2024

BRIEFING PAPER

Renewables Policy and Practice:
A LOOK AT NAMIBIA

Photo: NOW Engineering Solutions

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Renewables, their potential as primary energy sources, and their role in sustainability have historically taken a backseat in global energy agendas. Renewable energy is energy derived from natural sources that are replenished at a higher rate than they are consumed. Unlike finite fossil fuels, renewables are primed for sustainability because they are diverse enough to serve the full range of energy needs while creating significantly less greenhouse gas emissions. This lessens the disruption of the planet's atmospheric energy balance and in turn, facilitates the sustainable and long-term mitigation of climate change[1].

Namibia currently imports up to 70% of its electricity from neighbouring countries including South Africa and Zambia. Like most Southern African countries, a large proportion of the electricity used is generated from fossil fuel sources like coal. However, as the climate crisis calls for action across the planet, nations have become incentivised to rethink the norms of energy extraction and supply. Namibia is a nation that is undeniably naturally positioned for a thriving renewables sector.

Namibia's location uniquely aligns it with abundant renewable resources. Located on the southwest coast of Africa, the Benguela current creates high-speed winds and its subtropical desert climate positions it to receive a wealth of sunlight. This natural endowment along with a need for Namibia to reduce its dependence on electricity imports and minimise negative impacts from fossil fuel-heavy energy supply has historically incentivised the government to increase the country's share of renewable energy.

Currently, almost 300,000 households have no access to electricity. Renewable energy can bridge the access to electricity gap by providing off-grid energy options for the population. As shown by national initiatives, it can also help to transform Namibia's economy if executed efficiently. This briefing paper presents the landscape of Namibia's renewable energy sector focusing on policy, practice and career opportunities.

Renewables Landscape in Namibia

Namibia has had a long history with renewables due to its natural endowments and more recently, efforts to mitigate the effects and adapt to the requirements of a changing climate. There have been five key policies and initiatives guiding the trajectory of Namibia's renewables sector. These are the White Paper on Energy Policy (1998), the Renewable Energy Feed-In Tariff (REFIT) Programme (2011), the National Renewable Energy Policy (2017) and the Namibia Green Hydrogen and Derivatives Strategy (2022).

One of the earliest renewable energy policy provisions in post-independence Namibia was captured in the White Paper on Energy Policy (1998). The energy policy committee of the Ministry of Mines and Energy developed the white paper. It sought to develop a sustainable sector through the state promotion of renewable energies. The white paper notably highlights hydropower, solar and wind energy as renewable sources that could enable Namibia's economic growth alongside environmental sustainability.

It outlines four main goals:

- Social upliftment through off-grid electrification of rural households using solar power
- Achieving economic efficiency by providing decentralised power options for the grid
- Ensuring security of supply by diversifying energy sources
- Promoting environmental sustainability through the efficient use of biomass and solar water heaters

The white paper also highlighted two key challenges to renewable energy policy: institutional challenges and development challenges. The institutional challenges included the lack of an institutional framework that promotes the balanced use of all forms of energy including renewable energy, the lack of financing systems for renewable energy applications and the limited coordination among ministries engaged in energy provision. The developmental challenges covered limited access to energy particularly in rural energy and limited self-sufficiency in the energy sector.

The Renewable Energy Feed-In Tariff (REFIT) Programme was initiated by the Electricity Control Board (ECB) and finalised in October 2015. It was designed to increase investments in renewable energy technologies by offering long-term contracts to renewable energy Independent Power Producers (IPPs)[2] . Through this policy programme, NamPower signed 14 Power Purchasing Agreements (PPAs) with various Independent Power Producers. It addressed one of the major institutional challenges in the sector by contracting independent power producers to develop renewable energy assets.

The National Renewable Energy Policy, launched in 2017, sought to guide how the state would develop the renewable energy sector and scale up the contribution of power from renewable energy sources in the national grid. It lays the groundwork for a National Renewable Energy Act for Namibia, legislation that has yet to be enacted.

1. The United Nations Framework Convention on Climate Change, Renewable Energy Sources and Climate Change Mitigation special report, 2012. https://www.ipcc.ch/site/assets/uploads/2018/03/SRREN_Full_Report-1.pdf
2. Jan-Barend Scheepers, Namibia's Renewable Energy Feed-In Tariff (REFIT) Program, 1 year in . Economic Association of Namibia, October 2016. (https://ean.org.na/download/namibias-renewable-energy-feed-in-tariff-refit-program-1-year-in-jan-barend-scheepers/)

The policy's main objectives included:

- It aims for 70% or more of electricity generated in the country to be from Renewable Energy sources by 2030.
- It commits to undertaking periodic evaluations of the suitability of Namibia's 121 constituencies within the 14 regions for grid extension and grid-based renewable projects.
- It commits to prioritising the use of non-electricity sector renewable energy including the use of renewables for thermal energy and domestic, industrial, and transportation fuels.

