## Netherlands Green Hydrogen mission to Namibia

01 - 06 September 2024



**Netherlands** 

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#### **Foreword**



It is with great pleasure that we welcome the Dutch private sector representatives to Namibia. We look forward to a full and exciting program on the topic of Green Hydrogen.

The Green Hydrogen economy is developing rapidly around the world, presenting great growth and investment opportunities for Dutch companies. These opportunities encompass all aspects of the value chain process such as production, storage, transport, and port development as well as applications.

Green Hydrogen is a strong priority of the Namibian government, which is demonstrated in their ambitious Green Hydrogen Strategy and Green Industrialisation agenda. The Namibian government recognises international cooperation, investment, skills development, as well as the involvement and inclusion of local communities as crucial elements to achieving a thriving green economy. The exchanges between our countries and industries continue to expand. The visit by President Mbumba to the Netherlands, discussing hydrogen with King Willem Alexander and Prime Minister Rutte and addressing the World Hydrogen Summit in Rotterdam, was a recent milestone on our joint road.

The programme of this mission promises to be full and rewarding. In addition to site visits, there will be excellent networking opportunities with experts, matchmaking with commercial counterparts, a trade reception at the NL pavilion at the Global African Hydrogen Summit, and engagements with local and national government representatives.

Wishing the delegates success, great business exchanges and a wonderful visit to beautiful and thriving Namibia.

Joanne Doornewaard Ambassador The Netherlands

## The Netherlands



## **Introducing the Netherlands**

#### How do the Dutch make a difference?

Through their interactive approach to finding innovative solutions to the big challenges facing the world today. The Dutch way of thinking and working has been shaped by centuries of living in the low-lying delta of the Netherlands. Through the ages, the Dutch have joined forces to find ingenious ways to tackle challenges like water, urbanisation, energy, food, health and security. By being inventive, pragmatic and

open to new challenges, the Dutch have created a flourishing and resilient land.

The Netherlands is a constantly evolving ecosystem of cities, industry, agriculture and nature, all integrated through smart infrastructure. It is a source of knowledge and experience that the Dutch are keen to share with others. Learning from the past to create a better future. Together, seeking sustainable solutions for the most liveable world.



The Netherlands your partner in sustainable solutions

## The Netherlands and hydrogen

Large-scale production of hydrogen is a solid, viable solution towards a carbon-neutral future. The Netherlands has the means to realise this future via the following efforts: • Upscaling the production capacity of clean hydrogen. The Netherlands is targeting 500 Megawatts of electrolysis capacity for 2025. This target rises to at least 3 to 4 Gigawatts for 2030. • In collaboration with various European countries, we are dedicated to paving the way to develop a hydrogen market, with structured regulations, network management, certifications and safety, all playing a role. • A strong focus on regional, national and international infrastructure and storage. • Developing and testing of a variety of applications in transport, industry and the built environment. • Due to Europe's high usage of energy, partnering up for the import and export of hydrogen, as well as other renewable energies is fundamental to reach our mutual goals. Our approach The Netherlands knows sustainable development can only be achieved

through joint efforts and working together. We carry innovation in our core, which along with first-class technical expertise means only the highest standards will be accepted. We thrive in a high-tech environment, where our global players create flexible, fast-moving networks of specialist companies and research institutes. With organized national consortia for clean energy expertise, the Netherlands is keen to internationally exchange knowledge and skills in many areas such to set up international supply chains. From production, import, and manufacturing electrolysers, to transport, storage, and applications in heavy industries, hydrogen offers a wide range of possibilities. The Nether-ands has a particular focus on renewable energy innovation and offers fast and easy access to the right technology providers, researchers and other specialists. Covering markets across the world, we are happy to hear your stories and work together to create cleaner energy for everyone

#### Facts and figures on the Dutch hydrogen ecosystem



#### 9 million m<sup>3</sup>

The Netherlands has a large potential of reducing carbon emissions by transitioning from being Europe's second largest hydrogen producer, production of over 9 million m\* of (fossilbased) hydrogen, to becoming a hub for clean hydrogen.



#### 3-4 GW / 2030

To enable large-scale production of carbonneutral hydrogen, the Dutch ambition is to have installed 3 to 4 GW of EU target for that year is aiming for annual production of 65 Petajoules (P3) of clean hydrogen by 2030.



#### 21 GW / 2030

Offshore wind is a crucial enabler of scaling up the production of carbonneutral hydrogen. 21 GW of offshore wind capacity by 2030, while there is enough space for a further scale-up to 40-75 GW.



