Namibia IPP and Investment Market Framework Technical Assistance

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NAMIBIA'S ELECTRIC POWER SECTOR

Submitted to:

Mr. Siseho Simasiku
Chief Executive Officer
Electricity Control Board
8, Bismarck Street
P.O. Box 2923
Windhoek, Namibia

U.S Trade and Development Agency
1000 Wilson Boulevard
Arlington, Virginia 22209

Submitted by:

CORE International, Inc.
5101 Wisconsin Avenue, NW
Washington, DC 20016, U.S.A.

and

EMCON Consulting Group
Windhoek, Namibia

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Mailing and Delivery Address: 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901
Phone: 703-875-4357 ● **Fax:** 703-875-4009 ● **Web site:** www.ustda.gov ● **email:** info@ustda.gov

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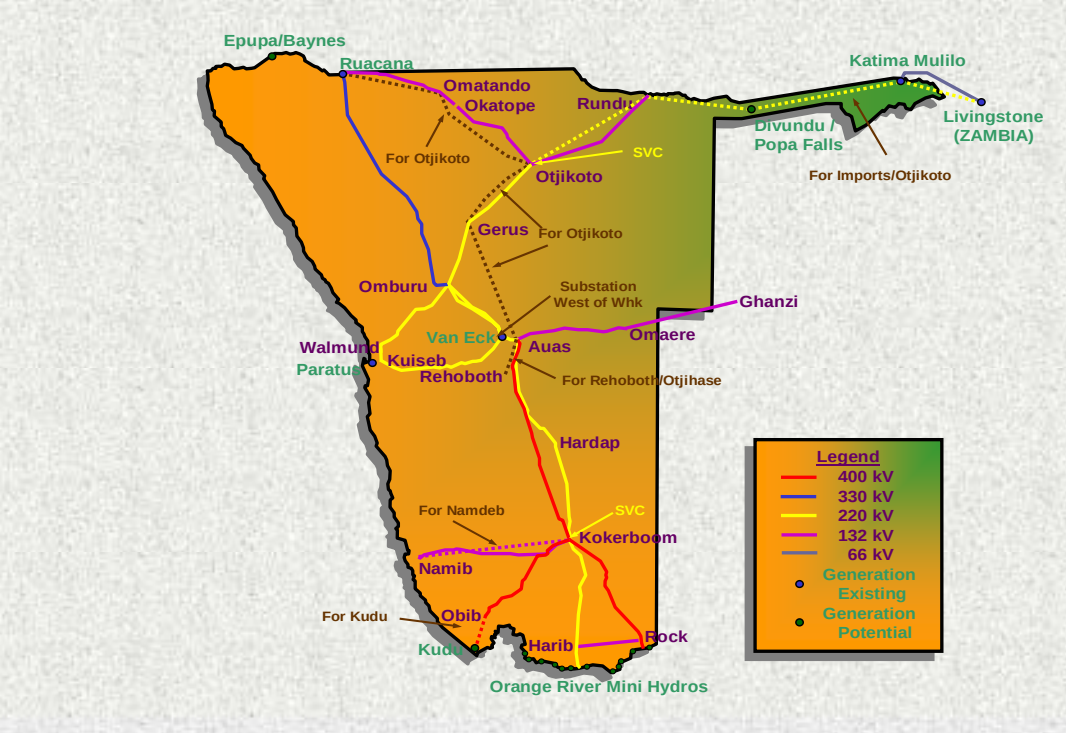
I. Description of Namibia Power Sector

a. PHYSICAL DESCRIPTION OF SYSTEM

i. Transmission System and Forecast Demand

The figure below shows the main Namibian transmission grid, both existing infrastructure as in 2005 and planned connections (in dotted lines).

The Namibian Transmission Grid, 2005



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The main currently planned transmission extension is the Caprivi link, which is a HVDC project intended to link the Namibian system with Zambia and Zimbabwe. The link is intentended to have a capacity of up to 600MW and will enable NamPower to trade electricity between Zamibia, Zimbabwe and other countries to the North and South Africa in the South. It will also make Namibia less dependent on imports from South Africa by opening up new supply options from the north, and will also reduce Namibia's exposure to the South African transmission grid which currently has some significant constraints which threaten supply stability to Namibia in the short to medium term.

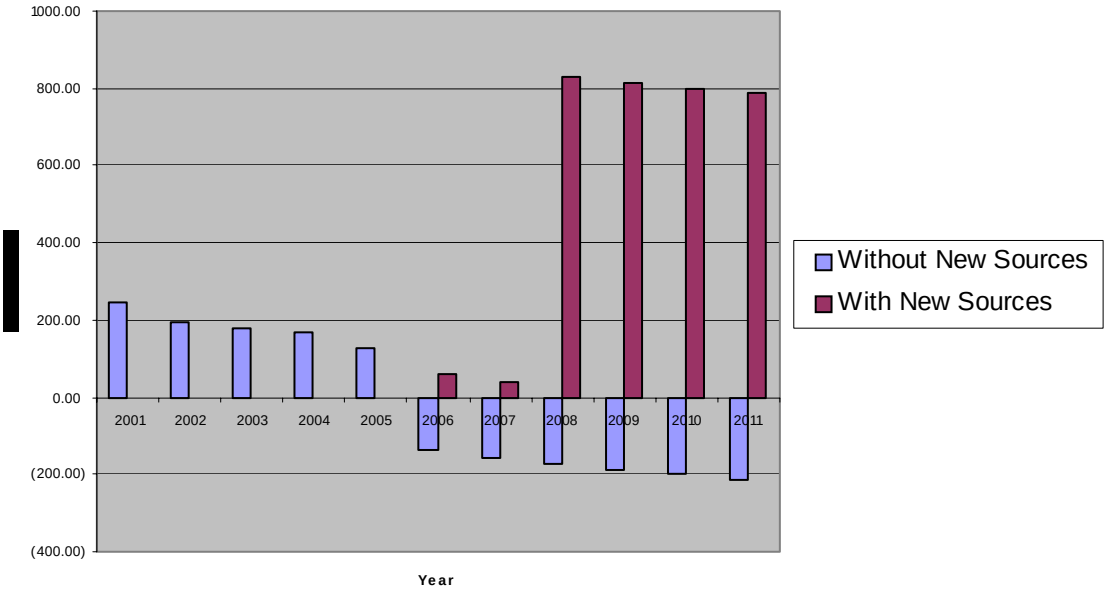
Other transmission projects indicated on the above map are the seond 132kV line from Kokerboom to Namib which is already under construction and the proposed interconnection the the planned Baines hydro power station, which is under negotiation with Angola.

