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Namibia: Energy Policy

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Without Abstract

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General Information on Namibia

The Namibian coastline stretches for about 1500 km between neighboring countries Angola to the north and South Africa to the south. Namibia's neighbor to the east is the landlocked country of Botswana. According to the World Bank, Namibia is categorized as an upper middle-income country with a gross domestic product (GDP) of US\$13 billion in 2014. The GDP value of Namibia represents 0.02% of the world economy. GDP in Namibia averaged 5.25 billion USD from 1980 to 2014, reaching an all-time high of 13.02 billion USD in 2012 and a record low of 1.62 billion USD in 1985. The total population is 2.403 million people (see World Bank (Namibia), [2016 – http://data.worldbank.org/country/namibia](http://data.worldbank.org/country/namibia) (Accessed 12 April 2016)). Namibia is endowed with a rich variety of minerals including diamonds, uranium, gold, silver, copper, lead, zinc, iron, fluorspar, limestone, etc. (see Geological Survey of Namibia – <http://www.mme.gov.na/gsn/> (Accessed 12 April 2016)). Currently, the combination of the expanding mining sector and other economic activities is leading to an increase in electricity demand and generation within the country. In addition to the existing major mines (copper, zinc, diamonds, uranium, and gold), notable foreign direct investment has been injected into the local mining sector over recent years. Recently, three new mines were constructed including the Otjikoto Gold Mine, the Tschudi Copper Mine, and the Husab Uranium Mine. Consequently, new developments and major investment growth in the electricity sector have been driven by both external and domestic parties and spearheaded by the national electricity utility (NamPower). Namibia's electricity sector faces major challenges mainly because security of supplies, both nationally and regionally, is not guaranteed and the demand is outstripping the supply at present. The demand for electricity increased from about 630 MW in June 2014 to 657 MW in June 2015. As Namibia strives into becoming an industrialized nation by 2030, more economic activities will require substantial amount of power. The gap between local power generation and excess demand of energy has been sourced from neighboring countries, i.e., mainly from South Africa but now also from Zambia, Zimbabwe, and Mozambique under the regional Southern African Power Pool (SAPP) framework.

Need of (Nonrenewable and Renewable) Resources

Namibia's energy resources is a composition of hydro, liquid fuels, electricity, nuclear energy (though not yet operational), geothermal energy, gas, coal, solar water heaters and cooker, and charcoal (wood). These can be grouped into petroleum downstream and upstream and electricity generation.

Electricity Generation

The electricity sector including generation is regulated by the Electricity Control Board in terms of the *Electricity Act 4 of 2007*. The three main electricity power stations (Ruacana, Van Eck, and Paratus) and other sources of energy generation cannot meet the required demand of energy in Namibia. The installed capacity of all three power generation stations is around 500 MW. The biggest one is the Ruacana Hydropower Station which generates about 332 MW of electricity, Van Eck Coal Power Station only generates 120 MW, and the Paratus Diesel Power Station and Anixas Fuel Power Station at the coast generate with only 24 MW and 22.5 MW, respectively. These power stations do not generate electricity to its full capacity at all times, the Ruacana power station depends on seasonal rainfalls and water flow in Angola and weather conditions, while the other power stations like the Van Eck station have not been operating during 2013 due to some technical problems, these make the electricity shortage in the country to be worse and resort to imports (NAMPOWER [2015](#), Windhoek, Namibia).

In order to improve the generation capacity, NamPower plans to develop the 600 megawatt (MW) Baynes Hydropower Project in the north. The proposed project will comprise a hydropower plant on the Kunene River 40 km downstream of the Epupa Falls with an installed capacity of about 465 MW and an average energy production of 171 MW (Baynes Hydro Power Project at <http://www.nampower.com.na/Page.aspx?p=222> (Accessed 20 April 2016)). Another major project is the development of the 800 MW Kudu Gas Project in the south – with the involvement of both national state entities, Namcor for the upstream offshore production of the gas and NamPower for the downstream component including the gas-to-power project (Kudu Gas Project at <http://www.nampower.com.na/Page.aspx?p=215> (Accessed 20 April 2016)). A recent development in 2016 is a proposed 250 MW gas-fired power plant at Walvis Bay, in the Erongo region. The Xaris project is privately funded and is based on a power purchase agreement (PPA) between NamPower and Xaris whereby NamPower will buy power on agreed terms from the Xaris plant. It is intended that the 250 MW plant will run as a proper peaking plant when required and be readily available when the Kudu, Van Eck, or Ruacana power stations are out of service for maintenance, planned or forced outages in the future. It is expected that the successful commissioning of both the Kudu and the 250 MW Xaris project will not only ensure security of supply and long-term power tariff stability but will also transform Namibia from being a net importer to a net exporter of electricity (Xaris Project at <https://walvisbaypowerplant.com/> (Accessed 20 April 2016)).

