



Namibia
Green Hydrogen
Programme

Demystifying Green Hydrogen

A contribution to the dialogue on Green Hydrogen in Namibia



Hyphen Met Mast, Tsau //Khaeb National Park



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Along the entire Namibian coastal line, thick mist from the Atlantic regularly rolls into the harsh desert environment throwing a lifeline to lichen, succulents, desert-adapted insects and reptiles, and other living things. This mist is a natural phenomenon and although when witnessed may appear to be something from science-fiction, is in fact reality. Similarly, the ambitions of the Government of Namibia (GRN) for the development of a green hydrogen sector are real. Our country holds a unique position as one of the top locations in the world for green hydrogen development – this is a fact.

As we progress our collective learning and appreciation of the potential green hydrogen production and green hydrogen-driven industrialization has for Namibia, there is a need for constructive debate between stakeholders. The balancing act between the urgent need for jobs, business opportunities and improved livelihoods and the need for sustainable growth whereby we protect the environment, ecosystems and biodiversity is challenging. We should aim for an open and fact-driven debate to optimize the benefits and minimize the costs of developing this new green hydrogen sector in our country.

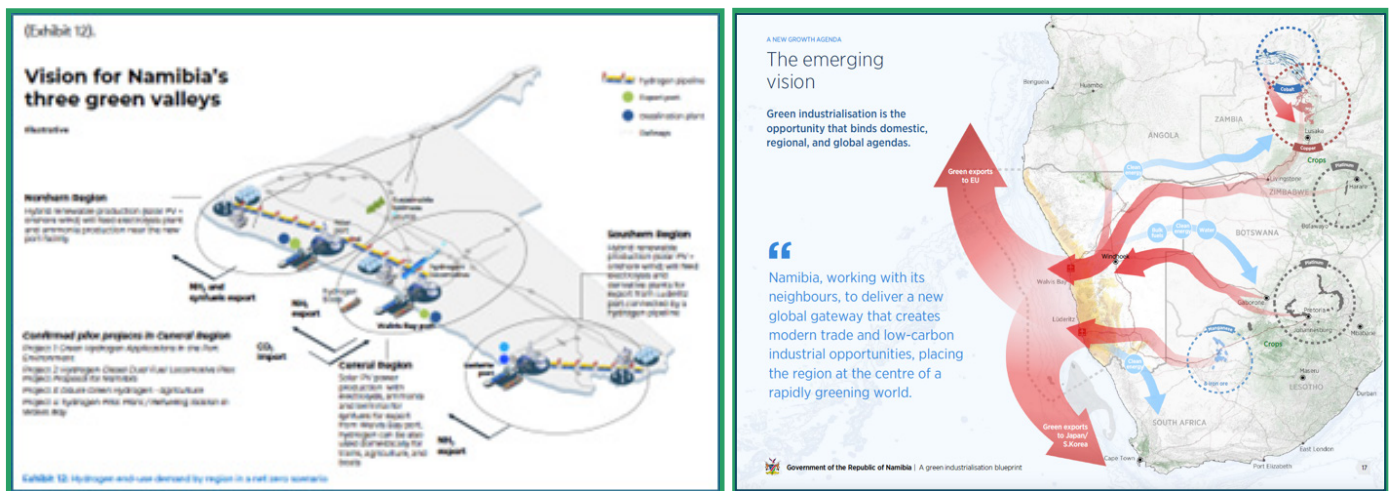
FACT 1 TRANSPARENCY

The Harambee Prosperity Plan II was launched in 2021 by H.E. Hage Geingob, late President of Namibia, setting out ambitious targets to support regional and global decarbonization. HPPII was GRN's first policy document that specifically identified green hydrogen production for export and local industrialization as a complementary engine for growth. In 2022, under the Ministry of Mines and Energy (MME), GRN concretized the HPPII ambitions in the Green Hydrogen and Derivatives Strategy. This strategy identifies three Green Hydrogen Valleys: the Northern Valley, the Central Valley and the Southern Valley, which is also known as the Southern Corridor Development Initiative or SCDI. GRN seeks to diversify and industrialise the Namibian economy to include the production of green hydrogen and its various derivatives such as green ammonia and promote the use of this new source of energy to power new industries. The SCDI is one of the top three locations in the world for co-located solar and wind resource and all three valleys are close to the ocean. Proximity to the ocean is important for the desalination of water that is needed during the production process and easy access to port facilities reduces the cost of export of the final product to overseas markets.



