



Ministry of Foreign Affairs

# ***GHz propositions bonding the Netherlands & Namibia***

*Commissioned by the Netherlands Enterprise Agency*

*>> Sustainable. Agricultural. Innovative.  
International.*

# GH<sub>2</sub> PROPOSITIONS BONDING THE NETHERLANDS & NAMIBIA



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# List of Acronyms & Abbreviations

AC	- Alternating Current
C&I	- Commercial and Industrial
CH <sub>3</sub> OH	- methanol
CMB	- Compagnie Maritime Belge
DC	- Direct Current
DTAA	- Double Tax Avoidance Agreement
EIF	- Environmental Investment Fund of Namibia
EU	- European Union
FMO	- Dutch Entrepreneurial Development Bank
GH <sub>2</sub>	- Green Hydrogen
H <sub>2</sub>	- hydrogen
HDF	- HDF Energy
LoI	- Letter of Interest
MgCl <sub>2</sub>	- magnesium salt
MoU	- Memorandum of Understanding
Mtpa	- Million Tonnes Per Annum
NA	- Namibia
NaCl	- (sea) salt
NAMCOR	- National Petroleum Corporation of Namibia
NamPort	- Namibian Ports Authority
NamPower	- Namibia's National Power Utility company
NamWater	- The Namibia Water Corporation
NCRST	- Namibian Commission on Research, Science and Technology
NH <sub>3</sub>	- ammonia
NIPDB	- Namibian Investment Promotion and Development Board
NL	- the Netherlands
O&L	- Olthaver & List, Namibia's largest private employer
R&D	- Research and Development
RVO	- Netherlands Enterprise Agency
SAGHS	- South Africa Green Hydrogen Summit 2022 in Cape Town
SAPP	- Southern African Power Pool
WACC	- Weighted Average Cost of Capital
WHS	- World Hydrogen Summit 2023 in Rotterdam



## EXECUTIVE SUMMARY

This report was commissioned by the Dutch Embassy in Pretoria and the Netherlands Enterprise Agency (RVO) and addresses an array of potential options for collaboration between the Republic of Namibia and the Kingdom of the Netherlands in the field of renewable energy and hydrogen in particular. The scope of work feeds into the preparation for the anticipated visit to Namibia by H.E. Mark Rutte, Dutch Prime Minister on June 19th, 2023.

Although Namibia has never been in the Dutch sphere of influence historically speaking, the influence is nevertheless noticeable in the Namibia of today. The African language finds its roots in Dutch, the church life is influenced by the Dutch reformists and the law is inspired on Dutch-Roman principles. All of this arrived in Namibia through South Africa.

After a brief period with a presence of a Dutch embassy in Windhoek and some development aid projects in the period from 1993 till 2006 the bilateral relationship between both countries remained positive albeit on a low level. Dutch private companies continued to be active in the hospitality sector and more lately in the beer industry when Heineken took over full control of Namibian Breweries. The Dutch arm of Shell has announced promising light oil finds off-shore.

The prospect of low operational costs of producing hydrogen in Namibia awakened Dutch interest in the country as Europe will be in need of substantial amounts of renewable energy. The EU is projecting that 50% of its hydrogen demand needs to be imported from other continents. The Netherlands has an important hub function in the energy supply of NW-Europe with its ports of Rotterdam and Eemshaven and Gasunie operating a large gas pipeline network. This infrastructure is now being adapted to facilitate the import and distribution of hydrogen and its derivatives.

Green hydrogen or its carriers are important for the energy transition and stabilising the power supply, however its cost price is still far from competitive compared to fossil fuels it needs to replace. This price gap called 'Green Premium' has to be mitigated by government intervention. The choice Europe seems to make that it subsidises the users of hydrogen will not automatically mean that the producers of hydrogen abroad have a bankable business case. All will depend on solid off-take agreements with a price formulation which financial institutions, banks and investors understand and guarantees are mitigating the technology and country risks. This is not yet in place as there is no real global market in green hydrogen yet and the technology has not yet reached maturity at the desired scale.

In addition the Weighted Average Costs of Capital (WACC) is crucial for these capital intensive hydrogen projects as around 75% of the operational cash out will be debt servicing. As a consequence hydrogen projects reach a fully funded stage predominantly in stable countries with a high credit rating and a strong domestic banking sector. In emerging economies this is not always the case. Optimal natural conditions such as sun, wind, space and water are therefore not the only conditions precedent but the financial sector is ultimately a key factor. Europe will need to be prepared to offer blended finance for the producers in Namibia to overcome this finance hurdle which is at odds with the earlier mentioned principle of subsidising the new users of hydrogen within Europe. Alternatively firm, long term off-take agreements need to be offered to allow producers to seek funding.

Namibia has proactively formulated an ambitious green hydrogen strategy with three hydrogen valleys and documented meanwhile a number of investment proposals of which Hyphen is the only large scale export oriented project currently. This project is aiming at the export of a million tons of ammonia through the port of Lüderitz for which Port of Rotterdam and InvestInternational supported a harbour masterplan. Hyphen signed a 'Feasibility and Implementation Agreement' with the government of Namibia at the end of May 2023 setting out the further roadmap for its development.

Provided funding will become available for this and a handful of other hydrogen initiatives in Namibia a number of opportunities for collaboration between the Netherlands and Namibia will arise.

This study identified the following propositions:

- Cluster around direct investments and securing import of hydrogen (derivatives)
- Cluster around harbour infrastructure and shipping
- Cluster around decentralised generation of renewable energy and long haul trucking on hydrogen
- Proposition for using brine from the desalination plant to mine raw materials and avoid environmental concerns for the marine ecosystem
- Cluster around hardware and equipment supply, supported by a GH<sub>2</sub> coordination centre in Namibia
- Cluster around R&D, education, capacity building and skills development
- Cluster around support and advisory services to the Namibia government
- Cluster around domestic social impact and hydrogen valley eco-systems
- Prospects of broader international cooperation

It is expected that these prospects will attract the interest of the Dutch private sector and institutions despite the fact that the opportunities in the Netherlands itself and nearby countries are also in abundance. However, it requires an inviting Dutch government policy and a lead investor. A decision was made by the Dutch government to add Namibia to the list of the so called combi-track countries opening up the relevant RVO and InvestInternational support instruments, provided it relates to the green hydrogen sector in Namibia.

In the government-to-government relationship some bilateral agreements need to be refreshed and the signing of a Double Tax Avoidance Agreement between both countries is a prerequisite. This should unlock further financial assistance from the Netherlands.

It is recommended to create a consortium between major Dutch actors in the hydrogen ecosystem centred around off-take and logistics of derivatives to take the initiative in the further development of a combined hydrogen agenda with Namibia and lead the way for the smaller equipment suppliers and service providers.

A strong bilateral government-to-government relationship between Namibia and the Netherlands will be of help in further developing these propositions.

## 1. Purpose of the study

The Dutch embassy in Pretoria in conjunction with the Netherlands Enterprise Agency (RVO) reached out to enhance their understanding of the hydrogen ecosystem in Namibia and the opportunities it offers to the Netherlands.

This study aims to identify the potential propositions for mutually beneficial collaborations between the Netherlands and Namibia on the production and trade of green hydrogen or its derivatives. This should make the intended visit by the Dutch PM Mark Rutte more concrete.

*“Content of the requested service should concentrate on areas where Namibian demands meet Dutch strengths in the entire GH2 chain. It should answer the question whether Dutch companies and stakeholders recognize concrete market opportunities for their solutions and if they are committed to seize these? These solutions regard the development of the entire GH2 value chain.”<sup>1</sup>*

## 2. Methodology

The involved consultants had already a network in the green hydrogen space in both the Netherlands as well as Namibia. Firstly, a quick check with key opinion leaders & decision makers in Namibia has been conducted. On the back of this, relevant Dutch companies were approached after having investigated the needs and interest of relevant parties in Namibia. This has been coordinated with the party doing a similar study on the GH<sub>2</sub> propositions for South Africa.

Desk studies aided the insights in the opportunities and potential issues of the GH<sub>2</sub> agenda. On the identified propositions a deeper understanding was gained by researching related articles and websites.

A relevant number of key actors have been met and interviewed in both countries. As a back-up for physical meetings or as preparation video-conferencing meetings were used as an alternative. At the time of the World Hydrogen Summit in Rotterdam a round table discussion was organised by RVO with the Dutch private sector and a Namibian delegation. The identified propositions were discussed in that session on May 10th, moderated by the consultants.

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<sup>1</sup> Terms of Reference Development of Dutch GH<sub>2</sub>proposition for Namibia - February 2023



### 3. Fact finding by desk research and interviews

#### 3.1 The main aim of Namibian – Dutch collaboration in GH<sub>2</sub>

The Netherlands aims to become a key trading partner with Namibia for green hydrogen and/or its derivatives. In the long term, the Netherlands envisages a green hydrogen corridor between the Namibian seaports and those of the Netherlands for large-scale export of hydrogen/ammonia and to contribute to energy security.

Namibia has been identified as a country with an ideal climate and natural resources to optimise the production costs of green hydrogen. For Namibia it is important to develop green hydrogen projects that contribute to the export market and generate hard currencies as well as the development of local economies and regional prosperity.

#### 3.2 European energy outlook and import demand

The REPowerEU Plan (May 2022) accounts for the consumption of 20Mt of renewable hydrogen and derivatives. This target is to be met with 10Mt produced in the EU and 10Mt<sup>2</sup> imported from outside of the EU.

Europe is facing four CO<sub>2</sub> reduction challenges:

1. **Reduce** the overall energy consumption and **reuse** basic materials.
2. The energy transition from fossil fuel to renewable energy, which relates to **electrons**.
3. The feedstock transition to decarbonise the petro-chemical industry, which relates to **molecules**.
4. The change of the **energy mix** of above from 'molecules' to 'electrons'.

The development of propositions for collaboration between Namibia and the Netherlands will not only have to address the options for the second category of securing Europe's energy needs for power (= electrons) but should also look at the options for decarbonizing the chemical industry (= molecules).

The long-term projections for electricity in the Netherlands assumes a 10 – 15 % contribution from hydrogen, primarily to stabilise the grid and therefore, the supply side<sup>3</sup>.

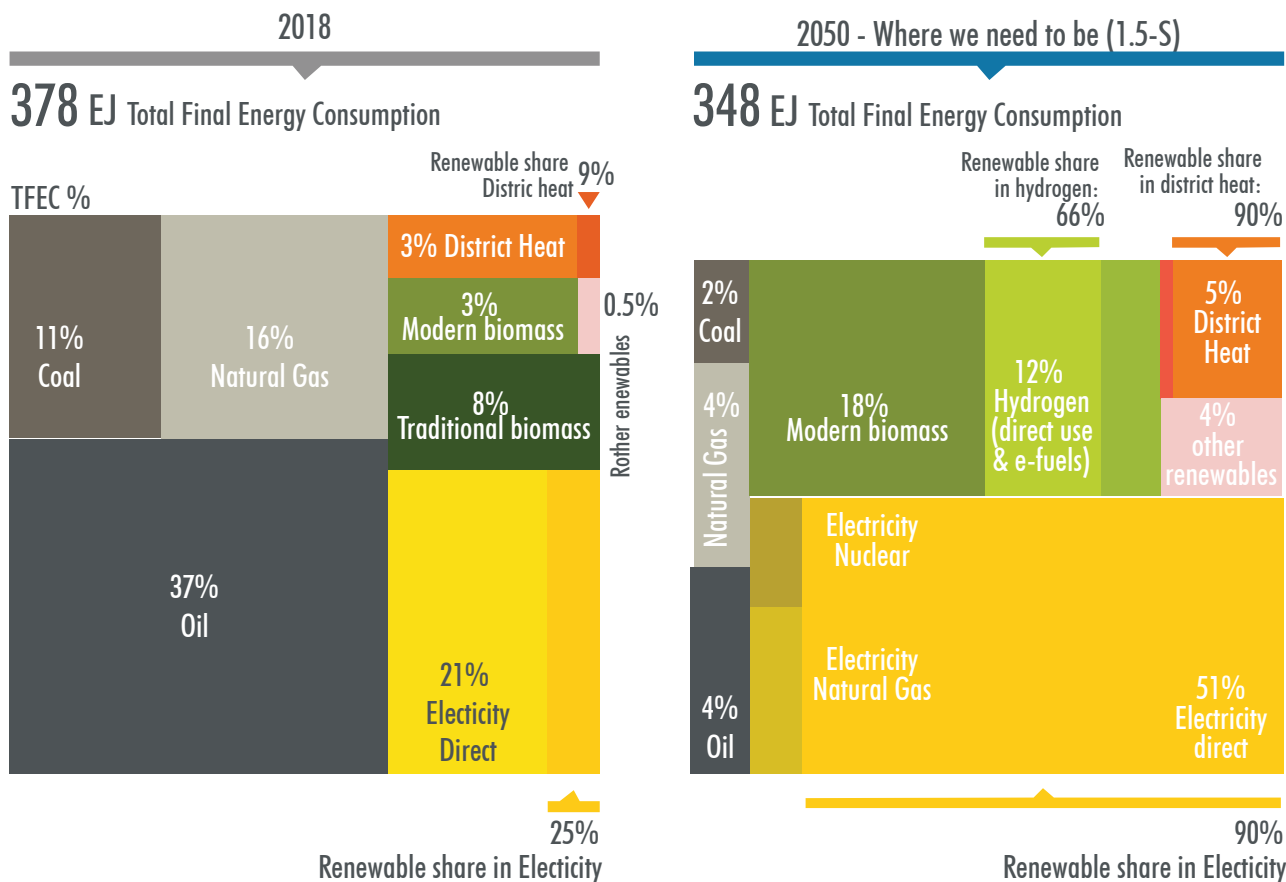
According to IRENA the share of electrical power in the energy mix should increase from 21% in 2018 to 51% in 2050. Modern biomass needs to grow six-fold in the same period and hydrogen and its derivatives will take 12% in the energy mix<sup>4</sup>. This is without replacement of fossil fuel feedstock for the chemical industry.

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<sup>2</sup> The energy transition from fossil fuel

<sup>3</sup> Energie door perspectief: rechtvaardig, robuust en duurzaam naar 2050- April 2023

<sup>4</sup> IRENA – World Energy Transitions / Outlook2021



However ambitious hydrogen projects in Europe face difficulties in attracting funding.