Rural Electrification

Electrification and especially rural electrification are long-term targets for Namibia. The 1998 Energy Policy White Paper pays special attention to rural electrification as it is seen as a nationally important objective with the potential to become the driving force behind economic development. However the major challenge is that as Namibia is a vast, sparsely populated country, many rural areas will never be connected to the national grid due to high costs associated in required investment and maintenance. Between 1990 and 2000, rural electrification was carried out under National Rural Electrification Programme (NREP), after which the Rural Electrification Distribution Master Plan (REDMP) was completed in 2000 (supplemented in 2005 and updated in 2010). In the master plan, the off-grid areas where grid connection was evaluated to be economically unfeasible in foreseeable future were identified. Securing electricity supply for these areas was planned in the Off-Grid Energization Master Plan (OGEMP) for Namibia. This plan introduces a concept of energy shops, locations where information and equipment are available, not just concerning electricity, but other energy solutions such as efficient wood stoves as well (Rural Electricity Distribution Master Plan for Namibia, Ministry of Mines and Energy, and EMCON, Windhoek, Namibia, 2010; and the Rural Electrification Master Plan for Namibia, EMCON Consulting Group, Windhoek, Namibia [2000](#)).

Petroleum Downstream

Presently, the petroleum downstream sector is regulated by the Ministry of Mines and Energy in terms of the *Petroleum Products and Energy Act of 1990*. The most dominant sector of energy in Namibia is liquid fuel which includes petrol and diesel and accounts for about 63% of total energy net consumption, followed by electricity with 17% net consumption, then coal with 5%, and the remaining 15% is from other types of energy such as solar, wood, and wind energy, among others. The role of affordable fuels is seen as a necessary factor for economic growth. Due to the geographical location and vast distances between economic centers in Namibia, the transport sector has the highest energy demand from petroleum products which are mainly imported from South Africa and other African countries.

Namibia's dependence on fuel imports creates a security of supply issue. Currently, the main private oil companies are importing 100% of petroleum products into the country. In 1990 the Ministry of Mines and Energy established the National Energy Fund in terms of the *1990 Petroleum Products and Energy Act*. The NEF collect levies imposed on controlled petroleum products (Petroleum Equalization levy) and on actual petroleum product consumed per month in the country. The Fund also collects money on behalf of the Motor Vehicle Accident (MVA) Fund and Road Safety Secretariat (RSS) and remits it to the respective institutions. NEF is also responsible for the road subsidy for transporters delivering fuel to far outlying rural areas and receives money collected by NamPower for an electricity levy (National Energy Fund at <http://www.mme.gov.na/directorates/energy/nef/> (Accessed 20 April 2016)).

Petroleum Upstream

Currently Namibia does not produce any hydrocarbons (oil and gas); however concrete plans are currently in progress to develop an offshore gas field (Kudu Gas Project) in the south of the country within the next couple of years. In terms of the *Petroleum (Exploration and Production) Act 1991*, the ownership of all oil and gas is vested in the State. The petroleum regime allows for international oil companies to apply for petroleum exploration licenses under an open licensing system which was adopted in 1999 (see Leon Moller, *Evolution of the legal framework for oil and gas exploration and production in Namibia*, Oil, Gas and Energy Law (OGEL) www.ogel.org, September 2013). The exploration profile has increased over the years with over 50 exploration licenses issued to local and international oil companies (MME, Directorate of Petroleum Affairs at <http://www.mme.gov.na/directorates/petrol/> (Accessed 15 April 2016)).

The national oil company (Namcor) is a joint venture license partner with a number of local and international companies in the search for oil and gas in Namibia. Presently, the country is virtually underexplored with only 25 wells that had been drilled offshore Namibia. Significant quantities of seismic surveys have been acquired (approximately 125,000 km of 2D and 28,000 km² of 3D seismic data). Namcor is also co-licensee and partner in the development and production (upstream phase) of the Kudu Gas Project. The project entails the offshore production facilities, an offshore pipeline of 170 km to transport the gas to shore and an 800 MW gas-fired power station in the south of the country (see NAMCOR – <https://www.namcor.com.na/> (Accessed 10 April 2016)).