The policy connects Namibia's renewable energy objectives to Vision 2030 and the commitments in the UN Sustainable Energy for All (SE4ALL).

The Namibia Green Hydrogen and Derivatives Strategy was launched at COP27 in 2022. The strategy outlines Namibia's plan to produce 10-15 MTPA (million tonnes per annum) of green hydrogen as well as its derivatives by 2050 at highly competitive costs. It aims to export hydrogen products including ammonia, methanol, synthetic kerosene and hot- briquetted iron (HBI) to international markets[3]. It also outlines the national plans to produce cost-effective electricity from green hydrogen. The strategy hinges on Namibia's ability to produce hydrogen at a long cost by utilising its upper hand as a country with rich solar and wind resources.

Its key objectives include:

- Establishing an appropriate and fit-for-purpose structure to help develop the green hydrogen industry. The structure will address planning, procuring, and monitoring future green hydrogen projects.
- The crafting of a Synthetic Fuels Act: legislation that will align Namibia's green hydrogen offerings with international green fuel, certification, health and safety, and environmental standards.
- The capacitation of Namibian citizens through training programmes and local content policies to promote sourcing from local companies.

Amongst all renewable energy strategies, Namibia's green hydrogen strategy has received the most pushback. This includes concerns over the lack of transparency surrounding the negotiation agreements with tender partners, questionable job prospects as foreign experts are expected to dominate senior positions and displacement of people living in territories earmarked for projects[4].

Spotlight on Renewable Energy in Practice

a) Solar Energy

Photo: Prysmian Magazine

Namibia is especially well positioned for solar sources of renewable energy. The country sees almost 300 sunny days and over 3 000 hours of sun per year. As a result, our annual solar irradiation reaches values from 2 200 to 2 400 kWh/m². To put this into perspective, the amount of sunlight received by only one square metre of Namibian land over a year holds the energy equivalent to powering a significant portion—around 20-24%—of a typical household's annual energy needs.

Namibia's first solar power plant was inaugurated in 2015 through the REFiT system. InnoSun Energy Holdings opened the Omburu Solar PV Park in May with an installed capacity of 4.5 MW, generating 13,500,000 kWh a year. The Park covers 40 hectares and contains more than 33,000 panels. The current produced by the panel is converted into alternating current, boosted by transformers, transported onto a power line, injected into the Omburu transmission substation and then sold to NamPower. The plant is expected to run independently until 2040 after which it will be handed over to NamPower.

The Otjozondjupa Solar Park was developed by HopSol Africa in 2016. It was the largest solar park at the time with a 5 MW installed capacity. Containing 52,080 panels, the park supplies 14,000,000 MWh of electricity per year to NamPower.

3. Ministry of Mines and Energy Namibia, 2022. Namibia Green Hydrogen and Derivatives Strategy (https://www.ensafrica.com/uploads/newsarticles/0_namibia-gh2-strategy-rev2.pdf)
4. Michael Reiders, Trevor Langat and Everlyn Njoroge, 2023. Green Hydrogen: Namibia's gateway to a clean energy future (https://www.controlrisks.com/our-thinking/insights/green-hydrogen-namibias-gateway-to-a-clean-energy-future?utm_referrer=https://www.google.com)

In 2018, the first twin solar PV plants in Namibia were opened in Gobabis in the Omaheke region. Ejuva One and Ejuva Two solar PV each have an installed capacity of 5 MW[5]. They have the capacity to feed 25.8 GWh into NamPower's grid each year. Other notable plants under the REFiT systems include Osona PV (5MW), Aloe PV (5MW), Alten PV (5MW), Ombepo Wind (5MW) and Metdecci PV (5MW). 13 out of the 14 REFiT agreements cover solar PV plants. In total the REFIT IPPs feed 173 Gwh units of electricity into the Namibian grid, making solar feed-ins the majority[6].

In June 2022, the Omburu 20 MW PV Power Plant was opened by NamPower. It was developed under the mandate of the NamPower 2019-2023 Corporate and Strategic Business Plan and is owned and operated by the national power company. The plant, which occupies 40 hectares, is designed to supply 67.8 GWh of clean energy annually. Finally, Namibia and Botswana are in the comprehensive Regional Market Study phase of the Mega Solar initiative. The project aims to generate 300-500 MW of solar power in Namibia and Botswana.