#### 136,000 km

The Netherlands, together with Belgium and France, already has over 1,000 km of dedicated hydrogen pipeline. The country's (136,000 km of hig quality pipeline) can be retrofitted to transport hydrogen at an acceptable alone is estimated at 'national hydrogen backbone', which could be ready by 2027.



The Netherlands is strategically located at the heart of the European hydrogen infrastructure proposed ional demand in North-western Europe 400 PJ by 2030.

### Namibia and the Netherlands

Unlocking opportunities in green hydrogen

Namibia and the Netherlands strive to reduce the global carbon footprint to combat climate change. Technological innovation, especially hydrogen production, distribution, and use, is critical to this effort. Hydrogen is seen as the missing link to a successful energy transition as it overcomes the final obstacles to achieving full decarbonisation of the economy. It can be produced from any energy source but is only green when made from renewables. Despite higher costs, both nations are committed to investing in renewable energy and green hydrogen development to achieve full decarbonization and energy sustainability.

#### Working together for a carbon-free future

The trade mission Green Hydrogen to Namibia from 1 to 6 September 2024 will include participation at the Windhoek's Global African Hydrogen Summit (from 3-5 September). This mission is for Dutch organisations looking to do business on the African continent or strengthen existing relationships. The Summit will reach the entire continent, but further programming focuses on opportunities, especially in Namibia. This mission is part of the combi track Green Hydrogen South Africa and Namibia.

#### Why partner with the Netherlands?

Namibia and the Netherlands have a unique opportunity to combine their strengths in renewable energy. The Netherlands has already built sizeable offshore wind farms, with more planned, and no longer requires government subsidies due to falling costs. By partnering with countries like Namibia, which has abundant solar and wind resources, the Netherlands can share its knowledge and technology to harness these renewable sources effectively. This collaboration leverages the both nations' cando mentality and triple helix approach, where government, business, knowledge centers, and other stakeholders join forces to create new

opportunities. Developing Namibia's green hydrogen industry will stabilise its electricity supply and establish an export market for lowcost green hydrogen to Europe via Dutch ports.

#### Green gateway to Europe

The Netherlands plays a crucial role in energy supply to Northwest Europe via the Ports of Rotterdam and Eemshaven. Unlocking the full potential of green hydrogen requires significant infrastructure adaptation, upscaling, cost reduction, and innovation. The EU projects that 50% of hydrogen demand in member states will need to be imported, presenting a significant opportunity for Namibia and the Netherlands to become a green gateway to Europe.

#### Namibia and the Netherlands

Namibia's government views green hydrogen as a long-term prospect and has an ambitious strategy involving three hydrogen valleys in its northern, central, and southern regions.

Namibia aims to develop its green hydrogen production capacities, scale market growth, and establish national and international value chains. This initiative will contribute to decarbonizing the economy, creating local employment, and boosting the economy, as

outlined in the Harambee Prosperity Plan (HPPII). The low operational costs of hydrogen production in Namibia due to its abundant renewable energy make it an attractive proposition for export to Europe.

In May 2023, Hyphen signed a Feasibility and Implementation Agreement with the Namibian government to export ammonia through the port of Lüderitz. Port of Rotterdam and Invest International support is crucial for expanding Namibia's port capacity. The goal is to establish a green hydrogen corridor between Dutch and Namibian seaports for large-scale hydrogen and ammonia export, enhancing energy security for Africa and Europe.

#### Strong partners for a green future

Both nations are committed to developing green hydrogen capabilities, scaling market growth, and building robust value chains. Namibia focuses on green hydrogen for local use and export, with the NL-mission network fostering collaboration. In May 2023, Hyphen signed an agreement with Namibia to export ammonia through the port of Lüderitz. Rotterdam and Invest International support is crucial for expanding Namibia's port capacity. The goal is establishing a green hydrogen corridor that strengthens energy security for both Africa and Europe.

Namibia and the Netherlands highlight the value of international cooperation in green hydrogen. This collaboration supports the Paris Agreement and the Sustainable Development Goals, especially SDG 7 (clean energy), SDG 8 (decent work), and SDG 12 (sustainable cities).

Their joint efforts (or: shared ambitions) will advance hydrogen production and its use across various sectors.

Let's unlock opportunities in green hydrogen together.



**Business delegation** 





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#### Alkalium

Alkalium is a company dedicated to introduce sodium metal as the new solution for the energy and iron/steel industries. Since Sodium is universally available in huge quantities it is a truly global solution.