*“During the recent World Hydrogen Summit in Rotterdam, Daryl Wilson, Executive Director of the CEO-led Hydrogen Council, [stated](#) that “the pipeline of hydrogen projects globally exceeds 500 projects valued at more than \$500bn of investment. In Europe there are 328 projects, yet barely more than 5% have made final investment decisions. Crossing the investment decision line requires the confidence that policy will support both demand and supply for the investment horizon of several decades. The public and private sectors need to come together and establish the conditions to take this critical step urgently.”<sup>5</sup>*

The Dutch industry is currently predominantly focused on changing the mix towards ‘electrons’ and moving away from fossil fuel energy, e.g. e-mobility. However, for a number of industries this will be difficult given the hard-to-abate nature of it. That also counts for the chemical industry using fossil-feedstocks such as oil and natural gas. They need to make a transition towards sustainable feedstocks that recycle carbon instead of adding it. Green methanol is the most logical choice for this.

The demand for green methanol to decarbonize the feedstock demand in the (petro)chemical industry is estimated to become 50% of the mix to fully replace crude oil of which a substantial part will need to be imported given the space constraints in the port Rotterdam<sup>6</sup>.

The maritime sector is globally also embarking on green methanol as prime fuel<sup>7</sup>.

<sup>5</sup>World EconomicForum - Action on clean hydrogen is needed to deliver net-zero by 2050.Davos;May 23, 2022

<sup>6</sup>A Sustainable CarbonFuture, Feedstock Transition for Harbor Industrial Cluster Rotterdam - December2022

<sup>7</sup>TNO–Methanol for Maritime – November2022

### **3.3 GH2 value chain development in the Netherlands and the fit with emerging supply chains**

In general the Dutch industry and knowledge institutions have innovative and relevant products and services for the development of a complete hydrogen ecosystem. This is also described in the RVO publication "Dutch solutions for a hydrogen economy". A substantial part of these enterprises are relatively young companies with interesting products or services carving out their place in the hydrogen value chain. They meet strong demand in the Netherlands and neighbouring countries while having difficulties attracting qualified personnel. In most cases, Africa is not featuring on their priority list. This is reinforced by the fact that a lot of investments in the hydrogen value chain are not yet commercially viable.

Only if the opportunity creation is enhanced and risk perception mitigated by (accommodating) inviting bi-lateral government policies, clear financing options and a strong leading Dutch frontrunner, this will probably change. Those conditions are currently not fulfilled, hence the majority of Dutch companies and institutions have a 'wait and see' or a "*Let frontrunners do the heavy lifting first*" attitude.

The parties that have the experience and clout to lead the way in Namibia (and South Africa) are the larger well established companies such as Shell, Vopak, OCI and Nobian / HyCC. All the rest depend on if others have created a need for infrastructure or services and are therefore followers at best and/or facilitators. In this category companies such as Port of Rotterdam, Gasunie, Soluforce, Koole Terminals and consultancy firms are active. Nevertheless they remove possible stumbling stones down the line and help to unlock the whole value chain.

A different dynamic is observed among the knowledge institutions where a clear demand for capacity building and skills development in Namibia is paired by willing and able Dutch institutions such as the TNO, New Energy Coalition, EnTranCe, DNV, Water Alliance and some universities. It is very likely collaborations will be established as a result of the visit of the Dutch Prime Minister, Mark Rutte c.s. in this sector. This is progressive as also a local knowledge base is a condition precedent for further business development and investments.

### **3.4 Political ambitions of Namibia in becoming an energy export country**

Namibia features abundant sunshine, steady winds at the coast, sufficient space and access to clean seawater. This leads to internationally recognized low operational costs.

"The 2nd Harambee Prosperity Plan's economic advancement pillar has three main objectives, including the development of complementary engines of growth. The green hydrogen strategy forms a part of this objective. It is further important to note that one of the key success drivers identified in the 2nd Harambee Prosperity Plan is collaboration between the public and private sectors, and the pursuit of economic



# VISION FOR NAMIBIA'S THREE GREEN VALLEYS

Illustrative

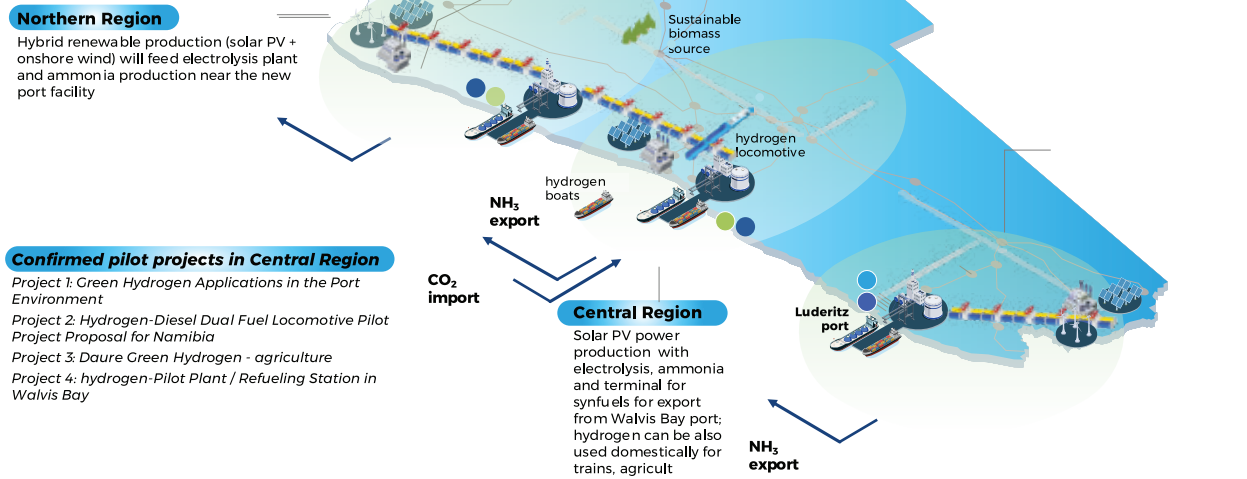


Exhibit 12: Hydrogen end-use demand by region in a net zero scenario

However, Namibia is lacking the required (port) infrastructure at this stage and has limited industrial tradition. The Harambee long term national plan of Namibia is aiming for improving its infrastructure and industrial base in order to create employment and prosperity.

The Namibian government is working on its regulatory framework and safety standards to encompass novel industries such as green hydrogen. International agreements to support Foreign Direct Investment such as Double Tax Treaties are limited but a special task force has been set-up and is under training to address the relevant matters.

## 3.5 Country Risk Profile

The main hurdle however is that the financial support structure is not in place and the risk profile of Namibia is leading to high capital costs which is crucial for a very capex intensive industry such as GH2.

The local commercial banking sector is very risk averse and for the majority subsidiaries of South African banks. Given the size of the required investments local banks will play no role, despite the set-up of green bond schemes.

The government overall is very supportive to facilitate FDI and developments in renewable energy and in hydrogen eco-systems in particular. A special presidential economic advisor has been appointed to advocate worldwide for Namibia's hydrogen potential.

<sup>8</sup> President Hage Geingob in his foreword of the Namibia hydrogen and derivatives strategy – November 2022

### 3.6 Public response

The Namibian public civil society and press are still very sceptical about the hydrogen industry development plans in the country as they have difficulty assessing the impact and positive influence on their livelihood and wellbeing. Namibia has a free press and many people are offered the opportunity to express their opinion, however sometimes without proper background knowledge.

In any case big projects and Foreign Direct Investments are often perceived as suspicious in view of corruption cases it triggered in the past and benefit imbalances.

It looks like the general opinion is deviating to the more imminent prospects of the recent light oil discoveries by Shell and TotalEnergies in the Orange basin.

### 3.7 Current GH2 projects announced in Namibia

In Namibia's view, only Green Hydrogen is sustainable in the long term. For this reason, the goal of the Namibian Government is to develop Green Hydrogen production capacities, promote a rapid market ramp-up and establish the corresponding value chains –both nationally and internationally. This will support local markets and local decarbonisation efforts, while generating employment for the Namibian people. As such, developing a Green Hydrogen industry will result in long-term pathways for economic recovery. As such, this pilot plant programme is linked to the ambitions articulated in the Harambee Prosperity Plan (HPPII)<sup>9</sup>.

#### **The Hyphen project:**

This project is so far the only big scale export oriented project. Hyphen is a joint venture between the German Enertrag and the British Nicholas Holdings.

Hyphen signed a Feasibility and Implementation Agreement (FIA)<sup>10</sup> with the Namibian government at the end of May 2023. The FIA sets out the process under which the project will be developed and the roles and responsibilities of each of the government of Namibia and Hyphen. Hyphen's principal task under the FIA is to investigate the feasibility of developing the project, and if feasible and approved by the government, to then proceed with the implementation of the project. The FIA is broadly split in five sequential phases and each phase can only commence if the previous phase has successfully been completed and approved by the government.

#### **Other GH<sub>2</sub> projects:**

There are a number of other green hydrogen projects announced in various degrees of development. The O&L joint venture with CMB from Belgium to set-up a pilot plant in Walvis Bay seems most advanced and equipment is already on order.

See Annex A.

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<sup>9</sup> Website GH2 Namibia - <https://gh2namibia.com/h2-projects/>

<sup>10</sup> <https://hyphenafrika.com/news/hyphen-hydrogen-energy-feasibility-and-implementation-agreement/>

### 3.8 Organisations and stakeholders around hydrogen

On a governmental level the planning around hydrogen projects is coordinated by the Green Hydrogen Council in which all relevant ministries, the Central Bank, NIPDB and the presidential economic advisor are represented.

The Dutch government offered financial support for setting up a Hydrogen Implementation Office and a SDG Namibia One Fund in which InvestInternational, Climate Fund Managers and the Namibian Environmental Investment Fund (EIF) will participate.

On a private business level the Namibian Green Hydrogen Association NamGHA (see <https://namgha.org/about-us/>) is:

- To Provide a platform for private sector entities to engage with each other as well as with the Government of the Republic of Namibia (GRN)
- To Guide the sustainable development of the industry and associated legislation and regulatory framework
- To Promote local job creation and associated regional economic development.

Equally is the Renewable Energy Industry Association of Namibia REIAoN representing all interested individuals and companies in the Namibian Renewable Energy Industry (see: <https://reiaon.com.na/>).

### 3.9 Existing Dutch investments and bilateral contacts

Although the Netherlands have no colonial history with Namibia and are neither executing a development aid program in the country, some Dutch influences, investments and interests exist.

Historical ties between the Netherlands and Namibia date back to the early days of the East Indian Company (VOC). The impact of Dutch presence in the region for Namibia since the 17th century cannot be neglected, partly because of a cascading influence through South Africa. Elements of that can be noted still today in the Afrikaans language and church organisations. Relationships had developed over a vast time span at many levels, diplomatically, culturally, socially, educationally and through Dutch assistance, especially the nongovernmental sector to Namibia's independence struggle.

Over the period 1990- 2006 Dutch government contributed over 55 million euros from its development cooperation budget to strengthening the water supply sector, educational, governance and commercial farming, job creation to name a few.

Relations and cooperation in the field of business and private sector development however, remained modest for various reasons. Besides the relatively small populations and modest domestic market, lack of financial incentives (from Dutch government) for Dutch investors and absence of a Double Tax Avoidance Agreement (DTAA) seems to make investors reluctant to engage in Namibia, besides the strong attraction for Dutch investors to South Africa.

**Heineken** has recently increased its stake in Namibian Breweries and is now controlling this famous beer brewery in conjunction with its South African operation.



Although **Shell** is no longer running its head office from the Netherlands some of its Dutch subsidiaries are active in Namibia, notably in the off-shore oil sector. Shell announced recently to have found relevant light oil discoveries in the southern off-shore Orange Basin. **Shell Namibia Upstream B.V.** applied for renewal of its environmental clearance certificate for proposed multiple exploration and appraisal well drilling in February 2023.

In the hospitality sector several lodges and car rental companies have Dutch ownership. Most prominent is the **N/a'an Ku sê** group, supported by the **van Uden** group and **ten Brinke** group of companies. Apart from running lodges and a restaurant the Naankuse Foundation Wildlife Sanctuary provides a safe haven and second chance for countless injured, orphaned and conflict animals.

Also triggered by the substantial tourism sector **KLM** flew to Windhoek several days a week before COVID forced them to terminate this route. It hasn't resumed flying yet.

An interesting development is pursued by **Kelp Blue** producing seaweed close to Lüderitz in the South of the country. This Dutch initiative is attracting a lot of worldwide attention. Another promising development is initiated by the **Radboud University** setting up a radio telescope on one of the highest mountains in Namibia to study the origin of black holes. Its main purpose is to provide an essential link to the network of telescopes around the globe known as the Event Horizon Telescope (EHT) which has recently produced the first ever picture of a black hole. The European Research Council (ERC) has awarded a Synergy Grant of € 14 mln. Construction and operation of the telescopes is also supported by a € 12 mln guarantee from Radboud University over 10 years.

In the renewable energy space **Taatisolar Namibia** is majority Dutch owned making inroads in the import and distribution of Solar Home Systems and DC appliances for the off-grid market. **TerraWatt** is aiming to set-up big grid connected solar parks. **Soly** (in JV with Shell Ventures and ABP) is eyeing Namibia for Lease-to-Own solar systems for the C&I market.

In the maritime sector **Port of Rotterdam** has signed a MoU with NamPort aiming at port development for export of hydrogen or its carriers. **Damen Shipyards** has delivered a complex diamond recovery vessel to DebMarine Namibia in 2021. The first long-term contract for the deployment of Damen's **InvaSave** is with Heat Exchange Products in Namibia. The containerised system will be used for the next five years in the port of Walvis Bay to treat the ballast water from visiting ships.

A number of **Dutch NGOs** and private impact driven initiatives are active in various parts of Namibian society. However, none of them have a real structural impact. Fundraising is coming and going through various platforms in the Netherlands. There is no coherent and consistent approach in the absence of a structural development aid relationship.

#### **The trade statistics show:**

Namibia Imports from Netherlands was US\$ 43 mln during 2020, of which mineral fuels, oils and distillation products form US\$ 23 mln, according to the United Nations COMTRADE database on international trade. This is less than 1% of Namibia's total imports. Namibia is 66% depending on imports from neighbouring countries, mainly South Africa.