Despite photovoltaic systems being the preferred form of energy for Namibian producers, there has been a slow uptake of solar energy across the board. The largest constraint is that of infrastructure: Namibia's expansive geography and low population density has presented challenges in the development of necessary infrastructure to support solar energy projects particularly transmission lines and modern grid systems. This means that the capacity for independent power producers to feed energy in the grid is limited as it has become costly to connect PV plants to centres of population and industry. Most PV systems developed on the consumer's premises (embedded generation) have been for self consumption in rural areas and for industry. The development and production of off-grid systems, also known as "mini-grids" is being pursued by through various projects. The Pathway to Renewable Off-Grid Community Energy for Development (PROCEED) is one such mini-grid project that Namibia in collaboration with the German government has undertaken to increase self-consumption efforts in the rural areas. This project which was based in the Tsumkwe and Gam constituencies that both had existing but subpar mini-grid projects running sought to diagnose the problems facing rural areas connected to electricity via mini-grids. The main finding was the continued high expense of tariffs and the persistence of an unclear national ownership model for mini-grids. A major project recommendation included the development of formal teaching programmes in the fields of solar systems technology and electricity storage, especially battery energy storage systems (BESS) in Namibian tertiary and vocational institutions..

b) Wind Energy

The conditions along the Namibian coastal regions, especially on the south coast around Lüderitz and the region bordering Angola, naturally position the country to have good wind resources. Wind farms are primarily located around Lüderitz because of a 1993 programme by the Mines ministry called the "Promotion of the Use of Renewable Energy Sources in Namibia". The project mapped the potential of wind energy for electricity generation and resulted in a 1998 interim report which identified Walvis Bay and Lüderitz as high-potential areas for possible wind park projects[7].

Photo: MIT

Namibia's first wind farm Ompepho was built in the Lüderitz region with a capacity of 6 MW and opened in 2017. It was the only wind power plant developed under the REFiT programme. The project features 3 turbines each of which extend 80 metres high.

In 2020, Namibia approved the construction of four wind power plants in the Tsau //Khaeb (Sperrgebiet) National Park near Lüderitz. This includes the Rosh Pinah Wind Power Station (40 MW) and Lüderitz Wind Power Plant (40 MW) which are being developed under the mandate of the NamPower 2019-2023 Corporate and Strategic Business Plan. The other two are being developed by two IPPs. Most notably, the Diaz Wind Power Project (44 MW) is being developed in a joint venture between United Africa and Quantum Power. The joint venture will also construct a 132kV substation and a 132kV transmission line to transfer the generated electricity to the NamPower substation grid[8]. The construction of these plants is still underway.

In 2023, NamPower signed a 25-year PPA and Transmission Connection (TCA) agreement with Cerim Lüderitz Energy for the development of the 50MW Lüderitz Wind Power Plant on a Build-Own-Operate Basis. The 50MW Lüderitz Wind IPP Power Project forms part of NamPower's planned generation projects under its Integrated Strategy and Business Plan (ISBP) for the period 2020 – 2025. It is planned to be fully operational by July 2025.

The wind potential in Namibia is strategically important because it is the focus of Namibia's green hydrogen ambitions. Wind energy is expected to drive the desalination facilities to provide the water for green hydrogen production in and around Lüderitz.

5. Nampower, 2018. Wattson: Investing in Renewable Energy. (https://www.nampower.com.na/public/docs/wattson/Watts%20On%20Edition%201%202018.pdf)
6. NamPower, 2021. Annual Report (https://www.nampower.com.na/public/docs/annual-reports/NamPower%20Annual%20Report%202021.pdf
7. Ministry of Mines and Energy, Wind Energy (https://www.mme.gov.na/energy/ene_wind.php)
8. Energy Central, 2020. Diaz Wind Power Project (https://energycentral.com/news/diaz-wind-power-project)

c) Hydropower

Photo: SciTechDaily

It is estimated that Namibia's natural potential for hydropower amounts to 2,250 MW. This potential is however largely unused because it greatly impacted by climatic factors. Namibia experiences high temperatures and high rates of evaporation across the board. The territory has also shown itself to be susceptible to extreme events like frequent and prolonged droughts, heatwaves, and floods. These events add an element of unpredictability to Namibia's hydrological resources and undermine our ability to turn our hydropower potential into a reality. However, despite these factors, most of the electricity generated inside the country is sourced from hydropower.

The Ruacana Hydro Power station has an installed capacity of 347 MW[9]. It is located near Ruacana and was commissioned in 1978. It has four turbines, the three initial turbines generate 85 MW each and the final one has a 92 MW capacity. It captures water from the Kunene River. In 2020, the power station accounted for 50% of Namibia's generation capacity.

There are several other hydropower projects lined up for development under the mines ministry's hydro-power master plan, the most notable of which is the Baynes Hydro Power Plant. It is supposed to be developed by the Angolan and Namibian governments on a 50-50 basis and implemented through the Angola-Namibia Permanent Joint Technical Commission (PJTC)[10]. The construction of the plant started in 2023 and it is anticipated to have an installed capacity of 600 MW, with 300 MW allocated to Namibia and 300 MW allocated to Angola. The other projects listed in the master plan including Hombolo (170 MW), Hartman (125 MW) and Marien (230 MW) have not been fully fleshed out[11].

d) Green Hydrogen

Photo: Sintef

Hydrogen as a power source has many variants, however, it is categorised as "green" when it is made with renewable power. Namibia's green hydrogen efforts are centred around three valleys across the country which will form a green fuel ecosystem. Three hydrogen valleys will produce ammonia, synthetic fuels and hot- briquetted iron (HBI) in the southern, central and northern regions[12].

