



**SALDANHABAY**  
INDUSTRIAL DEVELOPMENT ZONE

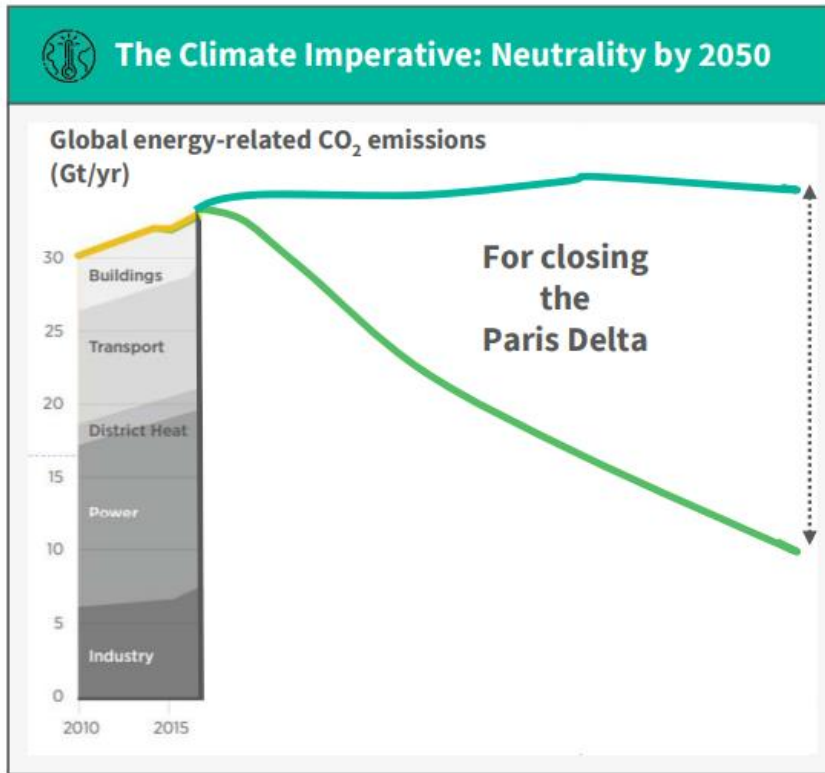
# Green Hydrogen

WCG Energy Workshop

# Introduction to **GH2 opportunity**

## 11 How to close the Paris Delta

04.05.2022  
Renewable PtX-Training



... and remaining loop-holes?



