Namibia Country Report

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Frequently used acronyms and abbreviations

CCGT	Combined cycle gas turbine
COD	Commercial operation date
CSP	Concentrated solar power
DFI	Development finance institution
DN	Directly negotiated
ECB	Electricity Control Board
EPC	Engineering, procurement and construction
IPP	Independent power producer
JV	Joint venture
MME	Ministry of Mines and Energy
NA$	Namibian dollar
NIRP	National Integrated Resource Plan
O&M	Operations and maintenance
PDN	Previously disadvantaged Namibian
PPA	Power purchase agreement
PV	Photovoltaic
RED	Regional electricity distributor
REFIT	Renewable energy feed-in tariff
REI4P	Renewable Energy Independent Power Producer Procurement Programme
RfP	Request for proposal
SAPP	Southern African Power Pool
TCA	Transmission connection agreement
ZAR	South African Rand

1 Introduction

Five years ago, few people would have considered Namibia as a prime investment destination for private power developers. While the country exhibited many of the macro-economic fundamentals needed to attract foreign investment, its power sector had no history of meaningful private participation. But the current situation is very different. By 2018, Namibia hosted the third highest number of independent power projects in sub-Saharan Africa. It is also the country in the region with the cheapest, local currency-based utility-scale solar photovoltaic (PV) project – with no sovereign support. The project – the 37 MW[1] Hardap facility – signals an important moment in the development of Namibia's electricity market and will have a significant impact on the future direction and structure of the country's power sector. Our report analyses the drivers behind this rapid market development, focusing in particular on the design and implementation of the competitive procurement programme that delivered the Hardap solar PV project.

We find that an often underappreciated part of the Namibian story is the importance of "getting the basics right" in terms of good governance and the country's investment climate. Not only does Namibia have a stable democracy underpinning prudent macro-economic policies, but it also has the only investment-grade-rated electricity utility in sub-Saharan Africa. The procuring entities furthermore invested a great deal to ensure that the project documents were bankable, that they maintained effective communication with the market, and that the project site and associated data met the expectations of the private sector.

The country also had to learn that the details matter – both around how the tender programme was designed, and how it was implemented. During the initial 3 x 10 MW project, NamPower failed to secure two of the three project sites - Osona (near Okahandja) and Omburu (near Omaruru) - before the tender closing date. This necessitated the relocation of these projects to the Hardap site (near Mariental), which was big enough to accommodate all three of the 10 MW projects. Although the successful tenderer for all the 3 x 10 MW projects was the same, it was considered a material change to award and triggered a set of events that would see the initial project award being set aside. A second attempt at procuring the project – implemented by NamPower – proved to be more successful by only allowing tendering for a single project.

The Hardap project further proves that it is possible to finance these kinds of projects in such a way that it limits the long-term risks and impacts on the host country in a way previously thought to be near impossible. Through innovative partnering between a commercial bank and a development finance institution, the Hardap project could be financed in local currency without a sovereign guarantee. This means that Namibian electricity consumers are not exposed to the vagaries of currency fluctuations on their electricity bills, nor are Namibian taxpayers on the hook for any defaults in payments to the project company. Given the financial health and efficient performance of NamPower, the sophistication (if not depth) of Namibia's financial markets, and the country's overall macro-economic stability, this arrangement should perhaps not come as a surprise. Nevertheless, the risk-averse nature of long-term capital, especially in the African context, usually means that these kinds of arrangements are not even on the table when discussing the bankability of private power projects in Africa.

Finally, NamPower's involvement has gone a long way towards mitigating risks throughout the project development, procurement and implementation phases. It identified and leased the project site, provided the environmental clearance certificate and site data, built the transmission line and substation, and managed the procurement process. NamPower also took

[1] The project's installed capacity is 45 MW, but its maximum export capacity is 37 MW.

equity in the project company, using their shareholding to ensure their own comfort with the project's technical quality. This shareholding also contributed to securing favourable commercial lending without any sovereign guarantee. Through their shareholding, NamPower developed a better understanding of what it takes to successfully bring this type of project to financial close and commercial operation, leading to a more accommodating stance on project implementation timelines and penalties, and greater understanding of the project finance environment.

Before focusing on the auction design and implementation, we provide some basic background on Namibia and its electricity sector. In subsequent sections, we discuss the design and management of the auction, as well as the roles played by key organisations, including some of the challenges they faced. Finally, we evaluate the programme and conclude by highlighting key lessons.[2]

[2] The analytical framework used is outlined in Appendix A. Our information was gathered partly from existing research and reports, and partly via personal communication with individuals involved in, or responsible for, establishing the auction programme.

2 Country overview

The Republic of Namibia is situated in the south-western region of Africa, sharing borders with Angola, South Africa and Botswana. It is one of the least densely populated countries in the world, with about 2,5 million people spread out across more than 850,000 square kilometres. Namibia gained independence from South African "administrative rule" in 1990 and has since held multiparty elections in 1994, 1999, 2004, 2009 and 2014 – all won by the South West African People's Organisation (SWAPO) (UNPAF, 2017; BBC, 2018).

Namibia is one of the few upper-middle income countries in sub-Saharan Africa, with nominal GDP per capita at US$5,227. It is highly ranked in most governance and investment attractiveness indices, in large part due to its political stability, macro prudential policies, and effective legal system that ensures enforcement of contracts. Namibia has developed a strong financial market and a world-class banking system, and the Namibian Stock Exchange is the second largest by market capitalisation in Africa. Nonetheless, the country's small market size has resulted in below average foreign direct investment (FDI) and an overall investment attractiveness ranking outside the top ten in sub-Saharan Africa (Fauconnier, Ramkhelawan-Bhana and Mandimika, 2017; UNPAF, 2017) .

The Namibian economy remains closely linked to that of South Africa. The Namibian dollar (N$) is pegged to the South African Rand (ZAR) and South African-linked companies represent a large portion of the firms listed on the Namibian stock exchange. The Namibian financial industry also maintains strong links with South African banks and financial services companies. Payments made to Namibia through the Southern African Customs Union[3] (SACU) make up more than 35% of government revenue and largely come from South Africa. This effectively means that any changes in South Africa's economic fortunes have a significant and at times disproportionate impact on Namibia's economy (Fauconnier, Ramkhelawan-Bhana and Mandimika, 2017; Southern African Customs Union, 2017; UNPAF, 2017; BBC, 2018).

While Namibia has experienced GDP growth rates above 5% for most of the 2000s, global ratings agencies revised its economic outlook from stable to negative in 2016. It has since experienced nine quarters of economic contraction, and public debt levels increased to more than 40% of GDP in 2017. The economic stagnation is in large part due to South Africa's own economic slow-down, as well as the impact of lower oil prices on Namibia's other major regional trading partner: Angola. While Namibia's poverty rate has declined from 28% in 2010/2011 to 18% in 2016, the recent economic woes are threatening to undo many of the country's socio-economic gains (Fauconnier, Ramkhelawan-Bhana and Mandimika, 2017; UNPAF, 2017; BBC, 2018).

Namibia's power sector: first steps towards reform and security of supply

Namibia has a relatively small power sector that is dependent on power trade with regional partners. The country has 594 MW of installed generation capacity (2019), the majority of

[3] The Southern African Customs Union is the world's oldest customs union, and effectively means that a single tariff is applied to goods entering the union (South Africa, Botswana, Lesotho, Swaziland and Namibia), and that no customs duties are charged between the members. All revenues are paid into a central revenue pool, which is distributed according to a formula that is heavily weighted in favour of the smaller customs union members (effectively, all member countries except South Africa).

which derives from the Ruacana hydropower plant[4] (347 MW) on the Angolan border (Figure 1). The national electricity access rate increased to 51% in 2016, from just above 25% in 1990. Peak electricity demand surpassed installed capacity in 2006 and the gap has been widening ever since, although there has been a slight recent decrease in demand – from 677 MW in 2017 to 639 MW in 2018. This slowing of demand growth is set to continue as economic growth falters and embedded generation (especially rooftop solar PV) increases. Given the country's excellent solar resources and its relatively high electricity tariffs, Namibia already has one of the fastest growing rooftop solar PV markets in sub-Saharan Africa (ECB, 2016; MME, 2016).

The majority of Namibia's electricity demand (60%+) is met through imports from the Southern African Power Pool (SAPP) – primarily governed by bilateral contracts with South Africa, Zambia, and Mozambique. South Africa's Eskom is the main contributor to the power pool and has been supplying around 2,000 GWh of the 4,800 GWh consumed annually.[5] Namibia has also been increasing its purchases on SAPP's short-term energy market (STEM), from 55 GWh in 2016 to 828 GWh in 2018. With almost all SAPP members facing electricity supply shortfalls of their own in recent years, Namibia is actively seeking to decrease its reliance on power trading (ECB, 2016; MME, 2016; MME, 2017a).

Most of the country's generation capacity and all of its transmission infrastructure is owned and operated by NamPower – the vertically integrated, state-owned utility company. In 1990, following Namibia's independence from South Africa, South West Africa Water and Electricity Corporation (SWAWEK) was transferred to the Namibian government and was later renamed NamPower. Although owned by the state, NamPower enjoys relative autonomy from the government in comparison with other state-owned utilities in sub-Saharan Africa, although a high turnover in recent years at CEO level[6] and questionable government appointments to its board and management have somewhat tainted its status as a "well-governed utility" (Kapika and Eberhard, 2013; The Namibian, 2015, 2018).

Nonetheless, NamPower is generally still regarded as being well managed, with full cost recovery, high bill collection rates and efficient employee levels. The utility's financial and technical performance is highly ranked in comparison to its regional peers and it is also the only utility in sub-Saharan Africa with an investment-grade credit rating. In stark contrast with other utilities in the region, NamPower paid dividends of more than US$5,7 million in 2019 and US$4,6 million in 2018 to its shareholder. NamPower finances most of its large projects – for example transmission networks – by raising bonds on capital markets (Kapika and Eberhard, 2013; Fitch Ratings Agency, 2014; Kaze, 2014; Reuters, 2017a; Eberhard and Dyson, 2019).

The Namibian distribution sector has several players, including Regional Electricity Distributors (REDs), local and regional authorities, as well as NamPower distribution. To address the lack of capacity and resources at local distributor level, in the early 2000s it was

[4] Ruacana is a run-of-the-river hydropower plant on the Kunene River that was commissioned in 1978. The plant's electricity output is very seasonal, with average monthly output ranging from 200 GWh in wet months to less than 60 GWh in dry months. The plant originally had 332 MW of installed capacity (3 x 80 MW plus 1 x 92 MW), but a recent major refurbishment increased this to 347 MW. Ruacana also has black-start capability from on-site diesel generators.

[5] Namibia has two types of contracts with Eskom. An off-peak bilateral contract (renewed annually) stipulates that electricity can be used only during off-peak periods and is priced based on season and time period (peak, standard, off-peak). The supplemental contract of 200 MW is a special assistance agreement that is conditional on Eskom being able to meet demand, and functions as a supply of last-resort option. Namibia also has a 10-year 50 MW contract with ZESCO (Zambia) that will expire in 2020, and a 80 MW supply agreement with ZESA (Zimbabwe) that expires in 2025.

[6] NamPower has had three CEOs in the past seven years: two MDs and one acting MD.

recommended that there be a gradual unbundling of the distribution sector into regional electricity distributors (REDs) (SAD-ELEC, 2000). In 2002, the distribution sub-sector was unbundled into five REDs, commencing with the establishment of NORED (covering the northern region of Namibia); CENORED (covering the central-northern region of Namibia); and Erongo RED (covering the central coastal part of the western region of Namibia) (Kapika and Eberhard, 2013). The proposed Central RED was fiercely opposed by the City of Windhoek and will most probably not be established soon, while the Southern RED is currently in the initial phases of being set up.

Table 1: Key institutions in Namibia's electricity sector

Ministry of Mines and Energy (MME)	The MME is responsible for developing energy policy; approving licences (as recommended by the ECB); rural electrification planning, funding and implementation; and the regulation of the petroleum industry.
Electricity Control Board (ECB)	The ECB is the statutory regulator for the Namibian electricity sector. It was established in 2000. ECB activities are funded by the ECB levy on electricity sales. Under the updated Electricity Act of 2007, the ECB is responsible for the regulation of techno-economic aspects of the electricity sector. ECB also manages licences and sets tariffs, as well as promotes private sector investment.
NamPower	NamPower is a private company which is 100% owned by the state, responsible for power generation, transmission, and energy trading.
National Planning Commission (NPC)	The NPC was established in 2013 to "plan and spearhead the course of national development". Amongst other functions, the NPC is responsible for identifying Namibia's socio-economic development priorities, and formulating, evaluating, and implementing national development plans.
National Energy Council (NEC)	The NEC was established in 1990 and advises the Minister of Mines and Energy on issues regarding energy co-ordination, development, exploitation, and utilisation in Namibia.
Regional Electricity Distributors (REDs) and other distributors	REDs are autonomous companies tasked with the distribution of power to electricity consumers in a specified region of the country. In return for contributing their distribution network assets to the REDs, the local authorities received shares in their respective RED.

Source: Authors' compilation

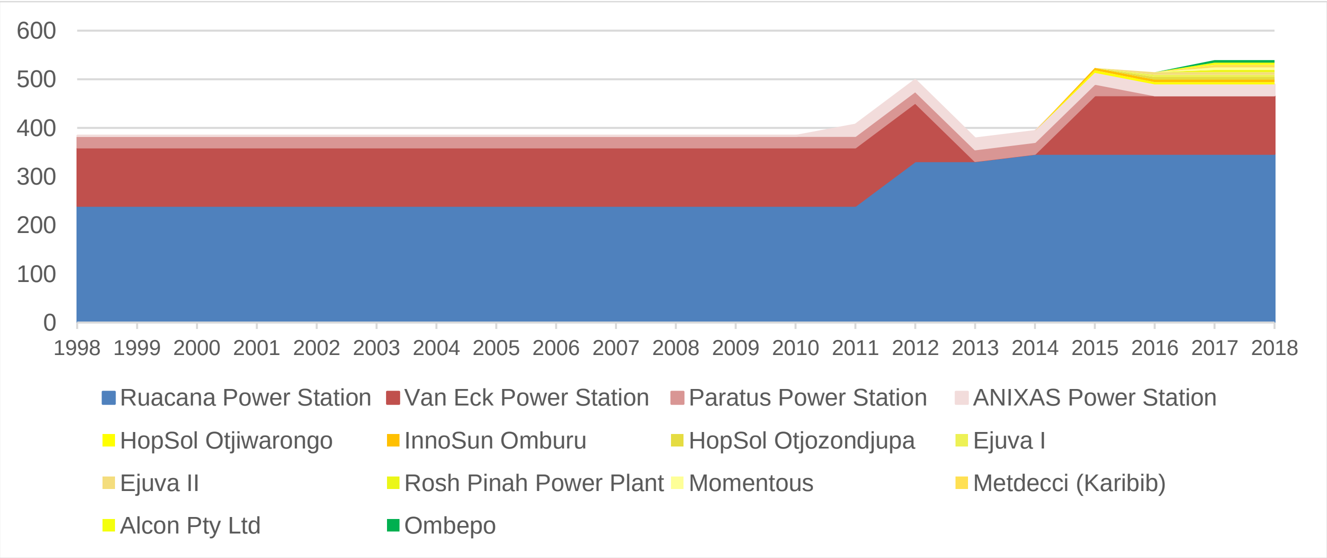

Figure 1: Installed electricity generation capacity: Namibia, 1998-2017
Source: Authors' calculation NamPower, 2018

Note: Blue = Hydropower. Red = Thermal Power. Yellow = Solar PV. Green = Wind.