Renewable Energy

Presently, the country relies about 98% on the 330 MW Ruacana Hydropower Station for the generation of electricity, making Namibia's electricity production almost 100% renewable energy (see Ruacana project, NAMPOWER – <http://www.nampower.com.na/Page.aspx?p=184> (Accessed 10 April 2016)). The 1998 Energy White Paper recognized the significant renewable energy resource potential in Namibia but also highlighted the gap between the renewable resources and their exploitation, mainly because of the lack of an adequate institutional framework, the novelty of renewable energy sector, and constraints in human resources and public awareness. The White Paper sets several goals for promoting the production and use of renewable energy in Namibia, such as the establishment of an adequate institutional and planning framework, development of human resources and public awareness, creation of suitable financing systems, and improving access to renewable energy sources, particularly in rural electrification, rural water supply, and solar housing and water heating (Namibia Energy Policy, pp. 42–48).

All renewable energy projects are overseen by a special steering committee chaired by the Permanent Secretary of Mines and Energy and with representatives from ECB, NamPower, and the Renewable Energy and Energy Efficiency Centre (NEI). In recent years, several projects and programs related to renewable energy have been initiated and conducted in cooperation with the government, private sector, and development organizations (*Namibia's Energy Future – A Case for Renewables in the Electricity Sector*, VO Consulting, Windhoek, October 2012). Some of these projects include the introduction of independent power producers (IPPs) for wind and solar power, the establishment of the Renewable Energy and Energy Efficiency Institute and the Namibia Energy Institute (NEI), the implementation of the Renewable Energy Procurement Mechanism that requires tendering for all renewable energy projects larger than 5 MW in size, and the provision of off-grid support to isolated areas in the country (see Namibia Energy Institute (NEI) – <http://nei.nust.na/> (Accessed 5 March 2016)).

Solar Energy

The 1998 White Paper highlights the significant solar resources in Namibia. The potential of solar energy to contribute to basic electricity services in remote areas, such as water pumping, water desalination, and electricity generation, was stated, and it is the intention of the government that the solar energy would contribute to the goal of social upliftment. Already in May 2015, the commissioning of the 4.5 MW Innosun-Omburu Solar PV Plant started to feed power into the NamPower system. Additionally, a number of solar projects are currently underway including the NamPower solar projects (NamPower is involved in investigating and developing new generation methods including two test solar projects of 64 kW fixed PV and 26 kW tracking CPV, respectively, and solar projects for residential premises in Okahandja and Rehoboth – see NamPower *Renewable energy projects* – <http://www.nampower.com.na/Page.aspx?p=245> (Accessed 10 April 2016)) and the 1.1 MW Namibian Breweries solar plant (The 1.1 MW Namibian Breweries plant consists of 4200 solar panels on the rooftop of the Namibian Breweries in Windhoek. It is regarded as one of the largest roof-mounted PV plant in Africa; see *Largest solar energy plant in Africa dawns in Namibia*, CNBC Africa (24 Feb 2014) at <http://www.cnbc africa.com/news/southern-africa/2014/02/24/largest-solar-energy-plant-in-africa-dawns-in-namibia/> (Accessed 10 March 2016)).

A number of studies on solar energy have been conducted in coordination with the Ministry of Mines and Energy and the Namibia Energy Institute (NEI), including (NAMREP 2005) (NAMREP Programme includes several studies such as the baseline study for “Barrier Removal to Namibian Renewable Energy Program” (Consulting Service Africa 2005) and an “Assessment of duties and taxes” related to solar technology in Namibia (Price Waterhouse Cooper 2005).) (“Pre-feasibility study for the establishment of a pre-commercial concentrated solar power plant in Namibia” 2012) (The study concerns concentrating solar power (CSP) plant in Namibia; it includes an assessment of the solar resources and proposed five potential sites for the plant (REEEL, GESTO 2012).) (SOLTRAIN 2009) (The Southern African Solar Thermal Training and Demonstration Initiative (SOLTRAIN) focusing on solar thermal systems was launched in 2009 and aims to provide training of solar thermal technology service providers, establishing a solar thermal technology platform for Namibia, and the SADC region, and flagship demonstration systems in chosen regions of respective countries. It involves four SADC countries: South Africa, Mozambique, Zimbabwe, and Namibia with NEI as the coordinator – see <http://www.nust.edu.na/nei.nust.na/web/?q=portfolio/21> (Accessed 5 April 2016)). A major project for solar energy is the Solar Revolving Fund (SRF) which was launched in 2006 and relaunched in 2011 by the Ministry of Mines and Energy. The SRF is a credit facility established and administered by MME to stimulate demand for the utilization of solar energy technologies in the rural areas, especially for communities living in off-grid areas, but also to urban clients (for *more information on these projects*, see Centre for Renewable Energy and Energy Efficiency at the Namibia Energy Institute – <http://nei.nust.na/> (Accessed on 12 March 2016)).