Hyiron Oshivela Project, preparing the ground, Erongo Region

Figure 1-2: The Green hydrogen Valleys in Namibia



Source: 2022 Green hydrogen and Derivatives Strategy and 2024 Green Industrialisation Blueprint

This Green Hydrogen and Derivatives Strategy was then followed by the Green Industrialisation Blueprint, elements of which were workshopped in April 2024 amongst a broad audience representing various levels of Government, state owned enterprises, academia and civil society including the private sector. This Blueprint identifies the early movers for Namibia to use some of the green hydrogen to power industrial projects in-country and looks at interlinkages between Namibia and the Southern African region.

There are many possible scenarios. Iron ore may be imported from South Africa to produce Direct Reduced Iron (DRI) in or around Lüderitz using green hydrogen or derivatives. Lithium may be transported by rail from mines in Namibia and neighbouring Southern African economies to the coastal areas where green hydrogen production is likely to be most viable. Namibia may import copper, platinum and other critical raw minerals (CRMs) from neighbouring countries for green industrialisation projects powered by green hydrogen. Exploration for CRMs is an active field of mining in Namibia, and new mining licenses are expected to be issued in the coming years. These may be viable for value addition in country. Ultimately Namibia may start producing components for renewable energy production.

FACT 2 JOBS AND BUSINESS OPPORTUNITIES

The Namibian economy has been largely moving sideways since 2016 and GRN had to find new growth opportunities to move Namibia beyond what is termed the “middle income trap”. How will the Namibian economy absorb the unemployed who represent more than 30% of the country’s work force and more than 40% of the youth? New, additional productive activity had to be secured and given Namibia’s competitive advantage in solar and wind resources which are both necessary for large scale green hydrogen production, Green hydrogen itself has been identified as a strategic input to clean manufacturing.

The green hydrogen sector provides considerable employment opportunities for individuals and Namibian businesses across the country – not just in those areas near the green hydrogen production facilities. Many economic services are required, such as: construction, technical services, maintenance and repair, transport, hospitality, financial services. Buildings, wind- and solar farms, pipelines, port facilities etc. will need to be constructed and subsequently maintained. Environmental and social impact assessments (ESIAs), technical design studies, and other specialist work will need to be undertaken in support of the various projects. Hyphen Hydrogen Energy for one will be requiring some 15,000 workers during the construction phase and a further 3,000 permanent employees for its gigawatt green hydrogen and green ammonia production facility in the SCDI. This large-scale project further targets 30% local procurement of goods, services and materials during the construction and operational phases.

At present the pilot projects and projects on private land in the Central Valley are employing over 200 people with approximate N\$170 million contracted to SME companies for various parts of the build-up of these green hydrogen projects. It is early days with each job in this emerging sector a truly new and additional job.

The green hydrogen sector can move Namibia into a higher economic growth trajectory bringing along many Namibians through jobs and business opportunities. Economic modelling by McKinsey and Company (Harvard University) provides an estimate of 250,000 jobs by 2040. This includes 180,000 direct jobs in the green hydrogen industry and 70,000 direct, indirect, and induced jobs from green manufacturing. These jobs will train up a new generation of highly skilled workers that will benefit not just the hydrogen industry but will be a catalyst for further industrialisation across the country in many other sectors.

In addition, jobs and business opportunities will be created through infrastructure upgrades (e.g. port and rail), the expansion of Lüderitz town to provide housing, healthcare, education, security and recreation services etc. to those taking up jobs in the green hydrogen sector (and other emerging economic sectors such as oil and gas, and commercial mariculture), and generally the services sector (financial, hospitality/MICE, research, media and publicity, etc.).