Namibia therefore has a well developed transmission system with strong existing interconnection to South Africa and clear plans to strengthen connections to the north. The transmission system reaches most significant existing loads within the country, with the moth notable exceptions being the Namdeb diamond mine in the extreme south west of the

[1] **Source: NamPower**

country (which is supplied directly from the South African grid) and the Caprivi region which is fed from the Zambian grid.

Forecast Supply and Demand Balance for Namibia

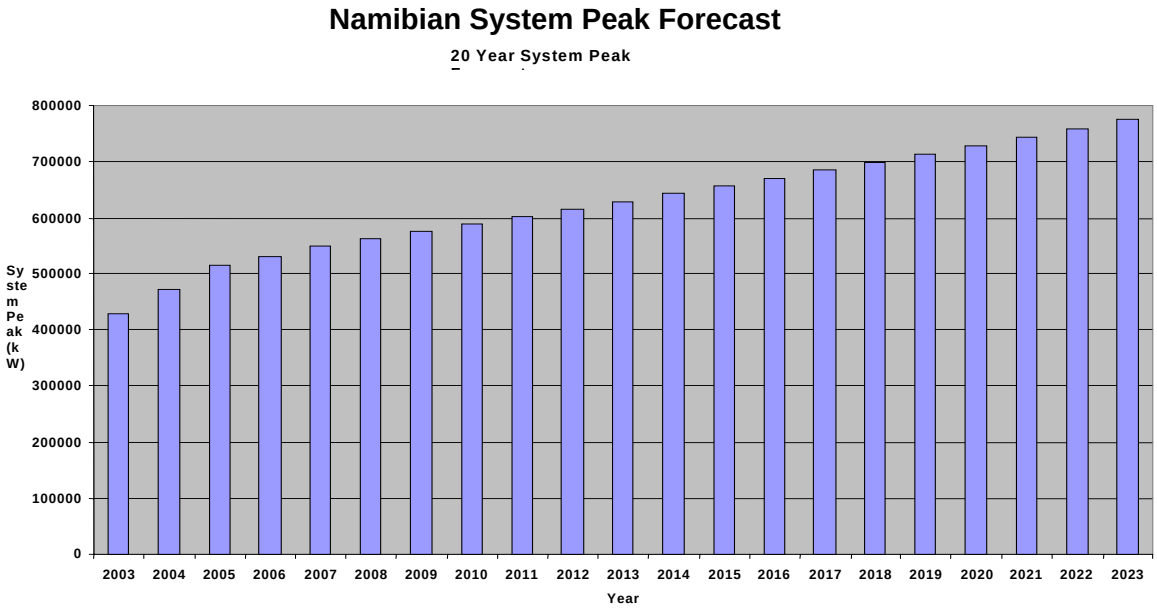


The above figure shows the supply and demand balance forecast with and without new supply sources (assuming the Caprivi link to come into operation in 2006 and Kudu in 2008, both of which will not be on schedule).

Taking into account that the Caprivi link has not yet entered construction and the Kudu power project has also not reached the investment decision stage it is clear that Namibia will rely on imports from South Africa for some time to come, but certainly beyond the projections shown above.

ii. Demand

A NamPower demand forecast for Namibia is shown below. This figure shows the projected system peak demand including normal growth and high probability step loads.



It is clear from the supply and demand projections that there is considerable scope for local generation to be developed, both on small, medium and large scale to meet the future demand in the country.

iii. Generation

The following Power Stations are presently utilized on the interconnected Power System:

1.) Ruacana Hydro Power Station: This Plant is situated in the north of Namibia, where the Kunene River becomes the Border between Namibia and Angola.

- Rating: 240/249 MW
- This station has Black Start up Diesel Generators.
- Equipment installed: 3 x Francis turbines (Voest Alpine Austria) and
- 3 x Generators (Westinghouse Canada)
- Rated 80/83 MW, 11kV, 3 x Gen.Trfrs rated 90 MVA (ABB RSA), 11/330 kV, SF6 Switchgear (Siemens Berlin Germany)
- One 330 kV Transmission line (570 km from Ruacana to OMBURU TX Station).
- Completion of the Power Station: 1978

The civil works for the addition of a fourth machine are completed, but the completion has been canceled because of external factors. The station is mainly operated as a Run of the River Power plant, because all upstream storage dams have not been completed or are damaged by the previous civil war activities in Angola.

A small diversion weir just upstream of Ruacana is situated in Angola. This weir only allows water regulation for approximately 1 day a week. For that reason the SAPP schedules for Ruacana operations are on a weekly base (according to ABOM regulations monthly schedules would be required). An interesting factor is that during the raining season (from about February until May each year), the station is run on full load and therefore operated as a Base Load Power plant and for the remainder of the year as a Run of the River plant.

2.) Van Eck Coal Fired Power Station: This plant is situated at WINDHOEK.