Bioenergy

Wood or biomass is the main source of energy in the rural areas of Namibia, more specially in the northern and northeastern part of Namibia. About 87% of Namibians in the rural areas use wood or wood charcoal as the main energy for cooking, heating, and lighting as compared to only 16% in urban areas. A pre-feasibility study via a grant from Germany has been completed and shows that it is technically feasible to build 10–20 MW plants utilizing invader bushes as a fuel source. NamPower seeks now to capitalize on this by investigating the building of a hybridized power plant combining biomass with solar to increase output and improve plant performance. A C-Bend Bush-to-Energy IPP biomass 250 kW project is part of a power purchase agreement with NamPower (*Bio-Energy in Namibia: Opportunities, Threats and Institutional Challenges for Rural Development and Food Security*, Michael Brüntrup, Raoul Herrmann, Martina Gaebler, German Development Institute/Deutsche S Institut Für Entwicklungspolitik, 2009, paper presented at the 13th ICABR Conference “The Emerging Bio-Economy,” Ravello, Italy, June 18–20, 2009).

Wind Energy

Namibia has a long coastline measuring over 1500 km with sufficient potential for wind energy. Wind energy is considered to be an efficient and fast-growing energy in the world; however the Namibian wind energy industry is very small and minimal. To date, the country has about 30,000 wind water pumps installed throughout the country –

ranking second on the African continent. Substantial wind energy found at the coastal part of Namibia is harvested on a small scale. There is currently one wind turbine (220 kW) installed which was installed in 2005, and it feeds the electricity distribution grid in Erongo region (see *Energy demand and forecasting in Namibia (Energy for economic development)*, National Planning Commission, Office of the President, Windhoek, Namibia, 2013, p. 18; see also *Fact Sheet on Renewable Energy in Namibia* – <http://enviro-awareness.org.na/common-files/files/%5BThink%20Namibia%20Factsheet%205D%20Renewable%20Energy.pdf> (Accessed 7 march 2016)).

Independent Power Producers (IPPs)

NamPower embarked on a Renewable Energy Feed-in Tariff (REFIT) interim program together with the ECB to accommodate 14 independent power producers (IPPs) domestically, each generating less than 5 MW from renewable energy. NamPower continues to negotiate power purchase agreements and transmission connection agreements with a number of potential IPPs (e.g., the Diaz Power (wind power generation of 44 MW) and the C-Bend Bush-to-Energy IPP biomass 250 kW project, supported by CENORED; see NamPower *Independent Power Producers (IPPs)* – <http://www.nampower.com.na/Page.aspx?p=245> (Accessed 12 March 2016); and <http://www.cenored.com.na/> (Accessed 10 March 2016)).

Energy Policy Conception of Namibia

The Namibian Energy Policy (also known as the White Paper on Energy) was adopted in 1998 as the overall policy framework for the energy sector in Namibia. The Energy Policy is currently under review. The Ministry of Mines and Energy is the custodian of energy and natural resources and is responsible for the promotion, development, and regulation of the energy, mining, and petroleum sectors in Namibia (see *Namibian Energy Policy, 1998* at – <http://www.mme.gov.na/energy/index.html> (Accessed 2 March 2016)). The Directorate of Energy within the Ministry of Mines and Energy formulated the Energy Policy with the assistance of EDRC, MEPC, NEPRU, and SADELEC and stakeholder participation. The Energy White Paper was approved by the Cabinet and tabled in the Parliament in July 1998).

At Namibia's independence in 1990, a policy for mining (included the energy sector) based on the South African mining legislation in the form of the Mines, Works and Minerals Ordinance of 1968 applied to the exploitation of both minerals and petroleum. A formal policy for the mining and petroleum sectors was absent. It was inevitable that this situation was not going to last forever because the new government adopted a robust approach and set a high priority on preparing a new legislation that would promote the development of the natural resources by providing modern laws for the orderly licensing and fair regulation of the mining and energy industries. Consequently, the promulgation of the *Minerals Act of 1990* and the *Petroleum Act of 1991* made it possible for the participation of more private players in the activities for the exploration and exploitation of minerals and petroleum in the country. The Energy White Paper was adopted in 1998, and it includes generation, distribution and supply of electricity, and the development (exploration and exploitation) of oil and gas resources. A separate mineral policy was adopted in 2003 for the mining sector.