## SUMMARY

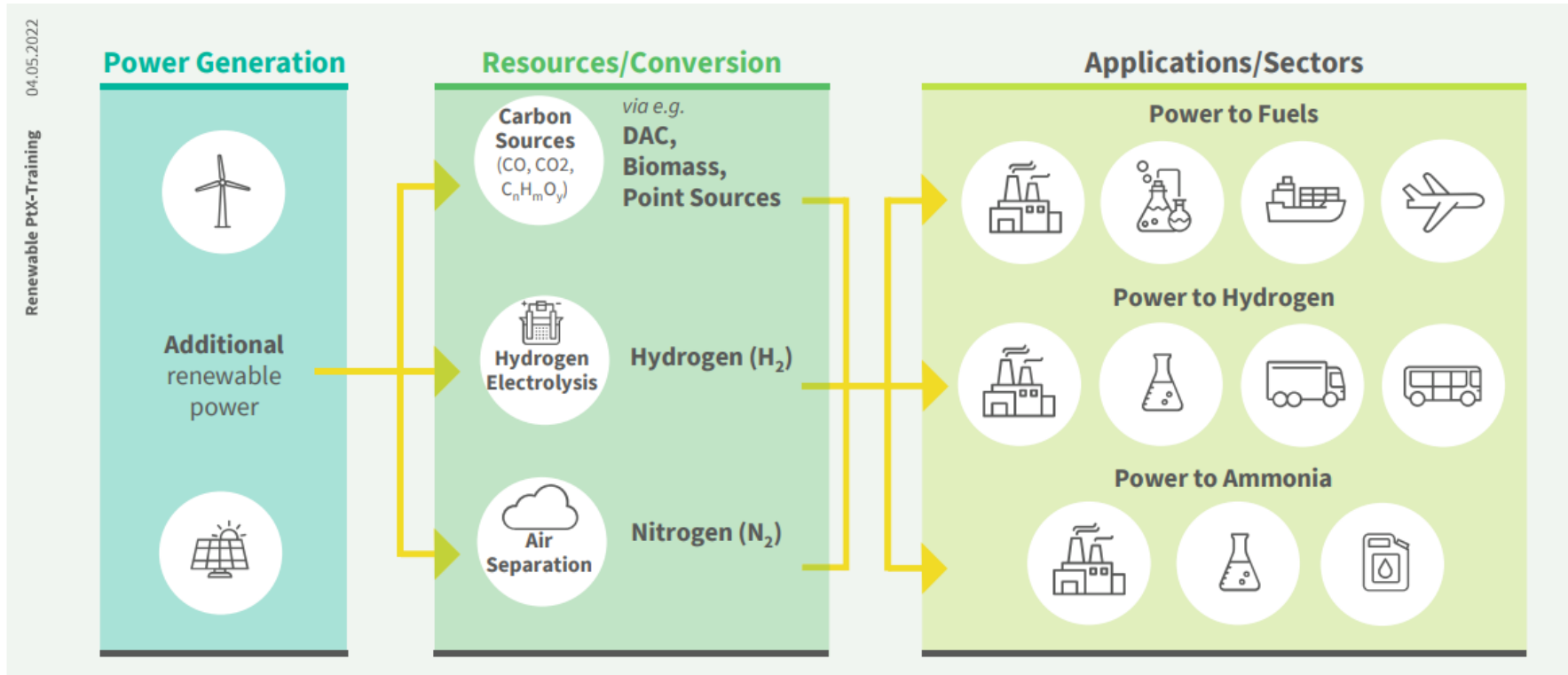
1. Complementary **energy carrier** to limit global warming < 2°C.
2. Absolute necessary energy carrier to achieve "climate neutrality" by 2050, especially for **indirect decarbonisation of hard to abate sectors**.
3. **Enable conversion of renewable electricity into materials and energy carriers** (hydrogen, platform chemicals, synthetic fuels etc.).
4. **Use global RE potential:** PtX can be transported and traded globally.
5. Technology will shape costs, applications and pace.

Source: International Renewable Energy Agency Hydrogen From Renewable Power Technology Outlook For The Energy Transition, 2018, p.10/1.

## Economic & Energy Resilience

# Steps from **RE** to **feedstock/fuel supply**

(~electrons to molecules)



Renewable PtX-Training 04.05.2022

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Source: Own illustration based on: Frontier Economics/World Energy Council, International aspects of a Power-to-X Roadmap, 2018, p.15/4.