- Rating: 120 MW.
- This station has no BLACK START UP and therefore needs external power supply for starting purposes.
- The plant has been designed as a dry cooled Power station because of water supply constraints in the Windhoek area.
- Equipment installed: 4 x 30 MW Generators (BBC Orsal Switzerland)
- 11 kV, Boilers: Chain grate / Stoker spreader feeder type (8 per boiler)
- 3 Boilers built by Yarrow RSA and one by Babcock & Wilcox RSA.
- Gen. Trfrs. : 3 x 35 MVA 11/66 kV (ASEA RSA) and 1 x 35 MVA 11/220 kV (ABB RSA)
- Completion of the Power station: Units 1 – 3: 1972/1973
- Completion of Power Station Unit 4: 1979

High grade coal is presently supplied by coal mines in RSA and transported by boat from Richards Bay to Walvis Bay and by railways to Windhoek. There is a very high cost of transport: 24 – 27 MJ/kg. This station feeds into the 220 kV and 66 kV interconnected Power system, respectively. The plant is normally operated as a standby and peaking Power station respectively.

3.) Paratus Diesel Power Station: This plant is situated in WALVIS BAY.

- Rating: 24 MW.
- This station has a Black Start up Diesel Generator.
- Equipment installed: 4 x 6 MW Units consisting of:
- 4 x MIRRLEES Marine turbo charged Diesel Engines KV16 Major (UK), 10 000 bhp 4 x BRUSH Generators (UK) 11 kV 7,5/6,4 MW
- Completion of the Power station: 1976

Light Fuel Oil (normal Diesel) is used for start up and stopping and Heavy Fuel Oil (Bunker Oil) is used for normal operation. This station is connected to the 11 kV Bus Bars of the Walvis Bay supply station and is feeding back into the interconnected Power System via 2 x 66/11 kV TX Trfrs.

This plant is mainly used as a standby and peaking Power station respectively, but it is also contractually bound as an emergency standby plant for the city of Walvis Bay (mainly for the Fishing industry).

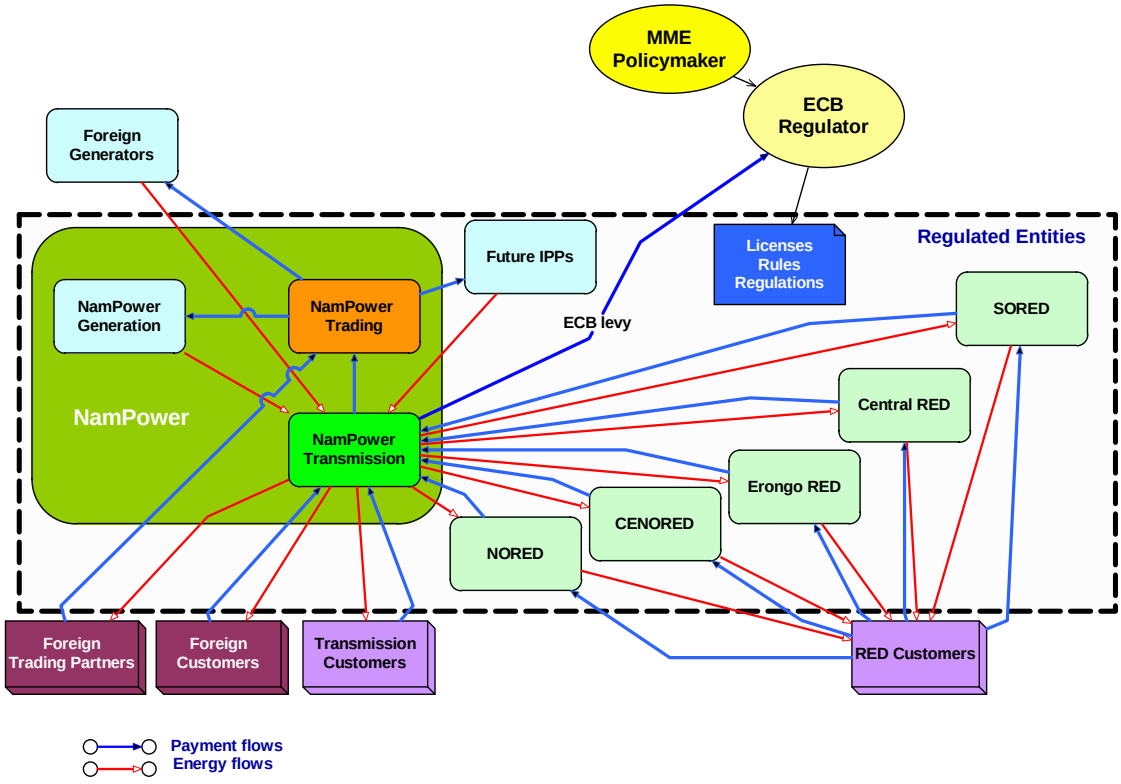
b. DESCRIPTION OF REGULATORY SYSTEM

The Namibian Electricity Supply Industry (ESI) is regulated by the ECB subject to the powers vested in the regulator under the Electricity Act (Act 2 of 2000). Under the Act, any person engaged in the generation, transmission, distribution, supply, import or export of electricity must obtain a license from the ECB for such operations. There are well defined processes for such license applications and the general license conditions have been developed and are generally well understood.

It is important to note that the ECB's independence is limited by the fact that the final decision on licensing matters rests with the Minister of Mines and Energy. The ECB's role is to evaluate the applications and make recommendations to the Minister. Experience so far has shown some cases where the Minister has overturned the ECB's recommendations, for example granted longer license terms to REDs than recommended by the ECB. It can therefore be said that some tension exists between the regulator and the political echelons.

The figure below provides an overview of the current envisaged industry structure. Establishment of the REDs has not been completed at this time, with Central RED and SORED yet to be formed and made operational.

Post-Restructuring Industry System, Namibia



i. Roles and responsibilities

Policy Level

The MME is the policy maker in the ESI. The MME has developed the Energy Policy which has, since 1998, been the overall guiding document for the ESI. The Electricity Act was developed under guidance from this policy, as have the restructuring actions that have taken place. The Energy Policy is therefore to this day a valid document and serves as baseline for policy in the ESI.