The Energy Policy White Paper of 1998 was Namibia's earliest effort to develop a harmonised policy for the energy sector (MME, 1998). A study on the operationalisation of the policy recognised the role of independent power producers (IPPs) in achieving electricity supply security and proposed a power sector structure that would enable IPPs to supply power to the REDs and other local and regional authorities through a single buyer, as well as to enter into export contracts directly with third parties. It also proposed the monitoring of bulk-sale agreements by an independent regulator so that the utility (as single buyer) would not ultimately support its own generation over that of IPPs (SAD-ELEC, 2000).

The Electricity Act of 2000 established an independent regulator called the Electricity Control Board (ECB). The regulator is responsible for approving tariffs over the entire power sector (generation, transmission, and distribution). The approved bulk electricity tariff charged by NamPower for the 2018/2019 financial period is NA$1,72/kWh (US$0,12/kWh). The Ruacana hydropower plant is the cheapest source of power on the system and produces electricity at between NADc 20-40/kWh (US$0,014-0,029/kWh). End-user tariffs in the capital City of Windhoek range from NA$1,44/kWh (US$0,10/kWh) for low-income residential consumers, to NA$3,06/kWh (US$0,22/kWh) during peak hours (in the high season) for commercial customers[7] (ECB, 2016; City of Windhoek, 2018; NamPower, 2018).

Not long after the Act was passed, various loopholes were identified. Most importantly, the Act made no provision for the promulgation of mechanisms that would enable private sector investment; it did not stipulate the asset transfer arrangement from municipalities to the REDs; and did not explicitly furnish the ECB with exclusive regulatory authority over the distribution sub-sector (Kapika and Eberhard, 2013). The Act was thus revoked, and a new Electricity Act was passed in 2007 (MME, 2007).

More recently, the National Energy Policy (MME, 2017a), National IPP Policy (MME, 2017b) and National Renewable Energy Policy (MME, 2017c) have been adopted to spell out the government's intent, direction and undertakings for the energy sector. The main goals of the policies are to ensure electricity supply security, affordability and reliability, primarily by increasing private-sector renewable-energy investment (both on-grid and off-grid). The IPP policy also stipulates that small IPPs (<5 MW) are to be procured through a renewable energy feed-in tariff (REFIT) scheme; whereas medium (5-100 MW) and large (100 MW+) IPPs are to be procured through a competitive tender process (MME, 2017b). Through the policy amendments, the country further formally implemented the modified single-buyer market model. This allowed IPPs to sell to NamPower and transmission customers such as distributors or large consumers[8] and endow the national electricity planning document (NIR) with legislative power. This is discussed further in Section 3.

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[7] This refers only to the energy charge, and excludes an additional capacity charge, ECB levy, and National Energy Fund (NEF) levy. As a rule of thumb, the cost components of the average end-user tariff typically comprise 50% generation cost, 20% transmission cost, 5% levies, and 5% distribution costs. The average retail tariff in Namibia is estimated at NA$2,45/kWh.

[8] Transmission customers are allowed, under the modified single buyer model to buy up to 30% of their electricity consumption from private generators (IPPs) under the first phase of the model, until 2021. The regulators will come up with new rules and allocations for the second phase, which will last until 2026. Part of the modified singly buyer framework includes the promulgation of a wheeling framework and unbundled tariff framework.

The pronounced policy focus on increasing private power investment was in part motivated by the public sector's struggle to increase generation capacity.[9] NamPower has for many years unsuccessfully tried to develop two large generation projects – Baynes (600 MW hydro – to be shared with Angola) and Kudu (800 MW combined cycle gas turbine (CCGT) fuelled by off-shore gas resources). These projects have experienced slow development, with NamPower unwilling to allow full private-sector involvement[10]. By contrast, the country has recently embarked on one of sub-Saharan Africa's most rapidly successful private power investment programmes, with more than 20 IPP projects reaching financial close in the last three years (Table 1). This is a significant development, considering that Namibia had no private power generation capacity prior to 2016. The majority of this new capacity is made up of relatively small (5 MW) renewable energy projects (primarily solar PV) procured through a feed-in tariff programme. There is also a handful of directly negotiated projects that reached financial close, some of them selling directly to REDs. Both the REFIT and directly negotiated deals are considered to be quite expensive, for the most part selling power at prices above the average cost of NamPower generation. The competitively procured 37 MW Hardap solar PV project at Mariental is an important exception and will be the focus of this report.

Table 2: List of power plants in Namibia

Power plants	Location	Technology	Capacity[11]	Category	COD
Van Eck[12]	Windhoek	Coal	30	Utility	1972
Paratus[13]	Walvis Bay	HFO	24	Utility	1976/Decomm.
Ruacana[14]	Omusati	Hydro	347	Utility	1978
ANIXAS[15]	Walvis Bay	Diesel	22,5	Utility	2011
Ejuva 1	Gobabis	Solar PV	5	IPP (REFIT)	2017
Ejuva 2	Gobabis	Solar PV	5	IPP (REFIT)	2017
Camelthorn	Outapi	Solar PV	5	IPP (REFIT)	2018

[9] The Ministry of Finance also wants to loosen fiscal constraints through increased use of public private partnerships (PPPs).

[10] NamPower committed to a maximum of 51% equity stake in the Kudu Power Station to allow participation of the private sector in the project. The upstream development included NAMCOR and a privately owned company.

[11] The capacity mentioned in this column refers to export capacity. The installed capacity of most of the IPPs is slightly above the export capacity, and is included as such in the calculation of Namibia's overall installed capacity.

[12] The Van Eck power station was commissioned in 1972 (NamPower, 2015) and was built as an interim measure, as Angola's grapple for independence from Portugal (1961-1975) further delayed the development of the Ruacana hydropower project (Kapika and Eberhard, 2013). Between 2012 and 2014, the power station was out of service for rehabilitation work and was re-commissioned in 2015 (NamPower, 2015). Due to various constraints the plant can only operate three of its four units at a time, and the ageing equipment as well as the poor emissions profile limits output to between 60 and 80 MW at a time. Coal for the plant is imported from South Africa through the Walvis Bay harbour terminal, making this an expensive plant used mainly for peaking and back-up.

[13] The Paratus power station was commissioned in 1976 (NamPower, 2017a). Like Van Eck, the Paratus power station was built as an interim power plant, because of the ongoing delay of the Ruacana project (Kapika and Eberhard, 2013). The power station was decommissioned in 2016 (NamPower, 2017a).

[14] The Ruacana power station was commissioned in 1978, with an installed capacity of 240 MW. In 2012, NamPower increased the power output to 332 MW by installing a fourth generator. In 2014, NamPower further increased the power output to 347 MW by replacing the runners of the initial three existing generators (NamibTimes, 2016; NamPower, 2017a).

[15] The ANIXAS power station was commissioned in 2011 to serve as a peaking power plant.

Momentous	Keetmanshoop	Solar PV	5	IPP (REFIT)	2017
Hopsol	Grootfontein	Solar PV	5	IPP (REFIT)	2016
Sertum	Trekkopje, Erongo	Solar PV	5	IPP (REFIT)	2018
Aloe Investment	Rosh Pinah	Solar PV	5	IPP (REFIT)	2017
ALCON	Aussekher	Solar PV	5	IPP (REFIT)	2017
UNISUN	Okatope	Solar PV	5	IPP (REFIT)	Construction
Tandii	Okatope	Solar PV	5	IPP (REFIT)	Construction
NCF	Okatope	Solar PV	5	IPP (REFIT)	Construction
Ombepo	Luderitz	Wind	5	IPP (REFIT)	2017
Osona	Okahandja	Solar PV	5	IPP (REFIT)	2016
Metdecci	Karibib	Solar PV	5	IPP (REFIT)	2017
GreeNam	Keetmanshoop	Solar PV	10	IPP (DN)	2018
GreeNam	Mariental	Solar PV	10	IPP (DN)	2018
Diaz	Spergebiet	Wind	44	IPP (DN)	Construction
Omburu	Omaruru	Solar PV	4,5	IPP (DN)	2016
Hopsol	Otjiwarongo	Solar PV	5	IPP (DN)	2016
Hardap (Alten)	Mariental	Solar PV	37	IPP (ICB)	2018
OLC Arandis	Arandis	Solar PV	3,8	IPP (ICB) – Erongo RED	2018
Sun EQ Four	Otavi	Solar PV	5	Embedded generation – Ohorongo Cement	2018
B2Gold	Otjikoto Mine	HFO/Solar PV	31	Embedded generation	2018
Ohorongo Cement	Otavi	Diesel	7,5	Embedded generation	2018
Hopsol	CENORED	Solar PV	5	IPP (DN) – CENORED	2018
Xaris	Walvis	LNG	250	IPP (ICB)	On hold[16]
Unspecified	Arandis	CSP	150	IPP (ICB)	Anticipated[17]
Unspecified	Otjiwarongo	Biomass	40	IPP (ICB)	Anticipated[18]
Unspecified	Otavi	Unspecified	20	IPP (ICB)	Anticipated[19]

Source: Authors' compilation; NamPower, 2017a)

Note: COD = Commercial Operation Date. DN = Directly Negotiated. ICB = Internationally Competitive Bid. HFO = Heavy Fuel Oil. CSP = Concentrated Solar Power.

Private power investment has also spread beyond the government procurement programmes and is presenting potential competition to the national power utility. Three utility-scale

[16]See: https://allafrica.com/stories/201706080689.html and http://www.energy100fm.com/?q=content/government-halt-xaris-gas-power-plant-walvis

[17] See Reuters, 2017b.

[18] See Reuters, 2017b.

[19] See Reuters, 2017b.

embedded generation/corporate power purchase agreement (PPA) power projects have been built in recent years (Table 2), with several more being developed. The story of most significance for the Namibian power sector is, however, the rapid development of the commercial and industrial rooftop solar market, with PV systems now covering a significant percentage of all commercial and industrial roof-space in the country. The country's cost-reflective electricity tariffs have driven much of this development: the relatively high price of electricity, coupled with the high solar irradiation levels, allows payback periods of only two to three years for most of these systems. As solar PV prices continue to fall, Namibia is bound to see rapid expansion of this market into the high-end residential sector. This means that in the medium term the grid operator is facing a significant "duck curve"[20] drop in demand during the day, with high power ramp rates in the evenings. Rapid rooftop PV expansion also means that electricity revenues from high-income, high-consumption customers, who have traditionally cross-subsidised tariffs for lower-income customers, are on the decline. The development of battery storage represents a further, potentially more severe challenge to the structure and sustainability of the country's power utilities.

[20] The duck curve (so named by the California Independent System Operator based on the daily residual electricity demand curve's resembling the outline of a duck) refers to the phenomenon where increased solar-PV penetration on the grid significantly depresses demand during daytime hours. This means that the required ramp rate during the hours when solar PV decreases output (usually coinciding with the early evening peak) becomes ever steeper. The duck curve presents significant challenges for conventional power generation technologies that have to balance out the system, since many of them are not able to ramp up quickly enough. For more information, please see: https://www.nrel.gov/news/program/2018/10-years-duck-curve.html.

Box 1: The Kudu Gas Power Project

The Kudu Gas Power Project was, for a long time, considered to be Namibia's flagship PPP. It is an 800-MW, combined cycle natural gas-fired power station, to be situated 25 km north of Oranjemund. The power station was set to be developed by NamPower through KuduPower, a Special Purpose Vehicle (SPV) established in 2005. A consortium led by Chevron oil company discovered the Kudu gas field at Oranjemund in 1974 (CSIR, 1999). In 1988, NAMCOR (formerly SWAKOR) drilled two wells and estimated that the well contained a reserve of about five trillion cubic feet of gas (CSIR, 1999).

In 1997, a joint venture (JV) comprising NamPower, Eskom, and Shell planned to build a 750 MW combined cycle gas turbine plant with an estimated cost of NA$4 billion (*Namibian*, 1997). Following further feasibility studies in 1998, Eskom realised that the electricity produced by the project would be too expensive and consequently withdrew from the JV in early 1999 (*Namibian*, 1998). This jeopardised the project's overall feasibility since a significant regional off-taker was a key requirement for the plant's commercial viability (Kapika and Eberhard, 2013).

In 2002 Shell transferred its rights to its partners, ChevronTexaco and Energy Africa, when it was discovered that the actual gas reserves amounted to only 1,3 trillion cubic feet. In late 2003, ChevronTexaco withdrew from the concession and relinquished its rights to Energy Africa (Kapika and Eberhard, 2013). Subsequently, NAMCOR acquired a 10% stake in the concession (*Namibian*, 2003).

In 2004, Eskom revived interest in the project and signed a memorandum of understanding (MOU) with NamPower, pledging to negotiate a PPA and other associated agreements relating to the operation and maintenance of the project. Energy Africa, NAMCOR, and NamPower entered into a JV, with the expectation that the project would come online in 2009 (Kapika and Eberhard, 2013). By 2007, while PPA negotiations between NamPower and Eskom were in progress, the gas-supply agreement between NamPower and Energy Africa stalled due to NamPower insisting that the gas-supply agreement be in Namibian dollars (*New Era*, 2008). Thereafter, Energy Africa sold its 20% stake to a Japanese firm Itochu (Kapika and Eberhard, 2013).

By 2009, currency risk still presented a stumbling block to negotiations (Kapika and Eberhard, 2013). Gazprom – a Russian energy giant – expressed interest in the project and in 2010, acquired a 54% stake in the concession – but withdrew within a year (Kapika and Eberhard, 2013). As a result, the Namibian government agreed to provide government guarantees to NamPower and NAMCOR to minimise the associated risk that these state entities posed to prospective upstream investors (*New Era*, 2012).

NamPower's latest plans have focused on reducing the scale of the planned Kudu Power Project (from 800 MW to 442,5 MW), because the off-take agreements with Eskom and Zambia's Copperbelt Energy Corporation (CEC) failed to materialise. The latest cost estimate for the power station is approximately NA$9,4-billion (US$760 million). At the time of writing, the Kudu Power Project is far from reaching financial close.

Box 2: The Baynes Hydropower Project

The planned Baynes hydropower plant is located along the Kunene River (200km downstream of Ruacana) and is envisaged as a 600-MW, mid-merit/peaking power station to be evenly shared between Namibia and Angola (NamPower, 2018).

In 1969, the South African government (the colonial authority in Namibia at that time) and the Portuguese government (the colonial authority in Angola at that time) entered into a bilateral agreement to develop the first phase of the Kunene River water resources. The bilateral agreement included a plan to develop a hydropower plant at Ruacana (currently operational), to be followed by a sequence of hydropower plants along the length and breadth of the Kunene River. This agreement gave rise to the construction of three schemes in the 1970s – Gove Dam in Angola, Ruacana Hydropower plant in Namibia, and the Calueque Water Scheme – that would facilitate water supply to Namibia and Angola (ERM, 2009).

In the late 1980s, NamPower (then SWAWEK) began negotiations for constructing a hydropower plant in the Epupa district. The Namibian and Angolan governments decided to carry out technical and environmental feasibility studies in 1991 – which were finalised only in 1998. The Baynes and Epupa sites were selected as the most technically viable for potential hydropower. This decision was preceded by a rigorous investigation of all probable hydropower development sites along the Kunene downstream of Ruacana (ERM, 2009; NamPower, 2018).

Further studies focusing on the technical, social and ecological features of these two sites continued. The final report concluded that only the Baynes Hydropower Project would undergo further development and eventual construction since the proposed site would be the least disruptive to the local Himba people (ERM, 2009; NamPower, 2018).

The plans to further develop the Baynes hydropower plant was reinvigorated by the expiration of NamPower's firm power contract (FPC) with South Africa's Eskom in 2005. Moves to renew the FPC proved futile, coinciding with the period during which South Africa was suffering severe power shortages. This resulted in more expensive imports, particularly during peak hours (NamPower, 2018). While the procurement process was expected to be finalised by 2017, at the time of writing there has still not been any noteworthy development of the project.