The Tsau //Khaeb National Park Southern Corridor Development Initiative (SCDI) hydrogen project will be housed in the southern valley. It will use wind and solar resources to feed electrolysis and derivative plants for export from Luderitz port connected by a hydrogen pipeline.

The second valley will be located in central Namibia spanning across the Khomas, Otjozondjupa and Erongo regions. The valley will include the Cleanergy Namibia green hydrogen and ammonia production plant in Erongo Region. The plant, whose construction began in September 2023, will produce green ammonia for applications such as heavy-duty transport, including trucks, locomotives, mining equipment and ships. It also aims to turn the Walvis Bay Port into a green ammonia bunkering hub to refuel ships passing the Cape of Good Hope.

Another major project in this valley is also the Renewstable green hydrogen power plant in Swakopmund by the French independent power producer HDF Energy. By 2024, Renewstable plans to use 85 MW solar panels to power electrolysers to produce hydrogen. This will be a carbon-free primary source for the Renewstable power plant. This electricity will be converted into hydrogen using an electrolyzing system during the day, turning water and oxygen into hydrogen. During the night, the plant will use a Hydrogen Fuel Cell to produce electricity from stored hydrogen. All in all, the plant will aim to generate 30 MW of electricity during the day and evening, and 6 MW at night, with 230 MWh of energy storage capacity.

The northern valley requires significant infrastructure investment and development to become a hub of hydrogen production. The Namibian Green Hydrogen and Derivatives strategy identifies Puros in the Kunene region as the hub of this valley due to its

9. Windhoek Observer, Poor performance of Ruacana hydropower plant hikes electricity costs (https://www.observer24.com.na/poor-performance-of-ruacana-hydropower-plant-hikes-electricity-costs/)
10. New Era, 2022. Baynes hydro project spluttering into gear (https://neweralive.na/posts/baynes-hydro-project-spluttering-into-gear)
11. Ministry of Mines and Energy Namibia. Hydro-Power Master Plan (https://www.mme.gov.na/energy/ene_hydropower.php)
12. Ministry of Mines and Energy Namibia, 2022. Namibia Green Hydrogen and Derivatives Strategy (https://www.ensafrica.com/uploads/newsarticles/0_namibia-gh2-strategy-rev2.pdf)

proximity to Cape Fria. The 2024 Namibia Green Industrialisation Blueprint earmarks wind turbine manufacturing and synthetic fuel production as investable industries in the Kunene region. Cape Fria has been earmarked as a possible site for a north-western port for several decades but has not yet been developed.

e) Biopower


Photo: Tara Energy

Namibian policy dating back to the White Paper on Energy Policy (1998) considers bioenergy or 'biopower' as a renewable energy source. In Namibia, bush encroachment affects up to 45 million hectares offering approximately 14 million tonnes per annum that can be harvested - turning an unwanted invasive species into a resource. Invasive bush wood is used for wood gasification and to produce wood chips and pellets. Currently, only 10% of this biomass potential is commercially exploited. However, at about 210,000 tons per annum, Namibia is the world's fifth largest charcoal exporter.

In 2020, there were two major industrial biomass users in Namibia: Ohorongo Cement and Namibia Breweries. Both use wood chips for heat production in their production processes. Namibia Breweries uses a biomass boiler at its main brewery plant in Windhoek. It replaced the use of approximately 4.6 million litres of heavy fuel oil since it was operationalised in 2017. This equates to a CO2 emissions reduction of 12,300 tonnes. The Ohorongo Cement plant near Otavi also utilises biomass.

Nampower plans to develop a 40 MW biomass power plant in Tsumeb. The power station is planned to be fueled by biomass wood chips that will be harvested from an area extending beyond a 100 km radius around the site. It is being developed under the mandate of the NamPower 2019-2023 Corporate and Strategic Business Plan.

There has, however, been limited consensus from scientists about whether or not biopower can be considered an environmentally friendly energy source. As opposed to solar, wind and hydropower which are emissions-free from the start, favouring wood may increase carbon emissions as it is burned by consumers to release energy[13]. Gasification also has a significant carbon emission, on average the carbon emission of biomass is 0.868 kg CO2 e/kWh, which is only 14.7% less than that of coal-powered tech[14].

