



A JUST AND EQUITABLE TRANSITION:

Politics, Partnerships and Economics of Namibia's Electricity and Hydrogen Sectors

SCOPING PAPER ON NAMIBIA

Morks Reid Global

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Ukama

Solidarity for prosperity

A JUST AND EQUITABLE TRANSITION: POLITICS, PARTNERSHIPS AND ECONOMICS OF NAMIBIA'S ELECTRICITY AND HYDROGEN SECTORS

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The aim of this project was to discuss a variety of views therefore each paper does only reflect the views of the author(s) and not the views of other participants in the project or the Ukama network as a whole.

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A JUST AND EQUITABLE TRANSITION: Politics, Partnerships and Economics of Namibia's Electricity and Hydrogen Sectors

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Abstract

Namibia is driven by the possible economic and social gains from developing its electricity and hydrogen sectors. Namibia's climate mitigation agenda aligns with Europe's ambition to decarbonise while attaining acceptable levels of energy security. This scoping paper analyses Namibia's ambitions and aspirations and the expectations of a just and equitable energy transition with the focus of understanding the enablers and limitations of Namibia's transition of the two connected sectors. We limited the scope to understanding the political economy issues in the transition, job potential and how EU-Namibia partnership could be an enabler of the transition. We conducted an audit to present the job dynamics -what jobs, where the jobs will be, and who gets the jobs. We identified possible barriers to achieving a fair distribution of jobs across genders and regions, and we identified scarce human resources and skill sets. Given the multiple stakes (foreign and local) and their varying levels of influence and power, and the implications of a retrogressive political economy for the electricity and hydrogen sectors, we conducted a political economy analysis (PEA) at different levels. We then focussed on the role (or lack) of Europe in Africa's green industrialization and the set of issues, narratives, interests, opportunities, and tensions that characterise the partnership. We find out that though there is mutual interest in achieving a low-carbon economy for both Namibia and the EU, their key motivations are quite different, but this partnership

is critical to achieving their individual energy and /or economic transition. Namibia fronts the economic and social development needs of its citizens as prime whereas Europe seems genuine about its commitment to reducing greenhouse gas emissions to meet their national and continental targets but with a spin on energy security and creating businesses and jobs. The Namibia Government's political will is evident, however, the depoliticisation of green hydrogen as a technoscientific and economic stimulus masks the extractive nature of agreements with Europe-related entities involved in Namibia's energy transition. We observe that international collaborations and green hydrogen diplomacy characterised by high levels of expectations may generate tensions with local expectations at both national and community levels. In addition, given the predominance of de-risking as a financing strategy, the approach has the potential to put Namibia in debt if it is not deployed with caution. Finally, given the historic unbalanced relationship, and how the Namibia-EU collaboration is fundamental for the transition, both parties ought to be intentional about increasing transparency and trust in their engagements. This need for more transparency and the political economy elements discussed in this scoping paper could be contextualised to benefit other African nations too as they transition to low carbon economies.

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Namibia's political economy, and we are thankful to her. Finally, we are grateful to the advisors and consultants from Morks Reid Global who endeavoured to accomplish the objectives of this study.

An Introduction to Namibia's Green Industrialisation

Namibia's Economic and social development goals are articulated in its strategic development plans, Vision 2030 and the National Development Plans (NDPs) 1-5. Namibia has also developed the Harambee Prosperity Plan (HPP) 2016/2017 – 2019/2020 - a complementary development plan to Vision 2030 and NDP 5, which is aimed at fast-tracking the country's development programmes and addressing social challenges such as poverty, hunger, inequality and unemployment. These plans contain the country's goals, targets, and strategies to guide them to achieve economic and social development. The underlying principle of these aspirations is that Namibia is inclined to sustainably deploy its resources to achieve its economic and social development goals. Industrialisation is one key approach that is considered to turn things around, and the Namibian Government is determined to transform several sectors to realise the country's aspirations. Aside from that, Namibia has signed and committed to the 2015 Paris Agreement and has developed its pathways and targets in its Nationally Determined Contributions (NDC). In the updated version of the 2021 NDCs, Namibia aims to aggressively avoid 91% (2015 emissions) of its BAU emissions in 2030.

Additionally, the Namibian Government acknowledges the importance of developing the country's energy sector to fuel Namibia's economic growth as it embarks on its industrialisation drive. An affordable and reliable electricity supply is a cardinal requirement for the manufacturing, mining, commercial and services sectors. Unfortunately, Namibia's energy situation does not offer such latitude for industrialisation. Namibia continues to face electricity shortages even though it is well endowed in wind and solar resources as well as natural resources (see Appendices A and B). The deficit between peak demand and peak supply in Namibia continues to be supplemented by imports from other countries in the Southern Africa Power Pool (SAPP) system. The continuous electricity deficit suggests that Namibia's energy supply industry

is less secure and more vulnerable. This situation of insecurity and high vulnerability makes increased investments in domestic energy generation necessary, and requires significant financial commitments from the Namibian government.

Investments and job opportunities in Namibia's energy transition are expected to increase, however, fossil fuel upstream, midstream and downstream sectors could stagnate and become redundant, leading to job losses in the sectors. Achieving a transformation involving multiple sectors and stakeholders, each with their unique interests and levels of power and influence, necessitates identifying and resolving conflicts between those who may benefit less and more from the change, as well as those opposing and supporting the hydrogen transition.¹ In the sub-region, there are concerns about African countries approaching the energy transition in a solo fashion. The risk of not maximising their negotiation power without a united front could affect the transition prospects of the individual countries. For example, a study on three African sub-regional cases has revealed the importance of regional integration to optimise the development of transboundary transport corridors anchored on extractive sources. The study highlighted that regional integration and cooperation encourage and optimise the development of shared infrastructure which can diversify national economies². Hence the formation of the Green Hydrogen Alliance by Egypt, Mauritania, Morocco, Namibia, and South Africa could stimulate collaborations in infrastructure development, capacity building, financing, standardisation and certification, regulation and policy. If the Alliance is managed well, cooperation between African hydrogen producers could maximise expected benefits in a just way by optimising shared infrastructure and value chains and streamlining policies and regulations. In the same vein, it is imperative for

¹ <https://www.un.org/osaa/news/green-hydrogen-fuel-africa%E2%80%99s-rise-%E2%80%93-hard-truths-and-key-questions#:~:text=The%20Africa%20Green%20Hydrogen%20Alliance,Africa%20is%20a%20good%20start.>

African countries to effectively enhance cooperation with other countries and development partners that have an interest in its energy transition. Thus, with Africa's long-standing relationship with Europe, the two continents could better collaborate on several fronts regarding the energy transition and development for mutual benefits.

Like most transitions, there are tensions between different actors at different levels (Global, Macro and Micro). These tensions emerge as actors engage with the opportunities and challenges of the investment types, related policies and regulations, labour issues and the use of scarce resources, and how that could benefit countries and regions and even different enterprises. For example, Daniel Yergin succinctly highlights tensions around countries' recent prioritisation of energy security, the lack of consensus on the desired pace of the transition, the divide between advanced and developing economies on transition priorities, and the tensions developing in mining and value chain development for the supply of transition minerals. It was also concluded that recognising and dealing with these tensions and dynamics in the energy transition is vital to increase understanding and support for the reforms/transformation³. The challenges also have implications for society, the economy and the environment. The consequences could be positive or otherwise depending on what, where, and how the transition activities and actions will be deployed, financed, managed, governed, and propagated. For example, the kind of jobs in a pre-transition phase is expected to significantly vary from the jobs of the future. To enable a just transition it is important to have insights about what jobs will be created or lost, where the jobs will be created/lost, who loses or gains employment, and the net gain in terms of jobs. These insights are important when pursuing a just transition leading to targeted interventions that enable inclusivity and equity. therefore, pursuing a just transition must hinge on equity and the actions/strategies/policies should be designed based on evidence.

We, therefore, acknowledge global transition trends and motivations, Namibia's aspirations and the related challenges and opportunities. We also believe

that coordinating and optimising internal and external resources could bring to light the realisation of Namibia's social, economic and environmental aspirations in a just and equitable way. However, there are aligned and nonaligned interests, power dynamics and differentials, matched or unmatched cooperation, and contestations leading to a higher or lower degree of consensus. These ingredients of political economy and ecology could impact the processes, actions, costs and benefits of Namibia's transformation agenda, and this terrain needs to be explored to develop the needed strategies. Namibia is emboldened to create a green economy and it is embedded in its vision to realise a balanced economic development without compromising its environment. The study focuses on electricity and hydrogen sectors where we expect high volumes of investments, a myriad of actors and activities, an unwavering political will (at least with the current regime) and a high interest in foreign collaboration and partnerships.

Aim

With the foregoing, this scoping study seeks to review and understand Namibia's electricity and hydrogen sectors and explore the potential of these sectors in creating jobs as envisaged in their industrialisation drive. The paper will analyse the actors in the sectors and discuss the political economy dimensions of the ongoing transformation to better understand interests, tensions, enablers, limitations, and the needed EU-Namibia partnership to inform the required policy or action. A cross-cutting dimension of this investigation is vital because the transition aspirations touch on various sectors and system cross-cutting policies, strategies, programmes and projects should be assessed, and their inputs used to improve the recommended policies and actions for a just transition in the sectors.

Objectives and Paper Structure

We present the status quo and specific aspirations of the sectors in section 2, and analyse the potential of Namibia's Economy and labour markets and how that could change by linking to and analysing

² Why regional integration is so important for resource-driven diversification in Africa (worldbank.org)

³ Bumps in the Energy Transition (imf.org)

the value chain of the two sectors in section 3. In section 4, we integrate and use country knowledge and sector aspirations to explore, identify and analyse political economy elements and their impact on achieving a just and equitable transition. Section 5 situates Namibia's aspirations, the identified political economy issues and their proffered actions and examines how existing and future cooperation with foreign partners (The EU) can support the transition, help mitigate potential risks and challenges, and enable the EU to benefit from the cooperation.

Our Approach

This scoping study used a desk review method involving gathering evidence from published and unpublished public and academic papers to understand various facets of Namibia's electricity and hydrogen sectors and their transition agenda. For additional insights and to validate our preliminary analysis of the evidence, semi-structured interviews were undertaken with key stakeholders from Namibia's public, private, research and academic institutions and non-governmental organisations. These interviews were designed using a political economy analysis framework.

Namibia's Politics, Socio-economic Development and Aspirations

The Place, the People and Politics

Namibia is a sparsely populated country measuring 824,292 km² on Africa's southwestern coast in the Namib Desert along the Atlantic Ocean Coast. Its geographical neighbours include Angola to the north, Botswana to the east, Zambia to the north-eastern region, and South Africa to the south. Namibia's demographic landscape is characterised by remarkable diversity but is primarily dominated by Bantu-speaking people, with the Ovambo ethnicity constituting over 50% of the population. The country is predominantly Christian, with Christianity practised by approximately 97.5% of the populace. Namibia faces socio-economic challenges, with an unemployment rate of 23% as of 2023. The nation is home to around 2.7 million people, with a high literacy rate exceeding 91%, reflecting a relatively well-educated population.

The country has been politically stable since gaining independence in the 1990s following a protracted struggle against South African rule. Namibia's struggle for independence has deep historical roots, marked by German colonial rule in the late 1800s, followed by the South African administration during the early 20th century.

The country's political landscape is generally regarded as democratic and stable, with more than eighteen active political parties. Out of about eighteen (18) political parties, the dominant political

Figure 1. Map of Namibia, showing 14 Administrative Regions



Source: Robert K. Hitchcock

party is the Southwest Africa People's Organization (SWAPO), which has ruled the country since independence in 1990. Popular Democratic Movement (PDM), and Landless People's Movement (LPM), are some of the major political parties constituting the main opposition. Other parties include the National Unity Democratic Organisation (NUDO) United Democratic Front of Namibia (UDF), and the Republican Party of Namibia (RP) but they are not popular.