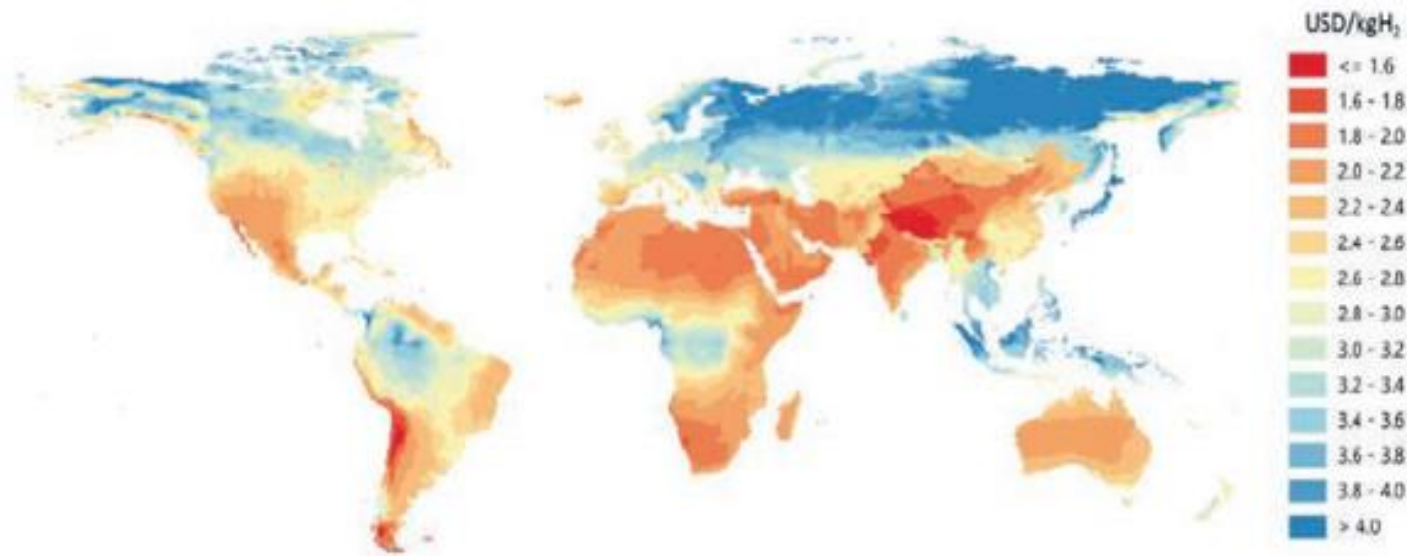
of the Federal Republic of Germany

**Base Requirements** →



# Scale & Size of the Global H<sub>2</sub> Opportunity

## Hydrogen costs from hybrid solar PV and onshore wind systems in the long term



## SUMMARY

1. Hydrogen will play a significant role in the transition to a net-zero energy system.
2. It will establish SA as a future energy market global trader, securing foreign direct investment, earning foreign income and creating economic growth and development
3. Import Markets for GH to 2050 will be the EU (2050: 11-15 Mt GHpa); Japan (2050: 5 to 10 Mt GHpa); South Korea (2050: 1.0 to 1.2 Mt GHpa) and the United Kingdom (2050: 0.5 to 0.7 Mt GHpa).
4. REPowerEU sets a target of 10mt domestic renewable H<sub>2</sub> production & 10mt H<sub>2</sub> imports by 2030.

# South Africa is **well positioned to produce GH2**



SA with large scale,  
high quality RE potential

- **Power sector decarbonization alone requires ~150GW of solar PV and wind installed capacity by 2050**
- **Green H<sub>2</sub> opportunity will need additional ~100GW of RE capacity (with 2-10GW by 2030)**
- **REDZ<sup>1</sup> alone can hold 900+ GW RE capacity with premium load factors**
- **Average load factors in SA amongst the best in the world and on par with major competitors like Chile, Saudi and Australia**



Sufficient land and synergies  
in solving for water security

- **Just 1% of SA land area (1.1MHa) would be sufficient to produce 10Mt of green H<sub>2</sub>**
- **SA with vast land available, with ~5.4 MHa in REDZ alone (areas not in competition with agriculture or settlements)**
- **Reducing water requirement (10Mt/yr. of green H<sub>2</sub> production is only 31% of current power sector use in coal-based generation), and increasing water security making financially viable desalination plants at the coast (desalinated water cost is a fraction of a premium commodity like GH<sub>2</sub> - ~\$0.01/kg H<sub>2</sub>)**



Unique expertise for  
beneficiation into e-Fuels

- **Proprietary Fischer-Tropsch tech—lacking in other countries (critical for Power-to-Liquid)**
- **Existing assets and knowledge (e.g., multiple Fischer Tropsch and steel facilities) allow for local beneficiation of green H<sub>2</sub> and enhances potential for large scale local demand**
- **Opportunity to capture portion of global export market for e.g., green ammonia/methanol/jetfuel**



**Western Cape is well positioned to produce GH<sub>2</sub> for local offtake, bunkers & exports**

# South Africa's Green Hydrogen Value Proposition

A unique combination of resources and capabilities will enable South African to compete in multiple areas.  
South Africa will differentiate itself by using proprietary **Fisher Tropsch technology** to target the **sustainable aviation fuel** market and using **PGM resources** to target **fuel cell and electrolyser manufacturing**.