The Energy Policy covers the exploitation of energy resources and deals with energy demand (mainly household energy), supply (electricity, upstream oil and gas, downstream liquid fuels, downstream gas, and renewable energy), and a number of cross-cutting issues (economic empowerment, environment, energy efficiency, and regional energy trade and cooperation). The policy's aim is to optimize possible national benefits while achieving the necessary balance of interests to attract investment in the energy sector. It identifies the different roles and functions of industry participants and lays out the basic legal and fiscal criteria. The main objectives of the policy are security of supply, social upliftment, effective governance, investment and growth, economic competitiveness, and economic efficiency and sustainability.

The 1998 Energy Policy includes objectives for the development of the oil and gas resources. The development of the petroleum sector is based on the fundamental issue of national ownership of the natural resources, which defines both the roles of the government and investor. This relationship between the government and industry is formalized through the licensing system instead of other types such as service contracts or production-sharing contracts used in other producing countries. In its policy, Namibia adopted the licensing system as its preferred arrangement with the private

sector (i.e., international oil companies). However the national oil company Namcor has the option to enter into joint venture partnerships with other private international and national companies. The Policy paved the way for the adoption of the *Electricity Act 2 of 2000* which has subsequently been repealed by the *Electricity Act 4 of 2007*.

Regulatory Framework

The most important institutional players in the Namibian energy sector are the Ministry of Mines and Energy (MME), Electricity Control Board (ECB), NamPower, Namcor, Regional Electricity Distribution (RED) Companies, Namibia Energy Institute (NEI), and National Planning Commission (NPC).

The Ministry of Mines and Energy

In Namibia, the role and responsibility for developing the natural resources sector, overseeing the industry activities and promoting the resource potential of the country, was given to the government's Ministry of Mines and Energy (MME) to exercise on behalf of the State on the basis of the *1991 Petroleum (Exploration and Production) Act* (the Petroleum (Exploration and Production) Act 1991 (Act 2 of 1991)). Furthermore, the Namibian Constitution bestows ownership of the natural resources (including oil and gas) below and above the surface of the land and in the continental shelf and within the territorial waters and the exclusive economic zone of Namibia in the State (the Namibian Constitution, Article 100 on sovereign ownership of natural resources). The *1991 Petroleum Act* vests all rights in relation to petroleum in the State, through the Ministry of Mines and Energy (section " [Need of \(Nonrenewable and Renewable\) Resources](#)," Petroleum Exploration and Production Act 1991 (Act 2 of 1991)). The MME is considered the "custodian" of energy and natural resources and is responsible for the promotion, development, and regulation of the energy, mining, and petroleum sectors in Namibia.

The main function of the MME is to act as the State's guardian of the energy and mineral resources and to license the use of the resources to Namibian registered companies and to regulate their commerce so as to protect the interests of the country and its citizens. MME comprises of six Directorates: Geological Survey, Diamond Affairs, Petroleum Affairs, Mines, Energy, and Administration and Finance.

The Energy Directorate is mainly responsible for the implementation of the Energy Policy and has three divisions for Electricity, Renewable Energy, and the National Energy Fund. The Directorate enforces compliance of legal requirements of the 2007 Electricity Act and regulations and researches new and renewable sources of energy. The Directorate is also responsible for the administration of the National Energy Fund and Solar Revolving Fund, the implementation of rural electrification, and the Off-Grid Energization Master Plan. The mandate of the Energy Directorate is to ensure the adequate and affordable energy supply in a sustainable manner taking advantage of the natural resources in support of the nation's socioeconomic development (see Ministry of Mines and Energy – <http://www.mme.gov.na/directorate/> (Accessed 2 April 2016)).

Electricity Control Board (ECB)

The Electricity Control Board (ECB) is the national electricity regulator; it was set up as a statutory regulatory authority in 2000 under the *Electricity Act 2 of 2000*. The 2000 Act has since been repealed by the *2007 Electricity Act* which expanded the ECB mandate and core responsibilities. The core mandate of the ECB is to exercise control over the electricity supply industry with the main responsibility of regulating electricity generation, transmission, distribution, supply, import, and export in Namibia through setting tariffs and issuance of licenses. It is envisaged that the ECB will be transformed into a broader energy regulator to also regulate activities for downstream gas, renewable energy, and the distribution infrastructure for gas and petroleum products. The Directorate of Petroleum Affairs in the MME will remain the government regulator for upstream energy (oil and gas) activities (see Electricity Control Board – <http://www.ecb.org.na/> (Accessed 3 April 2016)).