Job Pathways In Leading Renewables Sectors

Individuals seeking to start a career in the renewables landscape have many options, depending on their area of interest. The renewable energy project life cycle can be divided into these distinct phases: planning and design, manufacturing/construction, operation, maintenance and decommissioning. There are several job prospects available at each point of the projects and Namibians interested in this sector can position themselves at any of these stages across the life cycle and value chain.

The types of jobs available in and around the renewables sector across various stages can be divided into direct, indirect, and induced jobs[15] . Direct jobs are the types of jobs required in and directly associated with the primary renewables industries. Indirect jobs are jobs from sectors that provide the renewables sector with services and upon which the sector's activities depend. This includes infrastructure development, regulation, policy, education and training.

Induced jobs are the sort of jobs that arise from the presence of workers living around renewable project areas, these include service sector and support jobs. It is important to note that a responsible local content policy landscape and the cultivation of the entrepreneurial tenacity of local citizens encourage the creation of induced jobs. Local content policies are the various legislative and regulatory instruments, contracts and licensing arrangements imposed by the government that require firms to purchase and use of input goods and services available locally in that country. For example, citizens may invest in opening up a safety-wear factory for grid connection personnel, start wiring and cable security monitoring enterprises near projects developing new grid connections or sell locally produced crafts to the rising influx of visitors at Lüderitz port.

This section explores the job profiles of key direct and indirect jobs in the sustainable grid sector that are underrepresented in Namibian projects across the wind, PV, and green hydrogen sectors. These three sectors are the promising renewable energy sectors. Person-day labour analysis developed by the International Renewable Energy Agency (IRENA) has helped us identify these key sectors.

[13] Warren Cornwall, 2017. Is wood a green source of energy? Scientists are divided (https://www.science.org/content/article/wood-green-source-energy-scientists-are-divided)
[14] Yuan Wang, 2022. Research on Greenhouse Gas Emissions and Economic Assessment of Biomass Gasification Power Generation Technology in China Based on LCA Method (https://www.mdpi.com/2071-1050/14/24/16729)
[15] International PtX Hub, 2023. Skills needs and gap analysis in Namibia's PtX sector. (https://ptx-hub.org/publication/study-skills-needs-assessment-in-namibias-ptx-sector/)

A person-day analysis shows the labour demand of a project by demonstrating the number of people who work a single shift. A single person-day is one person working a normal working shift, so for example in projects where 10 people are working on the day shift and 10 people on the night shift, this totals 20 person days. The IRENA analysis shows that the project planning stage of a 50 MW wind farm with 2 MW turbines requires at least 2,580 person-days, the component manufacturing stage requires 1,000 person-days, the installation stage requires around 34,500 person-days and finally the continuous operation and maintenance requires about 2,655 person-days per year[16]. Meanwhile, the planning, manufacturing, installation, and operation stage of a PV project requires a total of 229,055 person days, with 56% of these person-days being required throughout the life cycle of the project[17]. The number of jobs associated with Namibia's green hydrogen agenda has been subject to criticism mostly due to the current skills deficit. These numbers also shift occasionally. However, the Namibian green hydrogen commissioner noted that the sector would create 84,000 direct jobs and 60,000 indirect jobs by 2030[18].

This presents these job pathways in terms of educational background, key skills associated with the job and the type of knowledge that a strong candidate would have a grasp of when approaching vacancies in the renewables sector. This design has been chosen to allow readers who are seeking to pivot into the renewables sector to be able to identify and curate their skills by identifying areas where they may seek additional training to supplement their current professional profiles. It also serves as a checklist for those within the sector to ensure they have an expansive range of knowledge and skills to position themselves advantageously in the sector. Finally, annexed to this section is a brief glossary of key companies and stakeholders that work extensively within the Namibian renewables industry.

- **Electrician/ Electrical Engineer (PV)**

  Educational background: Vocational training in electrical works and engineering. Programmes locally available include Electrical General (Level 1-3) at Okakarara Vocational Training Centre, and Bachelor of Engineering in Electrical Power Engineering at NUST.
  Key skills: Use of AutoCAD drawing tools, use of system simulation software, developing and interpreting electrical drawings, designing of electrical control systems including inverters, PV module array and system selection and monitoring skills, installing cable trays, conduits and cables.
  Key knowledge: Project management and scheduling tools, yield analysis, requirements for permits and approval, knowledge of various methods for affixing mounting frames to roof structures, knowledge of steps involved in PV construction phase, knowledge of international and national health and safety standards, electrical regulations and grid codes.

- **Systems Engineers and Grid Connection Engineers (PV and wind)**

  Educational background: Vocational or educational training in electrical engineering. Programmes locally available include Solar Equipment Installation and Maintenance (Level 1-3) at Eenhana Vocational Training Centre, Electrical General (Level 1-3) at Okakarara Vocational Training Centre, and Bachelor of Engineering in Electrical Power Engineering at NUST.
  Key skills: Design and construction of medium voltage electricity grids, modelling and analysing complex electrical systems simulations, effective communication and negotiation skills for engagements with grid stakeholders like NamPower, grid code certification
  Key knowledge: Regional and national grid code, regulations, policies and procedures, ability to use grid modelling and simulation tools, renewable energy plant monitoring and knowledge on renewable energy plant integration into the grid.