Regulatory Level

The ECB is the regulator in the ESI. The ECB has a non-executive Board and is staffed with a Chief Executive Officer supported by various staff members who perform technical and administrative functions. The ECB deals with the day to day administration of the ESI, which principally amounts to the management of licenses, management of tariffs and interactions with licensees. The ECB is also instrumental in developing regulations under the Act. The ECB is currently in the process of reviewing the Act with a number of proposed significant changes which will increase the powers of the regulator and put in place certain key legislation to enable the orderly implementation of REDs.

The ECB and MME are further in the process of investigating the possibility of changing the ECB from an electricity regulator to an energy regulator. It is at this point uncertain whether and when this may go ahead, but such a development is probably some years away.

Licensees

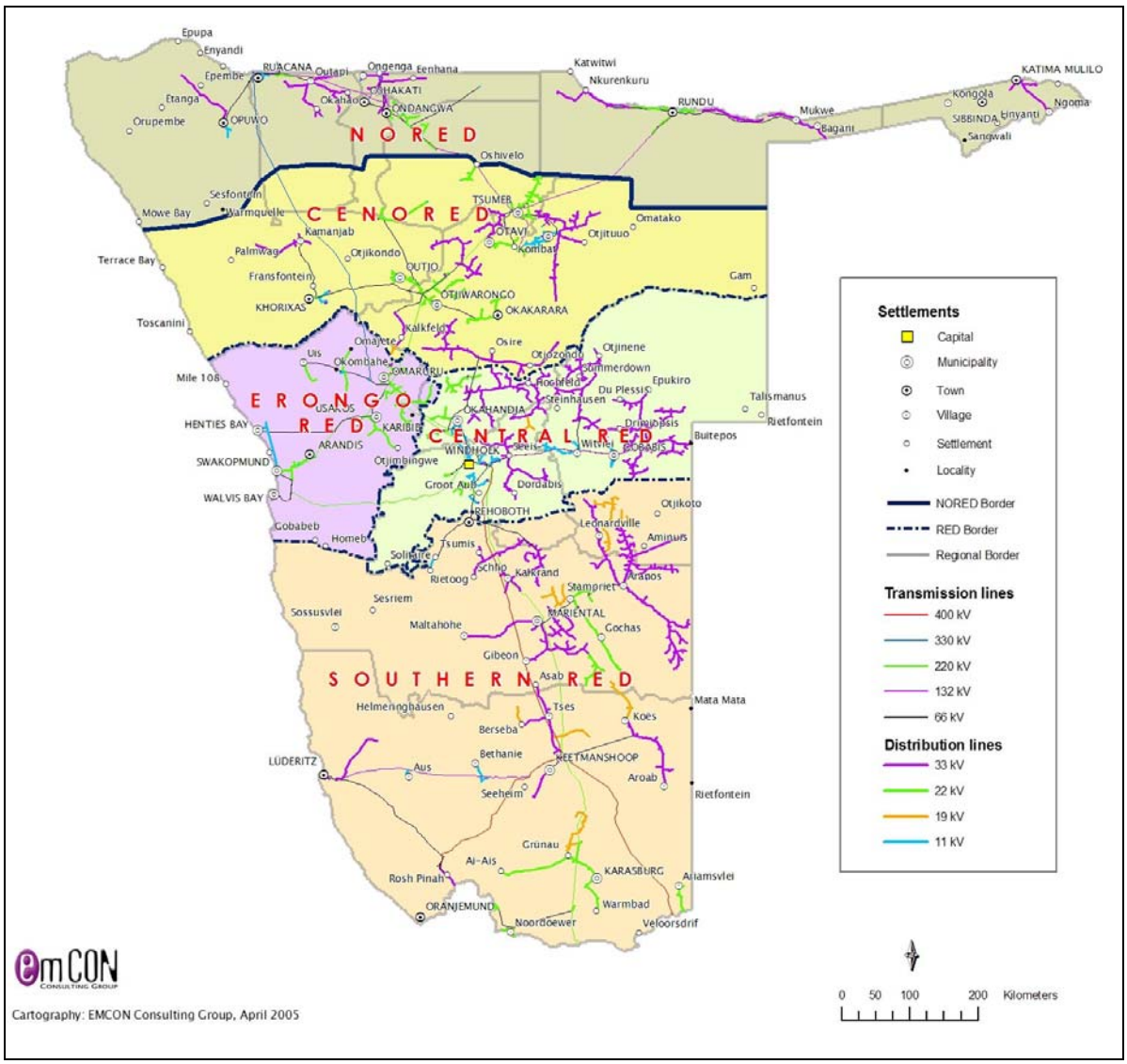
The main licensees in Namibia are NamPower and the Regional Electricity Distributors (REDs).

NamPower encompasses three main ring-fenced businesses, namely generation, trading and transmission. There is currently also a distribution component within transmission, but it is expected that this will be spun off to the last two REDs to be formed within the next year or two. NamPower in its role as system operator and trader, currently has the important role of balancing supply and demand, and it is the contracting party for imports, primarily from Eskom in the RSA but also from ZESCO in Zambia (for the Caprivi Region). As such, NamPower seeks to optimally balance its own generation with imports and thereby obtain the best possible cost scenario.

NamPower Transmission is divided into two businesses, the wires business and supply business. The wires business manages and operates the transmission network while the supply business looks after the transmission customers. These are some large mines, the REDs plus some smaller supply points which are connected directly to the transmission grid largely for historic reasons.

NamPower also holds licenses for import and export of electricity. These can be divided into those at trading level (transactions with Eskom) and at transmission supply level (supplies to Angola and Botswana, supply from Zambia).

Map of the Namibian Grid (2005) and Distributor Layout



The REDs are responsible for the distribution and supply of electricity to end consumers within their respective areas. Three REDs have already been established and are operational while two more are due to become operational within 2006/7. NORED was established in 2002 and is therefore within its fifth year of operations. CENORED and Erongo RED started operating in 2005 and are still in their stabilization phase. Within the SORED and Central RED areas the local and regional authorities as well as NamPower are still the licensed distributors, but the process to establish these REDs is under way.

ii. Description of decision pathways

The MME is responsible for setting policy which drives the activities of the ECB, and make decisions on recommendations brought to it by the ECB.