Namibia Exports to the Netherlands were US\$ 99 Million during 2020, mainly copper (US\$ 57 mln) according to the same source. This is nearly 2% of Namibia’s total export, the bulk is going to China (36%).

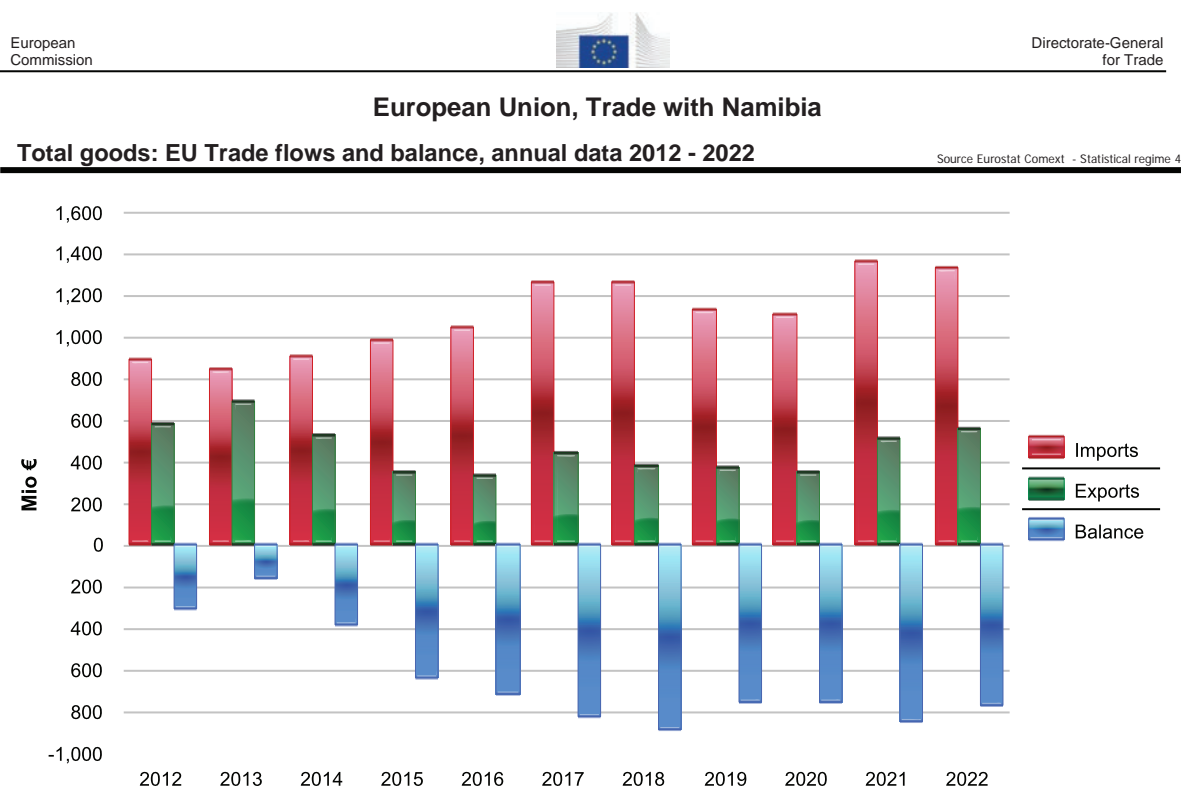
### 3.10 Role and position of the German and other EU efforts

Germany was the first country to sign a joint communiqué of intent with Namibia to develop the hydrogen market. Through this partnership, they will compare current green hydrogen technologies and research readiness levels along the supply chain and their applicability in Namibia; identify economic, technological, and regulatory requirements for the transport of and trade in green hydrogen and green hydrogen-based energy carriers; and identify economic, technological, and regulatory requirements to transport and trade green hydrogen and green hydrogen-based energy carriers.

The German Federal Research Ministry provided EUR 40 million in funding for a three-part programme: EUR 5 million in scholarships, EUR 5 million to develop a national synthetic fuels strategy, and EUR 30 million to identify four catalytic pilot projects to kick start the local hydrogen economy<sup>11</sup>.

During COP27 Namibia has signed an MoU with the European Union to establish a partnership on sustainable raw material value chains and renewable hydrogen, as part of the EU’s Global Gateway initiative whose aim is to create a renewable hydrogen market and promote new channels for investment and trade. For a total overview of the relevant EU programs and its member states projects on Namibia See Annex H.

The EU in total has a substantial trade deficit with Namibia, mainly because of the imports of primary products such as metals, diamonds, fish and meat.



<sup>11</sup> Namibia’s green hydrogen and derivatives strategy – November 2022

## 4. Macro economic context Namibia

### 4.1 Development status of Namibia

Namibia is classified by the World Bank as an upper middle income country. This means that it is excluded from some of the development aid instruments as defined by European Union member countries as well as other countries. These policies don't take into account the high income inequality, Namibia's Gini Coefficient Index is 64.2 and was most recently measured in 2019. This is one of the highest in the world.

GIZ Deutsche Gesellschaft für International Zusammenarbeit (GIZ) is the most strongly represented in Namibia, whereas also the Fins are historically active in Namibia. The EU Delegation to Namibia has a strong focus on renewable energy, i.e. climate change mitigation and the raw material supply, especially rare earth elements.

EU Embassies and other representations in Namibia include Germany, Finland, France and Spain. The Netherlands is represented by an honorary consul reporting to the Dutch Embassy in Pretoria.

Recipient country  
Namibia

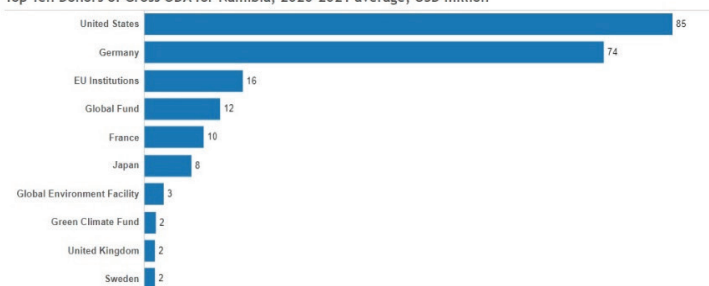
#### Receipts for Namibia

	2019	2020	2021
Net ODA (USD million)	144.3	180.2	182.2
Net ODA/GNI (%)	1.2	1.7	1.5
Gross ODA (USD million)	187.2	218.1	236.4
Bilateral share (gross ODA) (%)	74.6	77.5	84.0
Total net receipts (USD million)	147.8	214.7	-34.9

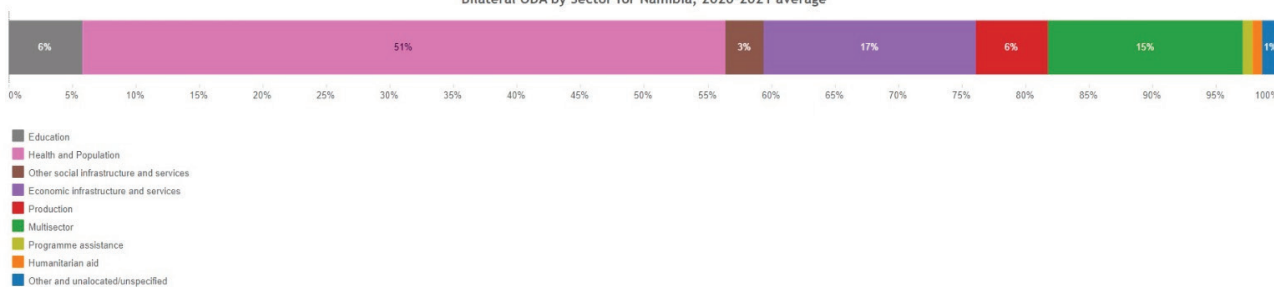
#### For reference

	2019	2020	2021
Population (million)	2.4	2.5	2.5
GNI per capita (Atlas USD)	5,170	4,550	4,550

#### Top Ten Donors of Gross ODA for Namibia, 2020-2021 average, USD million



#### Bilateral ODA by Sector for Namibia, 2020-2021 average



Source: OECD - DAC - <http://www.oecd.org/dac/financing-sustainable-development/development-finance-data/aid-at-a-glance.htm>

## 4.2 Socio-economic developments

Apart from the high inequality level as indicated by the GINI-index Namibia stands out as well in the Global Gender Gap index 2022 as issued by the World Economic Forum but then in a very positive way ranking nr. 8 out of 146 countries and before the Netherlands in place nr. 28.

Despite the economic recovery in 2022, the socioeconomic situation did not improve significantly. Employment is estimated to remain below pre-pandemic levels as labour-intensive manufacturing subsectors have added jobs relatively slowly. Spurred by higher fuel prices, inflation increased to a five-year high of 6.1% in 2022, disproportionately affecting the most vulnerable and decreasing consumers' real income. Poverty rates are estimated to remain above pre-pandemic levels.<sup>12</sup>

High unemployment levels among young people, even when educated, is a major problem. The lack of a substantial manufacturing sector given the small market is one of the reasons.

## 4.3 Taxation structure<sup>13</sup>

Namibia has a source-based tax system, which means that income from a source within Namibia or deemed to be within Namibia will be subject to tax in Namibia, unless a specific exemption is available.

Withholding tax on interest is 10% with the only exception of Germany, which is one of eleven countries with a Double tax Avoidance Agreement (DTAA). The Netherlands and Belgium do not have a Double Tax Treaty in place with Namibia.

Namibia has been a member of the Southern African Customs Union (SACU), which provides for free movement of goods between the member states consisting of Botswana, Lesotho, Namibia, South Africa, and Swaziland. Duties are levied in terms of a common external tariff on goods originating outside the Union, and no duties or quantitative restrictions apply on intra-SACU trade.

Namibia is a member of the Southern African Development Community (SADC), with an ultimate objective of forming an integrated economic bloc. The SADC member countries consist of Angola, Botswana, Democratic Republic of the Congo (DRC), Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, and Zimbabwe.

Namibia ratified the African Continental Free Trade Agreement (AfCTA) and preferential duty rates became applicable in March 2021. The AfCTA has 55 members and was formed to promote inter-Africa trade. The external SACU customs tariff has been updated accordingly.

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<sup>12</sup> World Bank - updated 29 March 2023

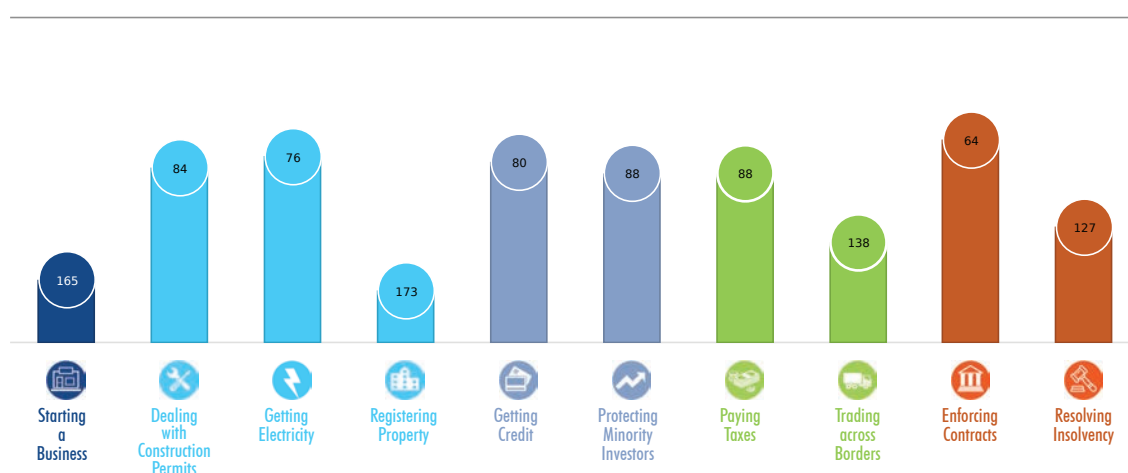
<sup>13</sup> PWC - reviewed 15 December 2022

Namibia is also part of the South African rand (ZAR) Common Monetary Area (Namibia, Lesotho, South Africa, and Swaziland), with no foreign exchange restrictions between its members. Foreign exchange regulations apply on other transactions and are strictly regulated by the Bank of Namibia. Namibia has a well-developed commercial banking system with four commercial banks.

#### 4.4 Ease of doing business

The World Bank ranked Namibia on doing business topics on basis of 2020 figures as follows:

Rankings on Doing Business topics - Namibia



Topic Scores



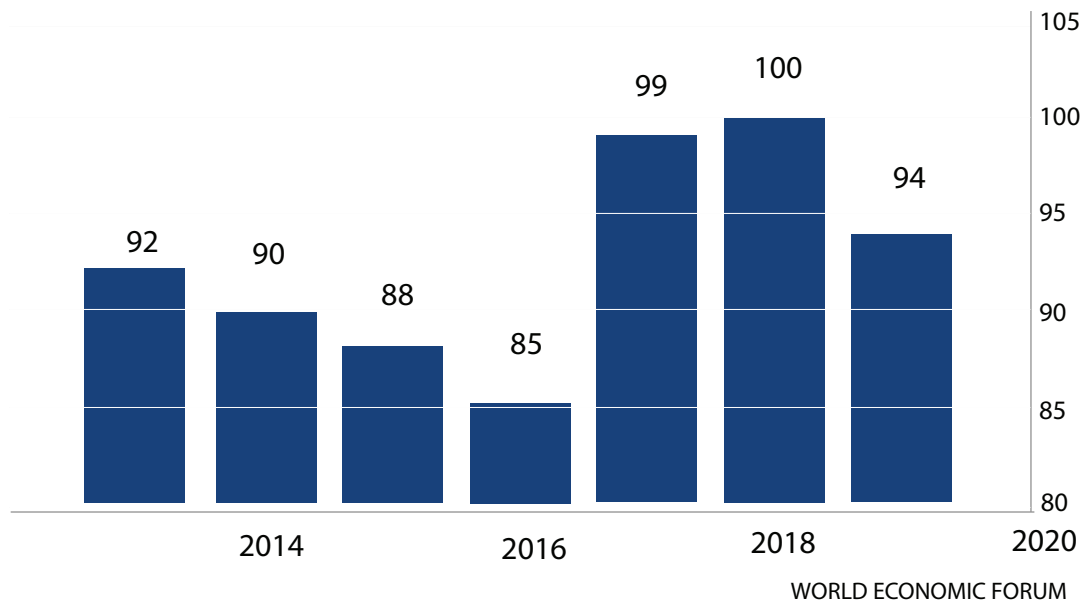
The Mo Ibrahim index on African governance ranks Namibia nr. 8 out of 54 countries in 2021. On 'Security & Rule of Law' it ranked even higher on nr. 5 but it deteriorated over the last 10 years somewhat. The 'Foundations for Economic Opportunity' improved strongly to a nr. 13 position whereas 'Participation, Rights and Inclusion' stayed stable on nr. 7 and 'Human Development' improved slightly to nr. 15 position. For a full country report see:

<https://assets.iiag.online/2022/profiles/2022-IIAG-profile-na.pdf>

Namibia scored 54.46 points out of 100 on the 2019 Global Competitiveness Report published by the World Economic Forum and ranked 94 out of 140 countries<sup>15</sup>.