Private power investment and REFIT progress in Namibia

Until recently, Namibia had limited experience with private-sector participation in its power sector. In 1996, the Namibian government signed a six-year competitively tendered deal with a newly established private company – Northern Electricity – for the operation of distribution networks in a rural, under-served district in the northern region of the country. Although the company was responsible for all operating expenses and revenue of the distribution system, the government maintained ownership of the assets (i.e. a concession agreement). Government declined to renew the contract in 2002, despite the private company's notable success in operating and managing the distribution infrastructure. In early 2002, the concession was transferred to the newly established NORED (Kapika and Eberhard, 2013).

2014 marked a true turning point for private power investment in Namibia. The directly negotiated Omburu solar PV project reached financial close and began construction in 2014, showing that it was possible to finance and build these types of smaller renewable energy projects without any form of sovereign guarantee (Kaira, 2017). Motivated by this "proof of concept", the interim REFIT scheme was designed as a pilot programme to increase generation from non-hydro sources. REFIT tariffs were initially set at quite generous levels, but were revised prior to projects being awarded based in part on price levels achieved in neighbouring South Africa's second bid window of the Renewable Energy Independent Power Producer

Procurement Programme (REI4P). Final feed-in tariffs ranged from US$0,078/kWh for onshore wind to US$0,099/kWh for solar PV and were indexed to inflation (Table 3).

Table 3: Namibian feed-in tariff rates

RE Technology	Capacity	FIT levels in NA$/kWh[21]	FIT levels in US cents/kWh[22]
Biomass	5 MW	1,28	9,3
Solar PV	5 MW	1,37	9,9
Onshore wind	5 MW	1,08	7,8

(Source: ECB, 2017)

Initially, 27 projects had been granted provisional licences by the ECB in the period leading up to the launch of the feed-in tariff programme, but had failed to advance to financial close in the absence of a structured procurement programme. These projects were all invited to participate in the REFIT Programme and were given six months to submit all required documents.[23] 14 projects (totalling 70 MW) were selected on a "first come, first meeting the requirements" basis.[24] They then had six months to achieve the PPA effective date with NamPower[25] and a further 12 months to reach the commercial operation date (COD).[26] The remaining IPPs were placed on a waiting list. The REFIT process therefore effectively became a race to the finish line, which helps to explain the rapid development of these projects.

In 2016, 14 REFIT projects (5 MW each), totalling 70 MW and more than US$123 million worth of private investment, reached financial close (NamPower, 2017b). All 14 REFIT projects reached their PPA milestones (ECB, 2017) and 13 reached COD by the required date[27] (Table 3). One is still under construction. This signalled a significant departure for the country's power sector, with the private sector quickly coming to represent a significant portion of installed generation capacity. The rapid increase in investment also stands in stark contrast with the prolonged and as yet unsuccessful efforts at getting the Kudu and Baynes generation projects off the ground.

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[21] The initially announced tariffs were higher for solar PV (NA$2,46/kWh) and wind (NA$1,16/kWh). For biomass it was lower (NA$1,23/kWh).

[22] Based on a NA$:US$ exchange rate of 0,072.

[23] Credit Approved Term Sheet from a reputable lender/funder: IPPs that are funding the project through their balance sheet and/or equity investment must render a reputable commercial bank's guarantee confirming funds availability. A letter from the same reputable lender confirming its willingness to provide financing on the terms and conditions of the contract agreements – PPA and TCA. Otherwise, IPPs that are funding the project through their balance sheet and/or equity investment must render a letter, in tandem with the contract agreements – PPA and transmission connection agreement (TCA). A shareholding certificate indicating a minimum share of 30% for PDNs (NamPower 2016b).

[24] Twenty-seven interested parties (already licensed) were invited. NamPower facilitated the submission and procurement process, with each party being provided a token based on the time the proposal was submitted.

[25] An IPP would have reached effective PPA date when the following documents were submitted: copy of a signed PPA; copy a signed TCA with NamPower; site permit; environmental impact assessment (EIA) certificate of the site; financial close document/s; generation licence; and a copy of the PPA regulatory oversight letter from the ECB.

[26] IPPs had to find their own land less than 5km from the grid.

[27] Projects that have not reached their projected PPA dates have been granted more time by the ECB, primarily due to *force majeure* risks materialising in the construction phase. For example, landmines were discovered on three of the project sites, requiring a lengthy clearing process and official police confirmation prior to development.

Table 4: List of Namibia's REFIT projects

Company name	Capacity	Location	PPA Signed	TCA signed	COD
Benzel & Partner Investment Pty Ltd	5 MW	Gobabis (Ejuva 1)	28/10/2015	25/04/2016	19/09/2017
OKA Investment Pty Ltd	5 MW	Gobabis (Ejuva 2)	27/10/2015	25/04/2016	19/09/2017
Camelthorn Business Venture Pty Ltd	5 MW	Outapi	27/10/2015	25/04/2016	
Momentous Energy Pty Ltd	5 MW	Keetmanshoop	30/10/2015	18/03/2016	24/10/2017
Hopsol Pty Ltd	5 MW	Grootfontein	22/10/2015	27/01/2016	30/06/2016
Sertum Energy Pty Ltd	5 MW	Trekkopje, Erongo	21/10/2015	20/04/2016	
Aloe Investment Number 27 Pty Ltd	5 MW	Rosh Pinah	29/10/2015	22/04/2016	23/07/2017
ALCON Pty Ltd	5 MW	Aussenkehr	29/10/2015	22/04/2016	29/09/2017
UNISUN Energy Pty Ltd	5 MW	Okatope	29/10/2015	27/04/2016	
Tandii Investment Pty Ltd	5 MW	Okatope	29/10/2015	25/04/2016	
NCF Energy Pty Ltd	5 MW	Okatope	29/10/2015	25/04/2016	
Ombepo Energy Pty Ltd	5 MW	Luderitz	13/01/2016	23/03/2016	08/09/2017
Osona Sun Energy Pty Ltd	5 MW	Okahandja	21/10/2015	05/01/2016	01/09/2016
Metdecci Energy Investment Pty Ltd	5 MW	Karibib	23/10/2015	24/02/2016	07/03/2017

Source: Author's calculation NamPower, 2017b

An important condition for all IPP generation licences in Namibia is that there needs to be a minimum 30% previously disadvantaged Namibian (PDN)[28] shareholding in the project company. It is a condition set by the MME and enforced by the ECB through the licensing process. In the REFIT programme many of the PDN shareholders' equity was financed by a shareholder loan from the lead developer. Several PDN shareholders have subsequently approached financial institutions such as the Government Institutions Pension Fund (GIPF) to refinance their shareholding, which would allow them to make decisions as equal partners on issues such as dividend declarations as well as free up cash flows for earlier dividend flows. According to the ECB, there are also changes afoot to ensure that there is more meaningful PDN shareholding in future power projects, based in part on what has been learned through the REFIT process.

Apart from the REFIT programme there have also been a number of private power projects procured directly by REDs. REDs are allowed to procure up to 12% of their total electricity consumption from IPPs under current regulations and are in part motivated to secure these projects as a way of attracting investment to their region. CENORED was the first RED to start purchasing power directly from IPPs, competitively procuring the 5 MW Hopsol solar PV project in 2015 at a price level close to that of the REFIT programme.[29] It was followed by Erongo RED's 3,8 MW procurement of the OLC Arandis project in 2016 at NA$1,18/kWh (US$0,085/kWh)[30]. CENORED awarded a further 6,4 MW to OLC Arandis in 2017 – although this project has not yet reached financial close. Windhoek municipality has also indicated their

[28] This includes racially disadvantaged persons, women, and persons with a disability.

[29] The Otjiwarongo municipality is a shareholder in the project company based on the land that is being leased to the project.

[30] This project is apparently facing transmission congestion, which is likely to result in Erongo RED needing to make significant deemed energy payments.

intention of procuring 5 x 5 MW solar PV plants in the near future[31] (CENORED, 2013; Confidente, 2015; De Klerk, 2016; Kaira, 2017).

Namibia's experience with directly negotiated (DN) projects has been less successful. While the 4,5 MW Omburu solar PV project (NA$1,50/kWh; US$0,11/kWh) paved the way for other IPPs by showing that it was possible to finance and quickly build an IPP without sovereign support, other directly negotiated IPPs have been slower off the mark. The Diaz wind project was, for example, the first IPP in the country to be awarded a licence by the ECB in 2007, but has still not reached commercial operation more than 12 years later. The project was initially unable to secure financing without sovereign support, after which the technical partners withdrew. The project eventually signed a PPA (without a sovereign guarantee) in 2017 with strict conditions precedent (CP) deadlines. It is at this stage unclear whether the project will be able to meet these deadlines, largely due to difficulties in securing permits for the environmentally sensitive site. The project tariff was also adjusted from NA$1,27/kWh (US$0,09/kWh) to NA$1,07/kWh (US$0,077/kWh) by the ECB.[32] Greenam also signed a PPA with NamPower in 2016 after long negotiations for 2 x 10 MW solar PV projects close to Mariental (Hardap) and Keetmanshoop at NA$1,16/kWh (The Villager, 2016).[33] The initial developers (F.K. Group, Israel) exited the project as soon as the PPA was signed. Both projects, however, started construction in 2018 and reached COD in 2019.

Namibia's experience with private power investment thus represents the entire procurement spectrum, offering a useful test case for comparing outcomes. The competitively procured Hardap solar PV project has delivered the lowest price (Figure 2) and is being hailed as evidence of the superiority of competitive IPP procurement by Namibian government and regulatory officials. In the following sections we will focus on this project and analyse the design, implementation, and outcomes of this solar PV auction.

[31] This procurement is currently on hold to align with the new PPP legislation.

[32] This was based on the ECB's internal due diligence and benchmarking analyses. The developers apparently threatened to take the ECB to the minister due to the tariff revision; the ECB countered with the credible threat of putting the project out to tender, which is all but guaranteed to deliver a lower tariff.

[33] Negotiations started at NA$2,40/kWh. The final tariff for the projects is NA$1,16/kWh. The Karas project will feed into the same Mariental substation as the Hardap PV project.

Figure 2: Price comparison of directly negotiated (DN), feed-in tariff (FIT), and internationally competitive bid (ICB) solar PV projects in Namibia

3 The Hardap solar PV project: auction design

Although the Hardap PV project obtained its legacy from the original 3 x 10 MW project, the Hardap solar PV project procurement was conceptualised and managed as a completely new tender. It was designed as a single-stage, two-envelope, sealed-bid, pay-as-bid tender process. Successful tenderers were offered a bankable and standardised, 25-year PPA with NamPower. In the final tender process, which was advertised on 13 May 2016, project developers were given three months to prepare their bids, which was extended to 22 September 2016 providing for a 19-week tender period. Although the tender validity period was 6 months, the evaluation process was completed by the end of November and the tender was awarded early in December 2016. The post-award project development process took longer than anticipated, with financial close and commercial operation deadlines being extended multiple times.

In this section we analyse the tender set up, focusing on how the auction volume was determined (auction demand); where the projects would be built (site selection); who was allowed to bid, and how this was determined (qualification and compliance criteria); how the projects were evaluated and ranked; and which tools and mechanisms were used to ensure the commitment of bidders as well as fair risk allocation between the host government, the off-taker, and bidders (seller and buyer liabilities).

Auction demand

Namibia's use of least-cost electricity expansion planning is a recent phenomenon that initially struggled to gain formal traction. In 2011 the ECB contracted Canadian consultants to develop a "National Integrated Resource Plan" (NIRP), with financial support from the World Bank. The NIRP was the most comprehensive overview of the Namibian electricity sector, outlining future options for power system expansion based on scenario analysis. When the NIRP was released in 2013, the least-cost expansion plan was built on the assumption that the Kudu gas power project would be realised by 2017. It offered no allocation for solar PV or wind in the next 20 years – apart from the projects that had already been committed to – and the only renewables allocation was limited to biomass[34] (Hatch, 2013). The 2013 NIRP was never sent to cabinet for approval and consequently never adopted by government.

The second version of the electricity plan has proven to be more influential and somewhat less beholden to existing project commitments. The NIRP was updated in 2016 and approved by government in 2017, with the least-cost scenario excluding the Kudu and Baynes projects. NIRP 2016 (Table 5) also increased the overall renewables allocation, with 229 MW of solar PV, 149 MW of onshore wind, 250 MW of CSP, and 80 MW of biomass expected to be online by 2035. The remaining demand was projected to be met by new thermal power plants (720 MW[35]) and imports (350 MW – phased out by 2017). Importantly, the annual allocations for specific technologies were relatively small (20 MW for solar PV and biomass; 50 MW for wind and CSP), meaning that Namibia would be unlikely to benefit from significant economies of scale in its procurement programmes. The biggest allocation for solar PV was in 2018 (50 MW), providing space for the anticipated competitive procurement of three 10 MW solar PV projects

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[34] Cost assumptions used for solar PV and wind were also too high, ranging from NA$1,73/kWh (20% capacity factor to NA$0,99/kWh (35% capacity factor) for wind and NA$2,42/kWh (20% capacity factor) to NA$1,61/kWh (30% capacity factor) for solar PV.

[35] The thermal allocation is made up of a 120 MW emergency power plant, as well as 2 x 300 MW thermal (coal, LNG or HFO) plants to be procured by NamPower.

(that would later become the single 37 MW Hardap project), as well as the start of commercial operations of the 2 x 10 MW Greenam PV projects (MME, 2016).

The NIRP planning process has not been without flaws and steps are underway to increase the accuracy, status, and influence of the resulting plans. Both the 2013 and 2016 versions of the NIRP have proven to be outdated before they were published, with prices achieved in South Africa's, Zambia's, and Namibia's own auctions for solar PV (and wind) being notably lower than those assumed in the NIRP 2016 model.[36] The slow economic growth and an increase in distributed solar PV has resulted in the overall electricity demand being lower than projected. A revision of the plan and its underlying assumptions is therefore underway. While the NIRP provides some certainty to the market in terms of government's intentions, the plan has no official legislative status. Accordingly, the state and its entities are not bound by the plan in their procurement decisions. Amendments to the Electricity Act currently being processed will change this, also giving the Minister of Mines and Energy the power to make determinations as to who should build new power projects. The minister has already made a determination – in 2018 – on 220 MW of new capacity, allocating 150 MW to NamPower and 70 MW (20 MW solar, 50 MW wind – in line with the NIRP) to the private sector (Kaira, 2018).