The stable political landscape and sound economic management have transformed Namibia into an upper-middle-income country, and significantly reduced poverty. About 28.8% of the population before 1990 lived under the poverty line which reduced to 17.4% by 2015-2016. Nonetheless, socioeconomic inequalities remain extremely high, and this is evidenced by its high Gini coefficient of 59.1 in 2015. According to the World Bank, structural constraints to growth and low productivity have impeded job creation. Namibia's GDP for 2022 is about USD12.6 billion, and growth declined from 6.1% growth to -0.8% in 2019 but has recovered to 4.6% in 2022⁴.

Natural Resources and the Energy Landscape

Namibia has abundant natural resources, and it is particularly endowed with minerals including diamonds, uranium oxide, special high-grade zinc, gold bullion and salt. The mining sector has been the backbone of the Namibian economy and it provides more than 12% of its Gross Domestic Product (GDP). Other important minerals in Namibia include lead, tungsten, gold, tin, fluorspar, manganese, phosphate, marble and copper. Diamond production in the country accounts for 2% of the world's total output. There are huge copper deposits where it is mined, processed and sold to foreign markets. Namibia is also a leading producer of zinc, and it has the potential to actively participate in the critical mineral and rare earth elements (REE) sector which is vital for the production of renewable energy technologies. For example, the interest in REE has heightened after the discovery of a proven ore

body of 579 million tons in the country⁵. In terms of energy resources, Namibia has diverse sources that are untapped, and they include oil and gas, renewable energy (wind, solar, and biomass), coal, hydropower, and even geothermal (refer to Appendix A). Nonetheless, it remains a nation that imports electricity and transport fuel, making it energy insecure but also with limited control over its carbon emissions. For example, about 67% of its electricity is imported from South Africa and other Southern African countries. In the case of South Africa, electricity from coal is very pronounced at 83%. Nonetheless, the potential of RE development is huge and could be exploited to increase Namibia's energy security and exports. The RE potential has thus increased international interest in green hydrogen production in Namibia. From Appendix A, Namibia is endowed with huge energy resources that can be exploited to close the supply deficit and increase access to electricity and productivity resulting in economic growth and welfare. Unfortunately, Namibia has not been able to do so as yet but it is rather embarking on an ambitious energy transition plan. would require some introspection.

Namibia's Developmental Aspirations

As indicated earlier, Namibia has its vision, plans and policies to achieve its aspirations. The five cardinal plans include the national development plan, the national integrated resource plan, the Harambee prosperity plan, the national renewable energy policy plan, and the nationally determined contribution (NDCs). The aims and goals of Namibia's vision, plans and policies have been detailed in Appendix B. Namibia's aspirations are geared towards using its resources to achieve inclusive, sustainable and equitable socio-economic growth. The plans have a critical role in the energy sector and aim to transition the sector in a just and equitable way.

⁴ <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=NA>

⁵ <https://www.trade.gov/country-commercial-guides/namibia-mining-and-minerals>

Situation Analysis of the Electricity and Hydrogen Sectors

The green hydrogen economy is a critical driver to reduce emissions as more renewable energy is incorporated into Namibia's energy mix. The 2021 NDC ambitious target shows that there will be massive investments in the electricity and hydrogen sectors (see Figure 3). Considering Namibia's aspirations for the electricity and hydrogen sectors based on its abundant renewable resources, it is important to deliberate on

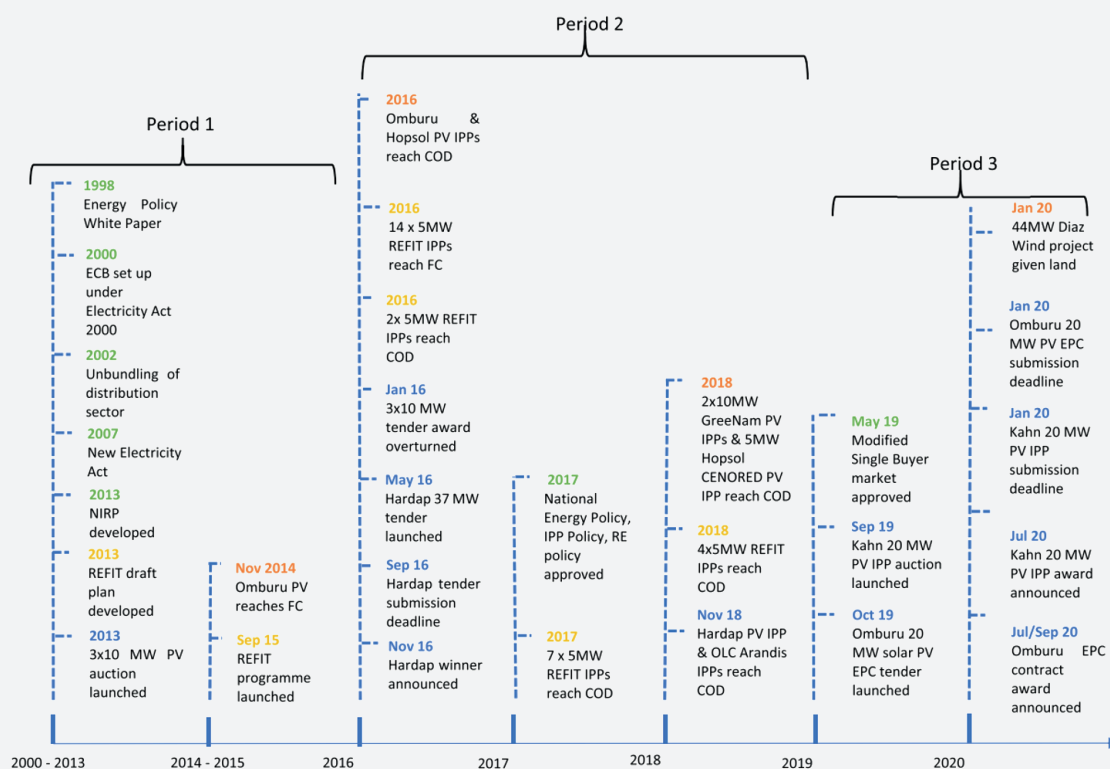
how activities in these sectors can transition in a just and equitable way. The political will of the Namibian government is very evident although the risk perception of technologies of the sector is high since hydrogen, solar and wind technologies are nascent. In this section, we seek to understand the developments and evolution as well as the current situation of the electricity and hydrogen sectors.

Table 1. NDC Mitigation contributions by sectors (MtCO₂e)

Sector	Mitigation potential (MtCO ₂ e)	% Reduction compared to BAU scenario in 2030
Energy	2.800	11.6%
IPPU & RAC	0.134	0.6%
AFOLU	19.030	78.7%
Waste	0.031	0.1%
Total	21.996	91%

Source: Namibia's Updated NDCs (2021) https://unfccc.int/sites/default/files/NDC/2022-06/Namibia%27s%20Updated%20NDC_%20FINAL%2025%20July%202021.pdf

Figure 2. Namibia electricity policy and regulation evolution



Source: Kruger (2022) : <https://doi.org/10.1016/j.jup.2022.101392>

Developments in the Namibian Electricity Sector

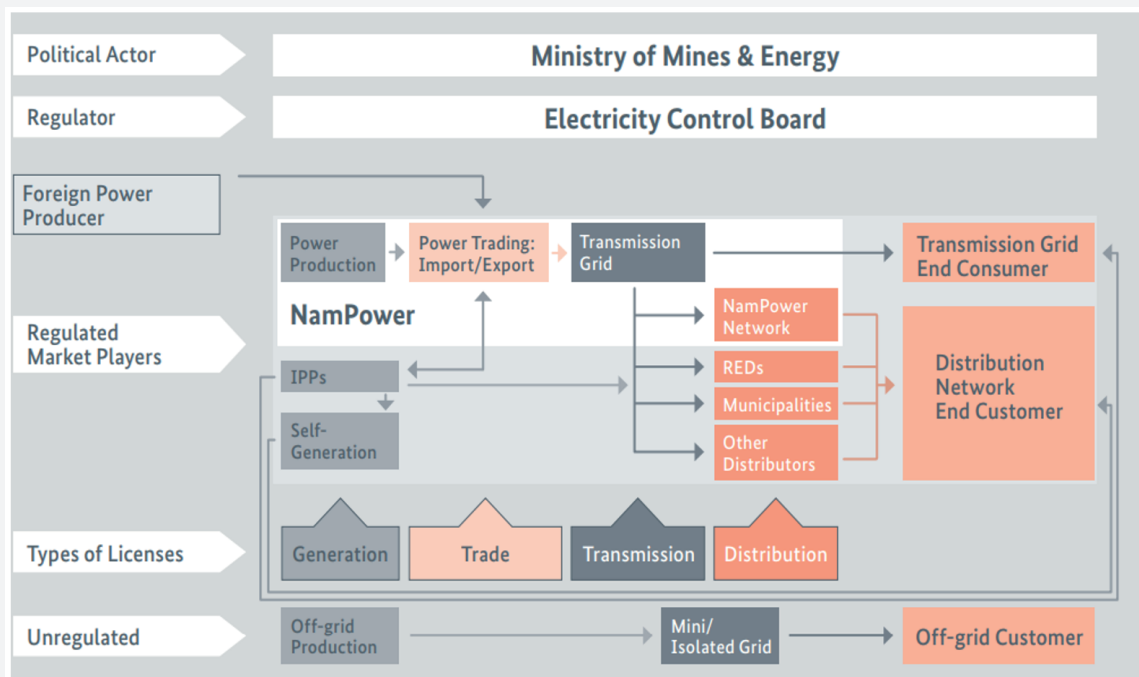
The electricity supply chain consists of generation, transmission, distribution and supply. NamPower, a state-owned utility, has always dominated the electricity sector, especially before 2015 when there was little or no private sector participation in the electricity supply industry. In terms of generation, Namibia has always had electricity from NamPower plants (that are largely hydroelectric) and importation from foreign generators in Southern Africa. NamPower generates electricity from hydro (68%), coal (25%) and diesel (8%) sources and imports significant amounts from South Africa which has an electricity generation mix that is dominated by 83% coal⁶. This means that Namibia's imported emissions are high since a significant amount of its consumed electricity comes from South Africa. In 2021 NamPower imported 67% of the

total energy requirement from SAPP, Eskom (South Africa), Zambia Electricity Supply Corporation Limited (ZESCO) and Zimbabwe Power Company (ZPC) to meet local demand⁷. The reliance on imports has been steady at around 50% of total requirements throughout the years since 2014. After 2015, independent power plant investors entered the market, but it was until 2017 that policies relating to their operations were finalised. Embedded generation by different distribution companies also adds to the generation capacity. The transmission sector is nationally owned and operated by NamPower, the utility which transmits electricity to distribution companies and bulk-buyers including heavy mining and other energy-intensive industries. There is no Independent Transmission Operator, and it is NamPower which grants access to the transmission network (from 66 KV and up). The distribution and retail sectors are integrated because these licences are issued together. However, the distribution sector

⁶ <https://www.energy.gov.za/files/media/explained/2021-South-African-Energy-Sector-Report.pdf>