<sup>14</sup> Mo Ibrahim Foundation 2022 IIAG

<sup>15</sup> World Economic Forum



#### 4.5 Foreign Direct Investments

According to UNCTAD's [2022 World Investment Report](#), FDI flows to Namibia accounted for USD 412 million in 2021, compared to a negative flow of USD -156 million one year earlier. The total FDI stock stood at USD 6.3 billion, just above half of the country's GDP (51.4%).

The sectors that have been attracting the most FDI in Namibia include mining, tourism, agriculture, and infrastructure development. In particular, the country's mining sector has been a major recipient of FDI, with foreign investors attracted to the country's abundant mineral resources, such as uranium, diamonds, zinc, copper, oil, which attract the majority of FDI.

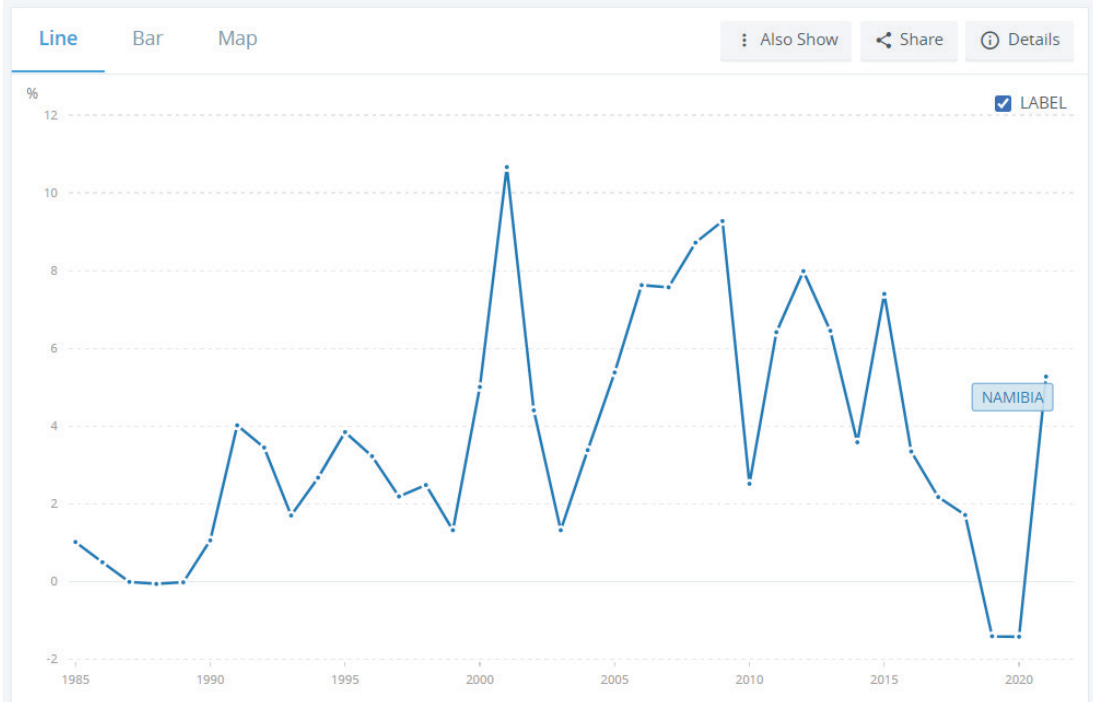
China has made significant foreign investments, especially in Namibia's uranium mining sector. Similarly, South Africa has made considerable investments in the diamond mining and banking sectors, while Canada has invested in mining of gold, zinc, and lithium. Spain and Russia have investments in Namibia's fishing industry. Additionally, foreign investors from the United Kingdom, the Netherlands, the United States, and other countries have invested in oil exploration.



## Foreign direct investment, net inflows (% of GDP) - Namibia

International Monetary Fund, International Financial Statistics and Balance of Payments databases, World Bank, International Debt Statistics, and World Bank and OECD GDP estimates.

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Namibia's lead investment promotion agency, the Namibia Investment Promotion and Development Board (NIPDB) is committed to creating a simple and transparent business environment. NIPDB facilitates doing business in Namibia, by operating a One-Stop Centre that connects investors to all the key business agencies, while ensuring compliance to the relevant policies and other legal requirements.

### 4.6 Energy supply and security<sup>16</sup>

Namibia's Electricity Supply Industry is regulated, operated and managed by several agents. The Ministry of Mines and Energy (MME) is responsible for energy policy and legislation, while the Electricity Control Board (ECB) is the regulator of the ESI. NamPower is a commercial public entity, responsible for electricity generation, transmission and energy trading. Regional Electricity Distributors (REDs) and some local authorities are licensed to distribute electricity, while a number of Independent Power Producers (IPPs) are licensed to generate renewable energy.

At its peak, the economy consumed about 640 megawatts of power per annum with a large part of the energy needs imported from neighbouring countries and the Southern African Power Pool (SAPP). On average, NamPower imports between 50% and 60% of its energy requirement.

<sup>16</sup> NIPDB website

The access rate is on average 56%, leaving 65% of its rural population and 28% of its urban population without electricity. This off-grid market is however increasingly covered by Solar Home Systems and mini-grids.

Namibia's Grid Connections Installed Capacity: 680 MW<sup>17</sup>

Hydro: 347 MW

Coal: 122 MW

Wind: 7 MW

Solar: 163 MW

Thermal (Gas, HFO, Diesel): 41 MW

#### 4.7 Regulatory framework in the renewable energy space<sup>18</sup>

Green Hydrogen provides an excellent link between sustainable energy generation and tackling energy poverty. However, this move needs to be supported with a fit-for-purpose regulatory framework for Namibia, as capital alone is not sufficient to move Green Hydrogen forward.

According to Namibia's Green Hydrogen Strategy, Namibia is set to introduce regulations and policies that would unlock the country's hydrogen potential by 2025.

The strategy refers to the establishment of a Synthetic Fuels Act, which will comply with international export requirements and reduce the operational uncertainty for developers. Furthermore, the Act is set to define clear oversight activities such as providing transparent access to land and permit processes for the benefit of investors and the locals.

Currently, there are no policies or legislation enacted that can regulate Green Hydrogen in Namibia. However, there are laws in place where specific provisions can be amended or a new section can be incorporated to regulate the Green Hydrogen sector. Amending relevant laws is one of the fastest and most effective approaches, considering the lengthy processes of enacting legislation in Namibia.

For example, the Electricity Act of 2007, provides for the generation of electricity including renewable sources, it also contains specific licensing processes, which can include Green Hydrogen. However, a concern raised by some of the project developers in terms of the Act, is the Single Buyer Market Model contained in the Act, which requires Independent Power Producers to supply at least 30% of production to the domestic market and the remainder can be exported. From a commercial perspective, this model has made it difficult for Green Hydrogen project developers to develop a business case for Namibia, as it would affect its commercial revenue and control the market in which the investor wants to operate in.

Developing a strong and fit-for-purpose regulatory framework in Namibia is key towards implementing Namibia's Green Hydrogen Strategy by 2025. The laws should be enacted in such a way that the Namibian people benefit from the Natural Resources, but most importantly, striking a balance to also attract foreign investment and grow the Namibian economy.

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<sup>17</sup> <https://www.usaid.gov/powerafrica/namibia> (2021)

<sup>18</sup> Munolwisho Elizabeth Ipangelwa / *The Brief* - 1 February 2023

Lawmakers have a critical role to play, they need to consider laws that are still in draft form such as the Energy Regulatory Authority Bill to accelerate the development of the Green Hydrogen sector in Namibia.

#### 4.8 Relevance of competitive funding<sup>19</sup>

Namibia is blessed with abundant sunshine, steady winds at the coast, endless seawater and sufficient space to make it an attractive location to produce green hydrogen. International studies that compare these inputs for hydrogen tend to keep the cost of capital constant in order to compare various locations on technical grounds. These natural inputs come at no cost. Sun, wind and water are for free. The technical studies only determine the potential output and efficiency of an investment, keeping the funding aside.

This is, however, only part of the equation. Producing hydrogen is capital intensive, and so the cost of capital is critical. According to the Oxford Institute for Energy Studies, for large-scale export-oriented green hydrogen projects, *“Servicing debt and equity comprises 75 percent of the total cash outgoing with operating costs amounting to only 25 per cent.”* *“The variable components, being interest and return on equity, are the components the project should seek to minimise and represent slightly more than the total operating cost.”*<sup>20</sup>

This underscores the oft-overlooked importance of financing costs as a function of the perceived commercial, technical, country and political risks for a project. According to the International Energy Agency, *“The economy-wide cost of capital remains quite different between groups of economies. When looking at the value of government base rates plus a broad market risk premium (to proxy corporate or project risk), nominal financing costs can be up to seven times higher in emerging and developing economies compared with the United States and Europe. Country-related risks and underdeveloped local financial systems account for much of this difference, which can be even greater in riskier markets and segments.”*<sup>21</sup>

Off-take agreements for green hydrogen and its derivatives are less straightforward than for more mature energy projects such as solar parks, wind farms or LNG projects, which have long terms and well-understood pricing mechanisms. For green hydrogen offtake, substantial uncertainty remains around the terms and pricing mechanism, which only adds to projects' financial risks.

The higher the risk profile, the more equity investors will require, and equity requires a higher return than interest on (secured) debt. Moreover, interest is mostly tax-deductible, which makes debt the cheaper, preferred form of leveraged financing for these long-term projects. Overall, in emerging and developing countries, the weighted average cost of capital (WACC) can be much higher than in developed economies.

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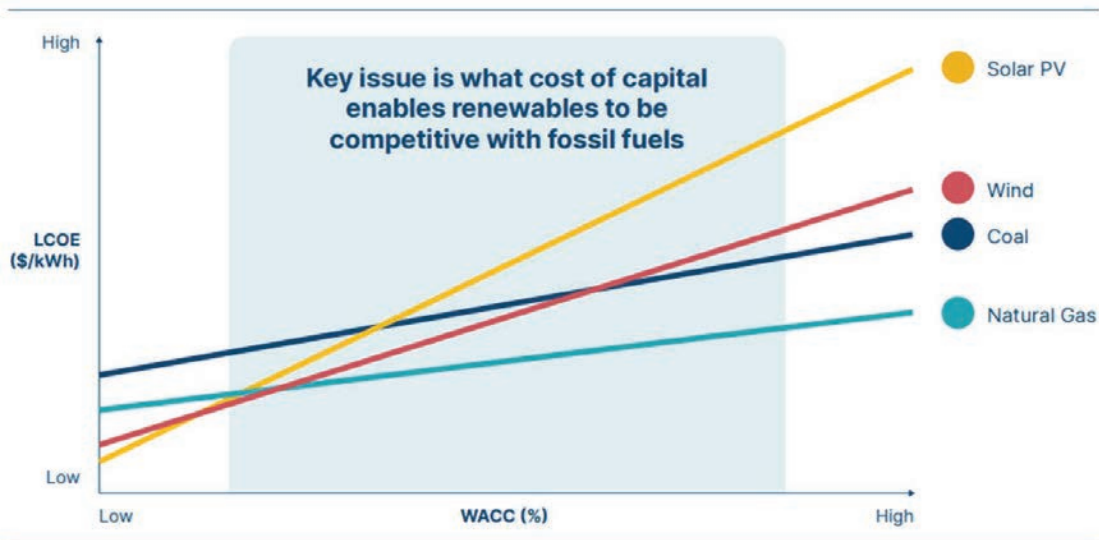
<sup>19</sup> As also published in *Etango - January - February 2023*

<sup>20</sup> Oxford Institute for Energy Studies - *Financing a world scale hydrogen export project – January 2023*

<sup>21</sup> IEA - *The cost of capital in clean energy transitions – December 2021*

## Competitiveness of wind and solar is very sensitive to the cost of capital, which is often significantly higher in middle and low income countries

Impact of weighted average cost of capital (WACC) on cost of power generation  
\$/kWh



SOURCE: Source: Systemiq analysis for ETC (2022).

At the end of the day, the banks determine if a project is bankable or not. Or, in developing countries, it is commercial banks, development banks, and foreign aid agencies together that determine whether to offer blended financing for higher-risk projects. The sheer size of export-oriented hydrogen projects – Namibia’s first is costing over US\$9.4 billion – means that funding requires consortia of commercial banks to back the projects together. Therefore, the size of the local banking sector is relevant as well, otherwise it will be a completely foreign-dominated activity, from funding to technology to off-take.

Government intervention is required in these early stages in developing a global green hydrogen trade, because not only are there few precedents for funding large-scale export-oriented hydrogen projects but, in addition, green hydrogen cannot yet compete with fossil fuel-based energy. According McKinsey: “Only USD 22 billion (about 10% of proposals) have reached final investment decision (FID) or are under construction or operational. This number has only grown by USD 2 billion in the last half year [of 2022], significantly slower than growth in project announcements.”<sup>22</sup> Not surprisingly, those projects that reached financial close are predominantly in Australia, Europe, China and the United States.