Global leader in **Platinum Group Metals Mining**  
(Platinum, Iridium and Rhodium)



Multiple water sources (from mining, sea and fresh water)



Renewable Energy endowments and a rapidly developing Renewable sector



Established petrochemical sector & technology base including **proprietary Fisher Tropsch technology** critical for power to liquids



Geographic positioning



Relatively well developed infrastructure



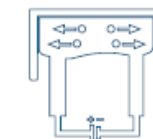
Export to EU, Japan, South Korea, UK



Decarbonization of local industry e.g. steel, petrochemicals, mining



Local and global sustainable mobility e.g. fuel cell buses, trucks and associated infrastructure



Manufacture of equipment and components e.g. fuel cells and electrolyser



# Commercial success dependent on execution



3:

## Commercial Building Blocks



# Saldanha as the 1<sup>st</sup> WC GH2 Cluster







# Saldanha as the 1<sup>st</sup> WC GH2 Cluster

## Location:

- Western Cape, 150km north of Cape Town

## Existing Infrastructure:

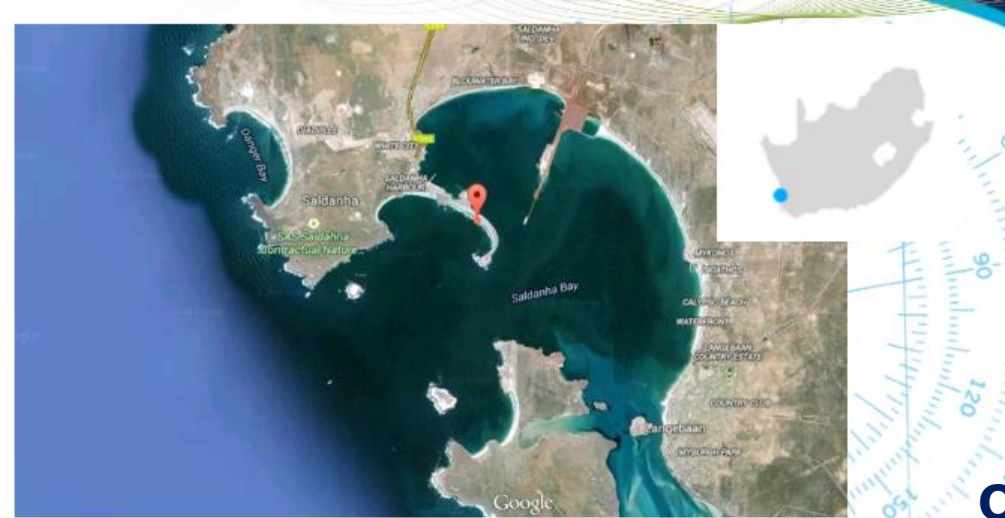
- One of the largest ore exporting (deep water) ports in Africa, supported by a dedicated rail link which connects to the Sishen & Kolomela Mines in the Northern Cape.
- No pipeline delivered bunkers are available

## Notable Characteristics:

- Special Economic Zone (SEZ)
- Bulk carriers account for ~77% of ships

## Green Hydrogen Potential:

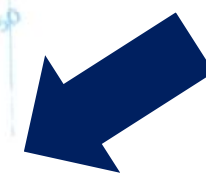
- High renewable energy potential from solar and off-shore wind.
- CSIR study concluded hydrogen exports could be cost competitive at US\$ 3/kg before 2030.
- Potential off-takers include AMSA, MyCiti Bus, port equipment & ground vehicles.



Activity/Entity	Saldanha Bay
Transnet: bunker fuel	504 kt/y
Transnet: port equipment	unknown
ACSA ground vehicles	0.0558 kt/y
PRASA MetroRail	6.6-11.0 kt/y
AMSA Saldanha Works	104 kt/y
MyCiti BRT	1.2 kt/y

Source: EU-SA Partner for Growth. Jan 2022. *Powerfuels 2: Stimulating domestic hydrogen consumption opportunities in South Africa*

