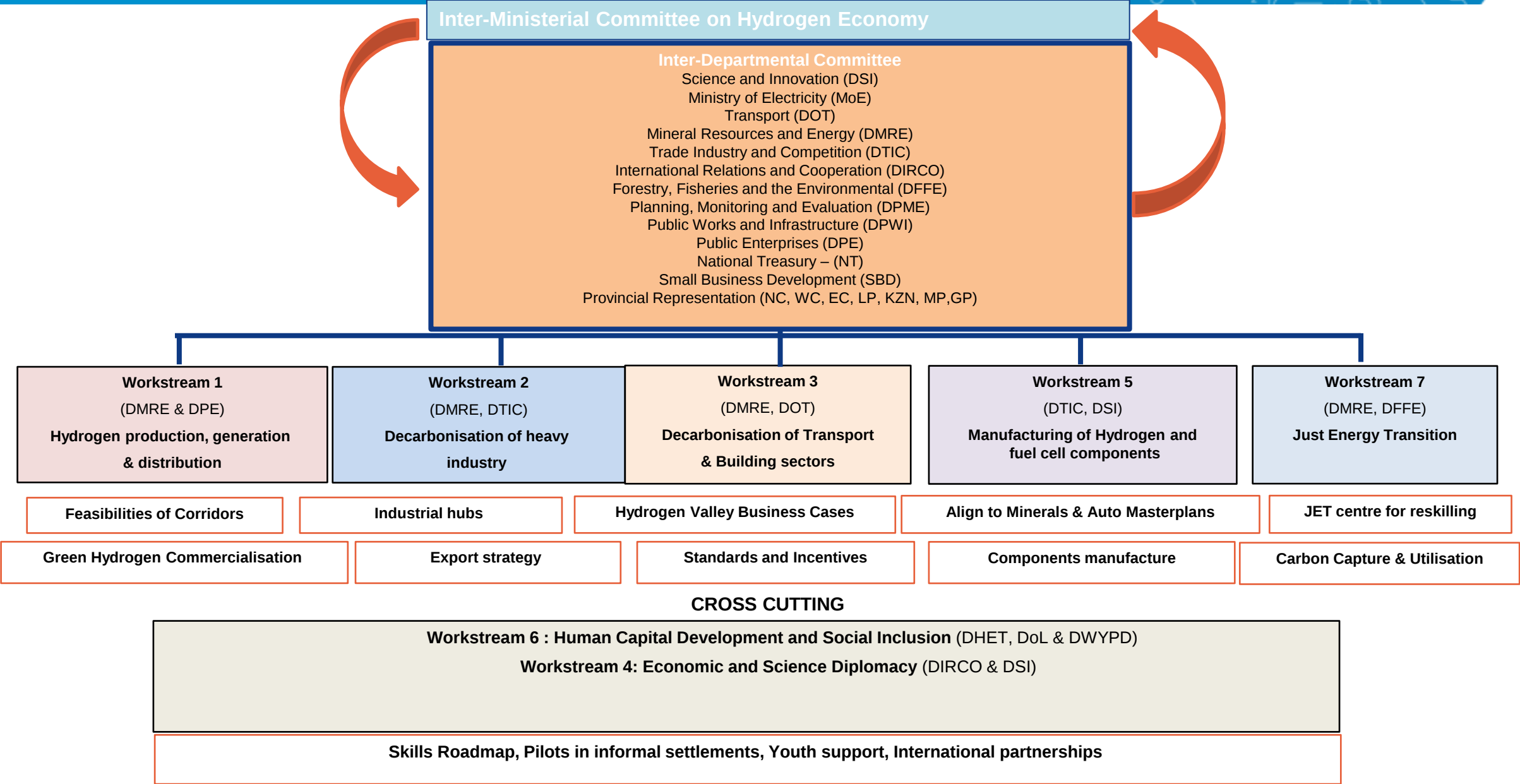


Demonstration scale (5 kg/batch) catalyst production



Production scale (50 kg/batch) - with increase in demand

CABINET-APPROVED INTER-MINISTERIAL COMMITTEE (IMC) ON HYDROGEN ECONOMY



STRATEGIC PARTNERSHIPS

- ❑ International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE). South Africa is the current Chair of the IPHE and aims to use its tenure to encourage more African countries to join IPHE.
- ❑ International Energy Agency
- ❑ United Nations Industrial Development Organization
- ❑ Hydrogen Council (private sector-led)
- ❑ African Hydrogen Alliance (Egypt, Kenya, Mauritania, Morocco, Namibia and South Africa).
- ❑ Bi-laterals with other countries: e.g., Japan, UK, Germany, Denmark, Netherlands.

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 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 ensure that no one is left behind.
- ❑ Government has initiated engagements with private sector and international partners to design appropriate operating models for the effective implementation of the Hydrogen Society Roadmap.
- ❑ South Africa has a healthy portfolio of intellectual property (IP) in key components such as PGM based catalysts for fuel cells and electrolyzers, which are ready to be integrated in commercial products, to achieve enhanced commercialization and sustainable local manufacturing.



1 Military Hospital Deployment August 2020



South African Post Office Fuel Cell powered scooters, 2019



Impala Platinum Fuel Cell powered forklift 2016

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