It is generally accepted that the levelized production cost of green hydrogen will fall over time. Scientists estimate that green hydrogen production costs can be better than halved in the coming decade, driven by enhanced economies of scale and innovations. With this ‘technical learning curve’, an investment in today’s technology could soon be uncompetitive. This uncertainty over the long-term production costs will make off-takers cautious about making long-term contractual commitments on the price. They

<sup>22</sup> Hydrogen Council & McKinsey – Hydrogen Insights 2022 – September 2022

are firmer on the volumes they require. And an additional risk is that if off-takers default, it is unlikely a replacement will be found on similar terms.

Governments of off-taker countries will have to step in to mitigate some of the risk. They have an interest in securing their energy needs and in facilitating the energy transition. Nevertheless, the interest rate on the additional commercial funding component will be crucial for the ultimate competitiveness of such green hydrogen projects.

#### 4.9 Credit ratings

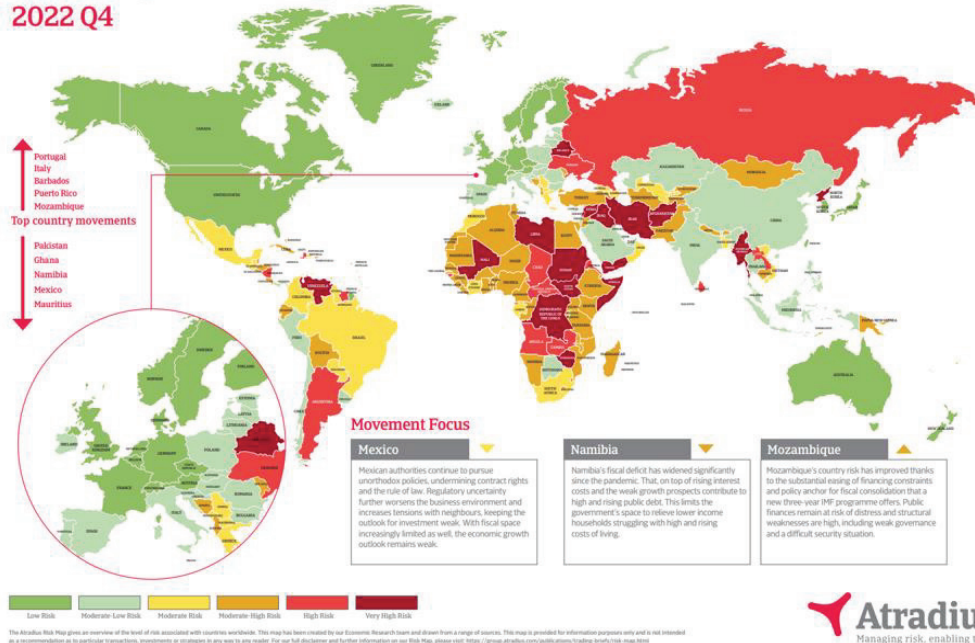
The risk premium due to perceived country and political risk will be key in the considerations by banks and project developers in which countries to start with green hydrogen production first. The credit rating of Namibia is affected by an increasing public debt level. Allianz is rating Namibia as C3 sensitive



Atradius lowered the credit rating of Namibia in Q4 - 2022 because of a widening fiscal deficit and a high and rising public debt and qualifies it as a moderate high risk country. They kept it at that level in Q1 2023.

### Country Risk Map

2022 Q4





## 5. Identified cross-sector opportunity clusters

A number of cross-sector opportunity clusters were identified. The aim is not to duplicate what other countries e.g. are already offering support for. The focus therefore will be on the next steps in the value chain; green derivatives and logistics as shown in below diagram:

### 5.1. Opportunity Cluster 1: Direct investments in the commodity trade corridor and securing import of hydrogen (derivatives)

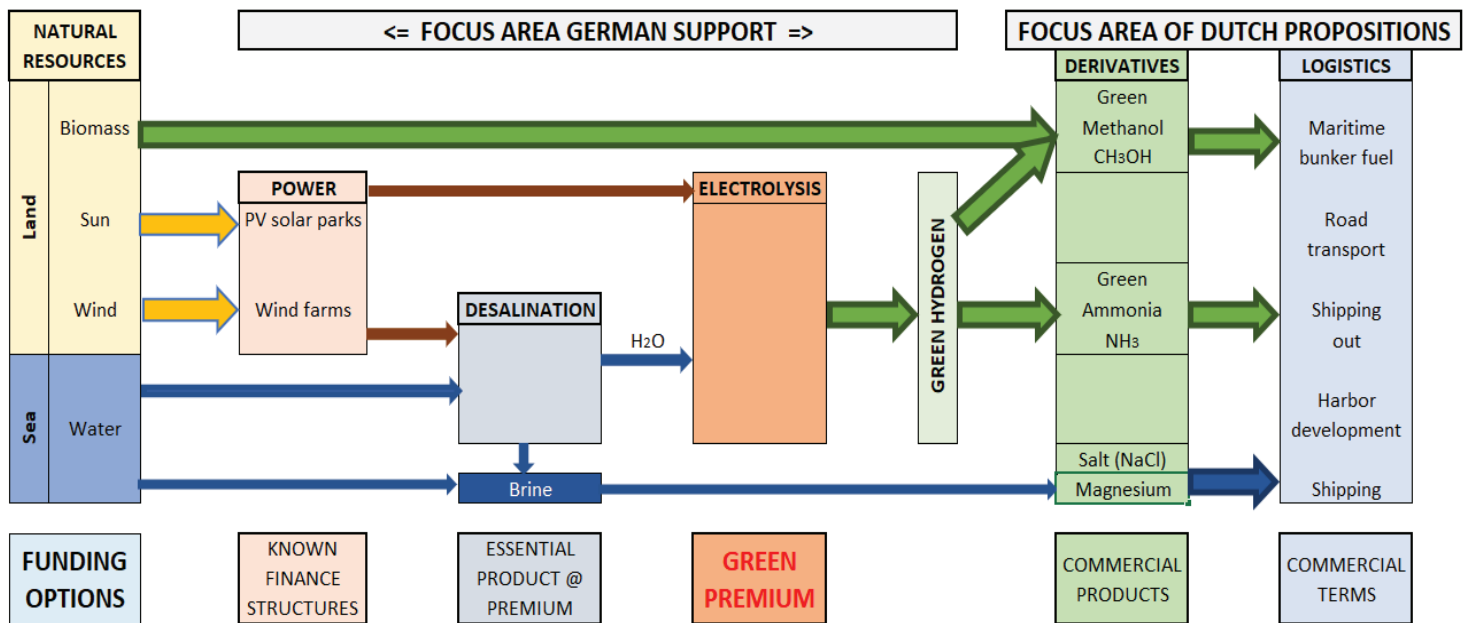
The Dutch hydrogen sector identified that the demand for GH<sub>2</sub> will exceed domestic supply necessitating additional import from other countries and Namibia was shortlisted as a source country. The latter will lead to FDI in the logistics and port infrastructure sectors. One of the key identified sector players thus far has been the Port of Rotterdam in collaboration with InvestInternational to fund the development of the Masterplan for Lüderitz harbour.

The role of Gasunie links into the commodity trade and a trading platform was set-up, called *Match & Connect* to assist potential end-users, producers or traders (shippers) from around the world by managing the commodity trade (hydrogen supply and demand) in one place. This will underpin the notion of bundling demand for subsidised off-take agreements in order to support in the financing of GH<sub>2</sub> production on the supply side. Thus far, the Dutch government is primarily taking potential GH<sub>2</sub> user side into consideration (maatwerkafspraken)<sup>23</sup> and have not yet subscribed to subsidising overseas producers. See also Annex B - Propositions on shared procurement and “Notulen Commissiedebat Internationale Klimaatstrategie – 25 April 2023”.

### 5.2. Opportunity Cluster 2: Proposition for port development and synthetic fuels

*Green Ammonia* - The current state of affairs show that the cost of a Master Plan development for the Lüderitz harbour, which is aimed at facilitating the export of green ammonia to the EU is being funded by a consortia of funders (Hyphen Hydrogen Energy, Port of Rotterdam and Invest International. A recently signed Feasibility & Implementation Agreement between Hyphen Hydrogen Energy and the Namibian government will further serve as a catalyst for the imminent harbour infrastructure development.





*Green Methanol* - It is predicted that the maritime industry will move to green methanol as a bunker fuel in the short-term. Therefore, opportunities to unlock funding for a feasibility study of green methanol production in Namibia should be explored. Regardless of the fuel choice, the transition to low-carbon fuels in the maritime sector is crucial for mitigating the impacts of climate change and promoting sustainability. Both green ammonia and methanol have the potential to significantly reduce greenhouse gas emissions in the maritime sector, but there are differences in their production and use. Green ammonia production is still in the early stages and requires significant investment in infrastructure and technology, making it a more expensive option compared to methanol. On the other hand, methanol production and use are more established and widespread, making it a more accessible and practical alternative in the short term.

See also Annex C - Proposition on Green Methanol bunker fuel. This could apply to South Africa as well.

### 5.3. Opportunity Cluster 3: Use of brine and avoidance of environmental concern

The hypersaline brine derived as an affluent from the desalination plant is an environmental concern but could be used to shorten the process time of the sea salt industry in Walvis Bay and Swakopmund. The brine contains not only NaCl sea salt but also a smaller proportion of magnesium salt (MgCl<sub>2</sub>). The competitive production of magnesium metal would be a good value proposition provided sufficient renewable energy is available for use in the production process. This could well fit in with the EU project Sea4Value, which aims at 'seawater mining' from such brine [<https://sea4value.eu/> accessed 14 May 2023].

See also Annex D - Proposition for using brine from the desalination plant to mine raw materials and avoid environmental concerns for the marine ecosystem.

#### **5.4. Opportunity Cluster 4: Decentralised renewable energy generation for the long haul transport sector**

The decarbonization of the transport sector will be essential as it accounts for almost one-quarter of global emissions. Namibia is most likely to emerge as an early adopter for long haul transport on green hydrogen due to its direct road corridors to and from South Africa, Botswana and Zambia. Therefore, the investment required to develop hydrogen fuel stations and infrastructure would not be high. This opportunity cluster should be developed in conjunction with the neighbouring countries.

The need for decentralised generation of renewable energy combined with local storage of GH<sub>2</sub> in anticipation of an e-mobility industry growth, is increasing. It is anticipated that the Namibian national grid will not be strong enough to accommodate a surge of electrical vehicles in the market, especially in consideration of the current shortage of power in the Southern Africa Power Pool (SAPP). *See also Annex E - Proposition on decentralised power generation and long haul trucking.*

#### **5.5. Opportunity Cluster 5: Green Hydrogen Centre (GH<sub>2</sub>-Centre)**

The various GH<sub>2</sub> projects and initiatives in Namibia offer multiple prospects for the key players in the Dutch renewable energy sector. Therefore, the establishment of a Dutch GH<sub>2</sub> Centre in Namibia as part of the Partners-of-International-Business (PIB) programme is highly recommended. The strategic objectives of the GH<sub>2</sub> Centre would be to promote Dutch business interests, market development, matchmaking and advisory services in Namibia. *See also Annex F - Proposition for Dutch GH<sub>2</sub> Centre.*

#### **5.6. Opportunity Cluster 6: R&D, education, capacity building and skills development**

Namibia has no history on hydrogen or chemical feedstock industries and needs to build up capacities and knowledge from the ground up. It therefore needs collaboration with foreign knowledge institutes.

*See also Annex G - Proposition for knowledge transfer and capacity building & skills development*

#### **5.7. Opportunity Cluster 7: Next Stage Port Development of Lüderitz**

The Netherlands has shown a sincere interest in the hydrogen developments in Namibia and desires to enable further cooperation between both governments and the private sector in both countries in order to stimulate and enable a local hydrogen ecosystem to the benefit of both countries.

*See also Annex H - Port Development of Lüderitz.*

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<sup>23</sup> Voorjaarsnota 2023 4.2 Klimaatafspraken

## **6. Recommendation**

### **6.1 Follow up round table discussion at the World Hydrogen Summit in Rotterdam**

The round table discussion at the World Hydrogen Summit on May 10th 2023 revealed a strong interest from the Namibian delegation and a relevant Dutch industry albeit with little awareness and exposure to Namibia. Further information on the prospects and opportunities Namibia offers needs to be made available.

### **6.2 Awaking Namibian interest in Dutch offering**

Generally speaking are the Namibian private sector and government institutions more familiar with the German offering than with the Dutch. There is clearly an information gap which needs to be bridged by more intensive exposure in both directions. The visit of the Dutch Prime Minister to Namibia in June is a good starting point but should be followed up by a counter visit by members of the Namibian Hydrogen Council and/or parliamentarian energy commission. Followed at a later stage by a broader Dutch trade mission.

### **6.3 Enabling policies to close the 'Green Premium' gap**

As described in proposition 5.1 is finance the key issue for the frontrunners in production of large scale green hydrogen. Without a certain degree of subsidy to mitigate the 'Green Premium' green hydrogen projects will not be able to take off at this stage.

The question is if European funding will be offered to the domestic user / consumer of green hydrogen or the overseas producer. In any case strong, long term and firm off-take agreements are necessary, both in volumes as in pricing. This is not a given yet.

A possibility to ringfence the funding problem is to slice the GH<sub>2</sub> projects in its different process steps (renewable energy generation, desalination, electrolysis, conversion in derivatives, infrastructure) and find separate solutions for its finance as each step has a different risk profile and asset base.

## **6.4 Communication plan**

In order to overcome the information gap a strong communication plan is needed, aiming at raising awareness in both countries of the GH<sub>2</sub> opportunities. Apart from coverage in general newspapers also specialised printed media such as Etango and web based platforms need to be addressed, preferably ahead of the PM's visit.

## **6.5 Suggested scope, NL-interest and programme of trade-mission**

This is already taking shape and has been discussed over time at various stages. An overview of relevant organisations and contact persons is attached as Annex H.

## **6.6 Broader spin-offs**

The Dutch interest and offering in the GH<sub>2</sub> ecosystem needs to be seen in a wider EU perspective as the energy transition in Europe is fully interwoven. Also the equipment supply side is to a large extent complementary. The possible Danish participation in this PM's visit underscores the willingness to team up in a broader context.

From the Namibian perspective there is a wider interest in Dutch technology, especially in the water and agricultural sectors. There is a generally positive attitude in Namibia towards 'the Dutch' which have not been captured in the past. In the slipstream of enhanced contacts on the GH<sub>2</sub> agenda, several other sectors on both sides can benefit as well.