National Power Utility (NamPower)

NamPower is the national power utility company of Namibia and was set up in 1996. As a state-owned enterprise, NamPower reports to the Minister of Mines and Energy and is regulated by the Electricity Control Board. The utility is registered as a company and thus operates according to the Companies Act, under the guidance and direction of a

Board of Directors. NamPower's core business is the generation, transmission, and energy trading, which takes place within the Southern African Power Pool (SAPP), the largest multilateral energy platform on the African continent. In terms of the 1998 Energy Policy, NamPower is mandated to work toward the supply of 100% of peak demand for electricity and 75% of electrical energy from internal (Namibian) sources. NamPower took over from the previous electricity utility called SWAWEK, which was founded in 1964 as the "South West Africa Water and Electricity Corporation" by the government of South Africa. A major achievement of SWAWEK was the effective development of the Ruacana Hydropower Station and the establishment of a transmission system for the distribution of electricity through most parts of the country. The Ruacana power scheme was energized in 1978, with a capacity of 240 MW (see NamPower – <http://www.nampower.com.na/Home.aspx> (Accessed 5 April 2016)).

NamPower owns a world-class transmission system and network of 132–400 kV of overhead power lines spanning a distance of more than 25,000 km, one of the longest of its kind in the world and enough to circle a continent. The national grid has been homegrown – designed and largely built by Namibians (see NamPower *Transmission* – <http://www.nampower.com.na/Page.aspx?p=147> (Accessed 2 April 2016)).

National Petroleum Corporation (Namcor)

The National Petroleum Corporation (Namcor) is the national oil company for upstream exploration and production of oil and gas (Namcor originated from the *Suidelike Olie-Eksplorasie korporasie (SWA) (Eiendoms) Beperk* (SWAKOR) which was a subsidiary of the South African petroleum state agency, SOEKOR (1965). SWAKOR operated as an arm of the South African government in Namibia mainly for the purposes of exploration and exploitation of oil and gas resources. SWAKOR was instrumental in the discovery of the offshore "Kudu" gas field in 1974. Namcor took over the position of SWAKOR in 1991 and is registered under the Namibian Companies Act (with the government as the sole shareholder). It provides technical advice to the Minister and acts as the government agency for participation in upstream activities (on behalf of the State) (Section 8, Petroleum (Exploration and Production) Act 1991; Namcor's main activities up to 1998 focused on the acquisition of geological and seismic data and the promotion of Namibia's petroleum potential. Since then, it has become more active in the industry and has now also taken on the role as co-licensee in a number of license blocks. In recent years it has also established itself as a key player in the downstream industry: importing and supplying 50% of the Namibian petroleum products locally.). Namcor is headed by the Managing Director who is responsible for the day-to-day activities of the company and answerable to the Board of Directors (consisting of five members with a Chairperson). The Board in turn is accountable to the Minister of Mines and Energy (see Namcor [2015](#)). In terms of the *1991 Petroleum Act*, Namcor is entitled to (i) carry out reconnaissance operations, exploration operations, and production operations, whether on its own or together with any other person; (ii) carry out any process of refining, or disposing of, or dealing in, petroleum or any by-products of such petroleum, or to take part in any such process carried out by any other person; (iii) advise or otherwise assist the Minister in relation to, or in any negotiations in relation to any agreement referred to in Section 13, or in relation to the discovery of, petroleum or the development of petroleum resources.

Regional Electricity Distributors (REDs)

The other key players in the distribution industry comprise the Regional Electricity Distributors (REDs), local authorities, and regional councils who are responsible for the distribution and supply of electricity throughout the country. The owners of a RED (its shareholders) are the participating stakeholders – i.e., the local authorities, regional councils, and NamPower for which the stakeholders transferred their assets and/or customers to the RED in exchange for shareholding. NamPower supplies bulk electricity to the REDs, mines, farms, and local authorities (where REDs are not operational) throughout Namibia. Since the commercialization of the electricity distribution market with the formation of the REDs, NamPower has gradually phased out its direct involvement in the distribution of electricity (The three main REDs are Northern Regional Electricity Distributor (NORED), Central and Northern Regional Electricity Distributor (CENORED), and Erongo RED. CENORED is the third licensed regional electricity distribution company to be established in Namibia, after NORED and Erongo RED in 2002 and 2004, respectively.).