Cleanergy Solar Park, Walvis Bay

In cooperation with the Ministry of Higher Education, Training and Innovation (MHETI) and the Namibia Training Authority as the anchor GRN institutions for tertiary education and vocational training, the NGH2P is coordinating the various training efforts to gear Namibians to actively participate in the green hydrogen sector through re- and upskilling and new skills development.



Green Houses at Daures Green Hydrogen, Daures Constituency

FACT 3 ENVIRONMENTAL AND BIODIVERSITY PROTECTION

Namibia has a proud conservation record, which is recognised internationally. This reputation rests partly on conservation outside parks and reserves on freehold and communal land through the CBNRM movement and the establishment and management of Protected Areas (PAs), and a robust regulatory framework. The country's commitment to biodiversity conservation is enshrined in the Constitution. Article 95 (l) provides the foundation for the formulation of policies, legislation and programmes aimed at safeguarding the country's biodiversity and ecosystems for the benefit of current and future generations.

GRN has put in place a robust regulatory framework for conservation in Namibia through Vision 2030, the Harambee Prosperity Plan I and II, and national development plans, policies and national legislation and commitment to international conventions. At implementation level the proclamation of National Parks, the requirement of environmental clearance certificates as guided by ESIA's and EMP's for economic activity, the registration of conservancies and ongoing support to the CBNRM movement providing environmental stewardship in tourism, livestock, and crop production are all contributing to safeguard the environment. Namibia has established the Environmental Investment Fund (EIF) which is accredited by the Green Climate Fund (GCF).

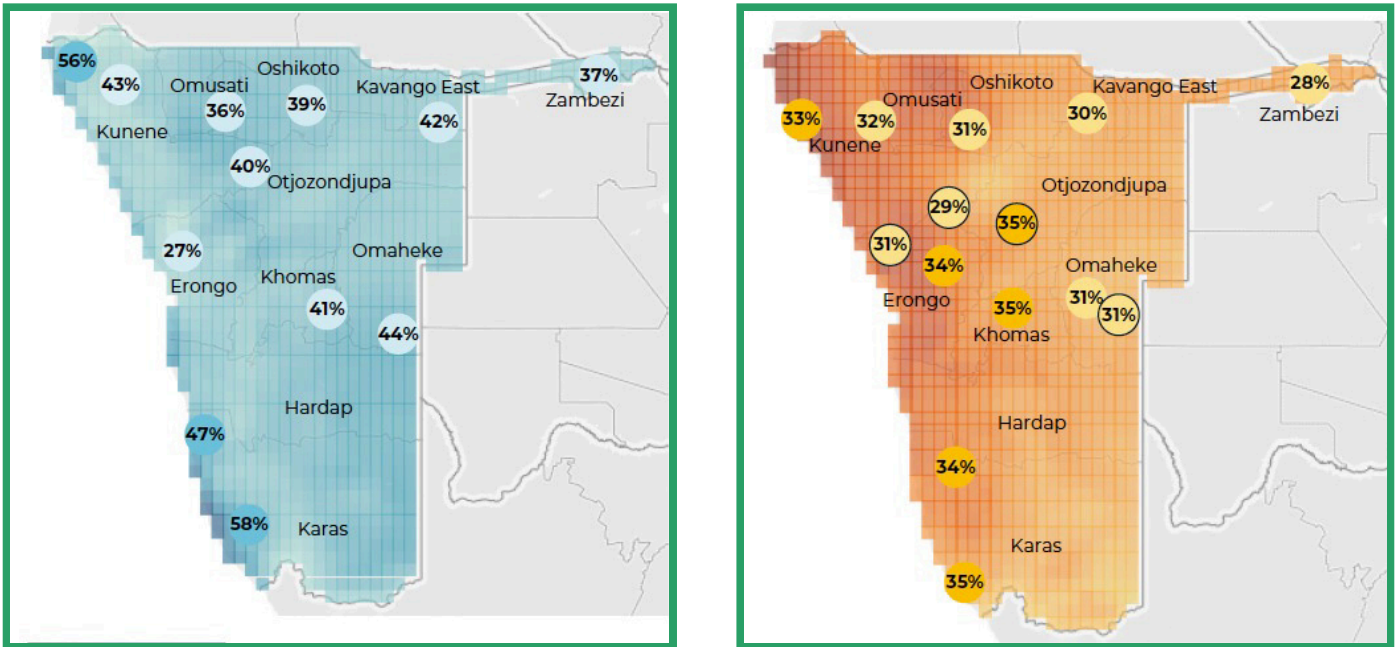
Currently Namibia has twenty (20) state run PAs covering about 17% of the country's land surface. The PAs conserve biodiversity and ecosystem by protecting some of the country's most important habitats and species of national and global significance. Overall, 44% of Namibia is under some form of conservation management. Various plans