**Opportunity**



**Value Chain Development**



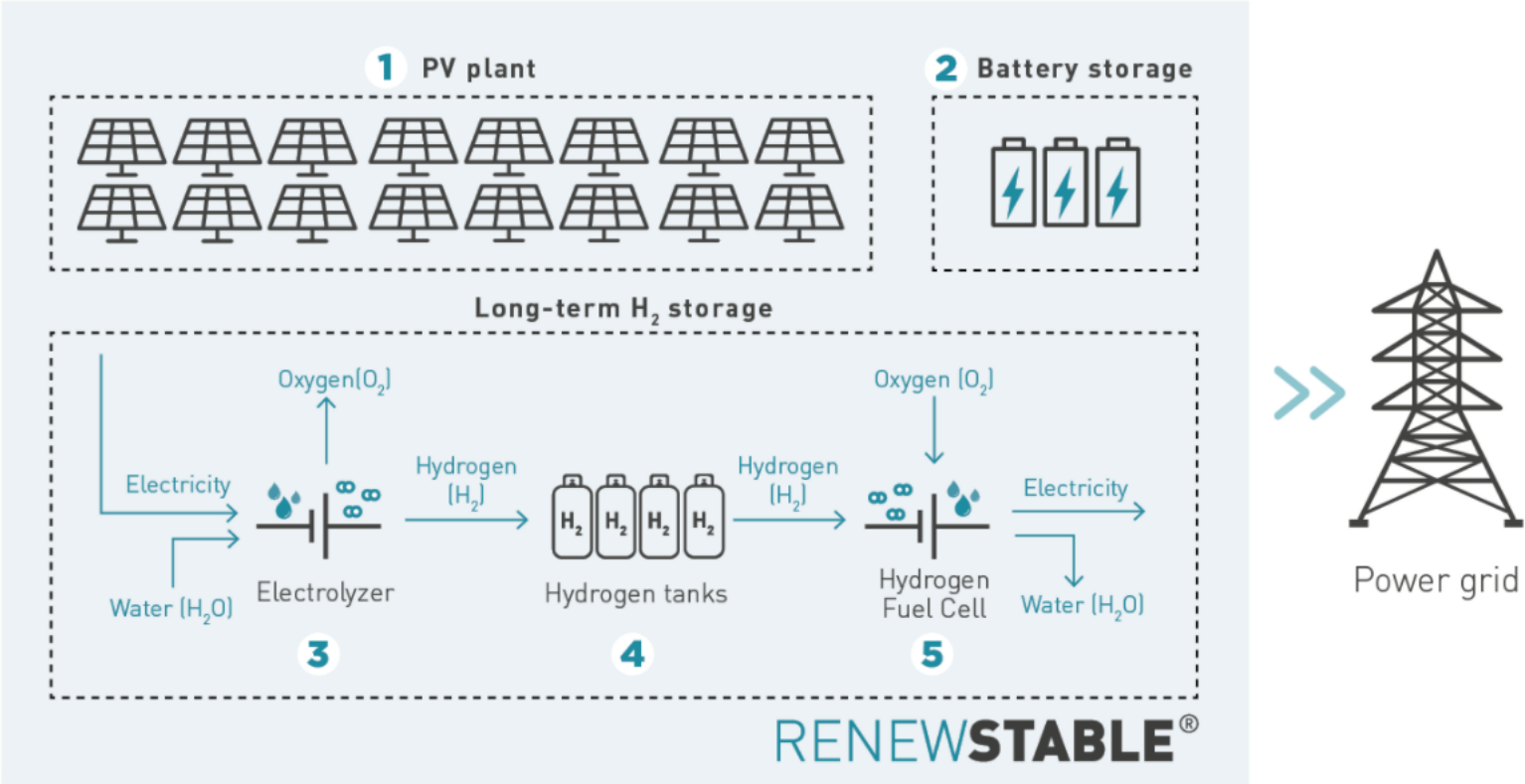
Establish Saldanha Bay GH2 Cluster

Establish Atlantic GH2 Corridor (synergies with Boegoebaai)



# GH2 as a **energy resilience pathway** for WC

HDF Energy to launch Africa's first hydrogen power plant in Swakopmund





# GH2 Recommendation – create an enabling environment for industry.

24 Clean hydrogen projects and investment (as of November 2021)

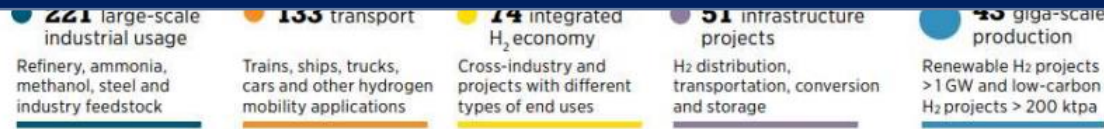


1<sup>st</sup> Mover Advantages

We need to create **Go-to-Market Strategies as a Province**, where the Freeport & ASEZ are the location of the investments and WC Inc. has aligned and addressed the enabling factors and bottlenecks internally and then with key role-players such as Transnet, TNPA, SBM, COCT, ISA, DMRE, Eskom, ACSA, Prasa, etc.

