State of the electricity market in Namibia

The Namibian energy and electricity market is in a state of flux and undergoing progressive liberalisation. The government has set itself the task of creating an enabling environment in which private sector players increasingly participate in the electricity market. It is hoped that this will usher in new forms of electricity generation and distribution models.

LIBERALISATION AND STRUCTURE OF THE ENERGY MARKET

Traditionally, the Namibian electricity market has been dominated by the state-owned utility Namibia Power Corporation (Pty) Ltd., or NamPower, for short. In the Namibian electricity market, NamPower was responsible for generation, transmission, distribution and the trading of electricity as well as supplying the end customer. For some years now, the Namibian government has been attempting to liberalise the market with an incentive to create a more flexible and cost-reflective electricity market open to private sector players and investments.

To date, efforts to liberalise the market have yielded beneficial results and enabled the participation of private, independent power producers (IPPs). Transforming the single-buyer model (power purchase only by NamPower) to a modified single-buyer model has given IPPs the opportunity to produce and sell electricity directly to NamPower and/or regional electricity distributors (REDs), such as municipal utilities or other large consumers. This development includes the possibility of transmission through the public grid.

Once the liberalization process has been completed, electricity trading by private players should be possible from 2026 onwards. However, supplying electricity to private households will continue to be carried out by REDs and municipal utilities.

Structure and actors of the Namibian electricity market

Source: Ministry of Mines and Energy, Government of the Republic of Namibia
The necessary licenses for electricity generation and distribution of energy will be granted by the Electricity Control Board (ECB), which is favourably disposed towards renewable energies. Electricity generation licenses are generally granted for self-generation plants, but also for commercial plants which supply third parties. The licensing process takes around 60 days. The list with the necessary documents and requirements for license applications is available on request from the ECB. Up-to-date information on the status of renewable energy regulations and the granting of licenses can be found on the ECB website: www.ecb.org.na

→ ELECTRICITY GENERATION AND PRICES

In terms of energy supply, Namibia is heavily dependent on imports. All fossil fuels (coal, fuels) must be imported. Despite the small population (approx. 2.48 million) and the very low electrification rate of 38%, the nationwide electricity requirement of around 3,600 GWh cannot be met. Despite a peak load demand of +/- 650 MW, the country only has an installed grid-connected generation capacity of 539.5 MW – of this 489.5 MW is owned by NamPower and 50 MW by IPPs. Most of the IPPs are photovoltaics, as stipulated in the Namibia Renewable Energy Feed-In-Tariff (REFIT) Programme. Therefore, Namibia is dependent on electricity imports from neighbouring countries, which supplied around 73% of total demand in 2018. The bulk of these electricity imports are sourced from South Africa.

Due to its high dependence on imports and the need for cost recovery, Namibia has the highest electricity prices in Southern Africa. The base electricity price 2019/20 for large off-takers (regional electricity suppliers, municipal utilities and industrial customers) is 1.65 NAD/kWh (approx. 0.10 EUR/kWh). It should be noted that the actual electricity costs for end customers are considerably higher than the base electricity price, as there is a surcharge covering additional costs and margins, which the regional electricity suppliers and municipal utilities pass on. Additionally, there are seasonal and time-of-day (TOU – Time of Use) fluctuations in electricity prices to buffer high import costs at peak times. The different electricity suppliers also have varying tariff structures, which can differ greatly according to customer groups, consumption levels and type of connection (prepaid or invoice). A general and realistic guideline translates to average electricity consumption costs between 2.20 and 2.60 NAD/kWh (ca. 0.14 - 0.16 EUR/kWh) for commercial electricity consumers.

Due to growing demand for electricity – on average around 4% annually – and in order to reduce electricity imports, the National Integrated Resource Plan (NIRP) of 2016 calls for power plant capacities to be expanded to 1,677 MW by 2035. The stipulated power generation capacities must consist of roughly equal proportions of renewable energies and fossil thermal power plants. Consequently, the framework conditions for net metering and mini-grids are set to be improved.
Renewable energies

Given the government’s plan to expand power generation capacities – 50% of which should be from renewable energies – and growing interest from commercial electricity consumers to invest in self-generation facilities, the Namibian renewable energy market is dynamic and replete with viable business cases. Given the high costs of grid electricity, renewable energy plants are competitive and can be economically implemented without subsidies.