Namibia is developing into a logistic hub to serve the landlocked countries in the hinterland, mainly through Walvis Bay and the well established transport corridors. As the Netherlands also have a strong logistic function in Europe and a lot of knowledge in this sector, further collaboration could be mutually beneficial.

## **6.7 Positioning of GH<sub>2</sub> in Africa policy**

The Dutch government is rounding off a revised policy on Africa and the momentum is therefore optimal to revisit the attitude to an upper middle-income country such as Namibia. The dual-track policy combining Aid and Trade should also apply to Namibia, at least for the renewable energy sector and climate change mitigation actions as defined at the various COP meetings.

## **6.8 Actions needed from private/public parties**

### **6.8.1 Most promising proposal(s)**

The most promising proposals need to be differentiated according to their timeline. In the short term the O&L / CMB joint venture is most realistic as it concerns firstly a pilot set-up for which the electrolyzers are already procured.

On the Dutch side the proposals aiming at infrastructure and trade are most promising. The Germans are already active in a number of other correlated activities. The production of green methanol however has not been covered by any of the listed projects while demand for it is expected to become substantial.

### **6.8.2 High level political messages to be conveyed by NL**

The strongest statement the Netherlands can make is support in the finance dilemma by either a direct equity participation or subordinated loan. Alternatively a government guaranteed firm long term off-take agreement at concessional terms could help to arrange local funding for relevant GH<sub>2</sub> projects. However an effective Double Tax Avoidance Agreement is a prerequisite for a competitive Weighted Average Cost of Capital.

The set-up of a GH<sub>2</sub> centre shows a commitment to improve trade and investment relationships. Opening up part of the Dutch development aid instruments for Namibia is also showing a strong signal.

### **6.8.3 Private and public engagements**

See overview in Annex I.

### **6.8.4 Relevant instruments including selective development aid**

Various development aid instruments will become available to Namibia as long as the projects are related to the hydrogen agenda. The exact definition of the scope is still unclear if it encompasses all renewable energy and climate change mitigation projects as well.

## 7. Conclusions

Production and distribution of green hydrogen is not yet viable on strict commercial terms. Government interventions are needed in the early phases of this new industry to overcome the 'Green Premium'. The Netherlands have strong and experienced financial institutions such as FMO, InvestInternational, Climate Fund Managers and Triodos Bank, which are all 'open' for Namibia but haven't financed anything yet in the country.

Namibia offers good conditions to produce green hydrogen and/or its derivatives however it will all depend if adequate blended finance can be attracted. The key issue is if required subsidies are directed towards the (domestic) users of green hydrogen or towards the (overseas) producers of it. In either case firm off-take agreements are needed to unlock the value chain.

The development of propositions for collaboration between Namibia and the Netherlands will not only have to address the options securing Europe's energy needs for power (= electrons) but should also look at the options for decarbonizing the chemical industry (= molecules). Green methanol offers the best opportunity in that respect.

If and when fully funded the current green hydrogen initiatives in Namibia offer good opportunities for the Dutch hard-to-abate industries to decarbonize and for the suppliers of relevant hardware and services to offer their products and knowledge.

The Hyphen initiative is a large-scale export oriented project with agreed terms and conditions with the Namibian government. However the feasibility still needs validation and it has not reached a financial close yet. The timeline of this important project will determine the future for a port development in Lüderitz as embraced by the Dutch.

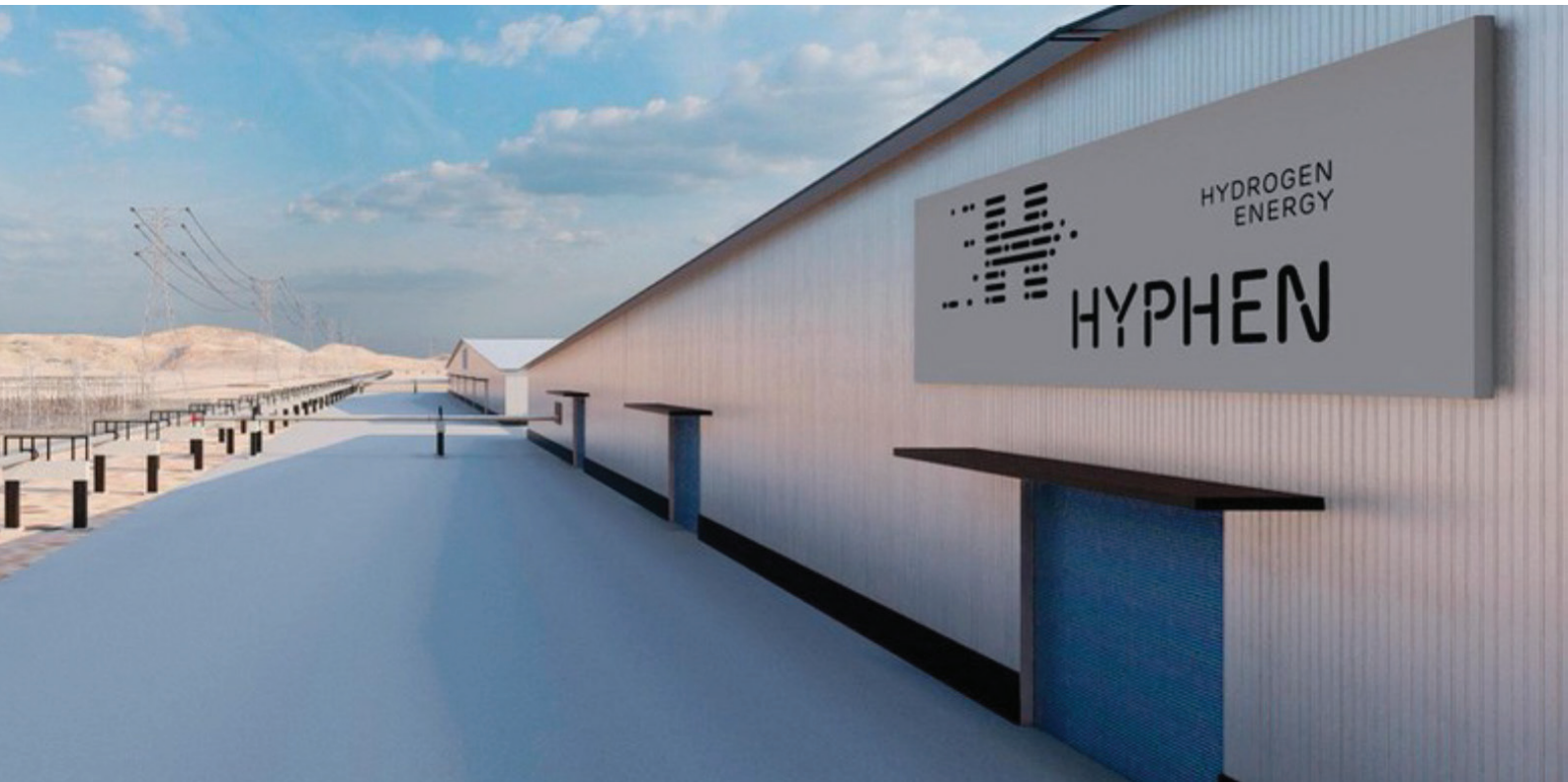
Any major involvement by the Netherlands should be accompanied by a local impact agenda to ensure Namibia and its population is benefitting from these developments in an equitable manner. This will have to start with capacity building and skills development. The Netherlands with all its expertise in logistic chains and chemical industries can assist Namibia in port development and production and trade of green hydrogen derivatives green ammonia and green methanol and residue products such as salt and magnesium.



## **ANNEXES:**

- A. Overview of current GH<sub>2</sub> projects in Namibia
- B. Concept Note 5.1 : Proposition for shared procurement of hydrogen.
- C. Concept Note 5.2 : Proposition for green methanol bunker fuel
- D. Concept Note 5.3 : Proposition for re-use of brine waste
- E. Concept Note 5.4 : Proposition for decentralised power generation and long haul trucking
- F. Concept Note 5.5 : Proposition for a Dutch GH<sub>2</sub> Centre in Namibia
- G. Concept Note 5.6 : Proposition for knowledge transfer and capacity building & skills development
- H. Concept Note 5.7 : Port development of Luderitz
- I. Overview of European Commission Programmes in Namibia
- J. List of proposed private-to-private and government-to-government engagements

## Annex A: Namibia Green Hydrogen Projects:



**Tsau //Khaeb National Park (Hyphen SCDI) Project**

**Location: Tsau //Khaeb National Park, //Karas Region**

**[Website: www.hyphenafrika.com](http://www.hyphenafrika.com)**

**[Download Project Data Sheet](#)**



## Green Hydrogen Applications in the Port Environment

Location: Walvis Bay Port

[Website: www.cmb.tech](http://www.cmb.tech)

[Download Project Data Sheet](#)



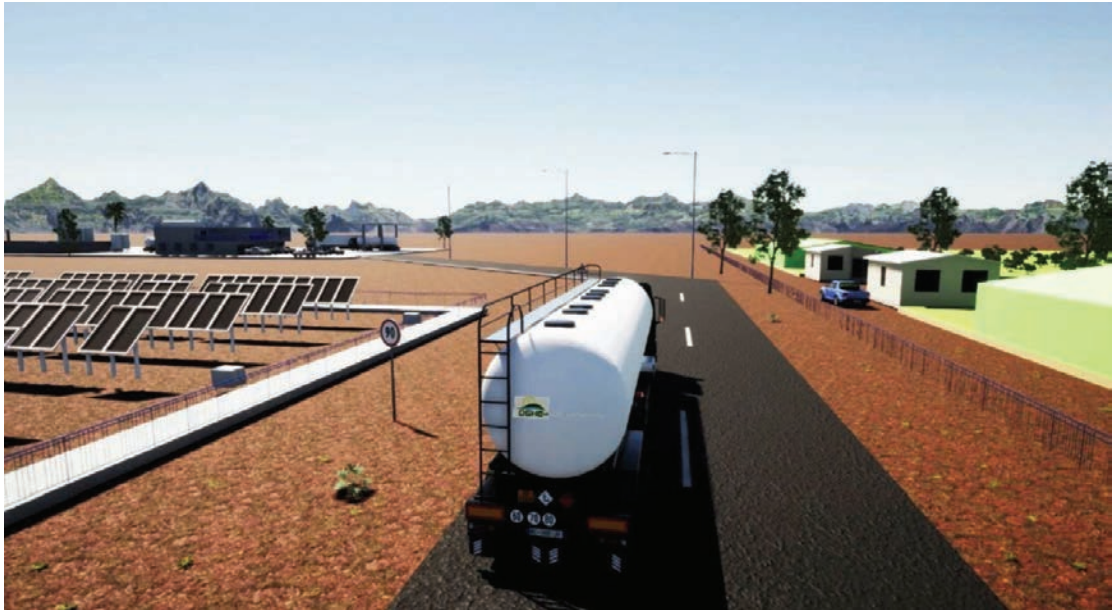
## Hydrogen-Diesel Dual Fuel Locomotive Project

Location: Walvis Bay to Kranzberg corridor

[Website: www.hyphentechnical.com](http://www.hyphentechnical.com)

[Download Project Data Sheet](#)





### **Daures Green Village**

**Location: Erongo Region, Daures Constituency**

**[Website: www.daures.green](http://www.daures.green)**

**[Download Project Data Sheet](#)**



### **H2-Pilot Plant / Refueling Station**

**Location: Walvis Bay**

**[Website: www.cmb.tech](http://www.cmb.tech)**

**[Website: www.ol.na](http://www.ol.na)**

**[Download Project Data Sheet](#)**

## PROPOSITION # 1

# EU Hydrogen Derivatives Offtake Pool

The Netherlands has shown a sincere interest in the hydrogen developments in Namibia and desires to enable further cooperation between both governments and the private sector in both countries, to stimulate and enable a local hydrogen ecosystem to the benefit of both countries. To this extent it is proposed to coordinate and subsidise the demand side in the Netherlands for hydrogen and/or its derivatives.

**Pre-assumption:** There is currently no global market for green hydrogen and firm off-take agreements are crucial for making the GH<sub>2</sub> projects bankable. It would help if the relevant Dutch industry is bundling its demand for GH<sub>2</sub> and/or its derivatives in order to create a stable combined off-take agreement which could also be subject to concessional finance and/or subsidies.

*“Moreover, trading platforms must be developed to facilitate the buying and selling of renewable hydrogen products. The EU can leverage its experience in developing successful carbon trading platforms to develop similar mechanisms for renewable hydrogen.”<sup>24</sup>*

**Scope:** This set-up should be open for the hard-to-abate Dutch industry who wants to change to green hydrogen or its derivatives but can't make it financially viable yet. For natural gas there exists already a shared procurement organisation called GasTerra in Groningen. Before this one dissolves the expertise could be valuable to set-up a similar trading platform for hydrogen.

Energy infrastructure company Gasunie offers market parties for hydrogen the opportunity to easily connect with each other via the platform **Match & Connect**. Users from seven countries are now active on the platform. **Match & Connect** helps potential end-users, producers or traders from around the world to bring GH<sub>2</sub> supply and demand together. The goal is to kick-start the international hydrogen chain for the benefit of the energy transition.

Through the platform, initial contact takes place. After the contact, it is up to the market parties themselves to make arrangements outside **Match & Connect**. Contracts are concluded bilaterally without the intervention or interference of this platform.

This proposition will be the next step of bundling demand and stabilising the pricing of it to make it more attractive. Subsidies are essential for the so-called ‘Contracts for Difference’ (CfD). This could go in combination with the H2Global initiative, linking<sup>25</sup> now with the new EU Hydrogen Bank which is set-up to mitigate the ‘Green Premium’ dilemma. However, financing of production is not directly helped when these instruments are meant for the GH<sub>2</sub> users. Firm off-take agreements on volumes and pricing mechanisms are key for attracting (blended) finance for producers.

<sup>24</sup> Oxford Institute for Energy Studies - Renewable Hydrogen Import Routes into the EU - May 2023

<sup>25</sup> [https://energy.ec.europa.eu/news/joint-statement-commissioner-simson-and-german-minister-habeck-energy-issues-2023-05-31\\_en](https://energy.ec.europa.eu/news/joint-statement-commissioner-simson-and-german-minister-habeck-energy-issues-2023-05-31_en)

**Costs:** The costs will depend completely on the scale and scope of the facility but could potentially run into the billions of Euros.