- **Projects Developer (PV and wind)**

  Educational background: An educational or vocational background in an engineering discipline, but also other backgrounds such as economics, law, and management. Programmes locally available include: Diploma in Project Management at UNAM, Postgraduate Diploma in Risk Management at UNISA (distance studies), Bachelor in Business Administration and Master of Business Administration in Integrated Natural Resources Management (Resources Mobilizations & Economics) at IUM.
  Key skills: Entrepreneurship, analysing technical and economic project documentation, ability to interpret project financials, strong negotiation skills to manage interaction with landowners to secure sites, with local interest groups to discuss concerns and come up with solutions, with project buyers.
  Key knowledge: Use of project management and scheduling tools, basics of photovoltaic, wind or hydro technology, knowledge of risk management procedures, and good foundational technical knowledge of engineering designs and drawings.

[16] International Renewable Energy Agency, 2017. Renewable Energy Benefits: Leveraging local capacity for onshore wind (https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/Jun/IRENA_Leveraging_for_Onshore_Wind_2017.pdf)
[17] International Renewable Energy Agency, 2017. Renewable Energy Benefits: Leveraging local capacity for solar PV (https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/Jun/IRENA_Leveraging_for_Solar_PV_2017.pdf)
[18] Maihapa Ndjavera, 2023. Green economy to resurrect local construction. (https://neweralive.na/posts/green-economy-to-resurrect-local-construction)

- **Technician/Operation and Maintenance personnel/ technical assistants (Wind)**

  Educational background: Vocational training or academic qualification specialising in mechatronics, electronics and engineering Programmes locally available include: Welding & Metal Fabrication (Level 2-3) at Okakarara Vocational Training Centre, Electrical and Mechanical (Fitting & Turning) training at NamPower Vocational Training Centre.
  Key skills: interpreting technical documentation, analysing and interpreting technical project documentation, ability to work with medium to high voltage equipment, working at heights - job involves climbing wind towers and accessing wind turbines to perform maintenance tasks.
  Key knowledge: Electrical, mechanical and hydraulic components of wind turbines, operations of medium to high voltage equipment, knowledge of control and regulation technology and a basic grasp of wind energy sector standards in Southern Africa.

- **Hydrogen Safety Specialists (Green Hydrogen)**

  Educational background: Vocational training or academic qualification specialising in chemical and environmental engineering, and risk assessment and management fields. Programmes locally available include: Bachelor of Technology in Power Engineering and Bachelor of Engineering in Chemical Engineering at NUST, Electrical General (Level 1-3) at Okakarara Vocational Training Centre, Certificate of Competence in Smart Grid Technology at Stellenbosch University.
  Key skills: Ability to conduct risk assessments for hydrogen-related processes and systems, ability to develop and implement emergency response plans, safety auditing and investigative skills.
  Key knowledge: In-depth understanding of hydrogen safety standards and regulations, knowledge of safety instrumented systems and their application in hydrogen facilities, knowledge of hydrogen leak detection technologies and methodologies and knowledge of local, national, and international safety requirements.

- **Hydrogen Fuel Cell Engineers**

  Educational background: Vocational training or academic qualification specialising in chemical and environmental engineering. Additional certifications in fuel cell technology, electrochemistry, and renewable energy systems may be beneficial. Programmes locally available include: Bachelor of Technology in Power Engineering and Bachelor of Engineering in Chemical Engineering at NUST, Renewable Power-to-X Basic Training at PtX Hub Namibia.
  Key skills: Ability to design and optimise hydrogen fuel cell systems for various applications, proficiency in control systems and electronics and experience in integrating hydrogen fuel cells into diverse applications, such as vehicles, stationary power systems, and portable devices.
  Key knowledge: Familiarity with various types of hydrogen fuel cells, such as proton exchange membrane (PEM), solid oxide fuel cells (SOFC), and alkaline fuel cells, knowledge and understanding of existing patents and intellectual property related to fuel cell technology, knowledge of national and international regulations and standards that govern these technologies.

- **Investment Promotion/Project Financing Roles**

  Educational background: Academic qualification specialising in Finance, Business Administration, Economics, or a related field. Additional training in renewable energy finance, project management, or sustainable development is advantageous. Programmes locally available include Certificate in Financial Risk Management, Certificate in Management and Taxation and Diploma in Accounting at UNAM, Bachelor of Accounting at NUST, Course in Finance, Contracts and Risk Mitigation for Private Power Investment in Africa (Power Sector Financing) and Postgraduate Diploma in Development Finance at University of Cape Town.
  Key skills: Proficiency in financial modelling and analysis, risk management skills to assess and mitigate financial and project-related risks associated with renewable energy investments, market intelligence tracking skills.
  Key knowledge: Have a good understanding of project financing models, renewable energy Environmental, Social, and Governance (ESG) considerations and frameworks, knowledge of contractual agreements in the renewable energy sector, including power purchase agreements (PPAs) and a knowledge of energy market dynamics.