The ECB interacts with the Licensees and prospective Licensees, providing information on policies, rules, regulations and conditions. The Licensee or prospective Licensee provides the ECB with information required as part of license applications or license conditions (once

a license has been issued). The ECB therefore stays abreast with key developments in the Licensees.

iii. Description of financial pathways

The flows of payments in the electricity system are described fully by the Roles and Responsibilities graphic (b. above). As the figure shows, the electricity system is self-supporting and in fact generates net funding for local government units.

c. Current reform initiatives in Namibia

i. Restructuring of NamPower

Around the year 2000, NamPower undertook a restructuring exercise (named NamPower Mongula meaning "NamPower Tomorrow") with the aim of ring fencing its regulated and non-regulated businesses. The result of this was the creation of Generation, Transmission and Distribution regulated business units with associated services and the NamPower Investments business unit which is not regulated and looks after NamPower's non-electricity assets and non-Namibian business opportunities.

A major exercise was undertaken at that time to determine cost reflective transfer pricing models, cost reflective tariff models and the principles according to which the business units would charge one another for services.

Electricity trading has been retained within NamPower, in the form of a Single Buyer business unit which is closely affiliated to the transmission business. Efforts from the ECB and NamPower to properly define the roles and responsibilities of the Single Buyer and more formally establish the market concept have so far not managed to reach consensus between the major stakeholders NamPower and ECB. Both entities have employed consultants who have done work on defining the Single Buyer. NamPower has, however, come to the conclusion that the Single Buyer model is not suitable for Namibia, whereas the ECB is still pursuing this model as an interim step towards a wholesale market. This is, therefore, still an area of uncertainty.

Since the conclusion of project Mongula, NamPower has essentially closed its distribution business unit. Assets and customers in the areas of NORED, CENORED and Erongo RED have been transferred, or at least deemed to be transferred, to the REDs. Operations of the remaining distribution assets have been absorbed into the transmission business, since most of the staff are required to operate the transmission system, having served a dual function previously. NamPower has committed itself to transferring the remaining distribution assets and customers to the remaining two REDs to be formed as soon as possible, i.e. as soon as the other stakeholders in the REDs together with NamPower have completed the process to establish the REDs.

There are no known plans to separate the NamPower business units into stand alone legal entities, and there are also no known plans to privatize NamPower.

ii. Description of power market

NamPower Single Buyer / Transmission Trading is at this point the only trader in the country. Imports from and exports to neighboring countries (RSA and Zambia) are contracted and managed there. NamPower Generation's output is also effectively purchased by this unit.

NamPower Transmission then sells the power on to a small number of transmission customers. These are a mix of large users (mostly mines and water pumping schemes), the REDs and an array of smaller consumers who, for legacy reasons, are connected directly to transmission substations.

There are also some cross border supplies where NamPower transmission supplies power at distribution or sub-transmission level to Angola, Botswana and RSA.

The REDs then distribute and sell power on to end users in their respective areas of supply. They serve approximately 150 000 end consumers, the vast majority of which are domestic users.

There is also one exception to the above system, namely Skorpion Zinc, power for which is effectively wheeled by NamPower on behalf of Eskom RSA. In order to ensure firm supply and a competitive price this arrangement was negotiated to enable the development of the operation in Namibia. The contract with Eskom contains a clause allowing the contract to be switched to a Namibian supply source after seven years – this was included with the Kudu development in mind and may present an opportunity.

iii. Description of market relations

Market relations are largely contract based. NamPower has agreements in place with Eskom in RSA for the main trading activity. This agreement is largely modeled on SAPP principles.

NamPower also has power supply agreements with all its transmission (and distribution) customers. Except for Skorpion Zinc, these agreements are largely standardized. The REDs have a slightly different form of contract from those used for end consumers.

iv. Roles of different government institutions, including regulators

The MME as policy maker has made clear policy statements in favor of an open, competitive and transparent market which promotes private sector involvement and investment. The ECB as regulator, as mandated by the Electricity Act, also enables an open market through the licensing regime.

v. Current state of restructuring

The major initial restructuring objectives of GRN have been achieved to a reasonable degree.

NamPower has been ring fenced into business units, although it can be argued that not enough separation has been created between these business units to really consider them to be operating independently.

In the distribution sector three REDs have been formed and have commenced operations, namely NORED (since 2002), CENORED (since 2005) and Erongo RED (since 2005). Development of Central RED and SORED is progressing slower, partly due to disagreements between stakeholders and partly due to delays in promulgating changes to the Electricity Act which are deemed to be necessary to properly empower the REDs.

An attempt has been made to establish a single buyer market. This has, however, so far not succeeded, with the ECB and Nampower as main players not reaching consensus whether a single buyer concept is workable and suitable for Namibia. The trading function is, therefore, still embedded in NamPower in a not very transparent manner.

vi. Regional convergence in restructuring

Regionally restructuring of the national electricity sectors is at different stages of development.

In the RSA, the most important regional player in the power market, efforts have been made to separate Eskom's generation and transmission businesses. This has, however, not gone very far. Eskom still dominates the regional market as a combined transmission and generation entity. The RSA is also busy establishing REDs – the process there has followed a rather different path from what was done in Namibia, and progress to date has been limited. The process has in fact been started, stopped again due to huge political and legal problems and has been re-started with efforts to establish RED1.

In other surrounding countries there is no significant development towards REDs or separation of generation and transmission business of the national utilities.

Regulators have been established in a number of countries, and other are in the process of establishing. The RSA, Namibia and Zambia have well established regulators, with Zimbabwe in the process of establishment. Botswana and Angola do not yet have electricity regulators.

vii. Next steps

The next steps in the Namibian power sector reform process are envisaged to be

- Promulgation of the new Electricity Bill (planned for 2006)
- The completion of the RED formation process by establishment of the last two REDs (probably 2007)
- Establishment of a single buyer market or another market alternative
- Moves towards incentive based regulation

II. Description of current IPP situation

a. General IPP environment

i. Legislative environment

The legislative environment is dealt with in annex 5.

ii. Relation to power system restructuring

While from a policy perspective the market is open for IPPs, some unresolved restructuring issues do impose barriers on the practical implementation of IPPs.