Alkalium-Energy aims to have sodium metal as the new world standard for energy storage and transport.

We will introduce new technologies that will allow sodium to loop continuously between producers of electrical energy and consumers of energy by releasing that energy in the form of heat and hydrogen - thus arriving at a zero emission and zero waste solution that will span countries and time domains of day, months, years. This technology offers an efficient alternative to e.g. Ammonia, liquid Hydrogen and other transportation.

Alkalium-Iron is focussed on applying sodium metal in the direct reduction of iron ore (DRI) thus eliminating the need for fossil fuels and/or Hydrogen. We will use the technology of Alkalium Energy and combine that with our technology dedicated for the iron/steel industry to recover the sodium so that it can loop between the producers of electrical energy and the iron/steel manufacturers.

In our business model you only have to buy the sodium once as it can be re-used over and over again.

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#### **Ballast Nedam**

Ballast Nedam is a Dutch construction and development company. For 147 years we have been exploring new ways of creating landmarks for a better living environment.

We focus on five transitions that represent the societal and environmental challenges we face and the solutions we want to offer.

- 1) Energy transition to create a sustainable energy system.
- 2) Urban development & construction to improve well-being for living and working.
- 3) Infrastructure to enhance mobility and logistics.
- 4) Water resilience to improve water supply and water protection, and
- 5) Industrial renewals to enable industrial transitions.

Based in The Netherlands, we work both domestically and abroad. We continue to explore international opportunities. Our projects abroad are concentrated in Europe, Asia, the Caribbean and Africa.

With work together closely with our international parent organization Rönesans Holding and its group companies. We work with dedicated teams that fully focus on their markets and clients. This enables us to act with the agility of a local player and the strength of a large construction company. We can adapt the best practices of our international experience and bring our unique capabilities to the international markets we work in.

We are Ballast Nedam, we challenge to improve.

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## <del>Gasune</del>



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#### Gasunie

Gasunie is an energy network operator. In the Netherlands and the northern part of Germany, we manage and maintain the infrastructure for large-scale transport and storage of gas. At the moment, this is mainly natural gas, but the energy transition will increasingly bring about a shift towards green gas and hydrogen. We also collaborate in the construction and management of heat and CO2 grids. We ensure that this part of the energy supply is safe, reliable and as sustainable as possible, ensuring that everyone has access to energy, always.

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#### **HyCC**

HyCC (the Hydrogen Chemistry Company), is a leading industrial partner for safe and reliable green hydrogen supplies and circular chemistry solutions to enable the transition to zero-carbon industry.

Building on over 100 years of experience in electrolysis and leadership in safety, HyCC realizes pioneering water electrolysis projects to supply industries with zero-carbon hydrogen from renewable power and water. From making sustainable steel to circular jet fuels – HyCC believes that green hydrogen is the key to providing a growing population with essential products, with zero emissions to realize more sustainable economic development. HyCC is a joint venture of the European electrochemical company Nobian and Macquarie's Green Investment Group.

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#### Impact Hydrogen

Impact Hydrogen accelerates hydrogen projects by organising the different stakeholders. This includes the production of green hydrogen, the distribution and the use of hydrogen in different sectors. Examples are mobility, industry, transport and the (off grid) energy system.

Impact Hydrogen designs and develops Hydrogen Valleys that contribute to the Sustainable Development Goals and a Just Transition. The organisation includes community engagement, human capacity building and involving SMEs.

Next to consultancy and project organisation, Impact Hydrogen develops the HyCooker, a hydrogen cooking device, the Hydrogen Learning Platform and is the owner of <a href="https://www.h2calculator.com">www.h2calculator.com</a>

Impact Hydrogen is based in The Northern Netherlands, and also has an office in Johannesburg, SA.



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#### Invest International

Invest International is a financing institution owned by the Dutch Ministry of Finance (51%) and Dutch development bank FMO (49%). We offer tailor-made financing and project development expertise to bring projects in emerging markets to fruition and create impact on the SDG's, while serving Dutch interests.

We have a catalytic financing capacity, offering investment capital for public and private projects, as well as grants enabling public infrastructure projects. While deploying our funds, we make efforts to engage the expertise of Dutch businesses, demonstrate strong environmental & social commitment and strive for local impact and inclusive growth. Invest International was assigned by the Dutch Government to develop and finance Green Hydrogen projects in emerging markets, to contribute to local sustainable development and support the energy transition in Northwestern Europe.