By 2035, a total of 669 MW of grid-connected renewable energy capacity is to be installed. The expansion is set to take place through competitive tenders with IPPs subject to power purchase agreements with NamPower or REDs. Renewable energies will also play an increasingly significant role in rural electrification. The construction of mini-grids with photovoltaics or biomass is to be accelerated, again through the use of IPPs.

Expansion targets for grid-connected renewable energies as per NIRP
Source: Ministry of Mines and Energy, Government of the Republic of Namibia

<table>
<thead>
<tr>
<th>Technology</th>
<th>Generation targets until 2035 in MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>220</td>
</tr>
<tr>
<td>Photovoltaics</td>
<td>149</td>
</tr>
<tr>
<td>Biomass</td>
<td>80</td>
</tr>
<tr>
<td>Concentrated Solar Power (CSP)</td>
<td>250</td>
</tr>
</tbody>
</table>

So far, 19 such power purchase agreements, including 14 REFIT projects, have been finished with IPPs, so that by the end of 2020 around 175 MW renewable energy capacity should be connected to the grid. The majority of these projects have been photovoltaics, but also includes 50 MW wind power and 40 MW from biomass power plants.

In addition to the government’s expansion plans, growing interest by commercial and industrial electricity consumers in renewable energy self-consumption systems is driving the growth of the renewable energy market. The unequivocal stance by regulators and the government to increase electricity tariffs and costs has been key to fostering investment appetite. Photovoltaic systems on the consumer’s premises (embedded generation) are by far the favourite form of self-consumption.

NATURAL POTENTIAL FOR RENEWABLE ENERGIES

The clear focus on photovoltaics (PV) is rooted in the high solar irradiation values, which clearly stand out even by African standards and rank among the highest in the world. With approx. 300 sunny days and over 3,000 sun hours per year, the annual solar irradiation reaches values of 2,200 to 2,400 kWh/m². Due to the constantly high irradiation, PV systems in Namibia generate twice as much electricity as comparable systems in Germany on an annual average. A daily yield of up to >5.6 kWh can be expected per kWp of installed PV capacity.

In comparison, natural conditions for wind power are limited in the region. High, constant wind speeds, which offer ideal conditions for the construction of wind power plants, are found above all on the south coast in the region around Lüderitz, as well as in the coastal region on the border to Angola. According to an analysis by the Ministry of Mines & Energy, an annual electricity yield of around 2,800 MWh per installed MW of wind power can be expected in Lüderitz.

In terms of bioenergy, the use of wood from invasive bush (encroacher bush) offers a potential source of biomass plants. The bushes cover approx. 30 million hectares and provide around 18 million tons of biomass which could be removed sustainably each year. The energy content of dried bushwood is approx. 3,300 kcal/kg. However, the challenge lies in “harvesting” the bushwood and the logistics. Hence, only about 10% of the biomass potential is currently being used economically, mainly for the production of charcoal. Namibia is the fifth largest charcoal exporter in the world with around 120,000 tonnes. Bioenergy from specially cultivated energy crops is not a viable option in Namibia due to the competition for land for food production and the scarcity of water.

The Federal Republic of Germany supports bush control and biomass utilisation through a technical cooperation project (2018-2021). In close cooperation with the private sector, aiming at international technology transfer and the conceptualisation of Biomass Industrial Parks, prerequisites for the large-scale supply of biomass to off-takers are established. The selective thinning of encroacher bush serves the purpose of restoring degraded land and through the partly labour intensive bush harvesting jobs are created in rural areas.

www.giz.de/en/worldwide/28648.html
The natural potential for hydropower is estimated at 2,250 MW. Of these, 347 MW are already being used from Ruacana hydroelectric power station. However, hydropower potential in Namibia is mostly theoretical, as limited water resources and regular drought make the continuous operation of hydropower plants difficult or near impossible. Complicating the matter is the fact that the large Ruacana hydroelectric power station can only be operated at maximum capacity during the rainy season.