The SEZs need the highest level of visible, consistent and unanimous support from the WCG as Shareholders to make this opportunity a reality.

23 Source: IRENA, Geopolitics of the Energy Transformation The Hydrogen Factor, p.42/fig.3.3.



Timing



# Recommendations to create an enabling environment for industry in the Western Cape

## 0 – 12 months recommendation

1. Finalise **business cases** for WCG, Saldanha & ASEZ.
2. Need **more land** for GH2 industry.
3. **Complete independent environ., spatial & safety studies.**
4. Aligned **port planning** to accommodate H2 / NH3
  - Bunkering Infrastructure
  - Exports Infrastructure
4. Support World Bank study on SB as **Green Bunker Hub.**
5. **Assess grid availability** for RE into the region to the zone.
6. Aligned approach on
  - **accessing grant funding earliest** (esp ahead of COP27)
    - via EIB, KfW, IDC, DBSA, ISA, WB etc.
  - **consular support**
    - via GIZ, Belgium, US, Namibia, etc.
7. **Endorsement of Pilot Projects** i.e.
  - Keren Energy
  - RheinMetall
  - RSS Investments
8. Use of **SB Innovation Campus platform** and Energy Transition programme to **create awareness & energy literacy.**
9. Continue with **Business Matchmaking between leads.**
10. Organizing **Capacity Building workshop** for provincial stakeholders.

## 6 - 18 months recommendations

1. **Establish regional collaboration** via MOU with Northern Cape (start of the Atlantic GH2 Corridor).
2. **Prioritise pilot projects.**
3. **Register corridor under SIP5** and/or as **separate SIDS** project to get national traction.
4. Western Cape '**open for Green Hydrogen business**'.
5. Set Green Hydrogen as **priority targeted investment promotion and attraction area**, as per country investment strategy.
6. **Dedicated H2 Capacity** in WC , IDZs, Municipalities
7. Dedicated H2 PMU unit to assist with 'mega projects'.
8. **Local Municipalities** to be engaged and aligned on project requirements.
9. Clarify **incentives** to attract project developers and OEMS to the region.
10. Alignment on **role of gas** in WC energy resilience roadmap.
11. **Showcase Western Cape R&D** in GH2 i.e., UWC, UCT, CSIR.
12. **Establish JET social and skills centres** on the West Coast.