Invest International has supported the development of the Green Hydrogen sector in Namibia from early on:

- We are the anchor sponsor of the Namibian Green Hydrogen Programme.
- Together with the Environmental Investment Fund of Namibia and Climate Fund Managers, we founded the SDG Namibia One Fund as a blended finance vehicle investing in Green Hydrogen projects in the country.
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   We provided the Namibian Government with development capital for Green Hydrogen projects channeled via the SDG Namibia One Fund.
  - Together with Port of Rotterdam and Gasunie, we support Namport in the expansion of the Port of Lüderitz





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#### Port of Rotterdam

The port of Rotterdam is Europe's largest seaport. The port owes its leading position to its outstanding accessibility for sea-going vessels, its intermodal connections and the 385,000 people working in and for Rotterdam's port and industrial area. The port of Rotterdam contributes approximately EUR 45 billion to Dutch GDP.

The objective of the Port of Rotterdam Authority is to enhance the port's competitive position as a logistics hub and worldclass industrial complex. Not only in terms of size, but also with regard to quality. The Port Authority is therefore leading the transition to sustainable energy and it is committed to digitalization in order to make the port, and the supply chain, more efficient. The core tasks of the Port Authority are to develop, manage and exploit the port in a sustainable way and to deliver speedy and safe services for shipping. program manager energy transition Port of Rotterdam is Europe's largest port and also develops and manages, together with local partners, ports in Oman and m.coopman@portofrotterdam.com Brazil. Additionally, Port of Rotterdam also advises governments, port authorities and private companies regarding various aspects of port development and port management.

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#### PricewaterhouseCoopers

PwC the Netherlands has more than 5000 people operating from twelve offices and from three different perspectives:
Assurance, Tax & Legal and Advisory. With offices in 151 countries and more than 364,000 people, PwC is among the leading professional services networks in the world.

We want our service offerings and delivery to contribute to the solution of important problems and help to build trust in society. In this way we want to add value for our clients, our people and society at large. This is our purpose and our yardstick for everything we do or want to do.

#### PricewaterhouseCoopers

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#### RFSH2

We specialise in Hydrogen Developments as well as designing, modelling, evaluating, and implementing renewable energy solutions across the globe.

We focus our efforts on collaborative renewable energy projects between the Netherlands and carefully selected countries that meet the risk-reward criteria of our company and our associated partners and investors.

Our RESH2 Engine underpins our comprehensive risk and financial evaluation of the key inputs, variables and costs vs benefits for a vast array of renewable energy generation plus storage models. We more accurately model technical and financial implications across the life of the project (at a high resolution of temporal scale) to provide more confidence to our clients, partners and investors regarding the forecasted economic viability of projects.

We offer detailed diagnostics (from a 'bottom-up' approach) to fully evaluate current or planned renewable energy solutions, integrating technical, climate and financial risks in a simple-to-use model which is available either as a once-off assessment or through ongoing live updates."

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## **SoluForce**



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#### SoluForce

SoluForce offers a safe, sustainable, cost-efficient and quickly deployable pipeline infrastructure for local hydrogen distribution. The non-metallic and flexible pipelines are pivotal in various hydrogen projects. As originator and technological leader, SoluForce is used for a variety of applications in hydrocarbon, water, mining and hydrogen industries. Such as high pressure flowlines, water injection, gas transport, slurry transport and hydrogen distribution.

They have at least 30% lower TCO and 4x lower CO2 footprint compared to alternatives. They are completely non-metallic, maintenance-free and without scaling, corrosion or embrittlement. All while being certified according to multiple international standards. With over 4.500 km of SoluForce pipe installed around the world in on- and offshore applications, our customers have been benefitting from our reliable solutions, know-how and experience since the year 2000.

The certified SoluForce pipeline system has a major impact on the feasibility of hydrogen projects. Based on proven technologies, it can be the perfect accelerator to achieve local green hydrogen distribution in a fast, flexible and cost-efficient manner.

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## Strohm



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#### Strohm

Strohm has the world's largest track-record for Thermoplastic Composite Pipe (TCP) having brought the technology to market in 2007. The business is committed to driving sustainability with its range of composite pipes suitable for low and high pressure liquid and gas transportation. Which helps clients to reach their net-zero carbon emissions targets and supports the renewables sector.

Strohm produces Thermoplastic Composite Pipes (TCP). Compared to conventional steel pipelines, TCP is not susceptible to corrosion or Hydrogen stress cracking, has lower transportation and installation costs for offshore projects and enables a comparatively lower project carbon footprint. The TCP pipelines are currently manufactured in three material variants to cover as many application areas as possible. It has proven to reduce the CO2 footprint of pipeline infrastructures by more than 60%. It is also 100% recyclable.