⁷ https://www.ecb.org.na/wp-content/uploads/2023/05/ECB_Annual_Report_2022.pdf

Figure 3. Namibia's Electricity Supply Market



Source: International Finance Corporation, 2020

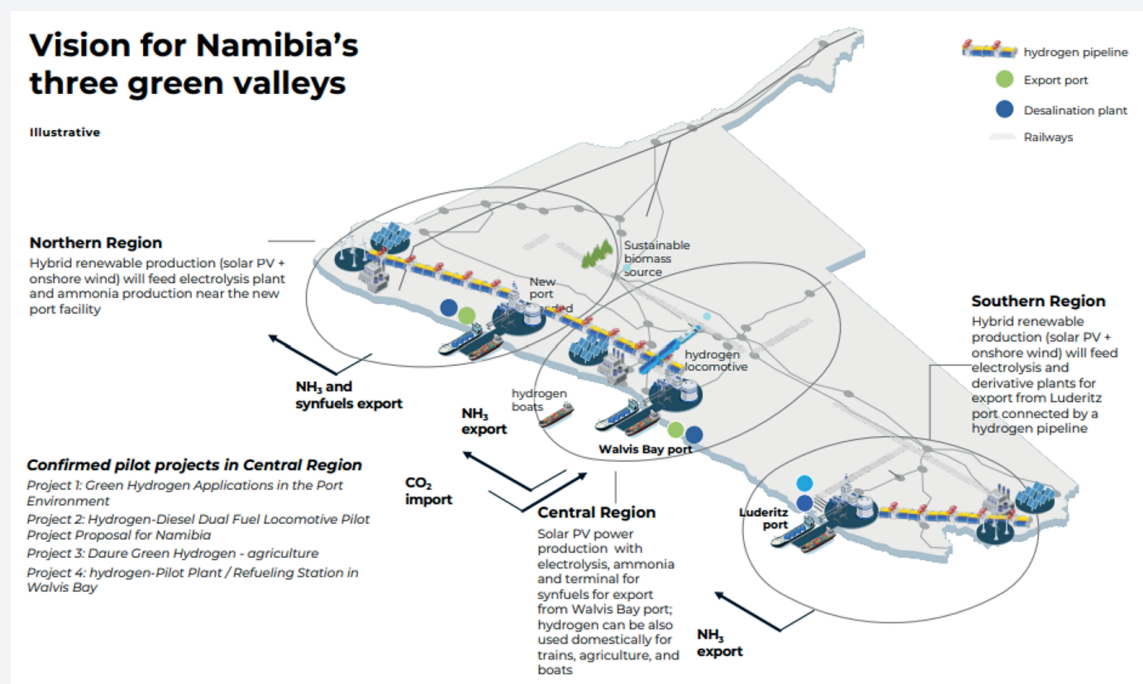
involves several players including NamPower, REDs, Local and Regional Distribution companies, and other distributors. For policymaking and regulation, respectively, the Ministry of Mines and Energy, and the Electricity Control Board (ECB) are responsible. The policy landscape has experienced several reforms including the Electricity Act, unbundling, Renewable Energy Feed-in-Tariff, IPP Policy, modified single-buyer market, and PV-IPP auction.

Namibia was the third country in Africa to launch an auction programme after Zambia commenced scaling up solar. Unlike its peers in the sub-region, Namibia demonstrated financial and technical independence by designing and operating its RE market without support from development partners. Instead, it used its local and development banks, and NamPower as the market designer and administrator. Aside from this uniqueness, Namibia still secured electricity prices comparable to or even lower than that of Zambia. Nonetheless, the responsiveness to price changes has been relatively slow, and this is because the decision-making process takes longer than expected.

Developments in the Namibian Hydrogen Sector

The wind and solar energy potential of Namibia is huge (see Appendix A). As a result, the Namibian government has aimed to become a leading green hydrogen producer and exporter. According to the Harambee Prosperity Plan, it is expected that Namibia will become more energy secure as it transitions to a low-carbon economy, generates more foreign investments and increases its foreign inflows. That apart, it is anticipated that more jobs will be created, and the domestic workforce will be upskilled to reduce unemployment. Internationally, hydrogen is becoming topical and stimulating the debates around its energy content and storage potentials aside from the discourse on the economics /production cost of green hydrogen. As such there is a certain position that perceives hydrogen as an expensive fuel while a counter view suggests it has prospects in competing with other fuels. This hydrogen production cost debate is critical to Namibia's hydrogen sector because

Figure 4. Namibia's hydrogen vision for three green valleys



Source: Namibia's green hydrogen and derivatives strategy

how it competes with other fuels directly impacts Namibia's production and export levels. However, in Namibia's case, green hydrogen is anticipated to be produced at US\$1.5/kg by 2030 which is cheaper than the proposed range of US\$5/kg.⁸ This is the cost of low-cost green hydrogen which is comparable to that of Chile which has the cheapest in terms of cost.⁹ That aside, there are "hard-to-decarbonise" sectors where hydrogen is applicable as an energy carrier. Such industries including steel, chemical production, and aviation could benefit from green hydrogen. The demand for hydrogen is expected to increase to about 660 Mtpa in 2050, from a 2030 figure of 140 Mtpa. The rising global demand means Europe, Japan, South Korea, China and North America will have to import to decarbonise certain sectors. Namibia envisions taking advantage of its abundant resources to produce 10-15 Mtpa of hydrogen by 2050¹⁰. This ambition has yielded more collaborations between Namibian and foreign research institutions, to research on hydrogen technologies. Germany is supporting this agenda just as other interested European countries including Belgium and the Netherlands. A hydrogen and derivative strategy has since been executed with a hydrogen commission formerly

institutionalised. With the Green Hydrogen Council fully constituted, the Hydrogen Commissioner will work with Namibia's Investment Promotion Council to attract investments. The commissioner is charged with collaborating with academic and research institutions to facilitate innovation. One critical role of the commissioner is to create awareness and engage stakeholders to enable transparency to avoid negative perceptions and doubts.

The Ministry of Mines and Energy is the policymaking institution for hydrogen and its derivatives. The regulatory framework and market arrangements are yet to be finalised¹¹. The legislative and regulatory framework has commenced with the drafting of the Synthetic Fuels Act. According to the hydrogen strategy, and from **Figure 5**, there will be various actors and institutions to operate and regulate the hydrogen sector and the related markets in the three valleys.

⁸ <https://www.dlapiper.com/en/insights/publications/2022/04/projects-global-insight-issue-5/green-hydrogen-in-chile>

⁹ <https://gh2.org/countries/namibia>

¹⁰ https://www.ensafrika.com/uploads/newsarticles/0_namibia-gh2-strategy-rev2.pdf

¹¹ Namibia's green hydrogen and derivatives strategy

Economics, Labour Market and Technology Analysis

Namibia has bold aspirations for the development of its electricity sector and the development of a green hydrogen economy. These plans are elaborated in several government documents such as the *Harambee Prosperity Plan II (HPPII) (2021-2025)*, the *Green Hydrogen and Derivatives Strategy*, the *National Integrated Resource Plan (NIRP) Review and Update (2022)*, the *National Energy Policy*, among others. The pursuit of the strategic objectives for the electricity and hydrogen sectors is fundamentally oriented towards Namibia's economic development, the creation of jobs and the positioning of Namibia as a major global player in the green hydrogen value chain. This section presents an analysis of the prospects for industrialization and job creation around the electricity and the burgeoning green hydrogen sectors.

Job Analysis in the Electricity Sector

Namibia's energy policy document (Ministry of Mines and Energy, 2017) recognizes the centrality of electricity for its economic development and has consequently laid out the challenges that the sector faces as well as key Government interventions and plans to address the challenges. Key among the challenges identified are insufficient domestic generation capacity to meet peak demand, a lack of baseload generation capacity and high reliance on imported electricity. This comes against the backdrop of an electricity access rate which stood at 34% in 2017 but has since improved to 55% (in 2021)¹². As of 2022, NamPower, the vertically

¹² <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=NA>

integrated state utility reported (Annual Report 2022) that the country had an installed electricity generation capacity of 509.5 MW ¹³ (NamPower, 2022)¹⁴. This, notwithstanding, Namibia has an unambiguous ambition to address its electricity sector challenges and increase local generation capacity. According to the HPPII the national peak demand was 673 MW in 2020 and is projected to reach 931 MW in 2025 and 1348 MW by 2030.

To meet this demand, the HPPII envisages local installations to reach 879 MW of generation capacity by 2025 – about 41% additional capacity compared with 2020. Additional capacity is expected to come from technologies such as biomass, solar PV, wind and thermal generation. **Table 2** shows a breakdown of electricity generation plants expected by 2025 (as per the HPPII).

The Omburu Solar PV plant is reported to have been inaugurated in June 2022¹⁵. The plants in **Table 2** are expected to add to existing electricity supply assets that comprise Hydropower (Ruacan) – 347 MW, Solar projects – 135 MW, Wind – 5 MW, thermal – 145 MW, and imports of 380 MW.

In addition to the projects anticipated in the HPPII, Namibia's National Integrated Resource Plan (NIRP

Review and Update (2022) takes a longer-term view of the country's electricity needs and projects until the year 2040, assessing options for meeting these needs in a cost-optimal manner, taking environmental impacts into account. The NIRP under the accelerated renewable energy scenario (Accelerated RES) foresees the installation of an additional 3,116 MW by 2040. A breakdown of constituent technologies is provided in **Table 3**. This would represent a major shift towards a low-carbon electricity system for the country, dominated by wind and solar PV.

Jobs from the Energy Transition

Jobs associated with the electricity sector have been broadly categorised into manufacturing (Manuf.), Construction and Installation (C&I), Operation and Maintenance (O&M) and Decommissioning (Decom). Two other categories, transmission jobs and fuel supply jobs are often added. For this analysis, the scope is limited to the first four categories (manufacturing, Construction and Installation, Operation and Maintenance and Decommissioning). Total jobs created in the energy transition up to 2040 are therefore estimated as per Equation 1:

$$Total\ job = \sum_i^N (Manuf_i + C\&I_i + O\&M_i + Decom_i) \dots \dots \dots (1)$$

Where *i* represents the technology deployed, in this case, wind Solar PV, Biomass, etc. The implementation of this approach is based on the method proposed by

¹³ The HPPII reports a capacity of 624 MW as of 2020.

¹⁴ It should be noted that other sources report different figures.

¹⁵ <https://www.trade.gov/country-commercial-guides/namibia-energy>

Table 2. Anticipated Electricity Projects Under HPPII (by 2025)

Plant Type	Capacity (MW)
Biomass Bush to Electricity Project – Tsumeb	40
Anixas HFF peaking plant expansion - Walvis Bay	50
Wind Generation Project – Lüderitz	40
Omburu Solar PV plant- Omaruru	20
Khan Solar PV plant – Usakos	20
Wind IPP Project – Lüderitz	50
Total	220

Table 3. Electricity Generation Plants in 2040 under the NIRP

Plant	Capacity (MW)
HFO (Thermal)	50
Wind	1,546
Solar PV	830
Biomass	40
Battery Energy Storage	650
Total	3,116

Rutovitz, et al. (Rutovitz, et al., 2015) and adopted by Ram, et al. in their 2020 work on job creation during the global energy transition towards 100% renewable power system by 2050 (Ram, et al., 2020). These authors use the Employment Factor approach (EF) due to its "simplicity and effectiveness." Employment Factors for various technologies are shown in **Table 4**. The method adopted (Rutovitz, et al., 2015) outputs job-years for 3 of the categories (Manufacturing, Construction & Installation and Decommissioning) and the actual number of jobs for the fourth category - Operations and Maintenance. One job-year is construed to be one person working for a year¹⁶. The method also incorporates a Regionalization Factor which accounts for labour productivity variation across the various regions of the world based on data from the International Labour Organization (ILO) and

other sources. For Sub-Saharan Africa, a 2040 figure of 4.38 is proposed. This analysis tones this factor down slightly to 4 based on an optimistic view of labour productivity in the subregion. In addition to direct jobs, indirect and induced jobs are also accounted for by scaling with a factor of 3 (Rutovitz & Harris, 2012). The results of the analysis are shown in **Table 5** in which the Construction & Installation sector is seen to dominate with over 280,000 job years.

To enable an apples-to-apples comparison, the O&M jobs category is also converted to job years using the economic plant life of the various technologies. The results are shown in **Table 6** and show that the O&M category holds the largest share of jobs.