**Funding:** The Dutch government already formulated a H2Global project about the import of green hydrogen (€300 mln.) *“Maatregel betreft een gezamenlijk project met Duitsland, waarbij tenders worden georganiseerd om op basis van tienjarige contracten waterstof in te kopen en door te verkopen in de vorm van éénjarige contracten. Dit brengt importstromen van waterstof op gang. Voorwaarde: er moet voldoende voortgang zijn geboekt ten aanzien van afnameverplichting”*<sup>26</sup>.

In addition certain agreements will be made with individual companies; *“Met een combinatie van normering, beprijzing, subsidiëring en facilitering wordt de industrie gestimuleerd om te verduurzamen. Het kabinet intensificeert de maatwerkafspraken met de grootste industriële uitstoters tot een opgave van 2 Mton in 2030 ten opzichte van de CO2-heffing. Om deze extra reductie te bereiken wordt zo nodig een grotere groep bedrijven benaderd en worden extra middelen vrijgemaakt”*<sup>27</sup>.

The recently announced EU Hydrogen Bank<sup>28</sup> could play a role as well as it is set-up to mitigate the ‘Green Premium’ issue and so could help to decarbonise the industry. Groningen showed interest in housing this new bank.

### **Extract - Commissiedebat Internationale Klimaatstrategie – 25 april 2023**

“Voorzitter. Ik maak energiediplomatie even af, want dit ligt heel erg in het verlengde daarvan. .... Minister Schreinemacher noemde net ook al een paar voorbeelden. Op de eerste plaats hebben we in het kader van het programma van het Internationaal Energieagentschap JETP's, .... dat zijn gezamenlijke programma's met vrij grote economieën en energie-intensieve economieën, zoals die van India, Indonesië, Zuid-Afrika, Vietnam en Senegal. Daar lopen niet alleen gesprekken, maar ook echt concrete actieprogramma's waarbij een aantal Westerse landen zo'n JETP-programma adopteert. We gaan met kennis en expertise, maar ook met financiering die landen helpen om sneller hun hernieuwbare energiemarkt van de grond te krijgen. In Zuid-Afrika kent u alle voorbeelden van black-outs, waarbij een groot deel van de bevolking geen toegang heeft tot betaalbare energie, grote problemen met de kolencentrales. Via dat JETP-programma helpen we nu Zuid-Afrika om daar de enorme potentie aan wind, zon en waterstofproductie echt van de grond te krijgen. We doen het ook in het kader van onze ambities wat betreft groene waterstof.

U krijgt volgende maand een uitgebreide energiediplomatiebrief van mij over wat Nederland nu doet met landen die potentiële exporteurs van groene waterstof kunnen worden. .... Ik ga binnenkort met de premier naar Marokko, Namibië en Zuid-Afrika. In het verlengde van wat minister Schreinemacher eerder al heeft gedaan, hebben we met die landen MoU's afgesloten, of die zijn we aan het afsluiten, waarbij we de SNG's helemaal onderdeel laten zijn van de energiediplomatieaanpak. Namibië is in potentie de goedkoopste producent van waterstof, omdat de zon daar eigenlijk altijd schijnt en de wind ook altijd waait. Je kunt in Namibië grootschalige energieprojecten gaan opzetten en dan de groene waterstof zo snel mogelijk naar Europa exporteren, maar als ondertussen de lokale bevolking er niet van profiteert, zijn we de fouten van de vorige eeuw aan het herhalen. In de MoU's die de minister en ik sluiten, maken we afspraken over hoe local content wordt meegenomen, hoe de lokale bevolking toegang krijgt tot betaalbare energie en hoe we op een fatsoenlijke manier omgaan met de grondstoffen die daar nodig zijn.”

<sup>26</sup> VOORJAARSNOTA APRIL 2023 - bijlage-2-ontwerp-meerjarenprogramma-klimaatfonds-2024 - 4.5

<sup>27</sup> VOORJAARSNOTA APRIL 2023

<sup>28</sup> [Commission outlines European Hydrogen Bank to boost renewable hydrogen \(europa.eu\)](https://europa.eu/commission/press-corner/detail/en/ipr_23_1000)



## PROPOSITION # 2

# Synthetic Fuel Exploration

The Netherlands has shown a sincere interest in the hydrogen developments in Namibia and desires to enable further cooperation between both governments as well as the private sector in both countries to stimulate and enable a local hydrogen eco-system to the benefit of both countries.

### Preamble:

It seems the maritime industry favours green methanol as their future non-carbon fuel, although green ammonia is still an option explored by companies such as CMB. "... the shipping industry has been looking for alternatives, among which methanol is a prime candidate."<sup>29</sup>

Maersk has already ordered 19 vessels with dual-fuel engines able to operate on green methanol. TNO is spearheading a broad international consortium including Damen Shipyards and Maersk, investigating the use of green methanol as bunker fuel for the maritime sector in the Green Maritime Methanol project and offered their report to the Dutch DG Aviation and Maritime Affairs Ruth Clabbers recently (see: [Rapport: Varen op groene methanol binnenkort mogelijk \(tno.nl\)](#) but (inter)national policies form an obstacle, 17 April 2023).

Conclusion of this report: *"To use renewable methanol as a maritime energy carrier on the short to medium term, three things must be available:*

- *Production capacity*
- *Distribution capacity*
- *Methanol bunkering in most ports"*

This means that Walvis Bay must be able to offer green methanol as bunker fuel in the near future, as it is also a port of call for Maersk and an important off-shore supply base for the Orange basin.

The most logical option for Namibia to produce green methanol is to combine green hydrogen and biomass feedstock as an alternative to import methanol.

The O&L / CMB joint venture is executing a hydrogen pilot plant in Walvis Bay including production of green ammonia but are not considering producing green methanol. O&L partner CMB from Belgium seems to focus on ammonia for its fleet. In the second phase of their project sufficient hydrogen will become available to produce green methanol, the O&L Group has also experience with biomass. Namibia has a vast stock of biomass, predominantly from invader bush such as acacia, which is however known for its complicating high silicon content.

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<sup>29</sup> IRENA / Methanol Institute - Innovation Outlook Renewable Methanol - 2021

### **Scope:**

In the first instance a feasibility study needs to be done to assess the possibility of producing green methanol locally, making use of the available biomass. Issues might be logistic challenges, high silicon content, demand / supply balance and if the resulting scale is economically feasible.

If viable, this could result in a JV for the set-up of a dedicated green methanol plant in Walvis Bay, primarily to serve the maritime industry. Any access can be used to decarbonize the petro-chemical industry anywhere in the world.

Namibian stakeholders don't appear to recognize the true potential green methanol yet and are currently not mentioning it in their plans.

Production and use of green methanol in Namibia doesn't seem to feature in the collaboration with Germany or Belgium. This leaves a gap for the Dutch and Danes to fill.

### **Partners:**

An international consortium consisting of companies and institutions such as: Maersk, O&L, OCI, Damen, Vopak, TNO, NamPorts and NamCor might be potentially interested. Maersk already signed agreements for (a study on) methanol supply in Melbourne and Shanghai. Damen signed an MoU with Pon Energy and Caterpillar for the development of methanol powered tugboats on 28 November 2022. There is a strong connection with the Dutch maritime policy, which might trigger additional interests.

### **Costs:**

Depending on the scope and the to be agreed Terms of Reference. Too early to tell but Maersk is already conducting similar studies and might give a reference.

### **Funding:**

The potential (commercial) partners are in the lead and should contribute in the first place.

As Maersk could become a direct beneficiary of the availability of green methanol in Walvis Bay, they and/or the Danish government may want to contribute to the study and further set-up.

RVO and InvestInternational have funding options for feasibility studies and investment preparation. It may also fit in the EU Horizon 2020 - Zero Emission Waterborne Transport Partnership project.

### **Relevant literature to the topic**

*Methanol for Maritime* (2020) [<https://repository.tno.nl/>]

*Methanol as fuel heads for the mainstream in shipping.* (2023) [<https://www.dnv.nl/>]

*IRENA / Methanol Institute - Innovation Outlook Renewable Methanol* (2021)  
<https://www.irena.org/Publications/2021/Jan/Innovation-Outlook-Renewable-Methanol>

*CBM Sustainability Report* (2021) [<https://cbm-global.org/>]

*Investment in Green Hydrogen Partnership with Namibia* (2022) [<https://www.ol.na/portfolio/ol-nexentury/>]

*OCI Duurzame methanol voor de chemische industrie en scheepvaart* (2023) [<https://oci-global.com/>]

**PROPOSITION # 3****Resource Recovery From Desalination Brine**

The Netherlands has shown a sincere interest in the hydrogen developments in Namibia and desires to enable further cooperation between both governments and the private sector in both countries to stimulate and enable a local hydrogen ecosystem to the benefit of both countries. To this extent a project has been identified to use the affluent hypersaline brine from the desalination plants to harvest salt, magnesium and possibly other products while avoiding environmental concerns for marine life.

**Pre-assumption:**

The desalination process produces pure water needed for the electrolysis of GH<sub>2</sub> but discharges substantial volumes of brine as a residue back into the sea. This affluent has a much higher salt content and a different temperature gradient which could affect the marine ecosystem. The environmental concern is that releasing this hypersaline affluent back into the sea may affect local sea life and especially stock of migrating fish.

The interesting coincidence is that around Walvis Bay and Swakopmund huge production of sea salt takes place on the basis of a slow evaporation process in 5,000 ha of pans. If the brine can be used as feedstock to shorten that process it will result in increased production volumes.

In the Netherlands there is a strong salt / chloride industry with relevant producers such as Nobian and Nedmag (in magnesium chloride). Nobian has also experience with electrolyzers as this technology is used in the salt / chlorine industry for a long time.

**Scope:**

Turning a concern into an opportunity might work for the O&L / CMB project in Walvis Bay and the HDF project in Swakopmund as the locations are not far apart from salt pans in both places. In Lüderitz there is no salt industry.

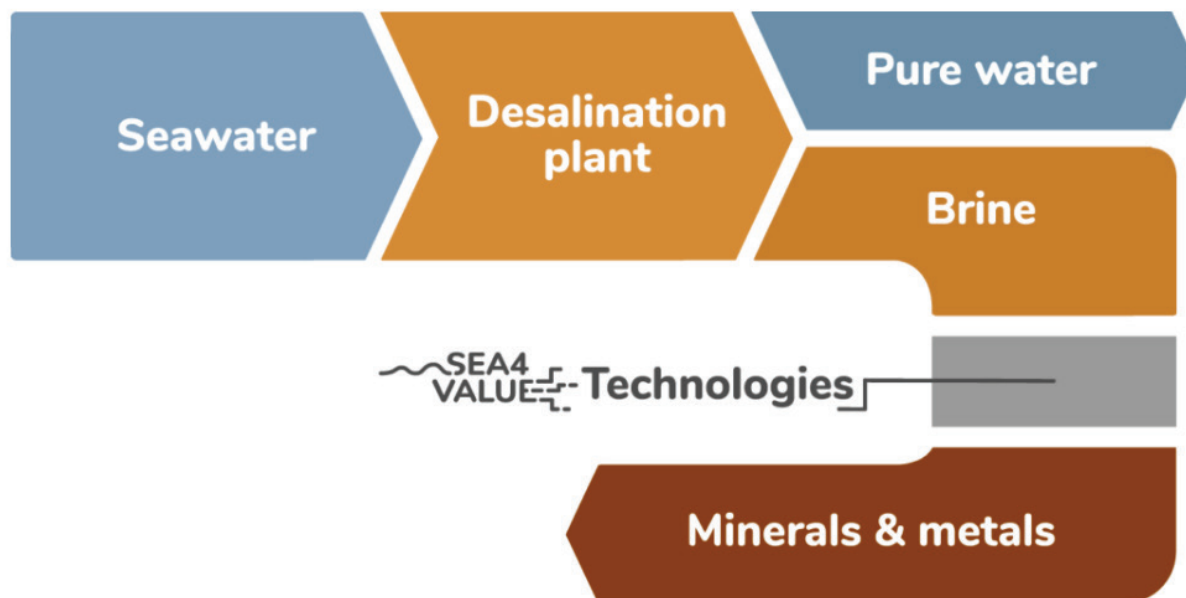
It may make it even more relevant to look into the fraction of magnesium salt (MgCl<sub>2</sub>) and investigate if that can be used to produce magnesium hydroxide or magnesium metal. This fits in the European project SEA4VALUE<sup>30</sup> for which cheap electrical power is needed. MgCl<sub>2</sub> can be exported to companies such as Nedmag in Veendam who are using it for a range of applications including the production of refractory bricks, bleaching pulp, and combatting icy

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<sup>30</sup> Sea4Value brings together 16 partners from Spain, Germany, Italy, Belgium, Ukraine, Netherlands, Finland and Switzerland to develop and upscale technologies to sustainably mine raw materials from brines. See: <https://sea4value.eu/> The focus lies on the 10 target elements of Sea4Value: Magnesium, Scandium, Vanadium, Gallium, Boron, Indium, Lithium Molybdenum, Rubidium and Calcium. It receives funding from the European Union's Horizon 2020 research and innovation programme. The Dutch partner in the project is WATER & ENERGY INTELLIGENCE BV, based in Delft

roads. If pure enough the magnesium salt can even be used in the food, medical, and cosmetics industries as well.

There are even more products which can be converted from the brine such as sodium hydroxide.<sup>31</sup>



**Costs:**

**Funding:**

In first instance for a feasibility study from InvestInternational and/or Climate Fund Managers, possibly in conjunction with the EU funded Sea4Value project.

**Potential lead partner:** Nobian

**Potential Dutch partners with relevant expertise:** Nobian, Nedmag, WATER & ENERGY INTELLIGENCE BV

**Potential Namibian partners:** WALVIS BAY SALT HOLDINGS (PTY) LTD.

**Next steps:**

- 1) Participate in the global SALT FORUM conference on 6 – 9 November 2023 in Swakopmund. See: <http://imformed.com/get-imformed/forums/salt-forum-2023/>
- 2) Identify potential Namibian partners to request for a feasibility to start with.
- 3) Connect with the EU Sea4Value project.
- 4) Apply for funding for a feasibility study at Invest International or Climate Fund Managers.
- 5) Feasibility study aiming at the possibility and validity of large scale 'seawater mining' to recover minerals and metals from brines produced in seawater desalination plants in a cost-effective way.
- 6) Develop pilot project with O&L / CMB Walvis Bay or HDF in Swakopmund.
- 7) If feasible, scale up and investigate options how to implement in Lüderitz.