Table 5: NIRP 2016 implementation plan and schedule

Year	New Generation Addition[(1)]							Retirement		System	New Generation Investment Cost [(4), (5)]		Energy Production				Load Forecast	
	Renewable (MW) [(2)]					Thermal [(3)]	Import	Plant	Capacity	Capacity	Renewable	Thermal	Renewable [(2)]	Thermal	Import	Total	Peak	Energy [(2)]
	Hydro	Solar PV	Wind	Biomass	CSP	0			MW	MW	N$ millions		GWh				MW	GWh
Existing	346.5	9.5				135.8	330			821.8								
2015											1,200.8							
2016										821.8	2,744.4		1,530.0	923.4	1,788.1	4,241.5	645.7	4,241.5
2017		70					20			911.8	1,295.9		1,713.9	928.0	1,907.2	4,549.2	692.5	4,549.2
2018		50	49			120		Paratus & Imp	26.3	1,104.5	343.1	3,305.1	2,011.2	1,598.3	1,170.6	4,780.1	733.4	4,780.1
2019										1,104.5	228.7	4,406.8	2,011.2	1,656.0	1,263.1	4,930.3	758.4	4,930.3
2020		20								1,124.5	1,108.4	3,305.1	2,063.8	1,697.8	1,338.6	5,100.2	785.9	5,100.2
2021						300		ICRE & Imp	370	1,054.5	1,048.1		2,063.8	2,701.2	522.7	5,287.7	815.9	5,287.7
2022			50							1,104.5	755.3	3,305.1	2,217.1	2,694.8	531.3	5,443.2	841.7	5,443.2
2023										1,104.5	537.9	4,406.8	2,217.1	2,797.4	591.7	5,606.1	868.5	5,606.1
2024		20		20						1,144.5	1,869.5	3,305.1	2,436.0	2,775.7	581.2	5,792.9	898.5	5,792.9
2025						300		Van Eck & Imp	188	1,256.5	2,573.1		2,423.3	3,422.6	145.0	5,990.9	930.7	5,990.9
2026		20								1,276.5	4,573.5		2,475.9	3,635.8	85.1	6,196.9	963.8	6,196.9
2027					50					1,326.5	3,083.3		2,826.3	3,532.9	65.5	6,424.8	1,001.0	6,424.8
2028			50	20						1,396.5	2,178.7		3,146.0	3,454.1	55.1	6,655.2	1,038.7	6,655.2
2029					50					1,446.5	2,167.4		3,483.6	3,369.1	42.6	6,895.3	1,077.6	6,895.3
2030		20								1,466.5	2,996.7		3,536.2	3,545.6	65.1	7,146.9	1,118.5	7,146.9
2031				20						1,486.5	3,693.8		3,702.7	3,623.0	79.4	7,405.1	1,158.7	7,405.1
2032		20			50					1,556.5	3,870.9		4,092.8	3,487.6	55.1	7,635.6	1,195.4	7,635.6
2033				20						1,576.5	3,561.7		4,259.3	3,586.4	72.2	7,917.9	1,239.3	7,917.9
2034					50					1,626.5	1,526.4		4,596.9	3,523.8	60.2	8,180.9	1,280.7	8,180.9
2035					50					1,676.5			4,947.3	3,488.0	54.2	8,489.5	1,328.5	8,489.5
Total	**346.5**	**229.5**	**149**	**80**	**250**	**855.8**	**350**		**584.3**		**41,357.7**	**22,034.0**						
	1055					**1205.8**		**584.3**			**63,391.7**							
	1,677																	

Note: (1) For Scenario 6 of Option 2
(2) The values shown do not include the contribution of Solar PV installations implemented under the Net Metering Program
(3) Assumes the short-term emergency diesel generators would be rented and there would be no investment cost
(4) Annual capital investment flow as per the typical capital disbursement schedule for each type of new plant
(5) The capital investment required for solar PV installations under the Net Metering Program is not included

Source: MME, 2016, p. 23

What seems to emerge from this analysis is that the Hardap PV project, as well as its preceding 3 x 10 MW projects, were conceived in line with the Energy White Paper, but without a National Integrated Resource Plan in place. This has been confirmed by the Ministry of Mines and Energy (MME) and NamPower, who indicated that the inability to close the Kudu and Baynes projects, and concerns about electricity supply security from SAPP, prompted government to rather focus on smaller projects that could be financed without a sovereign guarantee. The sizing of the of the initial 3 x 10 MW solar PV projects was therefore mainly

[36] Unit cost assumptions in NIRP 2016: NA$1,54/kWh for onshore wind, NA$1,61 for solar PV. By the time the NIRP was published, the latest rounds of procurement in South Africa had seen prices drop to below 50% of the assumed costs in the NIRP. These prices were also higher than the Namibian REFIT tariffs in place at the time.

determined by fiscal concerns and the resulting auction was consequently set to be run as a test case.

The programme has been plagued by a sense of uncertainty, as a consequence. The auction programme was initially developed in 2015/16 for 3 x 10 MW solar PV power plants at Okahandja, Omaruru, and Mariental. At a late stage in the procurement process, NamPower realised that they were unable to secure the two sites at Okahandja and Omaruru. As the preferred tenderer for all the 3 x 10 MW projects where the same; the Alten Renewable Energy Development consortium, it was decided to relocate the two projects to the Hardap site, which was big enough to accommodate the 3 x 10 MW developments. ENEL Green Power, one of the bidders and also one of the largest global renewable energy IPP developers, launched a legal challenge to the tender award based on this perceived material change. In early in 2016 the 3 x 10 MW solar PV tender was set aside and referred back to NamPower by the High Court of Namibia. NamPower therefore tendered a new solar PV (termed Hardap) project with a maximum export capacity of 37 MW in 2016. The increased size of the project (37 MW) was now based on what the site could accommodate and offered benefits in terms of economies of scale (and therefore a lower tariff). The new Hardap Solar PV Project capacity was based on a new original and conservative estimation to allow potential tenderers enough flexibility to design a suitable DC/AC ratio which can accommodate the newly required Capacity Factor guarantee. It is hoped that the strengthening of the planning framework, combined with the outcomes and lessons from the Hardap PV procurement round, will lead to greater certainty through predictable auction rounds in the near future.

Site selection

Kruger, Strizke and Trotter (2019) have analysed renewable energy project site selection as a salient determinant of auction outcomes in sub-Saharan Africa. The research finds that while a government-led site selection and preparation process is the most popular option – often chosen based on a belief that it will hasten the development process and reduce project risks (and costs) – it can lead to higher costs and risks, as well as longer lead times, when the process is poorly executed. This is mainly because the process can violate one of the fundamental rules of project finance: that risks are allocated to those parties most able to bear or control them (Shen-fa and Xiao-ping, 2009). With a government-led site selection process, the private sector is often allocated a set of site-related risks that they have little to no control over. Namibia's experience seems to support both sides of this argument, with problems with the initial project sites leading to a dismissal of the auction results.

NamPower opted to undertake the site selection and development processes for the original 3 x 10 MW sites in the belief that, had this been left to the private sector, a pricing war on land would result in higher electricity tariffs from the projects. Sites were thus selected based on the ability of the local substation to evacuate the generated capacity as well as alignment with the potential solar resource. After the bids had been submitted, NamPower realised that they would not be able to secure the sites at Okahandja and Omaruru in time.[37]

In Namibia there are various types of land classifications, each which their own set of procurement difficulties and different procurement processes. In the case of the 3 x 10 MW project, the Mariental and Okahandja sites formed part of an existing commercial farms. As such the land procurement process was governed under the Agricultural (Commercial) Land

[37] For one of the sites, the town council appeared to be unable or unwilling to proceed with the lease without securing some kind of "rent" from the process, while for the other site the owner wanted shareholding in the project.

Act of Namibia. For the Okahandja site, the land owner rescinded on the Offer to Purchase and consequently NamPower failed to execute a Sale Agreement and the Offer to Purchase was terminated by mutual consent. The project site situated near Omaruru was classified as Town Lands and the prolonged procurement process was not finalised before tender award. NamPower, who is a proponent of the approach where government procures the project site as part of the project development, argues that this approach vastly reduces development timelines and de-risks the project. This is due to the fact that the environmental impact assessment and geotechnical studies can commence and the risk of any fatal flaws be eliminated early in the project development phase.

When the Mariental site was put out to tender again (this time with a maximum export capacity of 37 MW), NamPower wanted to avoid a similar situation. The project site was leased by NamPower, since Namibia does not allow foreign ownership of agricultural, commercial, or communal land. Typically, leases on agricultural land are granted for a maximum of 10 years; NamPower therefore had to apply for exemption from local legislation (the Agricultural Land Reform Act of 1995) to allow for a lease length corresponding to that of the PPA (25 years).

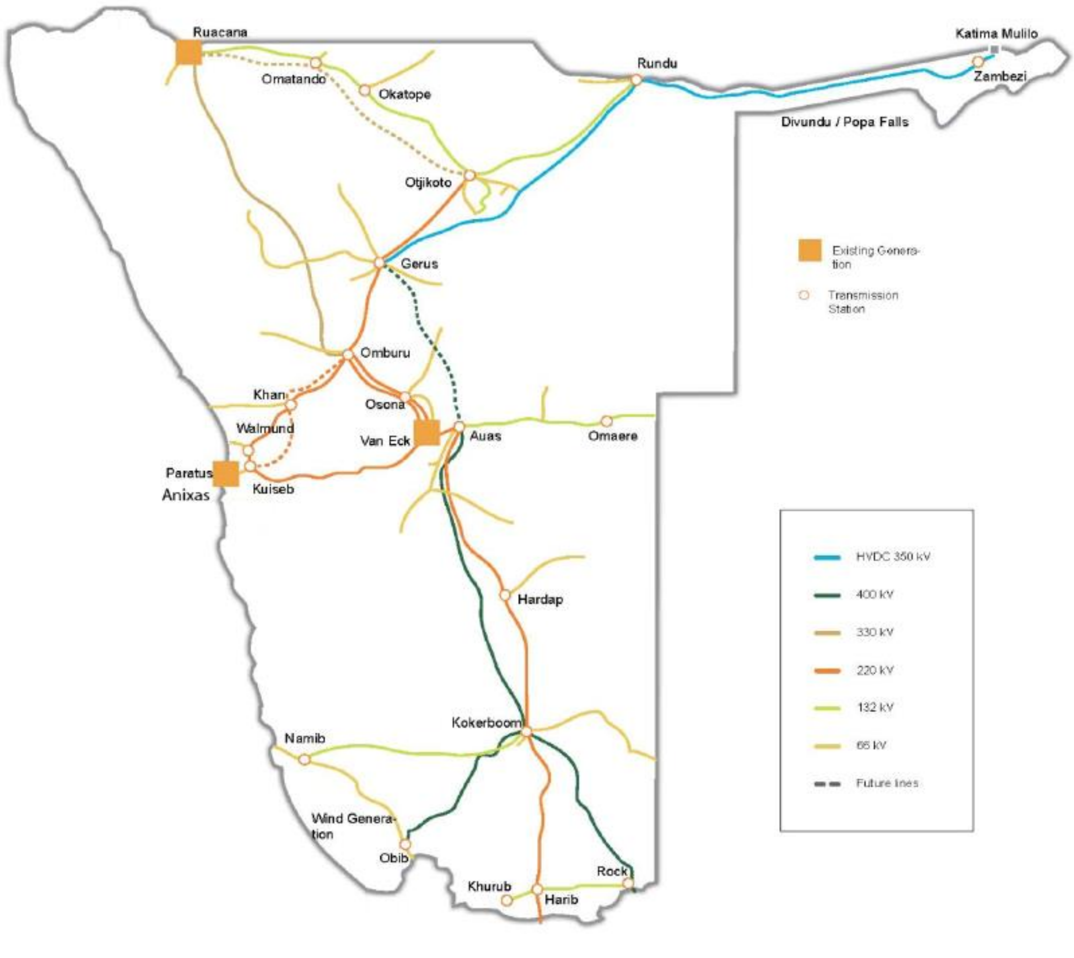

Figure 3: Namibia's transmission infrastructure and location of the Hardap substation
Source: MME, 2016

Apart from securing the lease for the site (Figure 3), NamPower also undertook all preparatory studies and provided the transmission connection (including upgrading of the Hardap substation, Figure 2). The preparatory studies included environmental impact assessments

(EIAs) (with NamPower providing the Environmental Clearance Certificate[38]), topographical studies, geotechnical assessments, [39] hydrological studies, and meteorological analyses. Interviewed bidders commented favourably on the quality of the preparatory work. NamPower also provided detailed information on the grid capacity and proposed connection. In return for providing the site, the connection infrastructure and the related development activities, NamPower expected to be given between 10% and 19% equity (they were eventually provided with 19%) in the project company depending on the overall equity contributions related to the value of the project and compared with NamPower's investment.

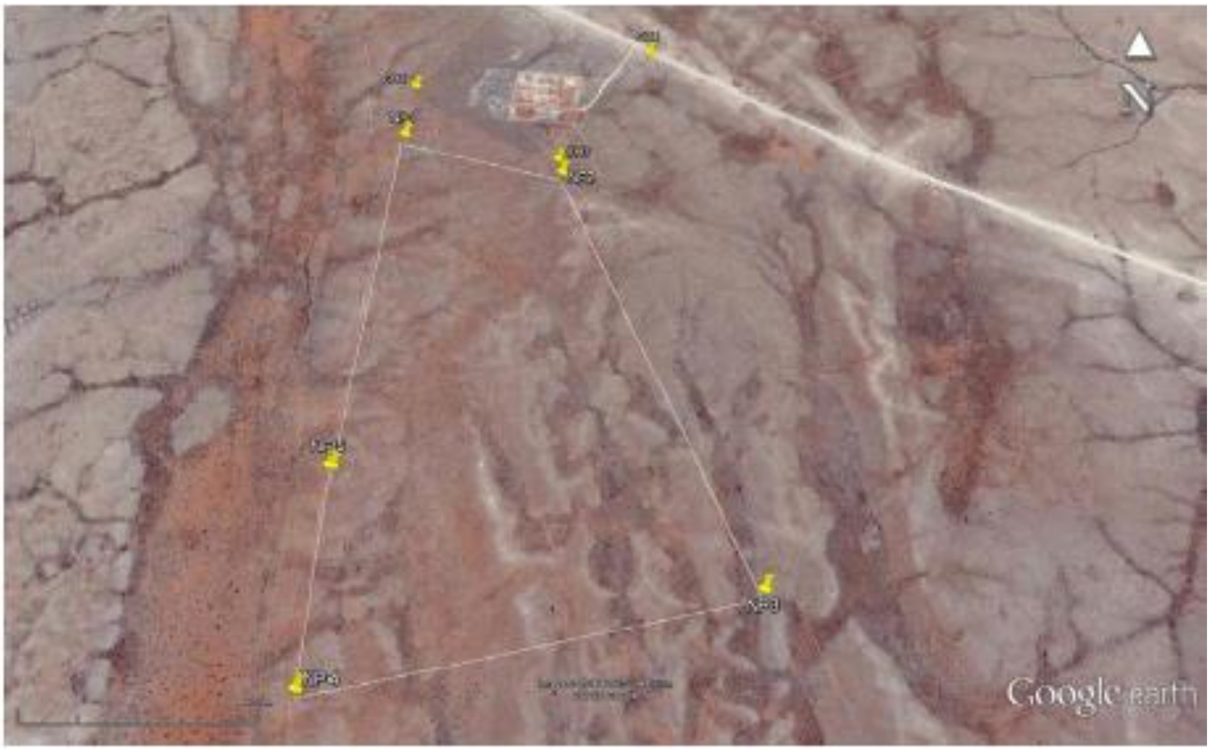

Figure 4: Layout of the project site
Source: NamPower, 2016b

Despite providing the site, the geotechnical study, Environmental Clearance Certificate, and the transmission infrastructure, the responsibility for adequately preparing and the final development of the site[40] ultimately fell to the bidders. The tender documents were clear about the fact that bidders would bear all site-associated risks – including subsurface and environmental risks (weather inclusive). Bidders also had to construct a road for site access and needed to secure any other permits required. NamPower strictly enforced their mandatory site-visit policy, with no one allowed to submit a bid who had not attended the formal site visit (that

[38] The Hardap site's EIA clearance certificate was obtained following an EIA study for the initial development of the three potential sites in 2016. The certificate was still valid at the time of the 37 MW bid. However, NamPower filed for an amendment to the certificate so as to be exclusive to the site. The original EIA certificates for all three sites were also originally awarded for a maximum of 30 MW projects. When the project size was increased to 37 MW, this necessitated a revision of the certificate.

[39] The geotechnical assessments were carried out by GEOINTEC for the original 3 x 10 MW project at Mariental. This study was subsequently bought and provided to all interested bidders during the procurement of the 37 MW project.

[40] The technical specification documents provided detailed specifications regarding the site development requirements.

formed part of the pre-bid conference). Bidders were allowed further site visits and additional investigations – if deemed necessary and approved by NamPower.