**FINANCING OPPORTUNITIES FOR RENEWABLE ENERGIES**

Larger firms and industrial enterprises generally have the financial resources or access to capital, to finance investments in renewable energy for self-consumption. Due to the trend towards operator models, however, project developers must increasingly have their own capital to finance projects.

Local financing is available for this purpose. The banking sector in Namibia is well-developed and access to credit financing is possible. Similarly, financiers are showing an increased interest in renewable energy projects and a few banks have already financed REFIT projects.

In addition to commercial banks, development finance institutions such as the Development Bank of Namibia is also involved in renewable energy financing. The South African Development Bank for Southern Africa and the Industrial Development Corporation are equally open to financing transactions, with given conditions subject to individually negotiated terms.
Market segments and potential for renewable energies

The basic policy framework and regulations for private-sector participation in the electricity market have been established. Due to current regulations and the modified single-buyer model, the following opportunities have emerged for private sector involvement in the Namibian electricity market.

→ EMBEDDED GENERATION AND SALE TO COMMERCIAL CUSTOMERS

Rising costs for grid power mean that decentralised renewable energy systems for self-consumption can be implemented economically and with relatively short payback periods. This is why the market segment for self-consumption in industry, commerce and agriculture is developing dynamically. A conservative estimate based on industrial large-scale consumers in Namibia assumes at least 5,000 potential customers or plants in this market segment.

The capacities of the plants vary depending on the consumer. For agricultural enterprises and tourism facilities, the plant sizes range between 20 and 250 kWp. Commercial consumers tend to have a demand for plants of 500 to 1,000 kWp. For large-scale consumers, the project size can also reach single-digit MW values.

One trend in the area of self-consumption plants is the orientation towards operator models in which the electricity consumer concludes a purchase agreement with the project developer. This means that the project developer must have access to financing in order to realise the project.

→ GRID-CONNECTED PROJECTS – PRIVATE-TO-PUBLIC

The expansion plans of the Namibian government essentially represent the theoretical market size of the segment. According to NIRP, 19 power purchase agreements have already been concluded with IPPs, leaving around 110 MW photovoltaics, 100 MW wind power and 40 MW biomass that must be awarded in further REFIT and other open tender bidding rounds. Due to the relatively high technology costs, it is questionable whether the planned 250 MW CSP will be realised.

The basic tariffs of the REFIT programme should be the guideline for setting tariffs in the tendering process.

Base tariff of the 2015 REFIT programme

Source: Ministry of Mines and Energy, Government of the Republic of Namibia

<table>
<thead>
<tr>
<th>Technology</th>
<th>REFIT base tariff 2015 (in NAD/kWh)</th>
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</thead>
<tbody>
<tr>
<td>Wind</td>
<td>1.08 (approx. 0.07 EUR)</td>
</tr>
<tr>
<td>Photovoltaics</td>
<td>1.37 (approx. 0.09 EUR)</td>
</tr>
<tr>
<td>Biomass</td>
<td>1.28 (approx. 0.08 EUR)</td>
</tr>
<tr>
<td>Concentrated Solar Power (CSP)</td>
<td>1.90 (approx. 0.12 EUR)</td>
</tr>
</tbody>
</table>

→ MINI-GRIDS

Even when compared to other African countries, Namibia has a very low electrification rate of 38%. Due to the long distances and sparsely populated countryside, connecting rural communities to the national power grid makes neither technical nor economic sense in large parts of the country. For this reason, mini-grids are coming into focus in order to improve access to electricity.

At the behest of the Federal Republic of Germany, the Federal Ministry of Education and Research is supporting the development of viable models for renewable energy-based mini-grids in Namibia.

The project is called Pathway to Renewable Off-Grid Community Energy for Development (PROCEED) and, among other activities, analyses existing mini-grids in order to develop concepts and solutions that meet local needs, are technically up-to-date, economically viable, maintenance-friendly and, thus, sustainable.