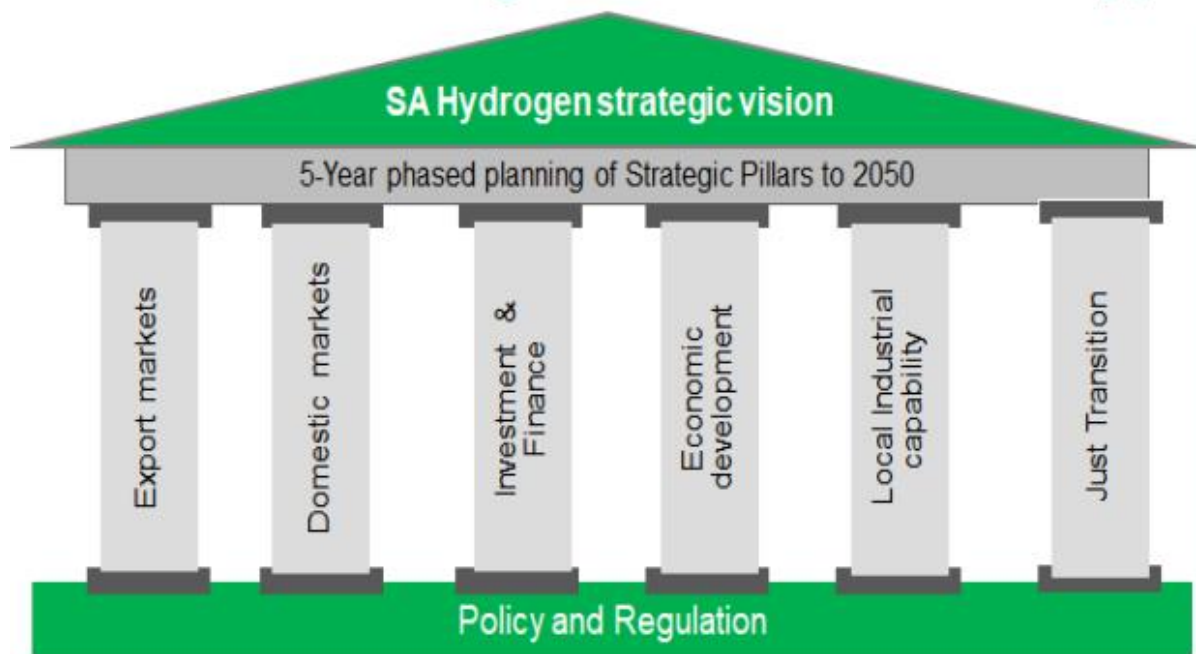


**Supporting Slides.**



# Commercialisation Strategy Pillars

The strategic actions are based on six key pillars and reliant on enabling policies and regulation.



## Role of the commercialisation strategy :

- National coordination / shared vision
  - Provide policy certainty
  - Encourage investors
- Guide decision makers (government, private)
  - Ensure proactive industry development

## Strategic objectives to be considered in pursuit of South Africa's GH vision.

- **Export Markets:** Secure global market share and competitive trade position
- **Domestic markets:** Decarbonise SA economy; energy security and reliability
- **Investment & Finance:** Mobilise foreign direct investment, domestic funding and low-cost green finance
- **Economic and socio-economic** Maximise development impact (incl. skills and economic development and social inclusion )
- **Local industrial capability** Local industrial capability and value chain linkages e.g. Raw Materials & equipment
- **Affordability of a Just Transition** Maximise job creation and alternative options for potential job losses
- **Regulatory Environment:** clear enabling investment environment

Commercialisation Vision : Developing a globally competitive, inclusive and low carbon economy by harnessing South Africa's entrepreneurial spirit, industrial capability, strong financial sector and natural endowments

# Global Opportunities to Produce power-to-X



## » Political stability

Trading renewable energy may become crucial for countries that have built their business models on fossil energy in the past.

## » Energy diversification

It also becomes a new opportunity for „newcomers“: countries that do not have fossil resources but favorable wind and sun conditions

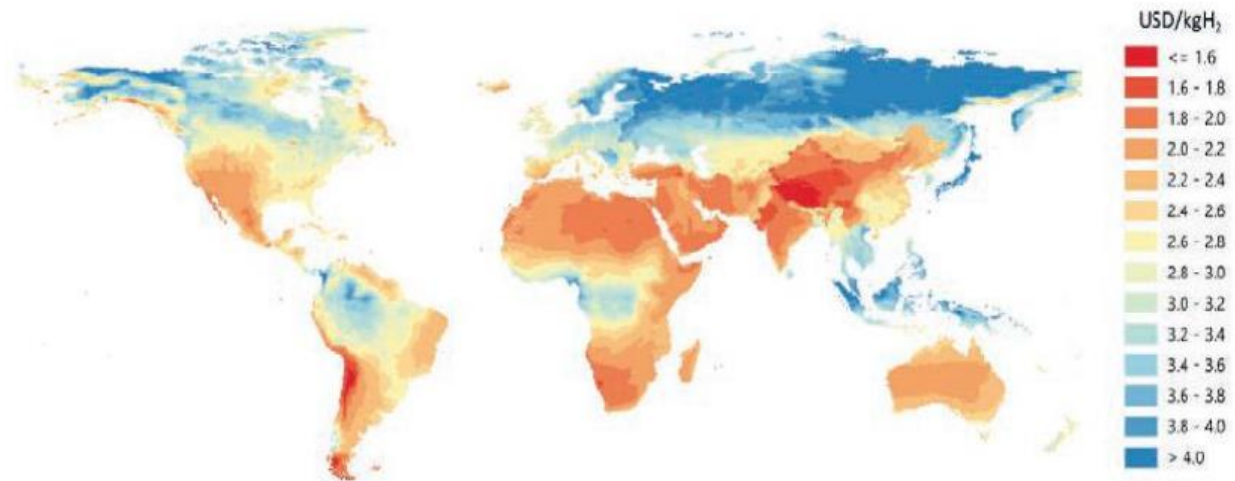
## » Maintaining the balance of trade

It is important to have economically strong partners for an export-oriented EU.