and programmes – both GRN and donor-funded – to enhance the preservation of the natural environment are implemented continuously. Namibia is also committed to delivering on its carbon reduction commitments under the Paris Agreement.

Namibia is committed to leveraging its natural resources and implementing its green industrial vision in the most sustainable way for the benefit of Namibians. The country has experience in the successful development of projects in environmentally sensitive areas (e.g. uranium developments in the Erongo region guided by a Strategic Environmental Assessment) and Namibia intends to maintain this track record.

Notably the best wind resources are found along the coast of Namibia and extraordinary wind energy capability is present in the Tsau //Khaeb (Sperrgebiet) National Park (TKNP). National protected areas, on land and ocean, are a prominent feature in the three valleys. The entire West Coast is covered by various national parks or protected areas. The TKNP runs from Oranjemund at the Orange River in the South up to Lüderitz along the coastal area. The Namib-Naukluft Park joins to the North of the TKNP, and both Protected Areas are partially or fully adjacent to the Marine Protected Area Meob-Chamais Islands. Going North the next Protected Area is the Dorob National Park, followed by the Cape Cross Seal Reserve, with further North the extensive Skeleton Coast Park stretching from the Ugab River Gate all the way to the Kunene River mouth and border with Angola. The Namibian coastal protected areas form part of the world's largest trans-boundary protected areas, namely the Iona-Skeleton Coast Transfrontier Park between Namibia and Angola and the /Ai-/Ais-Richtersveld Transfrontier Park in the South.