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#### TerraWatt

TerraWatt is a Dutch and Namibia based project developer and EPC contractor. Terrawatt develops, builds and finances renewable energy projects such as solar and biochar. For each MW developed, we work with Young Africa and support the education of less privileged youth to become solar installers.

The way we do business is to use best-practice guidelines from science and industry knowledge. Based on that, we set the standard for quality control and recognizable impact for the environment, local economy and communities. We call this Land Inclusive Solar Parks. LISP strives for balance in Economy, Technology, Ecology and Community.

TerraWatt has a well-established network of local partners and connections of people, businesses and governments. The first project is a 50 MW solar project. As this projects is being build, it's the first step in building a network and consortium of Namibian and European partners for the development of Green Hydrogen (GH2) in Namibia. We have the logistical expertise in Walvisbay and Rotterdam for transport of project equipment and hydrogen.





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#### TNO

TNO, as a trusted, independent, and pioneering applied science and technology organization, plays a multifaceted role. We innovate, investigate, and orchestrate, collaborating closely with governments, universities and the private sector. We inform government on policies and empower evidence-based decision-making through rigorous investigations, cutting-edge scientific insights, and reliable measurements. By building national and international consortia and ecosystems, we drive technological and methodological breakthroughs that help to realize a secure, sustainable, healthy, and digital society. See also www.tno.nl.

The portfolio of TNO is broad. We are active on energy transition and circularity, mobility, construction, and environmental research. We do have activities on digitalization, policy and strategic advice and high-tech manufacturing. TNO conducts applied research. This is performed for the largest part in collaborative programs with partners from private sector and/or government.

Our portfolio in hydrogen ranges from the development of next generation electrolysis technologies to application focused research in chemical industry, mobility and shipping. We have teams of dedicated experts working on safety related issues, storage, different application domains and policy development. Several laboratories are available for testing and upscaling hydrogen technologies, for example our power lab for testing of fuel cells and our Faraday lab for testing of electrolysis modules on a lab-scale.

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#### Van Oord

Van Oord is a Dutch family-owned company with over 150 years of experience as an international marine contractor. Van Oord employs over 5,000 employees comprising of in total different 89 nationalities.

We operate a large versatile fleet, which encompasses stateof-the-art vessels to execute the projects around the world. This equipment is designed in accordance with the highest quality and safety standards.

A continuous investment program is part of the company's strategy.

#### Our mission

As a global marine contractor, we focus on dredging and marine construction, offshore wind, offshore infrastructure and infrastructure in the Netherlands. We work safely and partner with our client and stakeholders to create innovative and sustainable solutions.

#### Our propose

Our propose is to create a better world for future generations by delivering Marine ingenuity. We are an asset enabled, knowledge driven, high-performance organization with a focus on The Right People, Sustainability and Digitalization.

#### Our values

Van Oord's values 'we care' and 'we work together' are fundamental to eliminating all incidents and personal injuries. Everyone working at, with or on behalf of Van Oord is expected to take responsibility for safety and deal proactively with safety matters. This includes clients, partners, subcontractors and suppliers.

Van Oord Dredging and Marine Contractors B.V.

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#### Vopak

Around the clock and at ports around the world, Vopak provides infrastructure solutions to deliver safe, reliable, and efficient storage of essential products for everyday life. For over four centuries, we have created connections with businesses and communities on a global scale and with a future-focused approach, improving our services continuously. We embrace and expand our role in initiating and enabling positive change, taking responsibility in tackling global challenges such as the energy transition and ensuring security of supply across many markets and locations.

Vopak is actively shaping a sustainable future as an independent infrastructure provider with a global network and more than 35 joint venture partners, with a history that spans more than 400 years. We support long-term, steady cash-flow generation and aim to expand our network of LNG, LPG and industrial terminals. We contribute to the energy transition, with a focus on infrastructure solutions for low-carbon and renewable hydrogen, ammonia, CO2, long-duration energy storage, and sustainable fuels and feedstocks.

Serving over 1,000 customers, we search for the optimal infrastructure solutions to help them thrive and unlock new opportunities. We serve the communities we operate in through the Vopak WeConnect Foundation, where we support local initiatives for further development.

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Official delegation

## Official delegation

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## To learn more on how The Netherlands is cooperating with its international counterparts:

Visit NL Platform or follow us on LinkedIn



**Netherlands**