- **Data Analytics for Demand-Side Management in Renewable Energy**

  Educational background: Academic qualification specialising in Data science, statistics, energy analytics, computer science, or a related field. Programmes locally available include Bachelor of Technology in Electronic Engineering and Certificate in Big Data Technologies, Certificate In Python Programming Advance Level at NUST, and Information Communication Technology (Level 2-4) at Okakarara Vocational Training Centre.
  Key skills: Proficiency in data analytics tools such as Python, R, or MATLAB, ability to use predictive modelling to optimise demand-side management strategies, data visualisation skills and ability to use tools like Tableau or Power BI.
  Key knowledge: In-depth knowledge of demand-side management techniques and strategies, familiarity with various data sources in the energy sector, including smart metres, sensors, and IoT devices, knowledge of electricity grid operations, familiarity with key metrics and indicators for assessing energy efficiency and knowledge of market trends in energy analytics.

- **Knowledge Management/Research and Development**

  Educational Background: An academic qualification or vocational training in Engineering, environmental science or related fields. Additional training in knowledge management, research methodologies, and innovation strategies may be beneficial. Programmes locally available include: Diploma in Technical and Vocational Education and Training: Management at NUST, Post-graduate Diploma in Knowledge Management Sciences at IUM, Master In Business Administration - Information Management & Digital Intelligence at UNAM.
  Key skills: Proficiency in designing and conducting research projects related to renewable energy, the ability to Analyse data, literature, and industry trends to inform research and development initiatives, design and implement knowledge management systems to capture, organise, and disseminate information and technical writing skills.
  Key Knowledge: A good understanding of the intellectual property and patent landscape in renewable energy, knowledge of environmental considerations in research and development projects, knowledge of national and international regulatory frame-works and policies and knowledge of energy storage technologies and their role in enhancing renewable energy integration.

- **Energy Efficiency Practitioners**

  Educational Background: An academic qualification or vocational training in energy management, environmental engineering, mechanical engineering, or sustainability.
  Programmes locally available include: Bachelor of Technology in Power Engineering at NUST, Master of Sustainable Energy Sys-tems at NUST, Certificate of Competence in Smart Grid Technology at Stellenbosch University.
  Key skills: Ability to conduct energy audits and life cycle assessments, ability to use data analytics tools to analyse energy usage patterns and financial analysis skills.
  Key Knowledge: A good understanding of HVAC systems, lighting, insulation, and other building systems that impact energy consumption, familiarity with energy management systems and tools to monitor, control, and optimise energy use, knowledge of energy policies, incentives, and government programs promoting energy efficiency and knowledge of behavioural economics.

Key Stakeholders: Companies, Professional Organisations and Civil Society Organisations

- **Alpha Namibia Industries Renewable Energy Power Limited (ANIREP)**
  ANIREP facilitates the investment of long-term capital in infrastructural renewable energy projects in Namibia and across the wider Sub-Saharan Africa. It focuses on mobilising capital for projects in the renewable energy sector in generation, transmission, and distribution. It is the largest operation and maintenance contractor in Namibia, its subsidiaries include ANIREP Solar which owns the Ojtjiwarongo 5 MW and Grootfontein 5.73 MW solar PV plants and ANIREP Hydrogen.

- **CERIM Lüderitz Energy**
  CERIM Lüderitz Energy is a joint venture between Energy China and Namibian-owned company Riminii Investments. It will develop the 50MW Lüderitz Wind Power Plant on a Build-Own-Operate Basis.

- **Cleanergy Solutions Namibia:**
  Cleanergy Solutions Namibia is the result of a partnership between Ohlthaver & List (O&L) and CMB.TECH. Cleanergy Solutions Namibia is developing a green hydrogen production plant in the Erongo region. The hub will be made up of hydrogen production, a refuelling station, and a training centre.

- **Daures Green Hydrogen Village:**
  The Daures Green Hydrogen Consortium will construct Africa's first Net Zero village, produce green fertiliser (2024-2027) and aim to export green ammonia regionally and internationally by 2032.

- **ErongoRed:**
  ErongoRed purchases electricity to distribute to the various municipalities and town councils in the Erongo region namely: the Municipality of Walvis Bay, Swakopmund, Henties Bay and Omaruru; the Town Council of Karibib, Usakos and Arandis. It also generates power from a 220 kW wind generator called the Walvis Bay Wind Power Project.