¹⁶ <https://obamawhitehouse.archives.gov/sites/default/files/microsites/Estimate-of-Job-Creation.pdf>

Table 4. Employment Factors (Direct Jobs)

Plant	Manuf. (Job-years/MW)	C&I (Job-years/MW)	O&M (Jobs/MW)	Decom. (Job-years/MW)
HFO (Thermal)*	0.93	1.3	0.14	0.21
Wind	4.7	3.2	0.3	0.72
Solar PV [utility-scale]	6.7	13	0.7	0.8
Biomass**	2.9	14	1.5	0.32
Battery Energy Storage	16.9	10.8	0.4	0.8

*Fuel supply jobs of 15.10 jobs/PJ is estimated for this technology, **fuel supply jobs of 29.9 jobs/PJ is estimated for Biomass

Table 5. Estimated jobs from additional electricity generation plants (Accelerated RES 2040)

Plant	Manuf. [Job-years]	C&I [Job-years]	O&M [Jobs]	Decom. [Job-years]
Heavy Fuel Oil (Thermal)*	46.5	260.0	28.0	42.0
Wind	7,266.2	19,788.8	1,855.2	4,452.5
Solar PV [utility-scale]	5,561.0	43,160.0	2,324.0	2,656.0
Biomass**	116.0	2,240.0	240.0	51.2
Battery Energy Storage	10,985.0	28,080.0	1,040.0	2,080.0
Total 1 [Direct Jobs]	23,974.7	93,528.8	5,487.2	9,281.7
Total 2 [incl. Indirect+ induced jobs]	71,924.10	280,586.40	16,461.60	27,845.04

Table 6. Estimated jobs from additional electricity generation plants (Accelerated RES 2040)

Plant	Manuf. [Job-years]	C&I [Job-years]	O&M Job-years]	Decom. [Job-years]
HFO (Thermal)*	46.5	260.0	560.0	42.0
Wind	7,266.2	19,788.8	55,656.0	4,452.5
Solar PV [utility-scale]	5,561.0	43,160.0	58,100.0	2,656.0
Biomass**	116.0	2,240.0	4,800.0	51.2
Battery Energy Storage	10,985.0	28,080.0	20,800.0	2,080.0
Total1 [Direct Jobs]	23,974.7	93,528.8	139,916.0	9,281.7
Total2 [incl. Indirect+induced jobs]	71,924.1	280,586.4	419,748.0	27,845.0

Even though O&M jobs are typically taken up by local engineers, technicians and other professionals, it may be observed from **Table 6**, that the share of C&I jobs is quite significant (around 35% of total jobs). Put together, the O&M and C&I jobs represent over 87% of anticipated jobs and with proper measures towards capacity development and local empowerment, Namibian professionals could accept increased roles across the electricity sector value chain.

Job Analysis in the Green Hydrogen Sector

In the Harambee Prosperity Plan II (HPP II) (2021-2025) Namibia announced its intention to initiate steps to become one of the early movers in the global green hydrogen and ammonia sector (alongside countries such as Chile, Norway and Australia). It aims to export hydrogen products such as ammonia, methanol, synthetic kerosene and hot-briquetted iron to markets in Europe, China, Japan, South Korea and other parts of the world. Preliminary estimates by the plan suggested that annual revenues of \$800M+ could be realised. Under Goal 3 of the HPP II (Developing Complementary Engines of Growth), the Government of Namibia committed to investigating the feasibility of Green Hydrogen and Ammonia as a transformative strategic industry for the country (Goal 3 Activity 2). To realise this, some activities were planned. These included:

- ▶ Setting up an Inter-Ministerial Green Hydrogen Committee (GHC)¹⁷
- ▶ Drafting of a National Green Hydrogen and Ammonia Strategy¹⁸
- ▶ Conduct a detailed feasibility study with a Final Investment Decision (FID) expected in 2024.
- ▶ Development of the Southern Corridor Development Initiative (SCDI) vision, and
- ▶ A coordinated approach to Green Diplomacy

The country has since moved forward with the development of a Green Hydrogen and Derivatives Strategy to guide its pathway towards the envisioned green hydrogen economy. By 2050, Namibia aspires to create an at-scale green fuels industry with a production target of 10- 12 Mtpa hydrogen equivalent. Hydrogen products of focus (targeted for export) include ammonia, methanol, synthetic kerosene and hot-briquetted

iron. According to the *Green Hydrogen and Derivatives Strategy*, the hydrogen industry is expected to contribute up to US\$6 billion to GDP by 2030, 30% more than 2030 GDP estimates with no hydrogen industry development.

To realise this, the country has lined up some pipeline projects that are at various stages of preparation. These include:

1. A US\$18 million pilot hydrogen and ammonia production plant in the Erongo region. The project was launched in February 2022 by Cleanergy Namibia, a joint venture between the private Namibian group Ohlthaver & List (O&L) and CMB.Tech, a British company specialising in the development of green hydrogen applications¹⁹.
2. An US\$181.25 million green hydrogen project (by the French company HDF Energy) in Swakopmund on the coast in the administrative region of Erongo (with funding from the European Investment Bank (EIB))²⁰, and
3. The flagship Hyphen Hydrogen Energy project is estimated at US\$ 9.4 billion. The project has already acquired a 40-year concession for four thousand km² of land and is expected to produce up to 300,000 metric tons of green hydrogen per annum powered by 5 – 7 GW of renewable energy generation. Project shareholders include Nicholas Holdings and ENERTRAG²¹. Nicholas Holdings Limited is a UK-registered company incorporated in 1985 whose “nature of business” is stated as the development of building projects and construction of commercial buildings²². ENERTRAG on the other hand is a German company with a registered address in Dauerthal, Germany and with offices across various German cities and other countries (such as Ghana, Uruguay, Vietnam, South Africa and Spain)²³.

¹⁷ This was established on 23rd May 2021. <https://gh2namibia.com/>

¹⁸ Document available at: https://gh2namibia.com/gh2_file_uploads/2022/11/Namibia-GH2-Strategy-Rev2.pdf

¹⁹ <https://www.afrik21.africa/en/namibia-cleanergy-joint-venture-to-build-green-hydrogen-plant-in-erongo/>

²⁰ https://ec.europa.eu/commission/presscorner/detail/en/IP_22_6683

²¹ <https://hyphenafrika.com/shareholders/>

²² <https://find-and-update.company-information.service.gov.uk/company/01938852>

²³ <https://enertrag.com/en/portal>

The overall strategy is to develop three hydrogen valleys in the region of Khairas, the central region, and the northern region of Kunene (see **Figure 6**).

Jobs in the Green Hydrogen Sector

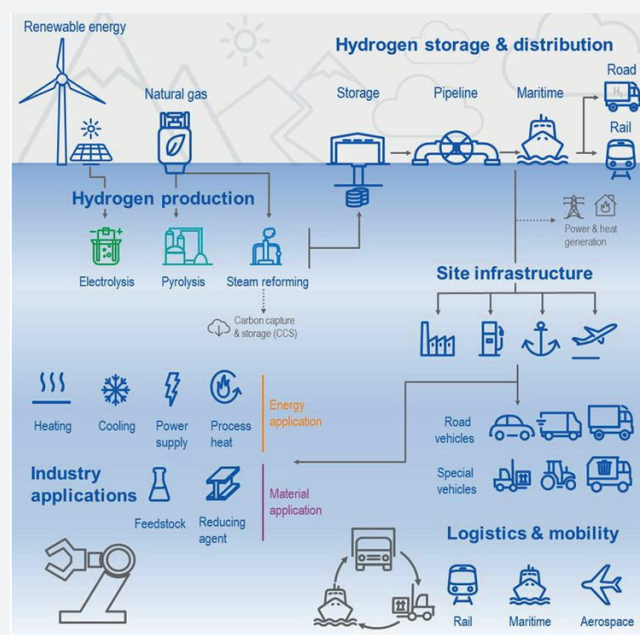
Estimates by the Namibian Government in the Green Hydrogen and Derivatives Strategy show that by the year 2030, the green hydrogen sector will generate as many as 80,000 jobs. This number is expected to shoot up sharply to 600,000 by 2040 as the project reaches scale. Meanwhile, Hyphen Hydrogen Energy alone has been assessed as having the potential to employ 3,000 people with temporary jobs during construction reaching 15,000 (over four years). The green hydrogen value chain may be visualised along the lines of the electricity sector as shown in Section 3.2. This will include Manufacturing of Green Hydrogen equipment (e.g., electrolyzers), Construction & Installation, Operations & Maintenance and Decommissioning. However, given that this is a fuel-based technology, significant activity will revolve around O&M throughout the project life (see **Figure 9**). Empowerment measures should therefore be developed with the entire value chain in mind and along with an analysis of entry barriers and any local competitive advantages.

Green Skills for a Just Energy Transition

In the transition to a greener electricity system and an industrial revolution built around green hydrogen as a strategic anchor industry, Namibia recognizes the existence of a significant skills gap that needs to be addressed for greater participation by Namibians and Namibian firms in the value chain. This need is recognized by the *Green Hydrogen and Derivatives Strategy* and also in the report of the *Task Force on the Fourth Industrial Revolution*²⁴. The Namibian Government's intention to pursue Green Diplomacy (as per the HPPII) as one of its strategic approaches creates an opportunity for dialogue with the EU around the energy transition and jobs. It is recommended that a green skills gap audit be conducted around which a comprehensive green skills development programme will be developed to ensure inclusivity, particularly for women and the youth.

²⁴ hpii.gov.na/storage/2023/04/4IRTF-Final-Report_2022-10-19_final.pdf

Figure 5. Hydrogen value chain



Source: TÜV SÜD

The Political Economy of Green Industrialization and Just Energy Transition

This section undertakes a comprehensive political economy analysis that delves into the interplay of socio-economic dynamics, geographical considerations, environmental and political factors surrounding Namibia's energy landscape. While green hydrogen is touted for its potential to reduce carbon emissions, the process of its production can have localised environmental effects that warrant careful examination and must ensure that the environmental implications are thoroughly assessed and mitigated.

The analysis focuses on Namibia's relationship with the partners involved in the Green Hydrogen initiative mainly the EU and Germany. The relationship with Germany is of interest given that Namibia was once a colony and this invites a multifaceted analysis of the historical, political, and economic dimensions that underlie the relationship. This historical context of colonisation by Germany adds complexity to contemporary interactions between the two nations. The legacy of colonialism carries historical baggage, including issues of land dispossession, cultural assimilation, and historical grievances that continue to influence diplomatic relations. The wounds of the past inflicted by colonialism can inform present negotiations and agreements, impacting how partnerships are forged and the degree of trust between Germany by extension EU and Namibia.

Namibia and the EU signed a Memorandum of Understanding (MoU) in 2022.²⁵ The MoU underscores a partnership aimed at advancing green hydrogen initiatives. This strategic partnership marks a pivotal step in addressing common environmental challenges and fostering sustainable energy solutions. The EU, known for its commitment to climate action and renewable energy, is keen to support Namibia in its pursuit of green hydrogen as a catalyst for economic growth and environmental sustainability. Through this MoU, both parties are positioned to collaborate on technology transfer, investment facilitation, and knowledge sharing, with the EU bringing its expertise

and financial support to the table. Namibia, in turn, provides the fertile ground for green hydrogen development, given its abundant renewable resources and strategic geographical location.

The depoliticisation of Green Hydrogen

The language used in the just transition and overarching discussions on climate change reduces everything to anthropogenic and technocratic debates depoliticising political undercurrents. Depoliticisation is a process where questions of power and political realities underlying any development project are suspended in the discussion but instead, they are simplified into technical problems that require technical solutions.²⁶ The headline statement from the Intergovernmental Panel on Climate Change (IPCC) for instance gives an urgent call to action and cooperation globally.

CLIMATE CHANGE IS A THREAT TO HUMAN WELL-BEING AND PLANETARY HEALTH. THERE IS A RAPIDLY CLOSING WINDOW OF OPPORTUNITY TO SECURE A LIVEABLE AND SUSTAINABLE FUTURE FOR ALL. CLIMATE RESILIENT DEVELOPMENT INTEGRATES ADAPTATION AND MITIGATION TO ADVANCE SUSTAINABLE DEVELOPMENT FOR ALL AND IS ENABLED BY INCREASED INTERNATIONAL COOPERATION INCLUDING IMPROVED ACCESS TO ADEQUATE FINANCIAL RESOURCES, PARTICULARLY FOR VULNERABLE REGIONS, SECTORS AND GROUPS, AND INCLUSIVE GOVERNANCE AND COORDINATED POLICIES.²⁷

The statement highlights the importance of addressing climate change and reducing carbon emissions, emphasising its impact on both human well-being and the health of the planet. However, when viewed through a depoliticisation perspective, it becomes evident that the language used in such declarations often tends to sanitise the underlying political and unequal relationships at play, especially in agreements between regions like Africa and the EU.