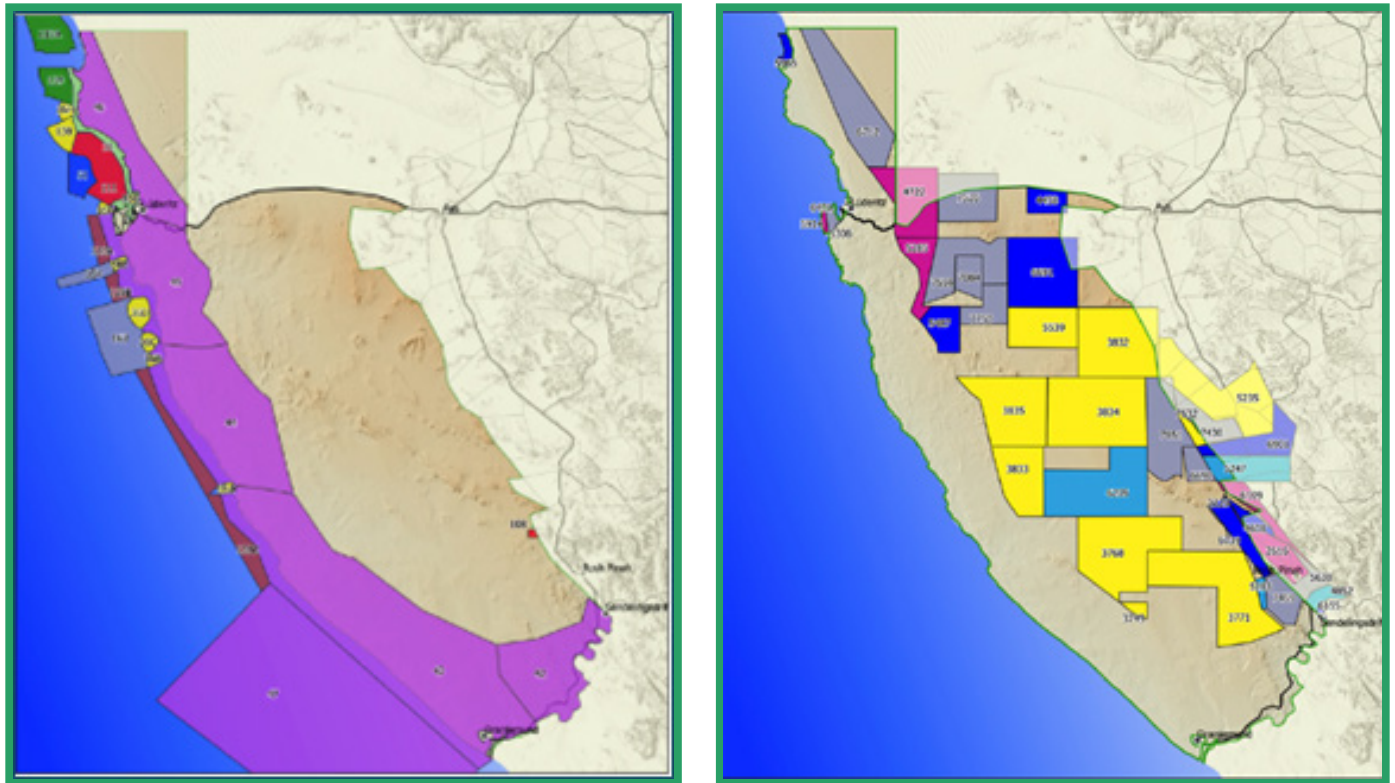
Figure 3-4: Distribution of Wind and Solar Resources in Namibia



Source: 2022 Green hydrogen and Derivatives Strategy

In the past and presently, economic activity is undertaken in these protected areas. For example, the coastal zone of the TKNP was mined for diamonds from 1908 with currently two key Mining Licenses inside park (ML44 and ML45) covering 3,226 km². The total park area measures some 26,000 km², more than two times the size of the State of Qatar. In addition, exploration licenses are scattered all over the park. These reflect economic rights given over the land to private sector companies by GRN. In addition, there are five (5) out of nine (9) tourism concessions awarded with access rights for guided tours into the park. Current activity further includes offshore marine aquaculture (kelp production and salmon cultivation) and marine fisheries. Economic and human activity is evident in TKNP with roads, active and abandoned mining sites, outposts for park wardens, and other infrastructure.

Figure 5-6: Illustration of Mining and Exclusive Exploration Licenses in TKNP



Source: Tsau //Khaeb (Sperrgebiet) Land Use Management Plan (2020)

Future economic activity in the Southern Valley will potentially involve the production of green hydrogen and derivatives including the development of a 300MW wind park by Namibia's state-owned company Nampower inside TKNP and the development of smaller-sized wind and solar parks by Independent Power Producers or IPPs. Other initiatives include the establishment of the Kudu gas to electricity plant, the development of a fuel bunkering facility at Angra Point, and further infrastructure development in and around the harbours of Lüderitz and Angra point and further inland to accommodate the offshore oil and gas sector and to facilitate the transport of minerals to the Lüderitz area for value addition, e.g. direct reduced iron from iron ore imported from South Africa. A hydrogen pipeline from Angra Point to South Africa, through the TKNP, is under study.

To accommodate the anticipated economic growth and additional work force, the town of Lüderitz will need to expand. With the current townlands sandwiched between the Namib-Naukluft National Park and TKNP, such expansion will need to encroach to some extent onto the national park lands. The Southern Valley will experience revolutionary economic development over the next decades. For this reason, GRN in collaboration with the NGH2P and the Environmental Investment Fund (EIF) has set out a Strategic Environmental and Social Assessment (SESA) to map the immediate and cumulative impacts of development on biodiversity, the environment and ecosystems and on socio-economic values in the area. The SCDI extends well beyond the TKNP and covers the whole Southern Valley (see Fig. 1-2).