This approach ultimately worked the second time around, in the sense that the project was awarded and eventually built. Nonetheless, the successful implementation of the 14 REFIT projects – all of whom had to find, secure, and prepare their own sites – asks whether the NamPower site selection and preparation process truly resulted in superior investment outcomes. Given that NamPower's provision of the land and grid infrastructure came at a shareholding cost to bidders, it is also not clear that project prices were positively impacted by this approach. Far from supporting a position that sees government as better placed to select and prepare sites for renewable energy projects, Namibia's experience merely shows that the public sector can be almost as good as the private sector in executing this function.

Qualification and compliance requirements

The original 3 x 10 MW auction was guided in its approach to bidder qualification by the "pilot" conceptualisation of the programme: NamPower used the auction to test the market and extract valuable lessons through a "learning by doing" approach that filtered through into many of the auction design and implementation decisions. The mandatory pre-bidding conference for example made use of an unusual informal "market testing" exercise: bidders were asked whether they would be able to submit a bankable bid without any sovereign guarantee. They were also asked to provide an indication of potential project price level by ticking one of three boxes: NA$1,20-NA$1,50/kWh; NA$1,00-1,20/kWh; and less than NA$1,00/kWh. This exercise not only provided an indicative price ceiling (NA$1,50; US$0,11/kWh) to the market, but also gave the procurer the chance to test their assumptions. The results were generally positive,[41] with most bidders indicating a willingness to bid without a sovereign guarantee, at levels below NA$1,00/kWh (US$0,072/kWh). The 3 x 10 MW auction also made use of a more conventional prequalification round, with bidders provided with draft technical specifications and project agreements which they were asked to comment on as part of their prequalification submission.

When the 37 MW project was taken to market, there was already an established sense of who would be interested and what they would be willing to commit to – in large part based on the bids received for the 3 x 10 MW project(s). The approach taken emphasised speed and technical quality to make up for the time lost during the first attempt at procurement and to ensure NamPower's comfort with the technology. For several aspects of the bidding process, this emphasis translated as a preference for standardisation and simplicity. The emphasis on speed also meant that there was no prequalification round, with all interested bidders needing to submit a full technical and financial proposal. No bidder that had not attended the pre-bid conference and project site visit, which attracted more than 250 interested parties, would be allowed to bid.[42]

Submission timelines turned out to be optimistic, with the request for proposal (RfP) released in May 2016 and the submission deadline set for 4 August that same year. In response to bidder requests the submission deadline was extended by more than a month, to 22 September 2016. This was mainly to allow for the adjustment of the financial model after certainty was gained on the exact costs for the upgrading of the transmission infrastructure (deep and shallow connection works).

NamPower spent a great deal of time and resources on establishing clear communication channels with the market before and during the bidding process. During the period between the publication of the RfP and the bid submission deadline, there were 11 clarification rounds (Table 6), with all questions and answers posted on the NamPower website. The quick turn-around on clarification requests, as well as the willingness to incorporate bidder comments in the project documents, are emblematic of NamPower's overall approach to the procurement programme: maintaining effective communication, in part also to learn throughout the process. Both NamPower and bidders commented on the value of this communication throughout the bid preparation phase, with NamPower in particular finding the comments helpful in ensuring that the bidding documents were bankable by the submission deadline. While they generally discouraged negotiations on and mark-ups to the project documents, several amendments were

[41] Some bidders found this exercise most unusual, opting to not proceed with the bidding process because of concerns about its legitimacy.

[42] Everyone participating in the pre-bid conference and site visit was automatically considered a participating bidder.

made through the clarification process.[43] Bidders were also allowed to make comments on the documents as part of their submission (and were provided with templates on which to do so). NamPower had the discretion to disregard the comments and/or dismiss the tender as non-compliant if these comments were considered material or would unfairly advantage a bidder. NamPower could also ask for clarifications on bids during the evaluation process.[44] Generally speaking, bidders interviewed indicated that they were happy with the quality of the documents and the preparation work done.

Table 6: Timelines for the Hardap solar PV bidding process

Phase	Date	Bidders	Description
RfP released	13 May 2016	200	No. of requests for EOI documents
Clarification No.1	7 June 2016		
Mandatory clarification meeting	8 June 2016	200	No. of private attendees (companies/ consortia)
Mandatory site visit	8 June 2016	200	Held with interested developers to allow for issues to be raised
Clarification No.2	13 June 2016		
Clarification No.3	15 June 2016		
Clarification No.4	28 June 2016		
Clarification No.5	12 July 2016		
Clarification No.6	18 July 2016		
Clarification No.7	1 August 2016		
Clarification No.8	15 August 2016		
Clarification No.9	23 August 2016		
Clarification No.10	5 September 2016		
Clarification No.11	5 September 2016		
Deadline for clarification requests	5 September		
RfP submission deadline	22 September 2016	13	Number of complete tender submissions

Note: EOI = expression of interest

Authors' compilation from RfP documentation

Thirteen complete bids were submitted on 22 September 2016 (Table 6).

Table 7: Submitted bids

The Power Company
Phanes Africa Pty (Ltd)
Aussenyen Energy Investments Pty (Ltd)
JV: Jordaan Oosthuysen & Nangolo QS
BioTherm Energy (Pty) Ltd
Alten Energy
JV: China Jiangxi International (Namibia) (Pty) Ltd & Profile Technologies (Pty) Ltd
Mulilo Sunpower Total Consortium
Green Energy Technology Holdings
Building Energy SPA
Montenya Energy
JV: Afres & Deutche Eco
MBHE African Power

[43] Some of these related specifically to baseload-related clauses that were part of the PPA.

[44] For written submissions, bidders had two days to respond. NamPower could also call bidders to a clarification meeting during the evaluation process.

Qualification criteria

While there was no prequalification round, bid evaluation for the 37 MW project was set up as a two-stage process (Figure 4): a technical evaluation process, followed by a financial evaluation process. Only bids passing the technical evaluation process would proceed to financial evaluation. The bidding procedure therefore made use of a two-envelope sealed bid process: envelope one would contain the technical bid details, while envelope two would contain only the financial proposal. If any aspect of the financial proposal was included in the technical proposal (envelope 1), the entire bid would be disqualified.

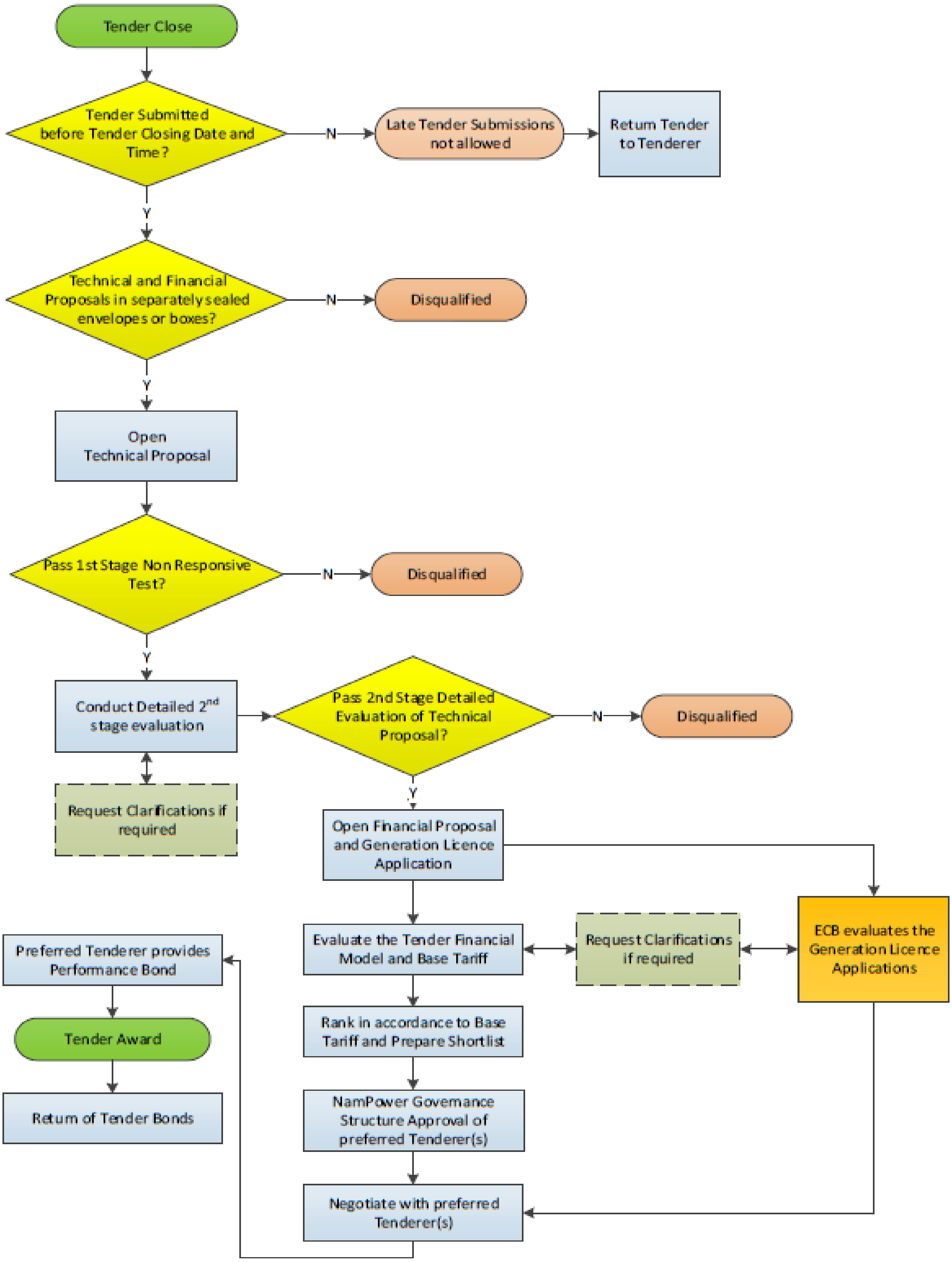

Figure 5: Overview of the tender evaluation process
Source: NamPower, 2016a, p. 13

Bidders needed to meet a number of minimum criteria for their technical proposal (envelope 1) to be considered “responsive” (Table 8), although these were largely concerned with securing bidder commitments to the core bidding requirements. Any bid that failed the minimum acceptable standard of completeness, consistency, and detail could also be rejected as non-responsive. Once a bid met the “minimum responsiveness” threshold, it would proceed to a more detailed, technical bid analysis process. This process investigated the legal, technical, commercial, financial, environmental, and social components of the bid.

Table 8: Minimum criteria for responsiveness of technical proposal

	Minimum criteria
1.	The tenderer is mandated to complete and submit the "Form of Special Power of Attorney."
2.	The tenderer is mandated to complete and submit the "Form of Covenant of Integrity."
3.	The tenderer is mandated to ensure that all deviations from the tender document's principal requirements/specifications/project agreements are listed in the returnable forms.
4.	The tenderer is mandated to manage its business activities in English and the submitted tender is to be in English likewise.
5.	Tenderer agrees to the mandatory 10% NamPower shareholding of the project company.
6.	Tenderer agrees to the minimum requirement of 30% PDN shareholding of the project company.
7.	Tenderer agrees to reach target COD within 12 months of tender award.
8.	Tenderer agrees to abide by the two separately sealed envelope submission system for the technical proposal and financial proposal.
9.	Tenderer's tender submission should have a validity period of a minimum of six (6) calendar months, beginning from the closing date of the tender.
10.	Tenderer is required to submit the original copy of the tender bond.
11.	Tenderer is mandated to furnish an original certificate of good standing from the Receiver of Revenue, or a letter of good standing from the government of its country of origin, that confirms its tax payment history.
12.	Namibian tenderer(s) are to present an original certificate of good standing obtained from the Social Security Commission.
13.	Namibian tenderer(s) are to present a certificate of good standing obtained from the Employment Equity Commission; otherwise, present a certificate indicating that it is not a registered employer as stipulated in the Affirmative Action Act, 1998.
14.	Tenderer is required to provide a minimum of two (2) reference projects – equal to or greater than 10 MW, that have been previously completed by the company or a consortium (that the company was part of) within the last eight (8) years.
15.	Tenderer agrees to recognise the Namibian Law as the governing law, with respect to all project agreements with the tender administrator.
16.	Tenderer agrees to recognise the Namibian Dollar (NA$) or South African Rand (ZAR) as the applicable currency in all project agreements with the tender administrator.

Source: NamPower, 2016b

The technical proposal consisted of more than 45 highly standardised and prescriptive documents (Table 9) that established a tenderer's capacity and eligibility for carrying out the project, compliance with the tender specifications, and acceptance of the project documents. NamPower set out a range of minimum requirements – technical and otherwise – that bidders would need to meet in order to reach the technical scoring stage. Technical scoring of proposals was based on only three components.

Table 9: Forms to be included in the technical proposal

C1	Form of Letter of Tender
C2	Declaration of Authenticity
C3	Form of Special Power of Attorney
C4	Form of Covenant of Integrity
C5	Minimum Responsiveness Criteria
C6	Proposed Shareholders Agreement for the Project Company
C7	Detailed Corporate and Administrative Information
C9	Reference Projects
C12a	Legal and Commercial Deviations Draft Power Purchase Agreement (PPA)
C12b	Legal, Technical and Commercial Deviation Draft Transmission Connection Agreement (TCA)
C12c	Legal and Commercial Deviations Draft Direct Agreement (DA)

C12d	Legal and Commercial Deviations Draft Land Lease Agreement (LLA)
C12e	Legal and Commercial Deviations Shareholders Agreement Term Sheet (SHA TS)
C13	Technical Deviations
C14	Form of Tender Bond
C15	Form of Performance Bonds
C16	Project Implementation Schedule
C17	Performance Guarantees
C18	Checklist of documentation required for the Specification
	Preliminary architecture and network layout of the control system
	Correction curves and formulae to correlate actual measurements to standard testing conditions
	Correction procedures for how to apply the correction curves and formulas
	Outline drawings of the support structure and support foundations for the PV modules
	Single line diagram of the power plant (indicative of all voltage levels)
	Preliminary layout drawing of the administration building
	Monthly generation forecast over 25 years, indicating expected degradation and plant availability
	Weekly generation forecast over 25 years
	Preliminary layout drawing of the substation building
	Preliminary layout drawing of the control room building
	Verification of power plant performance with simulations and calculations
	A working PVSYST model or similar of the proposed power plant and equipment
	Layout diagram of the power plant
	A working DigiSILENT dynamic model or similar of the power plant for harmonic analysis
	Outline drawings of the PV modules
	Type test certificates of PV modules
	Methodology to minimise MV module mismatch losses
	PV module manufacturer proof of BNEF Tier 1 rating
	Detailed drawing of power plan earthing and bonding layout
	Datasheets for all equipment listed
C19	Voluntary Site Visit Form
C20	EPC Contractor(s) Reference List
C21	O&M Contractor(s) Reference List
C22	List of Service Providers
C23	List of Equipment Suppliers
C24	Namibian Content

Source: NamPower, 2016b

Legal and technical compliance

Each submitted bid was first subjected to a legal review to verify its completeness, the *bona fide* credentials of the bidders (including a background check), and the legal nature of any submitted deviations to the project documents. The bid would then proceed to a detailed technical evaluation phase, which focused on three aspects:

- Confirmation of the technical and delivery capability of the project sponsor(s), engineering, procurement, and construction (EPC) contractor and operations and maintenance (O&M) contractor.
- The completeness and comprehensiveness of the technical solution, contracted performance guarantees and compliance with, and/or deviations from, the technical specifications.
- Confirmation that the bid meets all the minimum tender requirements.