²⁵ <https://single-market-economy.ec.europa.eu/system/files/2022-11/MoU-Namibia-batteries-hydrogen.pdf>

²⁶ Venugopal,R.(2022)'Cantheanti-politicsmachinebedismantled?'Doi10.1080/13563467.2022.204592.

²⁷ <https://www.ipcc.ch/report/ar6/syr/resources/spm-headline-statements>

Firstly, the statement predominantly frames climate change as a technical challenge, focusing on the anthropogenic and technocratic aspects of the issue. While it acknowledges the seriousness of the threat, it falls short of explicitly addressing the historical responsibility of developed nations, including those in the EU, for the disproportionate emissions that have driven global warming. This depoliticisation of the climate discourse masks the deep-seated political and economic power imbalances that underlie the climate crisis.

Secondly, the statement emphasises the need for international cooperation and financial resources, particularly for vulnerable regions and groups. While this is essential, it often obscures the fact that such cooperation is contingent on the willingness of developed nations to provide adequate support. The depoliticisation of this aspect overlooks the political negotiations and power dynamics that occur in international climate agreements, where economically disadvantaged nations often struggle to secure equitable terms.

In essence, while the statement underscores the gravity of climate change and the importance of cooperation, it tends to sanitise the political and unequal relationships that permeate international climate negotiations and just energy transitions. By focusing on technocratic solutions and cooperation without addressing historical injustices and power imbalances, the debate on just transition can become detached from the deeper political and economic issues that must be addressed to achieve true climate justice.

Similarly, in the hydrogen transition narrative between the EU and Namibia, the technical arguments are around decarbonisation, clean energy, energy independence, security and economics, with a promise of job creation and ready markets for hydrogen. The masking of power dynamics among actors in these narratives can simply alienate project drivers from reality and can be interpreted as a political strategy to rally for support on those controversial issues. With a particular focus on the energy and hydrogen sectors, this section aims to unravel the complex relationships

between diverse stakeholders, ranging from local communities to national government bodies, international partners, and private sector entities. By investigating the implications of a just and equitable transition within the context of Namibia's unique historical, geographical, and political realities, this analysis provides a holistic understanding of the challenges, opportunities, and potential pathways toward a sustainable and inclusive energy future.

Agenda Setting

The agenda on green hydrogen in Africa is being driven by a combination of actors, including governments for instance the six potential landing zones identified, namely Morocco, Egypt, Nigeria-Ghana, Ethiopia Djibouti, Tanzania-Rwanda-Kenya, and South Africa, European Union, African Union, Germany linked companies such as Enertrag and Hyphen Hydrogen, UN agencies and civil society organisations.²⁸ A complex interplay of factors that include interests, and power dynamics among the main actors shapes the promotion and development of green hydrogen on the continent. Namibia has demonstrated interest in developing green hydrogen as part of its energy strategy²⁹ and as a route towards economic recovery and inclusive growth.³⁰ At the international level, the UN Framework Convention on Climate Change (1992), the Kyoto Protocol (2007) and the Paris Agreement (2015) set the target to reduce carbon emissions and call for the use of the best science available to prime economic and social transformation. As both the international and national agendas are set, they are largely driven by interests and motivations among different stakeholders. The incontrovertible impact of climate change and the escalating levels of carbon emissions necessitate the formulation of an agenda focused on green energy. However, beneath the veneer of this technical discourse, there are underlying motives and vested interests that warrant a diligent investment of time to comprehend. At the national level, in Namibia, there is no consensus on the green hydrogen agenda.

²⁸ Bhagwat, S. and Olczack, M., 2020. Green Hydrogen: Bridging the Energy Transition in Africa and Europe. European University Institute. https://africa-eu-energy-partnership.org/wp-content/uploads/2021/04/AEEP_Green-Hydrogen_Bridging-the-Energy-Transition-in-Africa-and-Europe_Final_For-Publication_2.pdf

²⁹ Green Hydrogen and Derivatives Strategy, 2022. The Ministry of Mines and Energy, Republic of Namibia

³⁰ Harambee Prosperity Plan II 2021-2025. The Republic of Namibia

It appears that the drive towards green hydrogen is driven externally and a few elites are likely to benefit from the proceeds of the industry. In an interview with a policy advisor on energy transition in Namibia, he had this to say casting doubts on national coherence regarding the hydrogen sector.

THE COUNTRY IS JUST CONFORMING TO THE INTERNATIONAL AGENDA COMING UP WITH ASPIRATIONAL AND AMBITIOUS STRATEGIES TO GET OUR RELATIONS GOING, HYDROGEN WAS SOLD TO US AS A POTENTIAL FOR ECONOMIC DIVERSIFICATION. WE ARE A SMALL COUNTRY, AND WE DON'T HAVE THE RESOURCES WHICH MEANS WE ARE GOING TO BE LED BY THOSE WITH THE RESOURCES. POLICY ADVISOR, NAMIBIA

The quote reflects a sense of scepticism and pragmatism regarding Namibia's pursuit of hydrogen as a means of economic diversification. The project is perceived as a political legacy project for the incumbent leadership. The policy advisor suggests that Namibia is aligning itself with international agendas, crafting ambitious strategies to bolster its relationships, and embracing hydrogen as a potential economic avenue. However, the underlying concern is that Namibia's relatively limited resources might position it in a subordinate role, where it depends on external entities with more extensive resources for guidance and support in realising its hydrogen ambitions. This sentiment highlights the complex dynamics of international collaborations in the renewable energy sector, where developing nations like Namibia may find themselves navigating a fine line between economic opportunities and external influence.

Interests, Motivations, and Interconnectedness

The interests, motivations, and interconnectedness of green hydrogen in Namibia within the context of its relationship with the European Union (EU), particularly Germany, reflect a multifaceted collaboration driven by shared goals and mutual benefits. Namibia's abundant renewable resources, such as solar and wind potential, align with the country's motivation to diversify its economy, reduce carbon emissions, and enhance energy security. Green hydrogen production, using these resources, not only presents an opportunity to meet local energy demands sustainably but also positions Namibia as a key player in the global hydrogen market. The EU also seeks to boost its energy security while at the same time meeting the decarbonisation

targets. The following quote from the Memorandum of Understanding (MoU) signed between Namibia and the EU in 2022 sheds light on the interests and intricacies of the agreements.

"ALIGNED WITH THE EUROPEAN GREEN DEAL AND THE REPOWEREU PLAN¹⁰ LAUNCHED IN MAY 2022, THE EU INTENDS TO DIVERSIFY ITS GAS IMPORTS AND INCREASE ITS ENERGY SECURITY BY DEVELOPING RENEWABLE ENERGY AND PRODUCING RENEWABLE HYDROGEN. THE QUANTITIES REQUIRED TO SATISFY THE ENERGY DEMAND OF HARD-TO-ABATE SECTORS ARE LARGER THAN DOMESTIC PRODUCTION CAPACITIES. THE EU IS PLANNING TO IMPORT 10 MILLION TONS OF RENEWABLE HYDROGEN AND HYDROGEN DERIVATIVES BY 2030."³¹

The exploration of the interests, motivations, and interconnectedness of green hydrogen between Namibia and the European Union (EU), particularly Germany, unveils a complex and nuanced dynamic influenced by historical colonial legacies and the potential for extractive practices. Namibia's colonial history, marked by resource exploitation and unequal power dynamics, casts a shadow on contemporary interactions. Colonial powers extracted valuable resources from Namibia, including diamonds and minerals, often without fair compensation or benefit to the indigenous population. This exploitation left a legacy of economic inequality and resource imbalances that continue to shape Namibia's economic landscape today. The historical injustices and inequalities of the colonial era continue to influence how Namibia engages with the world today. Whether in international trade agreements, diplomatic relations, or domestic policies, the shadow of colonial history can affect how Namibia navigates contemporary challenges and opportunities.

Members of the public in Namibia have been commenting on the Green Hydrogen project and one of the local people who was frustrated by the overpromises of government to bring new technologies that seem to hold potential for transformation said.

³¹ MemorandumOfUnderstandingOnAPartnershipOnSustainableRawMaterialsValueChainsAndRenewableHydrogenBetweenTheEuropeanUnionRepresentedByTheEuropeanCommissionAndTheRepublicOfNamibia,November2022

THE GAME OF PLAYING WITH OUR PUBLIC FUNDS IS ALWAYS GOOD FOR POLITICIANS, FORMER COLONIALIST AND A FEW ELITES WHO SEES LOOPHOLE TO FILL THEIR TEMPORARY POCKETS. INSTEAD, I WOULD SUPPORT BUILDING NUCLEAR REACTORS WHICH GUARANTEES VIABLE POWER GENERATION FOR THE CURRENT GENERATION AND THE FUTURE. NAMIBIA CAN'T AFFORD EVEN TO REPAIR A BROKEN AMBULANCE, BUT STILL FOOLING PEOPLE WITH EXPENSIVE TECHNOLOGY PROJECTS WHICH SURELY BID US ON DEPENDENCY ON EUROPE FOR MAINTENANCE. SOCIAL COMMENTATOR, NAMIBIA³²

While the pursuit of green hydrogen aligns with Namibia's goals of sustainable development and economic diversification, concerns arise over the potential repetition of extractive practices that have historically benefited external actors more than the local population. In general, Green Hydrogen can be viewed as a misplaced priority given other sectors such as health that need the government's immediate attention as highlighted by the social commentator. The European Union (EU) and German-linked companies have taken an active role in Namibia's Green Hydrogen sector, with notable implications that hint at the extractive nature of these partnerships. One significant development involves the awarding of a substantial tender to Hyphen Hydrogen Energy, a German-linked company, for \$9.4 billion almost close to the gross domestic product (GDP) of the country at the time. While this partnership may ostensibly promote renewable energy, the concerns of extractive undertones emerge. As an example, during discussions about the project's launch, questions were raised about its funding, and partnerships with Namibian local companies revealing uncertainties regarding who bears the financial burden and potential repercussions. This highlights the intricacies of international collaborations where powerful foreign investors, such as Hyphen Hydrogen, influence the trajectory of development, possibly reinforcing structural drivers of external debt vulnerabilities in countries like Namibia.³³

Germany's interest in securing a sustainable source of green hydrogen dovetails with its technology

and expertise, promising benefits for both parties. However, this alignment carries a risk of echoing colonial patterns, where resources are extracted, and value is added elsewhere. The interconnectedness of this relationship could inadvertently perpetuate historical inequities if not carefully managed. Namibia's challenge lies in negotiating terms that ensure technology transfer, knowledge sharing, and investment without sacrificing its sovereign control over its resources or locking itself into exploitative arrangements. The promise of job creation also needs critical analysis. Without substantial efforts to enhance the skills and capacities of the local workforce, it's likely that job opportunities for Namibians will primarily revolve around construction and maintenance roles, rather than the higher-paid, secure positions which demand specialised training and expertise.

Addressing the extractive nature of the relationship requires a nuanced approach that acknowledges historical injustices and prioritises equitable collaboration. Collaborative frameworks should emphasise transparent governance, community involvement, and capacity-building to ensure that the benefits of green hydrogen production extend to local communities and contribute to sustainable development. By navigating this delicate balance, Namibia and the EU can reshape their relationship from one tinged with extractive undertones to a partnership founded on mutual respect, shared benefits, and a commitment to rectifying past imbalances.