Foremost among these is the failure of efforts to establish a reasonably independent single buyer, leaving trading and bulk purchasing control fully in the hands of NamPower. Thereby leaving any IPP exposed to NamPower's ideas of what price can be paid for power produced, as well as operating regimes for new plant. NamPower clearly have vested interests with their own generation plant, and must, from their perspective, strive first to maximize the business benefits for their own company.

IPPs would be less affected by the two REDs that still have to be formed. This may pose some questions regarding the stability of the retail market, but these are not of critical nature and should not affect an IPP negatively.

iii. Regulatory issues

The transmission and generation tariff models adopted by the ECB are currently under review. Both studies are nearing finalization and results should be available soon. This current uncertainty may well have short term effects on potential IPPs since pricing is a critical issue and the pricing models acceptable to the ECB will play a pivotal role in enabling or disabling IPPs. It is expected that the pricing models adopted by the ECB will be such that they support IPPs.

iv. Policy issues

The Energy Policy of the GRN makes the following statements (among others):

"Electricity supply in Namibia shall be based on a balance of economically efficient and sustainable electricity sources including gas, hydro-power, other renewable energy sources and imported electricity. In creating this mix, the risks associated with stranded investments as well as the benefits of improved security of supply will be taken into account." [2]

"Government will promote a dialogue with private investors and financiers with a view to facilitating economically viable and competitive investments in the electricity sector. It will also ensure the establishment of the necessary legal, regulatory, fiscal and environmental frameworks to create a favorable investment climate."[3]

"Government will facilitate the establishment of new high-voltage interconnections to neighboring countries to increase Namibia's possibilities of engaging actively in regional electricity trading."[4]

[2] **Energy White Paper, Section 3.1.5.1.**

[3] **Energy White Paper, Section 3.1.6.**

[4] **Energy White Paper, Section 3.1.5.2.**

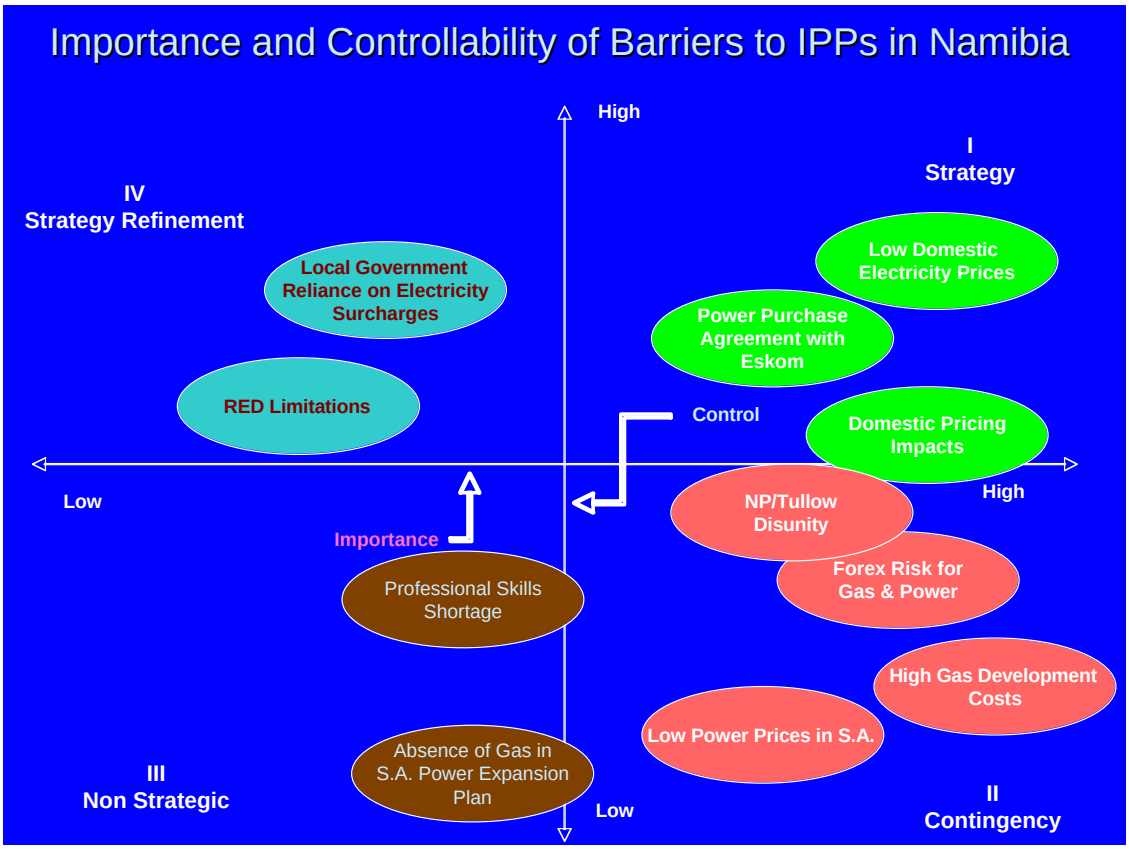
The policy therefore clearly emphasizes creation of an investment climate and trading of electricity with neighboring countries while also being cautious about economic efficiency and the possibility of stranded investments which Namibia can ill afford.

This policy sets a sometimes difficult task for the MME and the ECB. On the one hand, investment must be promoted (with a view to improving self sufficiency, another policy goal) and renewable energy sources are to be given preference, but on the other hand, this sometimes conflicts with the aim to maximize economic efficiency, at least in the short to medium term.