Bidders were required to provide evidence of their and the subcontractors' capability to successfully implement the project. The lead tenderer needed to prove that they had sufficient project and human resource experience in the power sector. Bidders also needed to submit at least two 10 MW reference projects that had been completed in the last eight years, and which the tender evaluation committee could visit, if necessary. This is a departure from standard practice in the region, where bidders are normally required to provide evidence of projects of a size at least similar to that being proposed, usually having been completed within a more recent timeframe (three to five years). It is not entirely clear what motivated the 10 MW reference projects determination and the longer timeframe. It could be argued that NamPower wanted to expand the pool of prospective bidders, perhaps wishing to include Namibian developers as well. If that were the case though, the 10 MW requirement would be too high a threshold for any of the REFIT project developers to meet, based solely on their REFIT experience. It is more probable that the 10 MW project reference requirement was taken from the original 3 x 10 MW procurement process. If this reference project size been increased to something closer to the actual project MW, the originally awarded party (Alten) would not have been eligible.

The bidding requirements were also geared towards ensuring that all technical equipment (down to the wiring used), and service providers were of sufficient quality. NamPower therefore required copies of all prospective contracts with EPC and O&M service providers, and any other major contracts, as part of the technical proposal. EPC and O&M service providers specifically needed to submit proof (reference projects) of work done on projects similar in nature and size to the Hardap PV project. Bidders furthermore had to specify all equipment suppliers and service providers – including datasheets for all equipment used. All equipment needed to be of a proven design and quality, meeting at the very minimum, South African National Standards (SANS).[45]

The technical specifications for the plant also set out a number of additional key minimum technical requirements:

- The degradation factor of the plant could not be more than 20% in year 25.
- The capacity factor for the plant needed to be 30% at COD – reducing to no more than 20% in year 25.
- The lifetime of the plant needed to be guaranteed at 25 years.
- An availability guarantee of 98% was required during daytime hours.
- The minimum performance ratio of the plant was specified at 0,75.

While these specifications served as minimum requirements, bidders were also required to make specific commitments on each of these – projected annually for the duration of the plant's lifetime. These projected annual values became part of the performance guarantee (discussed in more detail under "Seller and buyer liabilities").

Financial and commercial capability

The evaluation of the technical proposal aimed to establish the commercial and financial ability and commitment of the bidder(s). NamPower therefore assessed the financing arrangements (equity and debt) of the project, specifically requiring signed term sheets from lenders. This went beyond an in-principle agreement to finance the project, effectively requiring lenders to have conducted due diligence on the project. Signed term sheets were also required for any

[45] Equipment needed to be designed, manufactured, tested, and installed according to the most recent South African National Standards, International Organisation for Standardisation (ISO), International Electrotechnical Commission (IEC) or Institute of Electrical and Electronics Engineers (IEEE) and National Electrical Code (NEC) codes and standards. Where there was a conflict between national and international codes/standards, the more onerous specification or standard would take precedence.

financing of PDN shareholders. The project implementation schedule furthermore needed to be signed by all equity and debt providers to the project, as well as the EPC contractor.

The financial ability of the bidder was assessed by analysing the audited financial statements (for the past three years) of the lead bidder.[46] The bidding instructions made provision for bidding by entities younger than three years and did not specify minimum turnover or other financial health indicators. It is therefore unclear how the financial ability of bidders was evaluated.

Bidder compliance with the commercial tender requirements required a number of submissions. Bidders needed to provide letters of good standing from the Receiver of Revenue, the Social Security Commission, and the Employment Equity Commission (or their local equivalents in the bidding companies' countries of origin). They also needed to submit an organisational chart, company shareholders chart and shareholders table, clearly indicating the commercial relationships and specifically making clear the PDN shareholding arrangements. This stage also evaluated whether bidders had submitted the correct security guarantees and performance guarantees.

Environmental and social sustainability

The tender requirements featured a number of local content, ownership and employment requirements. Apart from the already discussed 30% PDN shareholding in the project company, the technical specifications also required that all unskilled labour used on the project were Namibian citizens. Although further minimum levels of local content or employment were not specified, bidders needed to list all local contracting, professional services and equipment suppliers as part of their technical proposal (along with proof of Namibian citizenship of the contractors/suppliers). Bidders were similarly required to specify the origin and value of all items (equipment, materials) to be used in the project. These local content and employment commitments were captured in the performance guarantees and formed part of the licensing conditions for the plant. A key clause in the performance guarantee document also stated that local content requirements would be further negotiated as part of the licensing process, but provided little clarity on the process or requirements.

NamPower ensured that the environmental clearance certificate[47] for the project site was secured by the time the Hardap PV project went to tender, having provided an environmental scoping report and environmental management plan to the satisfaction of the Ministry of Environment and Tourism. The involvement of a development finance institution (DFI) in the financing of the project introduced an additional layer of social and environmental due diligence in line with the International Finance Corporation (IFC) performance standards.

Once the technical evaluation (and scoring) was completed, compliant bidders' financial proposals were opened and checked for completeness and compliance (including the information needed by the ECB to apply for the generation licence). If a bidder failed to comply with the requirements, their bid could not proceed to the financial scoring stage.

[46] All participating parties/shareholders still needed to submit their audited financial statements, even though they might not be analysed.

[47] The original certificate was replaced by an amended one during the course of the clarification procedures. The original certificate referred to the original 3 x 10 MW sites, while the amended certificate was valid only for the Mariental site.

Financial proposal

The financial proposal (envelope 2) consisted of only four components (Table 10) aimed at establishing the project price (tariff) and securing a generation licence. It was assumed that once a bid had reached this stage of evaluation it would have been sufficiently vetted from a technical and commercial point of view. The financial model provided to bidders, and which they were obliged to use in their submission, was intentionally quite basic as it was the same model used by the ECB in its generation licence approval process.[48] The intention with providing this model was to ensure that there was no discrepancy between the tariff submitted and that which the ECB would approve. Only tenders which were found to be technically responsive where fully evaluated and scored. All sealed financial proposals were returned to the tenderers which were found to be non-responsive. During the financial evaluation process, NamPower validated all the assumptions used in the model. The evaluation process also allowed for an adjustment of the listed base tariffs for evaluation purposes only, to compensate for any inputs used in the tender financial models which were considered erroneous, inaccurate, or non-representative of the technical tender submission.

Table 10: Forms to be included in the financial proposal

D1	Base Tariff Calculation
D2	Tender Financial Model
D3	Price Deviations to Tender Documents
D4	Information required to apply for a Generation Licence

Source: NamPower, 2016b

The financial model was one of the more controversial aspects of the programme. One bidder that had been very successful in South Africa’s stringent REI4P programme chose to change the model to allow for a debt reserve facility. NamPower saw this as a material change that rendered the model invalid and provided different results, and therefore disqualified the bid. The bidder argued that the financial model provided was not sophisticated enough to handle a variety of financing arrangements. A second bidder – similarly experienced in South Africa’s renewable energy programme – was also disqualified at this stage. Both bidders indicated that they had submitted tariffs lower than that which was eventually awarded, and were distrustful of the financial evaluation process and the final result. NamPower maintains that it had stuck to the rules set out in the RfP documentation, which did not allow for any deviation from the financial model. It would be worth considering improving the sophistication of the financial model used in new procurement rounds to allow for a wider variety of financing options.

Bidder ranking and winner selection

Once a bid had passed the legal and technical compliance and evaluation stage, as well as the financial proposal compliance evaluation stage, it was assigned a score and ranked. Bid scoring and ranking was based on a combination of financial and technical criteria, weighted on a 70:30 basis (Table 9 and 10). The project tariff therefore played the most important part in the scoring of the bid – in line with practice in the region (e.g. South Africa, Uganda). The bidder that offered the project at the lowest price would be awarded the full 70 points and all other bids would be scored relative to this benchmark.

[48] During the clarification process, bidders pointed out a number of problems with the model. These were consequently fixed by NamPower, but the amendments needed to be officially approved by the ECB. This was one of the reasons for the submission deadline extension.

The technical scoring criteria used again illustrates the tender programme's emphasis on simplicity, speed, and technical rigour. Bids were scored based on the plant's total degradation factor in year 25, the guaranteed capacity factor in year 2,[49] and the project schedule from bid award to COD. These values would become contracted values in the project documents between NamPower and the successful bidder. This seems to present a much simpler scoring template than that used in for example Uganda, where more than 300 technical criteria in 27 sub-categories were assessed. It also departs from standard practice in the region by assigning no score to environmental and socio-economic criteria.[50] The scoring criteria also seem to support a transparent ranking process, with the all criteria lending themselves to simple quantification.

Table 11: Bid scoring criteria

Criteria	*Points*
Technical score	***30***
Total degradation factor on year 25	10
Guaranteed capacity factor for year 2 (as will be estimated)	10
Project schedule from bid award until target COD	10
Base tariff – normalised (financial score)	***70***
Total score	**100**

Source: NamPower, 2016b

It is therefore quite surprising that the proposal scoring and ranking process and outcomes were somewhat controversial – as was previously mentioned. From the clarification documents it is clear that NamPower was asked on two occasions (Clarification Cl1 and at the pre-bid conference) to provide more details on the formulas to be used to determine the scoring of both the technical and the financial criteria. NamPower however viewed the information provided in the RfP documentation as sufficient for the tenderers to prepare and submit a responsive Tender Submission.

Finally, the significant weight assigned to the project schedule in the award decision appears to have had little impact on the actual project development process, with the project having achieved commercial operation more than a year after the original target COD. This despite the use of performance guarantees and bonds that contractually committed the bidder to this proposed schedule. The 12-month window required for reaching COD after the project award was already considered to be very tight. Ensuring bidder commitment to this timeline through the performance guarantee and bonds should have been sufficient. Why bidders were asked to commit themselves to an even speedier – and ultimately unrealistic – project implementation schedule as part of the ranking criteria is not clear. Alten's bid commitment was 11 months – not much less than the 12 month maximum and proven to be ultimately irrelevant.

Running throughout the tender process has also been a NamPower concern regarding the technical quality of the projects – perhaps reflecting their limited experience with private investment, and solar PV projects in particular. This has been one of the main motivations behind NamPower's shareholding in the project company. It also explains the inclusion of the capacity factor and degradation factor scoring criteria. But perhaps it also reveals a limited

[49] In the original 3 x 10 MW procurement programme, bids were evaluated on the performance ratio of the plant. NamPower determined through that exercise that it was in fact too difficult to accurately estimate the plant's performance ratio, and therefore opted for the simpler "capacity factor" and "degradation factor" metrics in the 37 MW procurement programme. The capacity factor of the winning Alten project was 34.56%.

[50] In South Africa, for example, bidder commitments on a range of socio-economic issues were the only factors apart from the project tariff to determine bid ranking.

appreciation on the part of NamPower, of the incentives at work in the project development and financing processes. Given that the project owners' revenue maximisation is entirely dependent on the plant's performance, it is arguably not necessary to include these two technical factors as scoring criteria – especially since the project documents already require compliance with international equipment and performance standards. It can therefore be argued that the inclusion of these technical scoring criteria actually had no additional impact on the technical design of the project.

Seller and buyer liabilities

Bidders were effectively competing for a 25-year take-or-pay PPA with NamPower, denominated in local currency[51] (NA$ or ZAR) and fully indexed to the local inflation rate. Failure by NamPower to meet its obligations in terms of the site, the grid connection, and/or its shareholding commitments, would result in relief from contracted responsibilities for and/or deemed energy payments to the project company. This would depend on the project development stage. As has already been mentioned, the country offered no further sovereign support to the programme, nor was there any liquidity support on the table. In combination, the local currency tariff along with the sovereign's refusal to underwrite the off-taker, limited the participation of international financiers in the programme[52]. NamPower's investment-grade credit rating and its overall good performance provided some comfort to interested local and regional lenders, but DFI involvement was ultimately required to get the project financed on reasonable terms. The PPA also indicated that the site of arbitration would be Namibia. While investors typically prefer a neutral arbitration location, Namibia's effective courts system and independent judiciary appears to have allayed most concerns on this point.[53]

NamPower used a range of contractual financial instruments to commit bidders to realising the project within the desired parameters and deadlines. This included a bid bond of NA$400,000 (US$800/MW) – ten times cheaper than the bid bond requirement in the South African REI4P programme; a first performance bond to the value of 2% of total EPC costs (valid up to financial close); and a second performance bond to the value of 15% of the total EPC costs (valid from financial close up to successful completion of the Final Acceptance Test or payment in full of the Performance Liquidated Damages).[54] Bidders needed to submit not only the bid bond, but also the signed performance bonds as part of their bid submission. These bonds all had to be provided by local Namibian banks, and were unconditional, irrevocable and had to be available on demand. The second performance bond specifically covered the plant's licensability, its compliance with the Namibian grid code (including frequency and power factor), the plant's capacity, the committed capacity factor (annually projected), the degradation factor (annual), the plant's performance ratio, the lifetime of the plant, the availability guarantee, the use of Namibian content, and the health and safety requirements on site (specifically, lost time to injury frequency rate). Many of the values used for these parameters were taken directly from the project bidding documents. Nevertheless, the limited lifespan of the performance bond seemed not to correspond with some of the commitments it sought to guarantee (for example the annual capacity and degradation factor projections). The PPA also contained a performance liquidated damages clause, payable[55] if the project failed to meet the contracted capacity, performance ratio or degradation factors and failed to meet the target COD.[56] If the project failed to meet the minimum performance guarantees as stipulated in the PPA, it would count as a default event.

[51] Some developers had an expectation that there would be some form of forex risk exposure mitigation at financial close similar to South Africa's setup. NamPower, however, indicated that this would not be the case, and bidders would subsequently be fully exposed to forex movements on their equipment costs.

[52] Nevertheless at least one bidder had secured a financing commitment from the African Development Bank.

[53] This was, for example, a particularly sticky point in Egypt's renewable energy procurement programmes, leading to the delay and eventual cancellation of many large projects.

[54] From the technical and up to the final acceptance test.

[55] 1% of EPC cost for every 0.1 of the measured performance ratio being below the contracted performance ratio.

[56] 0.25% of EPC cost for every week expended from the target COD to eventual COD.

Despite the seemingly comprehensive and rigorous penalty regime that was set up, it has not been used in practice. NamPower's shareholding in the project company (and therefore exposure to the penalties and performance guarantees) plays into this dynamic and possibly exposes the utility to a conflict of interest.

Securing the revenue stream and addressing off-taker risk

As has been mentioned before, NamPower is one of a handful of utilities in sub-Saharan Africa considered to be in a healthy financial position. Nevertheless, the Namibian power sector – and NamPower in particular – is facing a set of challenges that could undermine this strong financial position in the medium to long term. The first set of challenges relate – somewhat ironically – to Namibia's cost-reflective tariff regime, the consequence of which has been the proliferation of rooftop solar PV in the commercial, industrial and (increasingly) residential sectors. This is an unsurprising development given the country's excellent solar resources, the dramatic cost reductions in solar panels and the relatively high electricity costs paid by larger electricity consumers. The pace at which this has developed has, however, taken most stakeholders by surprise, with at least the commercial and industrial market having apparently reached a saturation point.[57] The effect of this on the power sector is only starting to dawn on decision-makers, with planning scenarios needing to constantly adjust electricity demand projections downwards to accommodate these dramatic changes. With battery-based storage becoming increasingly cheaper as well, Namibia might well be one of the first countries in the world to experience mass grid-defection by commercial and high-income residential users in the near future. This will fundamentally undermine the financial health of NamPower, possibly triggering an early "utility death spiral" that could lead to it defaulting on its payment obligations.

At the same time, Namibia is embarking on a large-scale restructuring of its electricity industry, with reforms being pushed by the regulator (the ECB) and the MME. The scale and pace of the reforms are, however, not a foregone conclusion: while the modified single buyer model has been promulgated, powerful incumbents in the industry such as NamPower but also the City of Windhoek are resisting wholescale changes. Nevertheless, private power generation is growing rapidly, and regional and local government distributors are increasingly starting to procure power directly from IPPs. This situation represents less of a direct threat to the Hardap project's revenue stream, but introduces some degree of uncertainty for the medium- to long-term.