Local-Level Tensions among Key Stakeholders

The transition to hydrogen in Namibia is poised to generate multifaceted tensions among multilateral companies, the government, pressure groups and locals. Multilateral companies, often driven by profit motives, may press for favourable investment conditions and market access, potentially clashing with the government's efforts to safeguard national interests, including resource management and economic equity. Meanwhile, pressure groups advocating for environmental and social justice may exert influence to ensure

³² The commentator was close to the National Planning Commissioner overseeing the project

³³ Gabor, D and Sylla, N.S., 2023. "Derisking Developmentalism: A Tale of Green Hydrogen" John Wiley & Sons Ltd. <https://doi.org/10.1111/dech.12779>

that the transition aligns with sustainability principles, potentially challenging both government policies and corporate interests. Balancing these diverse interests while facilitating a just energy transition will be a complex endeavour for Namibia.

The location of the hydrogen project is a 4,000 square kilometres of land situated within Tsau Khaeb National Park, near the coastal town of Luderitz, southwestern Namibia in the Namib Desert.³⁴ The park's unique combination of onshore wind and solar energy, coastal proximity, and accessible export routes makes it one of the world's top five locations for economical hydrogen production.³⁵ The area has become a focal point for competition over land resources. This competition is driven by various interests, including the need for sustainable development, conservation efforts, mining and the pursuit of economic opportunities tied to the hydrogen project. As the park is rich in biodiversity and holds cultural significance for indigenous communities, there is a delicate balance to strike between environmental preservation and economic advancement. This competition for land raises complex questions about how to manage the competing interests and ensure that the benefits of the hydrogen project are equitably distributed while safeguarding the park's ecological and cultural integrity. The challenge lies in finding a sustainable and inclusive approach that addresses these concerns and allows for harmonious coexistence between conservation, community rights, and economic development within the park. The chief executive officer of an independent power producer interviewed reflects on the uncertainties surrounding land use in the context of hydrogen production.

"There are unanswered questions around land use: How much land does H₂ production take up? How does the land taken up by H₂ impact land requirements for other sectors such as agriculture, settlement, etc.? We don't want a situation where 10 / 20 years down the line we need land, but all the land has been used up by H₂. If H₂ is not going to inject energy into the grid, we might run out of land for generating

energy for local use on the grid." CEO of a Namibian Independent Power Producing Company.

The CEO's statement underscores the importance of land planning and its potential long-term consequences. The questions posed highlight the need for a comprehensive assessment of how hydrogen production will affect land availability and its potential impact on other essential sectors like agriculture and human settlements. The concern about depleting land resources, primarily for hydrogen production, calls attention to the necessity of a balanced approach to energy projects to prevent land scarcity issues in the future. Moreover, the reference to energy injection into the grid emphasises the need for strategic energy planning that aligns with the nation's energy needs while optimising land use for both local consumption and broader economic goals.

The government of Namibia has finalised an agreement with Hyphen Hydrogen Energy for a project valued at close to \$10 billion through a public tender process and it is alleged the company retains project rights for 40 years. This is the communication about the deal in the public domain and the intricacies of the agreement are sketchy. Allegations have been levelled against the government on lack of transparency, and unwillingness to engage citizens and address concerns in its dealings with the hydrogen project agreements reached, potentially excluding public input and scrutiny.³⁶ The Namibian in its article of 16 August 2023 "*Govt secretive on new green hydrogen-linked projects*" suggests that the secrecy surrounding the meetings between government and German companies might perpetuate historical patterns of resource exploitation, benefiting a select few at the expense of broader societal interests.³⁷ The involvement of foreign investors such as Nicholas Holding Ltd and ENERTRAG, a German-based renewable energy company³⁸ and international corporations underscores the influence of global actors in shaping Namibia's energy landscape. Concerns expressed by the opposition party quarters and pressure groups, including the Legal Assistance

³⁴ <https://gh2.org/countries/namibia>

³⁵ <https://www.rechargenews.com/energy-transition/british-german-developer-wins-tender-to-build-3gw-green-hydrogen-project-in-namibia/2-1-1094767>

³⁶ <https://www.civic264.org.na/news/media/president-hage-geingob-warning-locals-not-to-interfere-in-the-green-hydrogen-project-being-developed-in-tsau-khaeb-national-park>

³⁷ <https://namibian.com.na/govt-secretive-on-new-green-hydrogen-linked-projects/>

³⁸ <https://hyphenafrika.com/shareholders/>

Centre and Landless People's Movement (LPM), regarding nepotism and exclusion from decision-making processes further accentuate the political sensitivity of the situation. The purported secrecy surrounding the green hydrogen project raises questions about how this initiative aligns with Namibia's commitment to a just and equitable transition. Members of another opposition in parliament felt that there was a lot that was not given to the public about the hydrogen deal with Hyphen. The PMD opposition party secretary for information and publicity raised these concerns to the minister of mines and energy

"OUR INQUIRY IS DIRECTED TOWARDS THE OFFICE OF THE MINISTER OF MINES AND ENERGY, URGING THEM TO PROVIDE A COMPREHENSIVE EXPLANATION REGARDING THE DECISION-MAKING PROCESS THAT HAS LED TO THE PRESIDENTIAL ECONOMIC ADVISOR'S SIGNIFICANT EMPOWERMENT WITHIN THE GH₂ NAMIBIA PROGRAMME. THE EXTENT OF AUTHORITY VESTED IN HIM, INCLUDING THE PREROGATIVE TO MAKE RECRUITMENT DECISIONS, IS A DEPARTURE FROM ESTABLISHED NORMS AND RAISES LEGITIMATE QUESTIONS ABOUT CHECKS AND BALANCES. THE OBJECTIVE HERE IS NOT TO UNDERMINE HIS EXPERTISE OR QUALIFICATIONS BUT TO UNDERSTAND THE RATIONALE BEHIND THIS UNPRECEDENTED SHIFT IN AUTHORITY." HON HAMATA PMD PARTY

The sentiments from the opposition PMD Secretary for Information and Publicity raise concerns about the decision-making process within the GH₂ Namibia Programme, particularly regarding the significant empowerment of the presidential economic advisor. The speaker seeks a comprehensive explanation from the Office of the Minister of Mines and Energy, suggesting that this empowerment, which includes the authority to make recruitment decisions, deviates from established norms and prompts questions about the existing checks and balances. The analysis of this quote reveals several key points on transparency and accountability, institutional norms, expertise vs. authority, and checks and balances. In essence, the PMD party highlights the opposition's role in scrutinising government decisions to ensure transparency, adherence to established

norms, and the preservation of checks and balances within the GH₂ Namibia Programme. It reflects the broader democratic process of oversight and accountability in government actions at the same time exposing anomalies in how Green Hydrogen is being deployed in the Namibian economy.

The coincidence is that Tsau Khaeb National Park is also located in an area originally the hub of diamond mining by De Beers. Members of the public are prohibited from entering most of the area despite being a designated national park.³⁹ The utility of the area has many facets which are likely to ignite tensions around the cost-benefit of forgoing mining heavily reliant on carbon emissions and trading in clean energy processes. There is mining activity and it's a game reserve, so the hydrogen project will be an additional tier of land utilisation. Energy transition to green hydrogen is likely to render the fossil fuel industry dysfunctional together with its associated economic contributions to Namibia, job losses and redundancy. It is evident even at a global scale that the economic ramifications faced by the fossil fuel industry due to climate stabilisation efforts have potential losses, including stranded assets and reduced profits, for firms and governments engaged in fossil fuel extraction.⁴⁰ In a discussion with an energy expert working on the modalities for green hydrogen in Namibia, he mentioned that.

THE FULL REALISATION OF THE ENERGY TRANSITION MEANS THE DEATH OF THE FOSSIL FUELS INDUSTRY. THE "OIL LOBBY" SURELY HAS A BIG PROBLEM WITH THE ENERGY TRANSITION. THERE IS NO DOUBT THAT INVESTORS AS WELL AS OTHER BENEFICIARIES OF THE FOSSIL FUELS INDUSTRY ARE AT LOGGERHEADS WITH ENVIRONMENTALISTS AND OTHER PROPONENTS OF THE ENERGY TRANSITION. (ENERGY EXPERT, NAMIBIA)

Moreover, there is a risk that employment opportunities for locals in the region can be unequally distributed to people from other regions due to the alleged nepotism and because local people around the park are unlikely to be trained which may result in the elite capture of the hydrogen jobs. Besides local tensions,

³⁹ Hardy, Paula; Firestone, Matthew D. (2007). *Lonely Planet Botswana & Namibia*. Lonely Planet. p. 358

⁴⁰ Hansen, T. A. (2022) Stranded assets and reduced profits: Analyzing the economic underpinnings of the fossil fuel industry's resistance to climate stabilization. <https://doi.org/10.1016/j.rser.2022.112144>

another area with the potential to ease the tensions is technical capacity building which the next part explores as both an enabler and an opportunity to call for equitable partnerships. The national park where the hydrogen project will be based was mainly occupied by the minority ethnic group, the Himba people who are mainly hunters and gatherers. The Himba people, an indigenous community with a unique cultural heritage and natural relationship with their environment as hunters and gatherers, are at risk of experiencing disproportionate representation or exclusion in the Hydrogen Project in Namibia. As the project unfolds, it is essential to prioritise inclusive participation and engagement with the Himba community to ensure that their voices, rights, and interests are respected and safeguarded throughout the project's development and implementation. This approach aligns with principles of equity, social justice, and cultural preservation, fostering a more inclusive and equitable green transition for all stakeholders involved.

Technical Capacity Building

The capacity-building aspect emerges as an essential enabler. Building local capacity for regulating the new hydrogen sector and technology transfer becomes a strategic approach for ensuring Namibia's long-term sovereignty. Skill development, knowledge exchange, and technology localization can enhance the overall sustainability of the hydrogen industry. A more beneficial relationship between Namibia and the EU involves not only technology transfer but also focused investment in human capital, thereby ensuring mutual benefits. The Federal Ministry of Education and Research in Germany is set to allocate up to 40 million euros in funding from the Economic Stimulus and Future Package to support collaborative efforts within the context of this partnership⁴¹. This substantial financial commitment illustrates the government's keenness to promote cooperation in addressing vital human capital challenges and advancing mutual objectives. Namibian scientists will benefit from funding for

research and acquiring skills in German universities. The allocation of 40 million euros represents a strong commitment to foster research, innovation, and development activities that align with the partnership's goals. The current dependency on both technical and financial investment in human capital puts Namibia in a precarious position in terms of enjoying the full benefits of the hydrogen transition. The skills gap and needs analysis commissioned by GIZ in August 2023, noted a mismatch between Namibia's education sector and the technical capacity needed in the hydrogen sector.⁴²

The realisation of Namibia's green hydrogen potential is projected to generate a substantial number of jobs, with an estimated 85,000 direct employment opportunities by 2030, expanding to 185,000 by 2040.⁴³ These positions would primarily span construction, business services, transportation, and durable manufacturing sectors, alongside the creation of about 60,000 indirect jobs due to heightened economic activity. However, an underlying skills gap could impede the full harnessing of this potential. Current projections suggest that Namibia's available workforce by 2030, if left unaddressed, would comprise around 25,000 to 30,000 unskilled workers, 5,000 to 10,000 low-skilled workers, and a similar number of skilled workers, including fresh STEM graduates. This leaves a considerable talent gap of 55,000 to 60,000 workers, a number that could surge to 120,000 to 130,000 by 2040. Addressing the skills gap is crucial to unlocking the transformative potential of the green hydrogen industry in Namibia while ensuring that the workforce is equipped to contribute effectively to the country's energy transition and economic growth. Therefore, the question would be whose jobs are the just energy transition creating for if most locals are not skilled to the levels required for the new industry. The 40 million euros funding pledged by the Germany government without a concurrent effort to provide the necessary training and education to the Namibian workforce, the pledged funding alone may not be sufficient to bridge this gap effectively. A comprehensive skills development strategy is needed to address this issue.