Namibian Energy Institute (NEI)

NEI is a national institute for energy research established by the Ministry of Mines and Energy and hosted by the Namibian University of Science and Technology. Its forerunner was the Renewable Energy and Energy Efficiency Institute (REEEI) which was originally set up by the Ministry with the mandate to promote renewable energy and energy efficiency understanding and uptake in Namibia through research and development, for the collection and dissemination of information on renewable energy and energy efficiency technologies and practices, as well as for providing respective advisory services. The REEEI was transformed into the NEI in 2012, with an expanded mandate to cover nuclear, electricity, and petroleum (oil and gas), besides the original REEEI functions. The NEI is hosted by the University of Science and Technology and works in close cooperation with the MME. NEI's four centers are for Electricity Supply, Nuclear Science, Oil and Gas, and Renewable Energy and Energy Efficiency (Namibia Energy Institute – <http://nei.nust.na/> (Accessed 12 March 2016)).

National Planning Commission (NPC)

NPC is an Office of the President established by the constitution of Namibia and charged with the responsibility of planning national priorities and directing Namibia in the path of development. NPC's mandate is derived from Article 129 of the national Constitution and the National Planning Commission Act 2013 (Act 2 of 2013). The NPC coordinates the preparation of the development budget based on submissions from government offices, ministries, and agencies including regional councils and local authorities. The NPC periodically produces National Development Plans (NDP) to outline the strategy for working toward the goals of sustainable economic growth, equity, social harmony, and balanced progress. These plans and the general work of the NPC are often cross-cutting with the development of the energy sector of Namibia and thus are part of the framework of things to be taken into consideration (National Planning Commission – <http://www.npc.gov.na/> (Accessed 12 April 2016)).

International Aspects

Southern Africa Power Pool (SAPP)

The regional electricity organization known as the Southern Africa Power Pool (SAPP) was created in August 1995. Its 12 member countries are all from the Southern and Southeastern African region, the Democratic Republic of Congo, Tanzania, Malawi, Zambia, Angola, Zimbabwe, Botswana, Mozambique, Namibia, Swaziland, Lesotho, and South Africa, all sharing a common grid, although Tanzania, Malawi, and Angola are nonoperating members. The primary aim of SAPP is to “provide reliable and economical electricity to supply to the consumers of each of the SAPP members, consistent with reasonable utilisation of natural resources and the effect on the environment” (Southern African Power Pool (SAPP) – <http://www.sapp.co.zw/> (Accessed 10 April 2016)).

As the Namibian power utility, NamPower operates and participates in the cooperative pool through bilateral contracts as well as the Day Ahead Market (DAM). NamPower has several power supply agreements with other national utilities in the region, i.e., the *South African* electricity public utility (ESKOM), the state-owned power company in *Zambia* (ZESCO), the Zimbabwean Power Company (ZPC), the *Angolan* power utility Empresa Nacional de Electricidade (ENE), and the *Mozambique* power utility Electricidade de Moçambique (EDM) (NamPower signed a Tri-party Power Purchase Agreement (TPPA) with Aggreko and the Mozambique power utility (EDM), whereby Aggreko will provide 122 MW of gas-fuelled power from their interim power plant located at Gigawatt Park at Ressano Garcia, Mozambique, to the two national utilities. The agreement follows the authorization by EDM for the direct supply of power by Aggreko to NamPower and will see the installed capacity of 122 MW split between the two utilities with EDM utilizing up to 32 MW and NamPower up to 90 MW, based on the specific needs of both utilities (see *Cross-Border Power for Mozambique and Namibia*, Aggreko Media Centre, 14 March 2013, <http://www.aggreko.com/media-centre/press-releases/power-plant-mozambique-namibia/> (Accessed 20 March 2016)).

As the largest player in the region, South Africa optimizes 84% of total consumption in the region and more than 80% in power generation; Zambia and Zimbabwe have 4% and 3%, respectively, while the remaining is shared among other countries within the region which include Namibia, according to their regional power status. South Africa is the leading power exporting country in the region, followed by the Democratic Republic of Congo. The major power

importers are Botswana, Mozambique, and Namibia representing 67% of total consumption and then Swaziland and Zimbabwe (Southern African Power Pool (SAPP) – <http://www.sapp.co.zw/> (Accessed 10 March 2016)).