According to surveys by the Namibian government, around 100,000 households in approximately 4,300 settlements are considered “off-grid” and have no access to the electricity grid. This presents a potential market for the construction and operation of mini-grids using renewables. However, the challenge lies in proving the business case. The high electricity production costs associated with mini-grids can only be recouped, to a limited extent, through end customer tariffs. Thus far, no mechanism for subsidising mini-grids has been established and any potential subsidy or support mechanism must be sought out on a case by case basis.

→ OPPORTUNITIES FOR EUROPEAN COMPANIES

In order to serve the growing renewable energy market, Namibia depends 100% on imports of renewable energy technologies. Import duties are not levied on renewable energy technologies, except solar thermal energy for households. Profits of foreign subsidiaries in Namibia can be transferred without limitation to the parent company. This offers interesting business opportunities for European renewable energy companies despite the relatively small size of the market. This is true, in particular, in the embedded generation segment and for companies that:

- offer operator models, including financing: e.g. Build Own Operate Transfer (BOOT), leasing concepts, power purchase agreements;
- manufacture renewable energy components of various technologies, including electricity storage; and
- provide solutions that optimise own consumption and perform load management.

The number of local, established renewable energy companies in Namibia is low. Most companies focus on project development, engineering-procurement-construction (EPC) activities and installation of photovoltaic and solar thermal solutions. The established, local companies, some of which have been active in the field of renewable energies for more than 10 years, generally have sound know-how and technical understanding. As there is no formal training in the field of renewable energies in Namibia, employees are individually trained by the companies. Thus, the quality and the level of education of local companies and specialists can vary considerably.

Best Practice

Sustainable hotels

Since September 2018, the Chobe Waterfall Lodge, on the border to Botswana and Zambia, is being supplied by a 150 kWp photovoltaic system, including a 332 kWh lithiumion battery storage solution. The PV plant was constructed using a joint venture between CRONIMET Mining Power Solutions GmbH from Starnberg, Germany and the Namibian company O&L Energy, who jointly financed and constructed it. Qinous Smart Energy Storage from Berlin, Germany developed the energy storage system. Replacing the existing diesel generators with a PV system reduced energy costs and continues to ensure a more sustainable operation of the lodge.

However, cooperation with local companies is recommended in order to participate successfully in public contracts and tenders. In order to strengthen and develop the local economy, the Namibian government deliberately uses its procurement expenditures. Preference is given to local companies and consortia with local participation.
Sources and useful links:

- Ministry of Mines & Energy
  http://mme.gov.na
- Electricity Control Board (ECB)
  http://ecb.org.na
- NamPower
  http://www.nampower.com.na/
YOUR PARTNER FOR DEVELOPMENT COOPERATION

Economic growth creates jobs, improves people’s incomes, and promotes innovation. That is why the United Nations 2030 Agenda provides for the active involvement of the private sector in the implementation of the Sustainable Development Goals (SDGs). The Global Business Network (GBN) Programme encourages local and German companies to get involved in sustainable economic development in selected countries in Africa and Asia. Via Business & Cooperation Desks the GBN-Coordinators provide information, advice and guidance for businesses on existing support, financing and cooperation instruments of German development cooperation. The GBN-Coordinators work closely with the German Chamber of Commerce Abroad (AHK) regional offices. The GBN is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

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NEW MARKETS – NEW OPPORTUNITIES: NAMIBIA

In order to support the sustainable engagement of German companies in emerging and developing countries, Germany Trade & Invest (GTAI), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and the German Chambers of Commerce Abroad (AHKs) as well as other partners combined their expertise in the publication series “New Markets – New Opportunities”.

The booklet shows companies the economic potential of future markets as well as the funding and consulting opportunities offered by the German development cooperation. “New Markets – New Opportunities: A Guide for German Companies” is supported by the Federal Ministry for Economic Cooperation and Development (BMZ). All issues are published on the websites of GTAI and GIZ. You can find selected issues, for example on Namibia also at www.bmz.de/ez-scouts