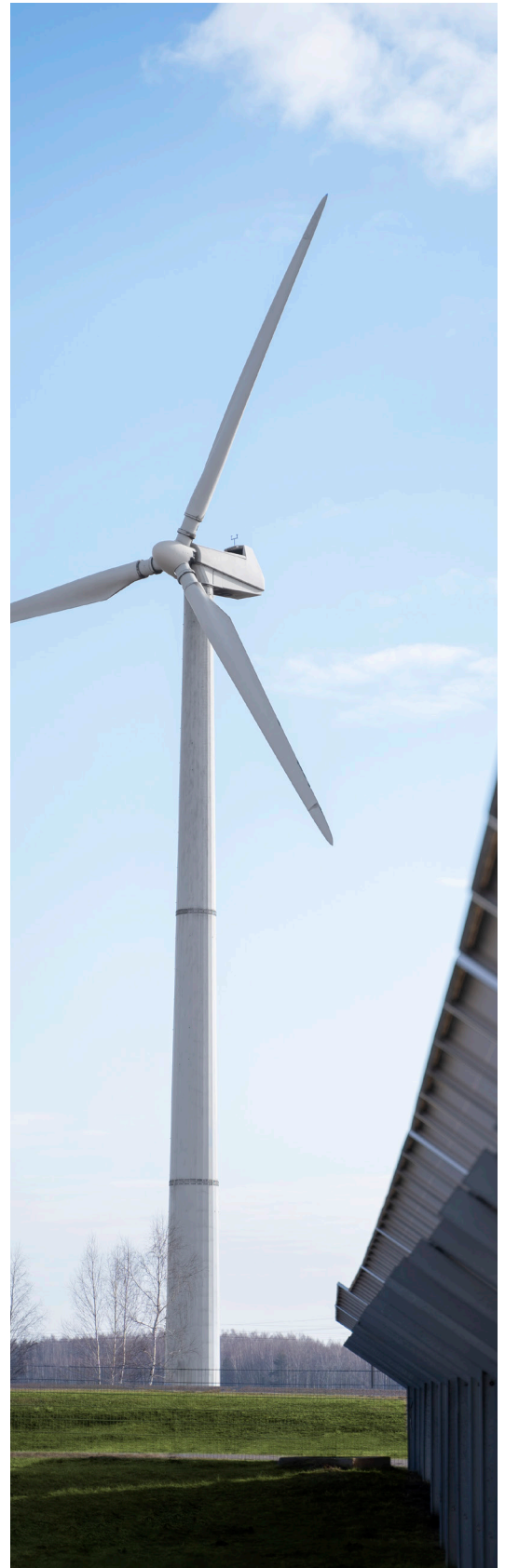


Angra Point, Luderitz

CONCLUSION

To offer an alternative source of income and new business opportunities to people and enterprises in Namibia, the country needs to diversify its economy and move beyond the middle-income trap. The economy must become more complex with greater forward and backward linkages between various sectors to boost economic growth. The beneficiation of minerals is a case in point. The country can no longer afford to ship raw materials and not use its own abundant wind and solar resources to add value thereby creating jobs and economic value.

Namibia will need to do this by carefully managing the delicate tension between priorities in biodiversity and environmental protection and the urgent need for job creation and socio-economic development. This is a balancing act that is best supported by effective consultation and cooperation between GRN, industry, civil society including human rights and environmental NGOs and CBOs, and Namibia's international development partners. The Ministry of Mines and Energy has instituted a Donor Coordination Forum for the energy sector, while the SESAs will offer a broad consultation platform to elicit views on the



socio-economic and biodiversity values vis-à-vis green hydrogen production and industrialisation, and other emerging sectors in the three valleys.

Figure 6-7: The Balancing Act



Photo 1: Living on the edge, high density area in Lüderitz



Photo 2: Living on the edge, endemic mesemb species in TKNP and Namib-Naukluft Park