The abovementioned developments, along with some hesitance about the fact that the PPA contained no provisions for political risk protection or off-taker default, necessitated the involvement of a DFI in the financing arrangement for the project. Nevertheless, the programme's high-quality documentation (including draft Direct Agreements), along with NamPower's willingness to engage with the market prior to and during the bidding process, provided a great deal of comfort to investors. The allocation of risks and responsibilities in the project documentation (including robust deemed energy payment clauses in the PPA) and the indexation of the tariff to Namibian CPI further mitigated many of the perceived long-term project risks. Moreover, one of the main and possibly underappreciated risk mitigation strategies employed was the shareholding by NamPower – the off-taker – in the project company. While NamPower's shareholding was predicated on its desire to be involved in the day-to-day business of the project company, it also meant that there is now a strong alignment between the interests of the project and the off-taker.

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[57] The full extent of Namibia's embedded/distributed generation/rooftop solar PV market is difficult to assess, as the ECB does not track this information (despite its strategic importance).

4 Running the auction: the key role-players

The pilot nature of the procurement programme also appears to have played a determining role in how the auction was designed and rolled out. NamPower, the ECB and the MME openly admit that the procurement programme was largely conceived as a "test case" for Namibia: the aim was to test the market and learn along the way. While the emphasis on learning is admirable, it also exposed the programme to accusations of poor preparation and a lack of transparency.

The institutional setup[58] for the 3 x 10 MW procurement process ended up being its Achilles heel. Namibia had set up a Renewable Energy (RE) Project Steering Committee to design and implement the procurement programme, influenced by the institutional setup of South Africa's IPP office. The RE Steering Committee was chaired by the Minister of Mines and Energy, and committee members included officials from the ECB, NamPower and the Namibia Energy Institute. It was established to facilitate the rapid development of renewable energy in the absence of the requisite policies. The Auditor-General's decision to set aside the 3x10 MW project award was not based on the changes introduced during the bidding process, but on the fact that the RE Steering Committee had no legal standing. It subsequently played only an advisory role.

The procurement of the resurrected 37 MW project was therefore handled entirely by NamPower, the only institution in the energy sector able to handle a process of this magnitude – through its procurement structures and policies – in close consultation with the MME and with support from other government departments (notably Environment and Tourism). The ECB's role was limited to evaluating the generation licence application (as part of the financial proposal) and granting the licence as soon as possible after the tender award.[59] Being one of the best-performing state-owned enterprises (SOEs) in Namibia and the highest rated utility in sub-Saharan Africa, NamPower had a well-established reputation in the market that helped secure bidder interest. Remarkably, NamPower was also able to develop (internally) a set of project documents that several bidders remarked on as being "as good as those used in [South Africa's] REI4P programme". The ECB had initially engaged an international consulting firm to develop the key project documents, which were almost entirely based on a US template and therefore proved to be ultimately unsuitable for use in Namibia. When NamPower therefore took over the procurement process, they relied on a set of mostly standardised documents that had been developed in-house. Interviewed bidders also remarked on the clear, simple tender rules and regulations (including the shareholding agreement), and the quick turnaround on clarification requests. The entire procurement process was designed and implemented by a small, capable team of no more than ten people[60] representative of all business units, including finance, energy trading, electricity pricing, legal, power system development, transmission and NEEEP Compliance office. The MME and the ECB also seconded personnel to the evaluation process for the 3 x 10MW projects, but not the 37 MW tender, and only for capacity-building purposes and to check compliance with the generation licence application requirements. Unlike the REI4P evaluation process, no external experts were used to audit or validate the results.

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[58] The original intention had been for the ECB to run the procurement process. They, however, realised that this would present them with a conflict of interest and therefore declined.

[59] The generation licence for the Hardap PV plant was provided in May 2017.

[60] This is remarkable when one considers that South Africa's REI4P programme had more than 150 consultants/advisors working on the programme at once during its setup. It might, however, also be one of the reasons for some of the controversies surrounding the outcomes of the programme.

The bid evaluation process was conducted in accordance with the NamPower tender and procurement policy. Security was strict and of the utmost importance. After the technical proposals had been opened (in the presence of participating bidders), the evaluation team conducted the detailed evaluations in a secured room with CCTV surveillance. Evaluation committee members had to sign a strict code of conduct that covered confidentiality, were not allowed to leave the secure facility during the evaluation process and could not even take in their own pens or pencils.

Despite NamPower's reputation and the emphasis on protecting the integrity of the evaluation process, certain decisions on the design of the auction and communication with the market still managed to taint the final award decision and played into a troubling narrative around the eventual award. The award decision – or at least the resulting generation license application – was therefore challenged again, although this time the complaint went to the ECB and not the courts. The ECB conducted a review of the award process and decision, concluding that it was merited and fair. This is nevertheless a troubling outcome for the process, and one would hope that NamPower will in future not only maintain the level of security and confidentiality, but also be more transparent about its evaluation process to avoid further controversy.

Namibia has since established a number of key policies, including a renewable energy policy and an IPP policy. The country has also determined that any procurement will now have to be run by a Central Procurement Board. How this new policy environment and institutional setup will interact with the processes and policies of established SOEs such as NamPower is not yet clear. NamPower has received exemptions under the provisions of the Public Procurement Act to run bids in 2020 for a 20 MW solar PV IPP and a 50 MW wind IPP internally; all future IPP and PPP tenders are bound to be subject to the PPP act and institutional provisions.

5 Auction outcomes

The Hardap PV auction attracted a great deal of interest. More than 250 parties registered their interest in the project (Appendix B). The response was so overwhelming that it necessitated an urgent venue change for the pre-bid conference. In the end, "only" 13 bids were submitted (Table 6).[61] While a much smaller number than the initial 250 interested entities, it is still one of the best responses to a competitive call for power project procurement in sub-Saharan Africa (excluding the REI4P in South Africa). While at least three of the bidding entities (Building Energy, Biotherm, and Mulilo) had secured projects in South Africa's REI4P programme, the likes of ENEL Green Power and other large utilities are conspicuous in their absence from this list.

The tender award process seemed particularly rigorous (if not entirely transparent) up to the point of announcing the highest ranked bidder – after which the process seemed to take on a less structured format. For example, the highest ranked bidder was invited to start negotiations with NamPower after the announcement was made, with the stated understanding that if parties failed to reach a negotiated conclusion, the next ranked bidder would be contacted to proceed with negotiations. It was not made clear upfront which issues would need to be negotiated after the ranking process – apart from stating that consensus would need to be reached on all project agreements. While this maintained some level of flexibility in the procurement programme for NamPower, it also came at a cost to the integrity of the process. Nonetheless, the standardised nature of the project documents and the clarification process appear to have helped the negotiations process along. Negotiations between NamPower and the highest ranked bidder (Alten) concluded in November 2016 – only about six weeks after the tender submission deadline (22 September 2016).

The Hardap PV plant has been developed as a 45 MWp facility with a maximum export capacity of 37 MWac. It covers approximately 100 hectares, consisting of more than 140,000 solar panels. The plant is planned to operate at a very high capacity factor of 34.5% (based on the AC export figure for year 1) – which is 4.5% higher than the already high minimum capacity factor required in the bidding documents.[62] As has been mentioned, the procurement process placed a great deal of emphasis on the technical performance of the plant. This is not only in the bidder qualification and evaluation criteria, but also contained in the performance guarantees. The project implementation process experienced two delays: one from Alten on reaching financial close, which saw the FC date shifting out by a month from 31 January to 28 February 2017; and a delay in reaching COD due to *force majeure* (strikes in the transport sector) from 7 September 2018 to 15 November 2018. None of these delays can be directly attributed to NamPower, either in its capacity as off-taker, transmission grid operator, or shareholder. COD was eventually achieved on 15 November 2018.

NamPower, together with the ECB, recently included an energy payment for reactive power support as an ancillary service, which the plant is able to provide. While it is encouraging to see these kinds of services being valued and compensated, it also feeds into the troubling narrative around the lack of transparency in the bidding process since these payments did not form part of the original bidding requirements or evaluation criteria.

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[61] Interestingly, whereas ENEL Green Power attended the conference, they declined to submit a bid.

[62] Some bidders indicated that they saw this as an unreasonably high expectation for the site during the bidding clarification process. For reference, the average capacity factor for utility-scale solar PV plants in South Africa is 24%.

Securing equity providers

The project was awarded to Alten Energias Renovables (Alten Renewable Energy), a Spanish IPP developer, who had submitted a bid tariff of NA$80,7/kWh. Alten has six IPPs in operation in Spain, ranging between 1,98 and 9,06 MWp, which were not large enough to pass the qualification thresholds. Alten had however also developed two projects (16,51 MW Grupo Solar Alcorena and 11,13 MW Grupo Solar Hinojosa del Valle) as a 50% member of a consortium with Group Ortis, which allowed it to qualify. The NamPower tender was the company's first venture outside of Spain; it has subsequently developed a significant emerging market focus, securing 350 MW of solar PV capacity in Mexico's 2016 auction and developing a substantial pipeline of projects in Kenya and Nigeria. The Hardap project company has five shareholders: Alten Africa (51%), NamPower (19%) and three PDN entities: Mangrove (12%), Talyeni Investments (6%) and First Place Investments (12%).[63] The EPC contract was awarded to Sterling & Wilson – an Indian EPC contractor – who subsequently subcontracted the majority of works to Namibian companies.

Alten Renewable Energy established Alten Africa with Inspired Evolution (through the Evolution II fund) as a subsidiary platform for project development and investment in Africa – including for the Hardap project. Inspired Evolution, an investment management business specialising in clean energy investments in Africa and emerging markets, is headquartered in Cape Town and was a prominent equity investor in South Africa's REI4P programme, through its Evolution I fund. The Evolution II fund is mainly focused on sustainable infrastructure in Africa. Inspired Evolution's approach is to help projects reach normalised operations – usually 16 to 18 months after COD for solar PV projects – after which they will normally exit. Investors in the fund are mainly DFIs: the Dutch Development Bank (FMO); The Global Energy Efficiency and Renewable Energy Fund (GEEREF); the Swiss Investment Fund for Emerging Markets (SIFEM), managed by Obviam; Quantum Power; the African Development Bank; Swedfund; and the Finnish Fund for Industrial Cooperation (FinnFund). It is therefore remarkable that even for this seemingly low-risk, bankable solar PV project in Namibia, considerable DFI equity funding was still involved.

Prior to setting up the Alten Africa platform, Inspired Evolution subjected Alten to a rigorous independent due diligence process. With the significant exposure of DFI funding in the Evolution II fund, investors needed to ensure that there were no ethical question marks around the project or the company.[64] While there seems to have been a lot of "noise" around the Hardap project (much of which has already been discussed), the due diligence process found the company and the project to be sufficiently clean. The due diligence process also extended to the PDN shareholders in the project company.[65]

The financing of the PDN loan has been one of the more contentious issues in the project. The PDN shareholders are all Namibian women between the ages of 35 and 55. Their shareholding in the project company was established through a long-standing professional relationship with Alten's Namibian country manager. The three PDN shareholders approached a number of local entities – most notably the Development Bank of Namibia (DBN) – to finance their shareholding. DBN declined to provide them with financing, citing concerns about the low margins (given the low tariff) and the fact that the shareholders were not committing any of

[63] No change in majority shareholding is allowed within three years of the project reaching COD without ECB/NamPower consent.

[64] Any corruption is an immediate event of default for these investors.

[65] There were accusations that the project award was due to the politically connected nature of the PDN shareholders in the Hardap project. The due diligence process did not find this to be true.

their own resources. Alten therefore extended a shareholders' loan to the PDN companies, but the exact terms and conditions of this loan agreement is one of the areas that has caused project implementation delays. The financing arrangement was initially challenged[66], not only due to what was seen as unfavourable financing terms (for example the spread on the loan), but also due to the fact that it apparently failed to give the PDN shareholders a significant "voice" in the project company. After lengthy negotiations, a compromise was reached that saw shareholding being provided to the PDN entities on better financing terms.

NamPower's shareholding in the project company also came to influence the project in a number of other ways. NamPower's internal calculations valued their contribution to the project company (through the provision of land, transmission infrastructure) at around NA$58,25 million (US$4,12 million). According to the terms of the shareholders' agreement, their contribution would determine their shareholding in the project company, based on the overall value of the project – but would be no less than 10% and no more than 19%.[67] The utility was adamant that they wanted to "see what is going on inside the SPV (special purpose vehicle)", especially from a technical reliability point of view. According to NamPower, the level of comfort that they required went beyond the legal and commercial due diligence traditionally performed by lenders to the project. They have subsequently used their "seat at the table" to influence the project's technical scope and implementation, even after its award. They also wanted to ensure that they had substantial veto rights – again especially when it came to the technical quality of the project.

NamPower's roles as procurer, off-taker, and shareholder have exposed the utility to multiple potential conflicts of interest. At the same time, the utility's shareholding has meant that some of the shareholder risks associated with these delays – such as calling on the performance guarantees – have been mitigated by NamPower's self-interest. Whether this is a sustainable model of project governance going forward, remains to be seen. Given the obstructive behaviour of Eskom in South Africa's REI4P programme and the dominant role played by state-owned utilities throughout the continent, it perhaps make sense to ensure that the off-taker is committed to the success of the project(s) through some sharing of benefits.

Securing debt providers

Convincing lenders to finance this project was always going to be tricky. While Namibia is one of the more stable sub-Saharan African democracies, and NamPower is regularly held up as a star-performer SOE in the region, most banks would still like to have seen some sort of sovereign support for the project. This was not forthcoming due to Namibia's fiscal constraints – a not unfamiliar situation on the continent. When NamPower therefore approached potential lenders to test their willingness to finance the project and the bankability of the documents, the issue of a sovereign guarantee was raised repeatedly. Without some form of sovereign support, most commercial banks would be unable to provide loan tenors that were sufficiently long. In addition, the local currency denomination of the PPA meant that most international lenders – including international development finance institutions – would be unable to lend directly to the project[68].

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[66] Conflicting information regarding NamPower's role in this negotiation has been provided to the researchers.

[67] The 19% limit was set to accommodate the lead developer's 51% and the 30% PDN shareholding. Were NamPower to have received shareholding proportionate to their estimated contribution to the project, this would have been closer to 31%.

[68] Nonetheless, at least one bidder had secured AfDB financing for their bid.

The innovative financing structure developed for this project is therefore a notable achievement.[69] Due to the NA$-ZAR currency link, the PPA could be denominated in South African Rands – which enabled Standard Bank to provide a ZAR760 million (US$56,4 million)[70] loan to the project.[71] Due to the abovementioned constraints, Standard Bank could initially offer only an eight-year tenor on the loan.[72] A guarantee offered by Proparco – the French development finance institution – enabled Standard Bank to stretch the loan term to 15 years. The guarantee was structured in such a way that it covered 30% of the debt (principal and interest) in year 1, increasing to 100% in year 8 of operations. This arrangement enabled Standard Bank to provide a loan tenor that would normally only be available from DFIs. It also enabled Proparco to help finance this project without being exposed[73] to long-term currency fluctuations on the actual loan amount.

Given the relative novelty of the financing arrangement, it should come as no surprise that it took longer than expected for the project to reach financial close.[74] It helped that both Standard Bank and Alten had been in regular contact with Proparco prior to the project being put out to tender. Nevertheless, DFI involvement meant that financial close was delayed by a month, with Proparco's due diligence process alone taking about six months to complete. The project eventually managed to reach the critical financing deadline on 28 February 2018.