What is certainly required is that long term views are taken on these issues, since the short term environment is not particularly friendly to investment in local power projects with electricity prices still low, the Namibian market not very open and Eskom in the RSA driving their own agenda of development which seems very much focused on Eskom continuing their domination of regional power generation.

v. Key barriers to IPPs

The figure below depicts some of the key barriers to IPPs identified during the study. This is discussed in more detail in Annex 6.



b. Kudu Gas field

i. Description of location, size

The Kudu gas field is situated approximately 170km off-shore to the south-west of Oranjemund in the south western corner of Namibia. The gas field is located around 4.5km underground and would require an under-sea pipeline of around 170km to reach the shore. Water depth at site is

around 170m. It is expected that the gas will be conditioned on shore at the same location as the planned power plant. The proven gas reserve is sufficient to fuel an 800MW CCGT power plant for 22 years (at6 a production rate of 140 MMscf/d).

ii. History of attempts at commercialization

Year	Description	Actors
1974	**Kudu gas field discovered**	**Chevron / Soekor**
1987/88	**Two additional wells confirm commercial potential**	
1993	**License awarded, seismic surveys undertaken**	**SEPN & Energy Africa**
1996	**Kudu-4 well drilled, further seismic surveys**	**SEPN, Chevron Texaco, Energy Africa**
1996	**Kudu Power Project initiated**	**SEPN, NamPower, Eskom**
1997	**MOU signed to promote 800MW power station at Oranjemund**	**SEPN, NamPower, Eskom, National Power**
1998	**MOU lapses due to Eskom not satisfied with commercial viability**	
1998 – 2000	**Strategy with 400MW at Oranjemund and 1600MW in the Western Cape is being pursued and identified as lowest cost generation option for RSA within time window (2005-2008), but no investment decision made**	**SEPN and CAMALA**
1998 – 2000	**Investigations into the feasibility of a 400MW power plant combined with FLNG facility. Kudu-6 and Kudu-7 wells are dry.** **SEPN and Chevron Texaco withdraw from the concession.**	**SEPN, Chevron Texaco, Energy Africa**
2004	**Feasibility study done for 800MW CCGT power station near Oranjemund, joint development agreement signed and MOU regarding power purchase signed between NamPower and Eskom.**	**NamPower, Energy Africa, Eskom, Namcor**
2005	**Full EIA conducted and approved**	**NamPower, Energy Africa, Eskom, Namcor**
2005	**Production license granted**	**NamPower, Energy Africa, Eskom, Namcor**

Note:

SEPN = Shell Exploration and Production Namibia

CAMALA = Cape Municipal Area Local Authorities

c. Kudu Gas transmission

i. Power plant – distance & cost

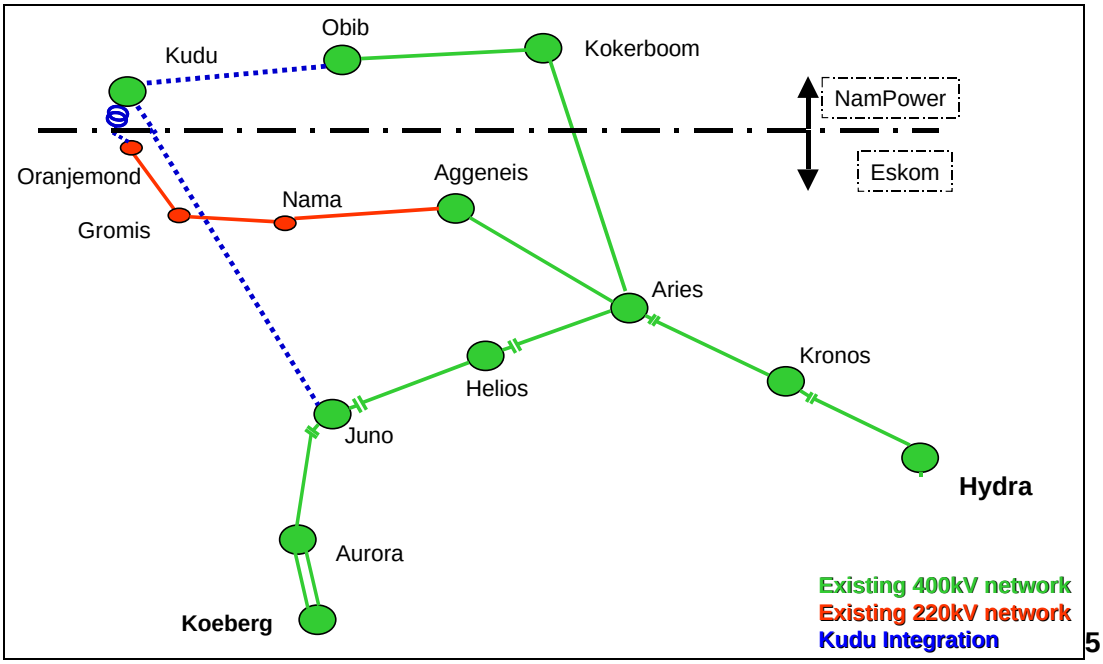
The CCGT Power station (either 2+1 or 2+2 shaft arrangement – this must still be decided) with a rating of 800 MW will be established at UUBVLEI about 25 km North of ORANJEMUND. The size of the Power plant could be doubled to 1600 MW at a later stage if additional Gas reserves can be established. The Gas pipeline will be about 170 km long. The estimated cost of the Power station will be 530 Million US$.

d. Kudu Power transmission

i. Interconnection with NamPower

Interconnection with NamPower: A 400 kV Power line to OBIB TX station will be required. Length: 82 km and estimated cost 58 Million US$. The Interconnection with ESKOM will require one 400 kV Power line to the Orange River: Length: 41 km and estimated cost 40 Million RSA Rand. A further 220 kV line to the ESKOM Oranjemond TX station will be built (Distance 41 km and estimated cost 28 Million RSA Rand). The second phase of development (another 800 MW) would require another 400 kV line to the Orange River (again 41 km and 40 Million Rand).

NamPower has already pre-invested in building the transmission system to Obib (Skorpion Project) at 400kV instead of the 220kV which would have been sufficient for Skorpion's needs. This was done with Kudu in mind, leaving only the link between Kudu and Obib to be constructed.