- **HDF Energy Namibia:**
  HDF Energy Namibia is a subsidiary of the French major Independent Power Producer HDF (Hydrogène De France) specialising in hydrogen power. It owns and will operate the Renewstable Swakopmund (RSWK) solar-hydrogen power plant in Namibia.

- **Hyphen Hydrogen Energy:**
  Hyphen Hydrogen Energy is a project development company established to develop, construct, and operate Green Hydrogen production facilities in Namibia to supply international and regional markets. Hyphen is developing Namibia's first fully vertically integrated Giga Watt (GW) scale green hydrogen project as a part of the Southern Corridor Development Initiative.

- **HyRail Namibia:**
  HyRail Namibia is one of the green hydrogen pilot projects. It is developing two hydrogen-powered locomotives which will be operated by TransNamib. The consortium is also developing a hydrogen fuel storage car that will be used to store fuel for locomotives.

- **HopSol Africa:**
  HopSol Africa is a private company in the solar industry. It works to bring grid-connected and off-grid renewable energy generation solutions to Namibians. Their projects include Omburu 25 MW plant, Ohorongo Solar Park, Hardap Solar Park Substation and solar PV installations at Vivo Energy Gammams, Tacoma, Nabta and Mariental.

- **InnoSun Energy Holdings:**
  InnoSun Energy Holdings is an IPP in Namibia, specialised in the development, financing, procurement, construction, and O&M of solar plants and wind farms.

- **Namibian Youth on Renewable Energy (NaYoRE):**
  NaYoRE is a non-profit that supports youth in the renewable energy sector through policy-making, education, training, and public engagement for capacity-building and entrepreneurship.

- **PtX Hub powered by GIZ:**
  Power-to-X means using renewable electricity, for example, wind power, to create something else ('X'). The PtX Hub works at Building capacities on PtX, supporting the national dialogue on PtX, advising political partners on sustainability and analysing Namibia's potential for PtX in-depth. Their activities include setting up a task force to coordinate between ministries and stakeholders, conducting scoping studies on-site to identify PtX opportunities and pathways specific to Namibia and organising the Train-the-trainer programme with Namibian energy professionals to become PtX experts.

- **Renewable Energy Industry Association of Namibia:**
  REIAoN is a member-based association that represents all interested individuals and companies in the Namibian Renewable Energy Industry. The association promotes renewable energy, lobbies for renewable energy issues, works to ensure that local agencies adhere to quality studies and provides industry representation for entities working in renewable energy.

- **SADC Centre for Renewable Energy & Energy Efficiency:**
  SACREEE promotes the market-based adoption of renewable energy and energy efficiency technologies and energy services in SADC Member States. Its activities include resource mobilisation, policy, quality assurance, capacity building and knowledge management, communication, and promoting investments in renewable energy and energy efficiency projects and programmes.

- **Solsquare Energy:**
  Solsquare Energy is a turnkey solar solutions provider. They install solar grids across the country, including a 200kWp on-grid solar plant at the Mercure Hotel in Windhoek. They offer consulting, planning, operation and maintenance, projecting and engineering procurement services.

About the Author

Suzie Shefeni is a researcher and political analyst. She is currently a research associate at the Institute for Public Policy Research (IPPR) where she has worked on projects related to renewable energy. Her professional and academic work has a strong focus on contemporary security issues relating to energy security and emerging technologies.

About the Namibia Renewable Energy Fellowship

This short briefing paper and associated fact sheet looking at pathways for young people to connect to renewable energy careers are being published as part of Namibia Renewable Energy Fellowship. Through the Fellowship 35 dedicated youth leaders completed a rigorous and impactful eight-month programme running from late 2023 until mid-2024.

The Namibia Renewable Energy Fellowship is more than just a training programme; it is a collaborative effort aimed at equipping young Namibians with the skills, knowledge, and networks necessary to become trailblazers in the renewable energy sector. Sponsored by the US Embassy Namibia and funded by the US Department of State, the fellowship was a testament to the power of international partnerships in addressing global challenges.

The programme was implemented by 10 Billion Strong, in collaboration with Future Africa International Namibia, and the Institute for Public Policy Research (IPPR) in Namibia. This partnership brought together a wealth of expertise, resources, and a shared vision of empowering the next generation of leaders who will drive Namibia's transition to a sustainable energy future.

About the IPPR

The Institute for Public Policy Research (IPPR) is a not-for-profit organisation with a mission to deliver independent, analytical, critical yet constructive research into social, political and economic issues that affect development in Namibia. The IPPR was established in the belief that free and critical debate informed by quality research promotes development.

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This project was funded by the US Government

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International
Namibia

Incorporated Association Not for Gain Registration Number 21/2000/468
Directors: M M C Koep (Chairperson), D Motinga, A. Du Pisani, J Ellis, G Hopwood (ex-officio)