SADC Energy Protocol

The SADC Energy Protocol was adopted in 1996 under the umbrella of SADC, of which Namibia is also a member country. The main objective of SADC is to “achieve development and economic growth, alleviate poverty, enhance the standard and quality of life of the peoples of Southern Africa and support the socially disadvantaged through regional integration.” Other important objectives are the sustainable utilization of natural resources and the effective protection of the environment. The SADC Treaty identifies a wide range of areas of possible cooperation in order to encourage and foster regional development and integration on the basis of balance, equity, and mutual benefit (Southern African Development Community (SADC) – <http://www.sadc.int/documents-publications/sadc-treaty/> (Accessed 5 March 2016)).

The objective of the SADC *Energy Protocol* is to promote cooperation in the areas of common interest and mutual benefit and cost-effective, efficient, and sustainable development and provision of energy services. The Protocol commits member States to cooperation and to the harmonization of national and regional energy policies, strategies, and programs on the basis of a common interest. Two important common policy goals are to ensure that sufficient, reliable least-cost energy services are available and to assist in the attainment of economic efficiency and the advancement of environmentally sustainable use of energy resources (see SADC Protocol on Energy at SADC – <http://www.sadc.int/> (Accessed 5 April 2016)).

Uranium

Namibia has two significant uranium mines capable of providing 10% of world mining output. A larger mine is set to start production. Its first commercial uranium mine began operating in 1976. There is strong government support for expanding uranium mining and some interest in using nuclear power. Uranium was discovered in the Namib Desert in 1928, but it was not until intensive exploration got under way in the late 1950s that much interest was shown in Rössing. Rio Tinto discovered numerous uranium occurrences and in 1966 took the rights over the low-grade Rössing deposit, 65 km inland from Swakopmund. Two other significant deposits found in early exploration were Trekkopje, a calcrete deposit 80 km NE of Swakopmund and near Rössing, and Langer Heinrich, a calcrete deposit discovered in 1973 by Gencor, 80 km inland from Walvis Bay and 50 km southeast of Rössing (see Namibian Chamber of Mines – <http://www.chamberofmines.org.na/> (Accessed 5 April 2016)). In April 2011 Namibia established its state-owned mineral exploration company, Epangelo Mining Ltd., with exclusive control over new strategic mineral developments, including uranium. However, both the government and industry have confirmed that this does not amount to nationalization of existing mines or leases. New exploration licenses will be granted only to Epangelo, and others interested will need to negotiate farm-ins with it, to become joint venture partners (see Epangelo Mining Company – <http://www.epangelomining.com/> (Accessed 5 April 2016)).

Uranium mining operations are regulated under the Atomic Energy Act 2005 and Environmental Management Act 2007. An Atomic Energy Board has been established along with a National Radiation Protection Authority. Finland's Radiation and Nuclear Safety Authority (STUK) is working with Namibian authorities to help develop uranium mining policies and a safeguards and nonproliferation regime, under a program funded by the Finnish Foreign Ministry (see Namibian Atomic Energy Board – <http://aebofnamibia.org/> (Accessed 5 April 2016)).

Nonproliferation

Namibia has been a member of the International Atomic Energy Agency (IAEA) since 1983 (see International Atomic Energy Agency (IAEA) – <https://www.iaea.org/about/memberstates> (Accessed 5 April 2016)). Namibia is a party to the Nuclear Nonproliferation Treaty and has had a comprehensive safeguards agreement in force since 1998 and in 2000 signed the additional protocol (World Nuclear Association – <http://www.world-nuclear.org/information-library/country-profiles/countries-g-n/namibia.aspx> (Accessed 5 April 2016)).

Conclusion

Overall, 2014 and 2015 have been challenging for the Southern African energy sector, including Namibia, mainly because of the long-term underinvestment in infrastructure, the devastating drought in the region, and the power imbalances (with regional demand outweighing supply), resulting in the majority of countries in the region suffering from regular and extended load-shedding and rolling blackouts. The outlook for South Africa in particular remains unsettled, with commodity prices, social challenges, and energy shortages hampering the development of the economy. The majority of Southern African countries (Namibia, Mozambique, Zambia, Zimbabwe, and Botswana) rely on close to 80% of total generation capacity derived from hydro plants and the low river levels that have presented major generation challenges, leading to energy generation below the norm from many facilities. In order to ensure a continued strong performance, the Namibian economy remains highly dependent on grid energy for growth which requires major investments both in nonrenewable energy projects and also in the abundant renewable energy resources of the country.

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