## » PtX- contribution

Hydrogen cannot be transported easily without a pipeline. Liquid fuels can be traded with existing infrastructure and enable a global renewable energy market.

## Hydrogen costs from hybrid solar PV and onshore wind systems in the long term





# Research positions Saldanha as zero carbon fuels & green H2 export hub.

1

- 3 research studies support Saldanha as ideal location for hydrogen production activities.

## #1: CSIR & EU Delegation (Nov 2021 & Jan 2022)

EU-South Africa (EU-SA) Partners for Growth EuropeAid/139363/DH/SER/MULTI

EU-South Africa (EU-SA) Partners for Growth EuropeAid/139363/DH/SER/MULTI

Service Contract No: PIV2018/399500

Powerfuels 2: Stimulating domestic hydrogen consumption opportunities in South Africa

Thomas Roos, Mamello Chauke, Fiona Oloo and Lindokuhle Mbatha

Submitted to: European Commission Service for Foreign Policy Instruments ESAS Lot 02306 B-1049 Brussels Belgium

## #2: DSI Report (Engie Impact Study) (Oct 2021)

science & innovation  
Department of Science and Innovation  
REPUBLIC OF SOUTH AFRICA

AngloAmerican BAMBILI ENERGY sanded ENGIE

South Africa Hydrogen Valley  
Final Report  
October 2021

ENGIE Impact

## #3: P4G - GtZ – Ricardo Partnership (Oct 2021) , (May 2022)

South Africa's role in the transformation of global shipping through green hydrogen-derived fuels

By Ricardo Environmental Defense Fund

For the P4G Green to Zero Coalition Partnership

2

- 2 further studies & forums to research Saldanha as ideal location for hydrogen production activities.

#1: World Bank with NPCC - Decarbonizing Maritime Transport through Zero-Carbon Bunker Fuels from South Africa

#2: PtX II study commissioned by DTIC and GIZ, led by CSIR, to investigate costs of productions at various sites across South Africa

3

- Further studies anticipated, led by:

Transnet & TNPA  
Via KfW

IDC

GIZ



# GH2 Outlook

## Possible GH2 pathways for Saldanha

### 1) Exports

Establish Saldanha as **Export Hub**

### 2) Local Demand

**Supply Local** Demand for H2

### 3) Shipping Fuels

Saldanha port as **Green Bunker** Destination

### 4) OEMs & Services

Saldanha Bay port to **support value chain activities:**

- Import gateway for renewables components
- Localisation of OEMs (assembly & manufacturing activities)
- Supporting services industries activities

### 5) Energy Resilience

Pathway for energy resilience for the region



# We need to create an enabling environment for industry

Country  
Investment  
Strategy – Big 5  
frontier

National strategy

Atlantic Corridor:  
Saldanha –  
Northern Cape –  
Namibia

Regional strategy

Western Cape  
as a GH2  
Province?

Provincial Strategy

Saldanha Port  
as export  
Hub?

Port Strategy

Role of SBIDZ  
as SEZ?

SEZ Strategy



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# Plenty Green **Funding** Available

Pockets of Funding to be Deployed	Amount	Deployment via	Comment
H2SA	12 million euros	GIZ	German Government working with Presidency
JETP	8,5 billion USD	DBSA, IDC, ISA, PCC	From US, EU, UK, Germany, Dutch
EIB	500 million euros	Direct	From European Investment Bank
KFW	200 million euros & 23 million as feasibility study grants	IDC	German Development Bank

Funding Agencies	Financial Instrument
<b>South African</b>	
IDC	Grants, equity, debt, loans
DBSA	Grants, equity, debt, loans
ISA	TBC
DTIC	CI feasibility study grant
<b>International</b>	
EIB	Numerous
World Bank	TBC
KFW	TBC

Some of the funding pockets have expiry dates for deployment. Dates to be confirmed.

Consular Agencies & Support	
GIZ	Numerous
US	Numerous ie via PowerAfrica, USTDA

Philanthropic Funds
Africa Climate Foundation
TBC