As the renewable energy IPP market matures and the Hardap project enters the low-risk operations phase, it is possible that the project owners might consider refinancing the project on better terms. The PPA allows for such a change in financing terms or even financing providers, but with the proviso that the project tariff be amended by the ECB to ensure that the benefits are shared between the company and the off-taker on a 50:50 basis. Given the off-taker's shareholding in the company, NamPower might be strongly incentivised to push for better financing terms.

[69] Alten originally wanted to finance the project on their balance sheet, but opted for project finance after the project was awarded.

[70] At an exchange rate of US$10,2 to the ZAR.

[71] The project was financed on an 80:20 Debt:Equity basis.

[72] Standard Bank also provided long-dated interest rate and currency hedges. Facilities provided included the loan, VAT facility and debt service reserve facility.

[73] Proparco is exposed on the guarantee fee that they are taking, but not on the actual loan principal.

[74] Alten's decision to switch from a corporate-financing to a project-financing model after the project was awarded has also contributed to this delay.

6 Learning from Namibia

Until recently, any survey of private power investment in sub-Saharan Africa would not have considered Namibia. The country simply had no private-sector involvement in electricity generation. This situation has since changed dramatically, powerfully illustrating the importance of the contributing elements to successful IPP investments at both the country and project levels. Namibia is a stable democracy with good governance indicators, prudent macro-economic policies and a well-developed financial industry. Its electricity sector is effectively governed and run and has, as a result, an efficient and credit-worthy utility company. These country level factors have allowed Namibia to secure substantial and rapid private power investment without the need for sovereign guarantees, credit enhancements, or hard currency denominated payments.

At the project level the Namibian case also offers lessons in innovative risk management that addresses some of the key barriers and long-term risks for private power investment on the continent. The Standard Bank-Proparco lending guarantee structure not only enabled a long-tenored loan to be provided to the project, but it also addressed the other key concern in many of these types of project: currency depreciation risks. By combining Standard Bank's ability to lend in local currency with Proparco's risk cover, the Hardap PV project showed that it is possible to finance a utility-scale power project in Africa without exposing the sovereign to additional contingent liabilities, or the electricity consumers to currency-linked price fluctuations.

Namibia's experience furthermore shows that structured procurement programmes, such as the feed-in tariff programme, are able to unlock private power investment at scale and within relatively short timeframes. The competitive procurement of the Hardap PV facility goes further, demonstrating that this can be done at an even larger scale, and more importantly, a much lower cost. The strengthening of the rational, dynamic, least-cost power system expansion planning framework will do much to cement and leverage the gains from these procurement frameworks for future investments.

In a sense, the story of the eventual success of the Hardap PV project is built on a strong foundation of getting the fundamentals right: ensuring that the project documentation is of a high quality and bankable, ensuring that project site preparation and data gathering is done properly, and committing to clear and ongoing communication with the market. It is also a story of pragmatism and cautious learning, with NamPower's approach throughout the process emphasising technical rigour and project quality on the one hand, while on the other hand focusing on keeping the procurement process (and especially the commercial and financial aspects) as simple as possible. The intention of "learning from" this exercise has been clear from the start and one can observe progress in the way that the programme was designed and implemented over time.

The future looks bright for Namibia's power sector: the Hardap project provided a powerful signal to decision-makers that competitive procurement offers superior price and investment outcomes for private power projects. The ECB has accordingly indicated that they will not be offering a feed-in tariff for utility-scale projects anymore. For a country that struggled for years to do mega power projects, the success of these smaller, renewable energy-based projects shows that an incremental approach can deliver rapid, cost-effective results. NamPower has recently launched competitive procurement programmes for two 20 MW solar PV projects – one to be established on an IPP basis, with the other an EPC contract with NamPower as the owner and operator. A 50 MW wind IPP tender was also launched. What is currently lacking at a national level is an up-to-date least-cost power expansion plan that takes into account not only the declining costs of renewable energy technologies, but specifically also accounts for the rapid expansion of embedded and distributed generation within the Namibian power system. Linking this plan to a predictable competitive procurement platform will likely produce ever cheaper, ever better private power projects able to support the country’s energy policy ambitions.

Appendix A

Analytical framework

The analytical framework used represents a widening and deepening of the work done by Eberhard and Gratwick (2011) and Eberhard et al. (2017) in their analyses of factors contributing to the success of IPPs in sub-Saharan Africa. These authors have identified a host of factors, at both country and project level that influence the success of IPP projects. In particular, they have emphasised the importance of competitive procurement (Eberhard et al., 2016) without explicitly making recommendations concerning the design and implementation of such procurement programmes – largely because the most of sub-Saharan Africa's IPP capacity has been procured through direct negotiations, often initiated by unsolicited proposals (Eberhard et al., 2016).

How procurement interactions between the public and private sectors need to be structured and managed is a key concern for the development of successful new renewable generation capacity in this region. Renewable energy auction design is a field of growing scholarly and practitioner interest. The work of (Linares, 2011; Lucas, Ferroukhi and Hawila, 2013; Del Río and Linares, 2014; Kreiss, Ehrhart and Haufe, 2016; del Río, 2017; Lucas, Del Rio and Sokona, 2017; Dobrotkova, Surana and Audinet, 2018; Hochberg, 2018; Kruger and Eberhard, 2018) offers a useful body of literature for developing a deeper understanding of how choices made in the design of procurement programmes can influence price, investment outcomes, and so on. Eberhard and Naude (2016) as well as Eberhard, Kolker and Leigland (2014) have also emphasised how choices made around procurement programme implementation can play a role in determining outcomes.

The analytical framework used in this case study attempts to combine lessons from the literature on IPP success factors with studies of auction design and implementation to offer a detailed and nuanced understanding of various factors that influenced the auction outcomes. Factors investigated and assessed in the study are outlined in the table below.

Table 12: Factors investigated and assessed under the study

Factors	Details
Country level	
Stability of economic and legal context	Stability of macroeconomic policies Extent to which the legal system allows contracts to be enforced, laws to be upheld, and arbitration to be fair Repayment record and investment rating Previous experience with private investment
Energy policy framework	Framework enshrined in legislation Framework clearly specifies market structure and roles and terms for private and public sector investments (generally for a single-buyer model, since wholesale competition is not yet seen in the African context) Reform-minded 'champions' to lead and implement framework with a long-term view
Regulatory transparency, consistency, and fairness	Transparent and predictable licensing and tariff framework Cost-reflective tariffs Consumers protected
Coherent sectoral planning	Power-planning roles and functions clear and allocated Planners skilled, resourced, and empowered Fair allocation of new-build opportunities between utilities and IPPs Built-in contingencies to avoid emergency power plants and blackouts

Competitive bidding practices	Planning linked to timely initiation of competitive tenders/auctions Competitive procurement processes are adequately resourced, fair and transparent
Programme level	
Programme design	Bidder participation is limited to serious, capable and committed companies Contracts are bankable and non-negotiable Balance between price (competition) and investment risks/outcomes is appropriate Programme is linked to and informed by planning frameworks (volume, transmission, and so on) Investment risks and costs are allocated fairly Design takes local political and socio-economic context into consideration Transaction costs (bidders and procuring entity) offset by price and investment outcomes Qualification and evaluation criteria are transparent and quantifiable Design allows for multiple scheduled procurement rounds Measures to create local capacity/market are built in through local currency PPA, shareholding requirements, and so on.
Programme implementation	Both the programme and the procuring entity have appropriate and unbiased political support, as well as an appropriate institutional setting and governance structures The procuring entity is capable, resourced and respected Co-ordination between various government entities is effective The procurement process is clear, transparent and predictable
Project level	
Favourable equity partners	Local capital/partner contributions are encouraged Partners have experience with and an appetite for project risk A DFI partner (and/or host country government) is involved Firms are development-minded and returns on investment are fair and reasonable
Favourable debt arrangements	Competitive financing Local capital/markets mitigate foreign-exchange risk Risk premium demanded by financiers or capped by off-taker matches country/project risk Some flexibility in terms and conditions (possible refinancing)
Creditworthy off-taker	Adequate managerial capacity Efficient operational practices Low technical losses Commercially sound metering, billing, and collection Sound customer service
Secure and adequate revenue stream	Robust PPA (stipulates capacity and payment as well as dispatch, fuel metering, interconnection, insurance, *force majeure*, transfer, termination, change-of-law provisions, refinancing arrangements, dispute resolution, and so on) Security arrangements are in place where necessary (including escrow accounts, letters of credit, standby debt facilities, hedging and other derivative instruments, committed public budget and/or taxes/levies, targeted subsidies and output-based aid, hard currency contracts, indexation in contracts)
Credit enhancements and other risk management and mitigation measures	Sovereign guarantees Political risk insurance Partial risk guarantees International arbitration
Positive technical performance	Efficient technical performance high (including availability) Sponsors anticipate potential conflicts (especially related to O&M and budgeting) and mitigate them
Strategic management and relationship building	Sponsors work to create a good image in the country through political relationships, development funds, effective communications, and strategically managing their contracts, particularly in the face of exogenous shocks and other stresses

Source: Adapted from Eberhard et al. (2016)

Appendix B

Eligible tenderers

ABB Namibia (Pty) Ltd

ACWA

African Infrastructure Investment Managers (Pty) Ltd

ALOE Investement 112

Alten Energy

Anassa Energy

Atlantic Petroleum

Atlantic Trade Port Holdings (Pty) Ltd

Aurora Power Solutions (Pty) Ltd

Aussenyen Energy Investements Pty (Ltd)

Aveng Namibia

Azores Island Investments

Beijing Engineering Coroporation Ltd

Benzel and Partners Investments (Pty) Ltd

Bigen Kuumba Infrastructure Services

BioTherm Energy (Pty) Ltd

BNT Masinga Trading and Projects cc

Bright Spark

Building Energy SPA

CARSO Business Solutions cc

Centre-Back Investments (Pty) Ltd

Chiloe Island Investments

China Nuclear Engineering Corporation Namibia (Pty)

China State Construction

Chobe Minerals & Energy Services

CIGenCo

Clean Energy Solutions (Pty) Ltd

Clydon PIH Investment (Pty) Ltd

Cobra Industrial Services (Pty) Ltd

Consolidated Infrastructure Group (CIG)

Consolidated Power Projects Namibia (Pty) Ltd

Cowashi Investments CC
Cuvelai Electric cc
DAKAK Integrated System
DS Projects (Pty) Ltd
DSOLAR
DT Amora Investment cc
DT Investment cc
Dunamis Consulting Engineers
ECONO Investments (Pty) Ltd
Elite Foods & Investments
Emcon Turnkey Solutions
ENEL Green Power Namibia (Pty) Ltd
Energy and Water Corp (EWC)
EOH Mthombo (Pty) Ltd
EOH Power Systems
EOLICA Navarra C.L.
Erongo Trading Services
E-Yethu Consulting
Fibon Group (Pty) Ltd
First Petroleum
First Solar
Fusion
Generale du Solaire
Godisha Energy (Pty) Ltd
Green Coal Okahandja
Green Cycle Investments
Green Energy Technology Holdings
Greenshare Investments Africa cc
GreenVen (Pty) Ltd
GreenYellow
Grupo Gransolar S.L.
Guinea Fowl Investments 39 (Pty) Ltd
Hangala Resources (Pty) Ltd
Hardap Energy Generation (Pty) Ltd
Hibachi Energy (Pty) Ltd

HMN Investments
Hockland Energy
HopSol
Ileni Investment cc
Iliso Consulting Namibia (Pty) Ltd
Illimite Investment JV
IMS Investments cc
INNOSUN Energy Holding (Pty) Ltd
Innovative Electrical Solution cc
Ino Investment (Pty) Ltd
Invest In Africa Energy
JABIL Inc.
JFM Omatabalo
Jovakuru Trading
Jumosha Energy (Pty) Ltd
Jumosha Holding Investment cc
JV: Afres & Deutch Eco
JV: Andjamba Construction cc & Yingli Solar
JV: ARCH Energy
JV: BMZ Investments
JV: China Jiangxi International (Namibia) (Pty) Ltd & Profile Technologies (Pty) Ltd
JV: Fermour Investment & Shamooi
JV: Jordaan Oosthuysen & Nangolo QS
JV: Karee Investment & Solar Africa Tirhani
JV: Multiplex Solution & Kambai Solar
JV: Omega & Acciona
JV: RC & EE Pro
JV: SEPCOIII Electric Power Construction Corporation & STECOL Corporation
JV: Tarse Construction & Painhas
JV: Upgrade Energy Africa (Pty) Ltd & Green Synergy Namibia (Pty) Ltd
JV: Willbedone Trading cc & Yingli Solar
JV: Y-Generation & Galen
Kalkrand Construction cc
Kambwa Construction (Pty) Ltd
Karas Energy Inv (Pty) Ltd

Kinetic Ovations Investment cc
Kinglord Investment (Pty) Ltd
Knight Piésold Consulting (Pty) Ltd
Kocherbaum Namibia Investment
Kongwa Investment (Pty) Ltd
Lerumo ILC Henkwange
Lesedi Nuclear Services
Litiki Investment cc
LSN Consortium
LTM Energy (Pty) Ltd
Magic Electrical Converter (Pty) Ltd
Manifest Investment (Pty) Ltd Consortium
MARCE Fire Fighting
Master Power Africa
MBHE African Power
Mcorp Invetsments (Pty) Ltd
MEC Technology cc
Mecheng Industrial Solutions
Megawatt Investments
MENEU Investment cc
Mobile Oil and Fuel Suppliers
Moipone Group of Companies
Montenya Energy
Mooisolar (Pty) Ltd
Mulilo Sunpower Total Consortium
Muscat Investments
NamEnergy Resources (Pty) Ltd
Namibia Consulting Engineers and Project Managers (Pty) Ltd
Natura Energy (Pty) Ltd
Natura Power Projects
NEC Power & Pumps
New Era Investment (Pty) Ltd
Next Stone Investment Company (Pty) Ltd
Nobis Investments
Nubian (Pty) Ltd

OKA Investments (Pty) Ltd

OKA Partner Investment

OLC Solar Energy Corporation (Pty) Ltd

Old Mutual Investment Group (Namibia) (Pty) Ltd

Omega Shipping & Logistics (OSL)

Ongoro Enterprise (Pty) Ltd

On-Track Investments (Pty) Ltd

Oshikoto Power (Pty) Ltd

Otesa Energy

Oxbow Investments cc

Oyeetu Enterprise (Pty) Ltd

Paragon Investment Holding (Pty) Ltd

Paramount Infrastructure Development (Pty) Ltd

Phanes Africa Pty (Ltd)

Pinnacle

Power Vision Investment cc

Proleze Trading cc

Radial Truss Industries (Pty) Ltd

Renewable Power Projects Namibia

RMB Namibia

Rosebank Investment

Sanedi

Selcouth Trading Enterprise cc

Shanghai Electric Consortium

Shapoorji Pallonji

Shine Africa Products (Pty) Ltd

Simon industries

SINOHYDRO Corporation Limited

SkyPower

SO Energy

Sol Group Namibia (Pty) Ltd

Solairedirect

Solarcentury Africa (Pty) Ltd

SOLAREFF

Solfutech

SOLsquare Energy (Pty) Ltd

Southern Solar cc

SUNCORP Namibia

Suncorp Solar Namibia (Pty) Ltd

SUNRISE Investments cc

TangMen Information Technology

Telemenia Ltd

Tesla Energy Solutions (Pty) Ltd

Teya Investment No. 18 cc

The Power Company

Tombolo Energy Investments

Trinity (Pty) Ltd

Uahova Investment

Umnotho Wesizwe Group

Unigea Solar Projects GmbH

Urban Farming

Veiinatobias Organisational Energy Consortium

VIGOR Energy Investment CC

Windhoek Consulting Group (WCG)

Worldmaster Power Systems cc

XAMI Power Engineering / Distribution

XON Systems

Zhong Mei Engineering Group (Pty) Ltd

Zizwe

ZTE Corporation

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