⁴¹ <https://hydrogen-central.com/namibia-germany-hydrogen-deal/>

⁴² Enhancing Employability: Skills Needs and Gap Analysis in Namibia's PtX Sector and Recommendations for a Skills Development Programme (2023). GIZ

⁴³ Green Hydrogen and Derivatives Strategy, 2022. The Ministry of Mines and Energy, Republic of Namibia. pp. 38-39

The long-term sustainability of this investment is a concern. There should be a clear strategy in place to ensure that the initiatives funded by Germany result in a self-sustaining and locally-driven human capital development framework, rather than perpetuating dependency on external support.

To address the skills gap, one of the obligations of Hyphen Hydrogen Energy is to secure the project's financing, oversee its construction, and assume responsibility for its ongoing operation and maintenance⁴⁴. Additionally, the green energy provider will bear responsibility for the project's technical, financial, environmental, social, and commercial execution. The challenge with this arrangement is that external capacity-building programs often come with pre-defined objectives and methodologies that may not align with the specific needs and priorities of African nations. This lack of local ownership and control can lead to a disconnect between the training provided and the actual requirements of Namibia. Capacity-building initiatives can inadvertently contribute to the "brain drain" phenomenon, where skilled individuals who receive training find the industrial growth in Namibia not developing at a proportional rate to the expertise gained and are naturally attracted to the high-tech countries. Brain drain is likely to happen where the trained workers often find work culture, health and safety conditions more conducive in high-tech countries than in developing nations. Health and safety conditions in allied energy industries in Namibia such as charcoal production have shown exposure to dust resulting in respiratory symptoms⁴⁵. This may call for in-country labour, health and safety conditions during this transition to hydrogen otherwise employees in Namibia will bear the burden of producing hydrogen for export at a competitive rate at the expense of their health and safety.

Sustainability challenges are often inevitable given the limited time limits of programmes and focus on long-term investment may not be a priority of external partners. Once the external support ends, there may be challenges in maintaining and expanding the capacity that has been built. Sustainability also

depends on governance and institutional capacities in place within the hydrogen sector which is discussed in the following section.

Governance and Institutional Capacity

Currently, Namibia faces substantial challenges in the governance, policy, and regulatory aspects of green hydrogen development. While the government has put in place the Green Hydrogen and Derivatives Strategy in November 2022, the absence of specific regulations under the "fit for purpose regulatory and institutional framework" to guide hydrogen-related activities in the country poses a significant hurdle for potential investors. Relying solely on verbal assurances and promises is insufficient to instil confidence in the investment landscape. To foster a more favourable environment for business activities, there is an imperative need for practical, accessible approaches. While the prospect of 40-year concessions, as indicated in Namibia's call under the Southern Corridor Development Initiative, may attract interest, substantial progress is unlikely to materialise without the establishment of robust legal and regulatory frameworks tailored to support hydrogen-related investments⁴⁶.

Namibia's burgeoning green hydrogen sector has witnessed the emergence of a cluster of key institutions, reflecting both the promise and complexity of this transformative industry. However, the challenge lies in the lack of clear-cut linkages and distinct roles among these institutions, resulting in a fragmented governance landscape. Among these entities are Hyphen Hydrogen Energy (Pty) Ltd, a private company spearheading a major hydrogen project, the now-inactive Namibian Green Hydrogen Research Institute, the Namibia Green Hydrogen Association, the Namibia Green Hydrogen Council, and the recently launched Green Hydrogen Implementation Authority Office. Alongside these, the Daures Green Hydrogen Village and the Clean Energy Solutions Namibia further diversify the landscape. While these institutions collectively represent a significant commitment to green

⁴⁴ <https://www.world-energy.org/article/33632.html#:~:text=Government%20of%20Namibia%20has%20permitted,total%20investment%20of%20%2410%20million.>

⁴⁵ Hamatui, N., Naidoo, R. N., and Kgabi, N. 2016. Respiratory Health Effects of Occupational Exposure to Charcoal Dust in Namibia. Taylor & Francis doi:10.1080/10773525.2016.1214795

⁴⁶ Namibian Investment Promotion and Development Board, NIPD, Southern Corridor Development Initiative, Market Sounding for Request for Proposals, 10 June 2021, <https://www.readkong.com/page/southern-corridor-development-initiative-scdi-namibia-6563952>

hydrogen, harmonising their roles and responsibilities remains a complex task, raising questions about effective governance in Namibia's rapidly evolving hydrogen sector.

Crucially, the formulation of hydrogen-related quality standards is an indispensable component of forthcoming legal provisions and regulations. These standards should encompass both upstream and downstream requirements, encompassing aspects such as the safe handling, storage, transportation, and further processing of hydrogen, as well as product purity specifications and comprehensive greenhouse gas emissions accounting throughout the entire production process. Additionally, mechanisms for certifying the origin of hydrogen for export must be addressed. Namibia recognises the urgency of this challenge and is poised to introduce regulations designed to create an enabling environment that unlocks the nation's hydrogen potential. In an interview with an electrical engineer with extensive experience spanning the entire electricity supply chain who has witnessed the dynamic evolution of the energy sector firsthand and CEO of a leading company that initially carved its niche as an independent power producer (IPP) in the solar industry. He commented on the lack of synergies among institutions and clear links to development frameworks of the hydrogen sector in Namibia

"THE H₂ PROJECT DEMANDS SIGNIFICANT INVESTMENT, YET THE FUNDING MECHANISM REMAINS UNCLEAR, LEAVING TANGIBLE PLANS IN A STATE OF UNCERTAINTY. FURTHERMORE, THE MISALIGNMENT OF H₂ PLANNING WITH EXISTING ENERGY STRATEGIES, SUCH AS NAMPOWER'S FOCUS ON DEMAND GROWTH AND INCREASED RENEWABLE ENERGY GENERATION, RAISES QUESTIONS ABOUT ITS INTEGRATION INTO THE NATIONAL ENERGY LANDSCAPE. IN ESSENCE, H₂ EMERGES AS MORE OF AN ECONOMIC DEVELOPMENT ENDEAVOUR THAN A CONVENTIONAL ENERGY TRANSITION PROJECT."
(IPP ELECTRICAL ENGINEER)

Under the proposed Synthetic Fuels Act, Namibia aims to define standards in alignment with international guidelines, reducing operational uncertainties for developers while establishing quality levels compliant

with international export market demands.⁴⁷ The Act is expected to institute transparent oversight activities, including equitable access to land and permit procedures for renewables and hydrogen, transparent procurement systems, and ensuring fairness for investors and local communities while safeguarding environmental and safety concerns. Collaborative development with both private and public sector stakeholders will be encouraged, with potential measures such as adjustments to transmission and distribution fees for hydrogen producers to account for ancillary grid services or mechanisms compensating developers for excess renewable energy capacity in specific areas. Furthermore, the Act will introduce frameworks for pilot projects where regulatory frameworks are not yet in place.

Derisking Development And Investment Framework For Hydrogen

In the global push to expand the use of green hydrogen, there is a growing interest in the role of governments, particularly in low- and middle-income countries, in creating development opportunities. Many African nations have expressed ambitions for green industrialization, relying on strategies known as 'derisking' to attract private investment. Derisking aims to make these investments more appealing to private capital by reducing risks. However, in the Namibian case, during COP27 in Egypt in November 2022, Namibia unveiled the SDG Namibia One Fund, a \$1 billion initiative developed in collaboration with two official Dutch development entities, Climate Fund Managers and Invest International.⁴⁸ This fund is designed to leverage concessional capital for attracting private investments in green hydrogen and kickstarting Namibia's green industrialization plans, as outlined by the newly established Green Hydrogen Council. It can be argued that this approach, while attracting investment, may weaken the state's ability to steer private capital toward sustainable green industrialization. There is a need for alternative strategies, like public ownership and partnerships, to guide and regulate

⁴⁷ GreenHydrogenandDerivativesStrategy,2022.TheMinistryofMinesandEnergy,RepublicofNamibia.p.39

⁴⁸ Gabor,D.andN.S.Sylla,2023."DeriskingDevelopmentalism:ATaleofGreenHydrogen"DevelopmentandChange.2.<https://onlinelibrary.wiley.com/doi/pdf/10.1111/dech.12779>

green industries. This shift is vital to prevent powerful foreign investors and global North governments from dictating the terms of green hydrogen development in the global South, potentially perpetuating debt vulnerabilities.

To forge an equitable and just green hydrogen transition amidst multifaceted challenges, Namibia must tread carefully. While streamlining regulatory frameworks and incentivising private investment is crucial, depoliticising the green hydrogen narrative risks side-lining essential political discussions and local community engagement. Simultaneously, the pursuit of derisking developmentalism necessitates vigilant oversight to prevent powerful foreign actors from dictating the terms of development, potentially exacerbating external debt vulnerabilities. Namibia's

government must strike a delicate balance by enacting and enforcing inclusive policies that address environmental, social, and economic risks. Local communities should actively participate in decision-making processes, safeguarding their interests. Public-private partnerships should be structured to ensure equitable benefits. Investment in education and skills development is pivotal for a knowledgeable workforce, and international cooperation is vital for technology transfer and infrastructure development. This call to action implores Namibia's government to navigate these complexities with foresight and diligence, fostering a just and sustainable hydrogen transition that aligns with its broader green energy ambitions.

Key Issues, Tensions and Opportunities to Strengthen Europe-Africa Relationship

Regaining and Boosting Trust in an Africa-EU Relationship

EU-Africa Relations span centuries with trade and colonial interactions. Most African countries fought for their independence after several struggles. China, Cuba, USSR (or Russia) at the time supported Africa's fight for Independence or self-rule. Africa's colonial History and its resultant high inequality levels generate mistrust in terms of dealing with European countries that have trade and industry footprints in the country⁴⁹. These trust issues may have improved with continuous engagements, however, since there are foreign competing interests from China, the USA and from within Africa (AfCFTA)⁵⁰, the EU must be deliberate about increasing trust with Africa using acceptable diplomatic strategies that are honest and genuine. China's relationship with Africa has deepened over the years and there are several Chinese interests

in various sectors of the Namibian Economy including mining, energy, agriculture and fishing. Chinese soft diplomacy and the involvement of its national entities to engage African Governments as well as its seemingly flexible financial support constitute its strategies for increasing its footprint in the region. The EU's type of governance and ideology and its support mechanism for Africa is quite different from that of China. The EU will have to reconsider its strategies and move up the "preference ladder" to better collaborate and invest in Africa. First, holding its firms that invest in Africa accountable and supporting African Governments and firms technically and financially during compliance breaches in all spheres (including labour, environmental, health and safety, financial conduct etc.). African regional blocs have intensified their trading arrangements and even formed a centre of continental African trade. AfCFTA is determined to facilitate and increase trade and investments within Africa and its

⁴⁹ <https://www.cgdev.org/blog/decolonising-eu-africa-relations-pre-condition-true-partnership-equals#:~:text=Commentators%20across%20the%20continent%20accuse,true%20equals%E2%80%9D%20with%20African%20states.>

⁵⁰ AfCFTA is an agreement signed by 54 AU countries and aims to remove barriers and enable intra-African trade and investment.

sub-regions. As highlighted earlier, Africa's renewable energy resources and the energy needs and security of advanced countries, the stakes for collaboration and investing in Africa are high and the EU will have to reorientate its approaches to maximise mutual benefits for itself and Africa.