<sup>31</sup> MIT research scientist Amit Kumar, professor of mechanical engineering John. H. Lienhard V and director of the Abdul Latif Jameel Water and Food Systems Lab.

## PROPOSITION # 4

### Decentralised Standalone GH2 Generation & Green Mobility

The Netherlands has shown a sincere interest in the hydrogen developments of Namibia and desires to enable further cooperation between the two countries with mutual benefits. Within the context of a value proposition for decentralised power generation and long haul trucking, a needs analysis is proposed to identify the feasibility for a decentralised power generation project including options for using electrical power and/or e-fuels for long haul trucking.

#### Pre-assumption:

It is assumed that Namibia strives to create an alternative fueling option for long haul trucks running on diesel in order to decarbonize the transport sector. At current, along the main routes, grid power is not available everywhere with stretches where the grid might not meet the e-vehicle demand. It can be assumed that renewable energy and suitable storage will be required to achieve the decarbonisation goals in the transport sector.

#### Scope:

Various truck producers like **DAF Trucks, VDL buses and Scania** are working on such solutions at present. Hydrogen can be used directly in a combustion engine or with the help of fuel cells converted back to electricity to power an electrical engine. Unlike electric cars hydrogen seems to become the preferred option for trucks as batteries will be too heavy for long haul trucking and recharging would also take too long.

Hydrogen filling stations could become a vital component for long-haul trucking as part of the crucial logistics industry in Southern Africa, and as the region moves towards a low-carbon future, an alternative green fuel is needed for long-haul trucks. In and between South Africa and Namibia, the trucking routes are limited to a number of long corridors that are extensively used. Consequently, with only a limited number of refuelling stations such a corridor can be serviced with hydrogen. This offers an opportunity for decentralised production of hydrogen on the basis of local solar parks in order to limit the complicated bulk transport of hydrogen itself.

Decentralised hydrogen production for fuel stations could provide a key opportunity for community development and job creation. This could involve the establishment of small-scale hydrogen production facilities. The excess green energy produced, could also be used directly, when this is beneficial. These facilities could be owned and operated by local communities, providing a source of income and promoting energy independence.

#### Funding:

Funding would be required In the first instance to conduct a feasibility study. The EU is funding a project for improving the Walvis Bay - Maputo corridor.



### **Proposed next steps:**

1. Apply for funding at Invest International or Climate Fund Managers
2. Identify a suitable party or institution in Namibia to manage the process of getting the feasibility study done.
3. Feasibility study focus would be on comparing opportunities of hydrogen from decentralised electrolysis and/or biomass, on both business cases as well as potential social impact.
4. Develop a pilot project with one hydrogen refuelling station in a major town (e.g. Windhoek) for municipal trucks such as garbage collecting vans. The O&I / CMB project seems to aim already for a hydrogen refuelling station in Walvis Bay.
5. Roll-out of filling stations and hydrogen trucks along one identified corridor.
6. If proven feasible the concept can be extended to all relevant corridors in Namibia and between neighbouring countries

## PROPOSITION # 5

### Joint NL-NAM GH2 Centre

The Netherlands has shown a sincere interest in the hydrogen developments in Namibia and desires to enable further cooperation between both governments and the private sector to stimulate and enable a local hydrogen ecosystem in Namibia benefitting both countries. It is within this context that a GH<sub>2</sub> Centre is proposed.

*“The Netherlands is determined to play a substantial and constructive role in building a global hydrogen economy. And it has a lot to offer because the Dutch are already at the forefront of European initiatives to kick-start a hydrogen revolution, building on various strengths including its strategic location as the gateway to North-Western Europe. Over 50 years ago, the Dutch discovered their natural gas reserves and went on to develop one of the world’s most extensive and sophisticated gas grids. At this gas storage facility in the northern province of Groningen, for example, hundreds of millions of cubic metres of gas can be stored in underground salt caverns. This same infrastructure – along with thousands of kilometres of gas pipelines throughout the country – is being mobilised to enable a second gas revolution, replacing fossil fuels with carbon-neutral hydrogen”<sup>32</sup>*

#### Rationale for the establishment of a GH<sub>2</sub> Centre in Namibia<sup>33</sup>

##### 1. Quality and reliability

The Dutch combine first-class technical expertise and innovative strength with a commitment to delivering high-quality, reliable products and solutions. Working with Dutch technology means you can be certain of compliance with the highest (European and international) standards.

##### 2. An international outlook

The Dutch have been doing business abroad for centuries. They understand what it takes to work successfully across borders and cultures, and are regularly ranked as having the world’s most proficient non-native English skills.

##### 3. High-tech excellence

The Netherlands has a long history in high-tech innovation. In terms of the number of patents per capita, it ranks second in the world. It is home to world-class research institutes in clean energy technology, global players in semiconductor technology and excellent machine manufacturers.

##### 4. Joint innovation

The Dutch excel in creating flexible, fast-moving networks of specialist companies and research institutes. The Netherlands is home to dozens of ‘field labs’ in which such networks translate fundamental research into innovative solutions and test them in real-life pilot environments.

<sup>32</sup> RVO - NL solutions for a hydrogen economy, 2021 p.22

<sup>33</sup> RVO - Excelling in Hydrogen - Dutch solutions for a climate-neutral world - April 2023

## **5. Easy access to specialist expertise**

The Netherlands has organised its clean energy expertise into national consortia. These networks offer fast and easy access to the right technology providers, researchers or combination of specialists. They pursue a common goal: solving global challenges together.

### **Pre-assumption:**

The Namibian Hydrogen Implementation Office has been approved with a 50/50 funding from InvestInternational and the European Union. The Namibian GH<sub>2</sub> Implementation Office will be embedded in the Ministry of Mines & Energy. The mandate of the office is to liaise between the Namibian line ministries and local stakeholders and to act demand driven. It will then be the logical counterpart for the GH<sub>2</sub> Centre, who will consequently focus more on the Dutch interests, and push the supply side of knowledge, technology and commercial transactions.

### **Objectives:**

To enhance partnerships and provide support in the following fields:

- Training and skills agenda, R&D, Technology transfer;
- Advice on regulatory framework; certification procedures & safety regulations;
- Advisory services on financial engineering (risk reduction, green premium mitigation);
- Board seat at the SDG Namibia One Fund;
- Matchmaking with prime Dutch energy users in order to develop offtake agreements;
- Promote combined offering by relevant Dutch manufacturers;
- Brief consultancies and engineering companies on relevant developments;
- Drive the local impact agenda on basis of Dutch experience with GH<sub>2</sub> Valley concepts;
- Design and follow a communication strategy to raise awareness in both countries;

### **Costs:**

The costs will very much depend on the agreed scope and set-up. The participating members will ultimately determine the size and so the costs. It could be a meeting place for young graduates and PhD students of both countries to collectively work on the energy transition agenda as a platform for networking into the future.

### **Funding:**

Participating Dutch institutions and private companies could sign up for the 'Partners-in-Business' (PiB) program of RVO and collectively fund the set-up of such a GH<sub>2</sub> Centre in Namibia.

### **Governance:**

Being part of the PiB organisation will stipulate a certain degree of structure and transparency. Reporting and accountability will need to be provided to all members and contributors. Prime counterparts will be the Dutch Embassy in Pretoria, the Namibian Hydrogen Implementation Office and the joined Strategic Working Group.

This set-up should qualify within the Bilateral Agreement on Technical Cooperation signed in 1992 between Namibia and the Netherlands.

## PROPOSITION # 6

### Knowledge Transfer, Skills Development & Capacity Building

The Netherlands has shown a sincere interest in the hydrogen developments in Namibia and desires to enable a further cooperation between both governments and the private sector in both countries to stimulate and enable a local hydrogen eco-system to the benefit of both countries. To that extent it is observed crucial to facilitate the transfer of knowledge to enable local capacity building & skills development.

#### Pre-assumption:

It is recognized that Namibia is not yet ready to host a completely new type of industry as it lacks the regulatory framework and knowledge base to effectively support the GH<sub>2</sub> developments. It is urgently needed to start capacity building and the development of relevant skills on all levels in the hydrogen ecosystem.

#### Scope:

Dutch knowledge institutes are already for decades engaged in the national gas industry and made more recently a move towards the hydrogen sector. The hydrogen ecosystem in the Netherlands has many components related to R&D, innovation, education and certification. All of that is relevant for Namibia too and Namibia has the absorption capacity to effectively cooperate with the Netherlands to transfer such knowledge and collaborate on specific issues arising from the Namibian situation.

Apart from academic exchange also law makers and government representatives / ministries need to be trained to become fully prepared for policy making in this new field of hydrogen and chemical feedstocks. For certification, testing and education a (field) laboratory is high on the wish list of Namibia.

Germany has also offered assistance in this field, but a lot needs to be done in a relatively short period of time as capacity building needs to be ahead of the real activities.

#### Costs:

The costs will be primarily associated with student bursaries and exchange programs of students and lecturers. Study tours might be helpful for law and policy makers. Journalist may also benefit from it.

#### Funding:

A new facility called Impact Clusters consortia will be open soon. They look a bit like PiB's but are no PPP's and are based on knowledge transfer but also positioning of the Dutch sector (grant 450 k Min FA/RVO and 450 k sector; mixed Dutch and local consortium)

**Potential Dutch lead partner:** New Energy Coalition (NEC)

**Potential Dutch partners:** New Energy Coalition (NEC), TNO, Gasunie, DNV and various universities

**Potential Namibian partners:** NCRST, NUST, UNAM, Namibia Green Hydrogen Research Institute, Namibian Standard Institute

## PROPOSITION # 7

### Next Stage Port Development of Lüderitz

The Netherlands has shown a sincere interest in the hydrogen developments in Namibia and desires to enable further cooperation between both governments and the private sector in both countries in order to stimulate and enable a local hydrogen ecosystem to the benefit of both countries. To that extent it identified some of the next steps for the port development of Lüderitz as subsequent to the Master Plan that has recently been completed by the Port of Rotterdam and NamPower.

#### Pre-assumption:

The port development of Lüderitz is correlated with the Hyphen ammonia project in terms of necessity and timeline. This project is so far the only big scale export-oriented development. Hyphen is a joint venture between the German Enertrag and the British Nicholas Holdings. Hyphen signed a Feasibility and Implementation Agreement (FIA) with the Namibian government at the end of May 2023. The FIA sets out the process under which the project will be developed and the roles and responsibilities of each of the government of Namibia and Hyphen. A recently finished Master Plan for the development of the Lüderitz harbour, which is aimed at facilitating the export of green ammonia to the EU, is being funded by a consortium of Hyphen Hydrogen Energy, Port of Rotterdam and Invest International. The conclusions were:

#### Conclusions :

1. Great potential identified. Especially the Sperrgebiet area south of Lüderitz is one of the world's top 3 areas for wind production.
2. A staged development.
  - A first stage will require 5.3 TWh (— 100ktpa H2 or 500ktpa NH3). Land area requirements are 30k Ha for wind and 2k Ha for solar parks. Investment in Namibia will be in the order USD1,1B\$.
  - Second stage 53 TWh. (10x stage 1).
3. The price of hydrogen delivered in Rotterdam reasonably competitive: 3,3 EUR/kg.
  - This is based on wind power production in the Sperrgebiet and ammonia as hydrogen carrier.
  - It is noted that further government support may be needed to ensure theist stage hydrogen be more competitive.
4. Cost Model results are pre-FS level only. Cost price levels are +/-50%. A follow-up detailed feasibility study will see a more accurate number.
5. Namibia could produce 2 Mtpa of green hydrogen. This volume could contribute a significant part, approximately 10% - of the hydrogen demand expected in Rotterdam by 2050.
6. Northport in Walvis Bay is most suitable port facilities for fast track development. Minimal investment needed in the port facilities.
7. Lüderitz port has the largest RE potential. Hydrogen industrial complex in conjunction with mining export. 2 challenges that need to be overcome:
  - Accessibility of the Sperrgebiet.
  - Permits to develop in the nature reserve at Angra point.
8. Largest Ask: the scale of investment for Namibia and Currency Risk. Close cooperation with international partners and institutions will be key to materialize the potential for Namibia.
9. NamPower and the Port of Rotterdam have had a very productive and pleasant cooperation to date and established a strong working relationship. Both are keen to continue working together to make this ambition happen.

#### Scope:



In the further port development, several opportunities for local and foreign companies will arise as shown in the following slide:

<sup>1</sup> <https://gh2namibia.com/wp-content/uploads/2022/09/Final-Draft-pre-FS-report-Namibia-Rotterdam-Hydrogen-Supplychain-28052021-1.pdf>



# CONCEPT NOTE 5.7



The following recommendations and next steps have been identified in the Masterplan:

## RECOMMENDATIONS & NEXT STEPS :

### Short-term action:

- Identify potential partners for the stage 1 project (500ktpa NH3) and build a consortium of the willing.
- Define and agree on the roles that Rotterdam and NamPower could play in the Namibian Hydrogen development and supply chain.
- Have one or more detailed Feasibility studies undertaken for one or 2 of the preferred carriers by carrier technology company.
- Identify and lock-in first customers/partners who may be able to offtake this first volumes of H2.
- Consolidate Namibian Governments ambitions and roll-out of H2 exports and local consumption.

### Mid-term actions:

- Develop Regulatory framework in Namibia.
- Make final decision on preferred port location and carrier.
- Initiate conceptual designs for one or more green hydrogen port industrial complex.
- Start the Define phase (FEED) for the stage 1 development.

## Funding:

The Partners-in-Business program of RVO could possibly be applicable for the collective approach of relevant Dutch enterprises in combination with Namibian counterparts.

Potential Dutch lead partner: Port of Rotterdam

Potential Dutch partners: Vopak, Koole terminals, consultancies, engineering companies, construction companies and dredging companies.

Potential Namibian partners: NamPort, NamCor, Hyphen, NamPower



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