Enabling Africa's Energy Transition Planning and Financing

The financial burden of the energy transition is a challenge for most countries including Namibia and those from the EU. At the same time, there are opportunities to realise substantial financial and socio-economic benefits from the green industrialisation agenda⁵¹. A good transition plan must be supported by a realistic and robust financial strategy. The EU and Africa have always transacted financially through loans, grants and committed funds to development partners including the International Monetary Fund (IMF), the World Bank and its affiliates, the European Investment Bank and European Commercial Banks. Relating to the trust issues discussed earlier, there are suspicions about the impact and conditions attached to loan facilities that come from these institutions. The conditions precedent and after disbursing deficit financing funds have been conceived to be a conduit to manipulate African Economies which could be detrimental in the long run. A case in point is the discourse on tensions and implications of the much-touted structural adjustment programmes (SAP) in African countries (Ghana, Nigeria and Kenya) in the 1990s. To date, there are mixed feelings about SAP regarding the cost and benefits as well as the process for accountability during the privatisation and corporatisation drive. The notion of home-grown policies emerged where local knowledge is optimised to reach a restructuring solution. Nonetheless, the EU and its funding agencies have been successful in funding and supporting several projects in several sectors including energy, agriculture, and finance. The first and most important step to support African countries will be to honour the climate change funding

commitments. This step will engender more credibility for EU countries and could manifest the EU's genuine ambitions for climate change cooperation and support for Africa. On the other hand, Africa needs to prepare and improve its State Owned Enterprises and their financial situation to meet the minimum requirements for funding. Restructuring state-owned utilities that are in financial distress and injecting efficiency could increase their eligibility for funds. The EU could support Africa by building capacity and supporting the process of reviving energy utilities that are key to the success of the energy transition. Based on the EU's experience and financial capacity, the community could participate in and support negotiations for funding to ensure there is value for Namibia during trading and financial transactions with its governments and companies. Nonetheless, it is important that a holistic plan for energy and its related sectors be executed, and a detailed financial strategy applied to realise the green industrialisation agenda. The EU could support Africa in preparing detailed energy transition plans and financial strategies.

Building Capacity for the Green Industrialisation

Namibia's situational analysis reveals that Namibia does not have the capacity and skills to achieve the green industrialisation agenda. With the electricity and hydrogen sectors, both high-skilled and low-skilled human resources are in short supply. This challenge also presents an opportunity for migrants to work in Namibia. However, presents labour and migration challenges that require policies and strategies that will ensure a just transition. The EU is experienced in dealing with labour and migration issues and could partner with Africa to plan and manage the related challenges. Namibia's labour and migration experience in the mining sector is not impressive, and this experience could be transferred to the hydrogen and electricity sectors.

Research, innovation and development need to complement green industrialisation activities and operations. The capacity of Namibia in research

⁵¹ <https://iea.blob.core.windows.net/assets/5afce034-9bd7-451a-ac361b35c63aaf5e/FinancingCleanEnergyinAfrica.pdf>

and innovation is not comparable to that of the EU. Therefore, an integrated human resource plan needs to be prepared for Namibia's agenda. GIZ-working Namibian Institutions have commenced work in this area, and more collaboration from other European countries can enrich the plan and strategies. The policies must address how to manage the expectations of the trained and upskilled labour and facilitate retention of labour instead of a brain-drain effect. In terms of innovation, the EU can support Namibia in drafting a robust and inclusive policy to stimulate research and innovation in the electricity and hydrogen sectors that address funding, intellectual property rights and capacity building.

The regulatory burden of the transition is huge, and Namibia requires expertise to design regulations and standards of products and markets to enable the transition agenda. Namibia has demonstrated capacity in various aspects of the transition, but the future regulatory requirements could be severe. For the massive investments in the electricity sector, Namibia will need expertise and capacity in designing the procurement process and the hydrogen and electricity sectors. The EU has matured electricity markets and could support Africa and Namibia to build capacity in these areas.

EU-Namibia Partnership for Green Industry Technology Transfer and Management

The EU-Africa technology partnership has been unidirectional with the EU leading and transferring innovation in products and services. The power dynamics and the capacity of the less technologically advanced country, party, or firm could be over-exploited to create tensions. However, globalisation and integrated markets provide information on competitors of the dominant party which supports decision-making and reduces over-exploitation. International standards and reliable platforms for trading technological products and services have contributed to reducing exploitative behaviour. However, where governance is impaired, exploitative behaviour could persist. In the short term, the EU could benefit from supplying, installing, and managing solar, wind and hydrogen-related technologies. However, in the long term, certain products and services could be manufactured, installed and managed by Namibian industries, firms and experts. For this inclusiveness to be achieved, the integrated human resource plan and the local content and public procurement legislations and laws should be reviewed and reinforced. To engender trust, both parties should be responsible for enforcing transparency and compliance with contracts.

Recommendation and Way Forward

In navigating the intricate terrain of the just energy transition to hydrogen in Namibia, a set of vital recommendations emerges, addressing various critical aspects of this transition. These proposals encapsulate the imperative need for robust green skills development, fostering the growth of the EU-Namibia relationship, refining governance and policy frameworks to align with Namibia's unique context, and addressing concerns surrounding de-risking development. Each recommendation is designed to ensure that the transition is not only just but also equitable, all while embracing the paramount importance of environmental protection. The current environmental regulations in the country need significant improvement to

establish stricter standards aimed at safeguarding the local environment. However, challenges exist in this regard, notably the lack of institutional capacity and accountability to enforce and oversee these regulations effectively. To pave the way forward, enhancing Namibia's environmental governance and regulation framework should be a priority, thereby facilitating a greener, more sustainable future for the nation. The following specific recommendations are drawn for consideration for Namibia's energy transition.

- ▶ **Prioritise Green Skills Development:** Invest significantly in education and skills development programs tailored to the green hydrogen sector and its value chain. Collaborate with institutions locally,

regionally, and internationally in an equitable fashion that fosters a win-win situation to nurture a skilled workforce capable of driving the hydrogen economy.

- ▶ **Enhance EU-Namibia Collaboration:** Strengthen ties with the European Union and explore avenues for mutually beneficial partnerships, including technology transfer, funding support, and knowledge exchange. Leverage the EU's commitment to climate action and sustainable development to advance Namibia's hydrogen agenda.
- ▶ **Contextualise Governance and Policy Frameworks:** Craft comprehensive and context-specific policies and regulations that address environmental, social, and economic concerns while fostering investor confidence. Involve local communities in decision-making processes to ensure their interests are safeguarded.
- ▶ **Mitigate Derisking Development Risks:** Exercise vigilance in overseeing derisking development initiatives to prevent powerful foreign actors from dictating the terms of development, which can potentially increase Namibia's debt. Balance the pursuit of private investment with public oversight.
- ▶ **Promote Inclusivity and Equity:** Prioritise inclusive development strategies that benefit all segments of Namibian society. Public-private partnerships should be structured to ensure equitable distribution of benefits, and mechanisms should be established to empower local communities and protect their rights throughout the hydrogen transition.
- ▶ **Prioritise labour, health and safety standards:** To ensure a just energy transition in Namibia's hydrogen sector, it is crucial to prioritise the welfare of workers and uphold the highest health and safety standards. Implement stringent labour regulations and standards to safeguard the rights of hydrogen sector employees, including fair wages, reasonable working hours, and safe working conditions. Moreover, establish comprehensive health and safety protocols tailored to the unique demands of hydrogen production,

These recommendations chart a course for Namibia's just energy transition to hydrogen. By investing in green skills, strengthening international collaborations, crafting tailored governance frameworks, mitigating development risks, and prioritising inclusivity, Namibia

can navigate the challenges and opportunities of this transition while encouraging a sustainable, equitable, and prosperous hydrogen future for its citizens.

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Appendices

Appendix A: Namibia's energy resources

Energies	
Coal	Coal occurs in Kaokoland, Omwambo, Kavango and Caprivi, the Huab Basin (western Damaraland), the Waterberg Basin and the Aranod Basin. Considerable amounts of technical data exist in most of these areas.
Renewable Energy Wind Energy Solar Energy Bioenergy	Wind: High, constant wind speeds provide the right ideal conditions to invest and operate wind power plants- particularly around the south coast and the coastal regions near Angola Solar: Solar irradiation records impressive values between 2200 and 2400 kWh/m ² Biomass: Namibia abounds in biomass resources. Encroacher bush is found in the north-central and central regions. This bush occupies about 45 billion hectares and produces commercially sustainable volumes.
Oil and Gas Resources	Currently, Namibia imports oil, natural gas and Liquefied Natural Gas (LNG). However, the discovery of sizable quantities of 11 billion barrels of oil and 2.2 trillion cubic feet of natural gas reserves. the oil and gas sector has the potential to transform Namibia's economy and reduce energy poverty ⁵²
Uranium	High amounts of economically viable Uranium are estimated at 6.1 million metric tonnes. In 2019, Namibia was fourth in the production of Uranium- producing 54,752 metric tons that year.
Hydropower	There are potential high-scale hydropower resources in Namibia. The Epupa and Baynes schemes studied in 1997 could have a capacity of about 600 MW, while lower-orange and Okavango projects could operate at 108MW.
Geothermal	The data on heat flow coverage and springs' thermal attributes is scanty. However, there are incomplete heat flow patterns in the Damara Belt and adjacent areas. This energy source is anticipated to contribute to the national electricity system

Appendix B: Namibia's vision, plans, strategies and policies

Aims and Goals	
National Development Plan (2017-2022)	The current version of the NDP is fifth (NDP5). The plans reflect the objectives and aspirations of Vision 2030 - Namibia's long-term vision. NDP5 is, therefore, a continuation of the previous NDPs and envisions achieving inclusive, sustainable, and equitable economic growth, building capable and healthy human resources, ensuring a sustainable environment, and enhancing resilience, and promoting good governance through effective institutions. The NDP5 aims to avoid the "middle-income trap" ⁵³ which can worsen inequalities in Namibia. In the first pillar, it envisions increasing investments in infrastructure development. It acknowledges the country's inadequate energy supply and aims to increase electricity generating capacity by transforming the power sector to attract independent power producers (IPP). The objective is to increase energy security and reduce electricity prices to enable domestic firms to compete internationally.
National Integrated Resource Plan (2022)	The NIRP contains medium and long-term generation and demand-side investment scenarios. It gives a picture of current and future supply-side and demand-side options required to meet future electricity demand. The goal is to plan to meet future electricity generation but guided by sustainability, cost-effectiveness and reliability. The NIRP 2022 is focused on the national electricity market and not on identifying commercial opportunities for exporting electricity directly (e.g., through large solar parks) or through energy products (e.g., hydrogen or ammonia) derived from RES.
Harambee Prosperity Plans (HPP1, HPP2)- 2021-2025	HPP2 is birthed out of HPP1, and it has five pillars that are anchored on inclusivity built on peace, stability, and the rule of law. HPP2 pillars include effective governance, social progression, infrastructure development, and international relations and cooperation. For Pillar 2, the Plan aims to redress inequality and reduce poverty by facilitating inclusive and sustainable levels of economic growth. The aim of Goal 3 of Pillar 2 (Economic Advancement) includes enhancing stewardship of Namibia's natural resources, increasing the productivity of sectors, and developing new sectors to create more employment opportunities and increase economic output. In Goal 2 of the EAP, the country aims for a secure and cost-effective energy supply resulting in several planned investments in Renewable Energy and strengthening policymaking and regulation in the power sector. Goal three aims to develop complementary sectors and has activities centred on green and blue economy investments. It aims to venture into green hydrogen and ammonia.
National Renewable Energy Policy (NREP) (2016)	To guide the government on how to develop the Renewable Energy sector and increase renewable energy in the electricity mix. The main objectives include using Renewable Energy to increase access to affordable electricity, increase investor confidence in the RE sector, enhance the value chains in the sector, to safeguard the job and investment benefits for Namibians. The NREP has a goal of increasing Namibia's energy security by increasing internally generated RE and increasing energy cooperation between Namibia and other countries. It has a 70% target for RE generation. The National Integrated Resource Plan (NIRP) will guide this investment.
Nationally Determined Contribution (2021)	Namibia has committed to reducing its GHG emissions conditionally by at least 91% of its BAU scenario by 2030. The energy sector is envisaged to reduce its emissions by about 12%.

⁵² <https://www.namibiaoilandgasconf.com/about>

⁵³ "Middle-IncomeTrap"referstothestagnationofacountrywithincertaindevelopmentbracketbecauseitisunabletotakeadvantageofthebenefitsandfeaturesthatthathigherclasspresents.

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Solidarity for prosperity