[5]

[5] **Source: NamPower**

ii. Sales opportunities

The main sales opportunities for Kudu can be summarized as follows:

- Feed into Namibian grid for local general consumption instead of running local thermal generation plant and displacing imports from the RSA (varying demand, depending on water situation at Ruacana, ranging from 170MW to 410MW in 2005 demand terms).
- Take over supply to Skorpion Zinc when that contract allows it (around 2011), around 100MW.
- Surplus to be sold to Eskom RSA.

There have been various occasions of interest in Namibia as destination for metal processing and smelting operations, ranging from manganese and heavy metals to copper. However, most of this interest was based on the low electricity prices based on the South African surplus capacity. Kudu will not likely be in a position to be competitive in such a pricing realm, and most of these project ideas are speculative and have a low probability of becoming reality.

There is also the regional power pool; however, it is not likely that a suitable buyer for Kudu's excess capacity would be easily found since most other countries with good transmission connections are oriented towards export themselves (Zimbabwe, Zambia, and Mozambique).

e. Other IPP opportunities

i. Hydro – location, state of development, key barriers and risks

a. The lower KUNENE River:
This River (excluding Ruacana) has an energy conversion potential of 1600 MW if all the major waterfalls and water rapids are developed. EPUPA and BAINES sites have been investigated and each site has the potential of between 360 and 500 MW depending on the envisaged Load factor.

Both stations could be developed as Base Load stations or Merchant plants. The major risk is that the Kunene River is the Border between Namibia and Angola and no development can take place without the involvement of Angola.

b. The lower ORANGE River: Small Hydro Power stations
There is a potential of 100 MW RUN OF THE RIVER Power stations (12 x small plants). The key barrier, however, is that the Border between RSA and Namibia is still defined as the northern flood line of the river i. e. the whole river belongs to South Africa.

c. POPA FALLS: This site is situated on the OKAVANGO River inside the Namibian border. However, the utilization must still be approved by OKACOM (the River-commission of all bordering countries). The station has a potential of 20 MW and would be a RUN OF THE RIVER station. The major barriers are the very small size of the plant and the environmental sensitivities of the OKAVANGO DELTA situated in BOTSWANA.

d. Thermal - location, state of dev MW OCGT Power plant situated at Walvis Bay: This will be an emergency PEAKING plant to bridge the very challenging years until either or both Kudu and Caprivi interconnections are in place (2007 until 2009).

ii. Development, key barriers and risks

A. 50 – 400 MW COAL FIRED POWER STATION situated in Walvis Bay. This plant is considered in case of Kudu and Baines not being constructed or very long delays should occur.

iii. Renewable

At least 20MW of wind generation potential has been identified at Luderitz in a project commonly referred to as the Luderitz Windpark. An attempt was made by NamPower in 2003 to obtain a generation license for a small Windpark (3-6MW), however, this failed for largely commercial reasons.

Namibia has high insolation levels over most of its surface area, but commercial scale solar power generation is not likely to be economically feasible.

iv. Regulatory and policy issues related to other IPPs

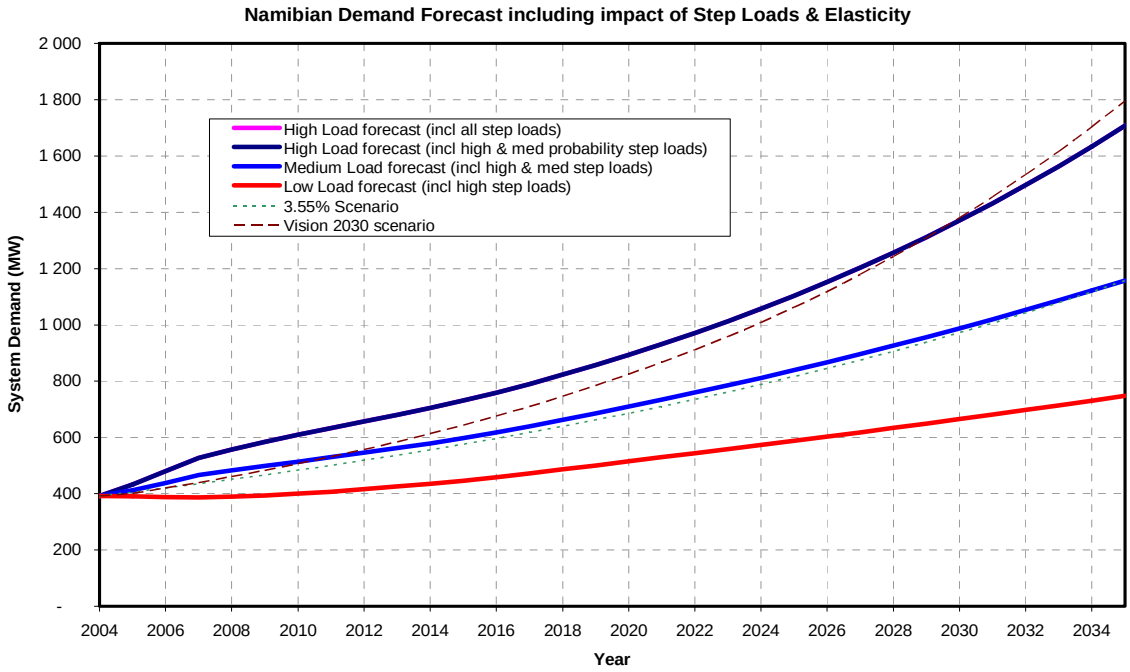
While the energy policy clearly promotes renewable energy, this is in many cases in conflict with economic realities. The effect of this was already observed in the license application for the Luderitz wind park which was rejected by the ECB, primarily for economic reasons.

From this perspective one could therefore deduce that there may be a regulatory gap since it is not clear to what extent renewables can and should be promoted at the expense of at least short to medium term economics.

III. Description of power sales opportunities

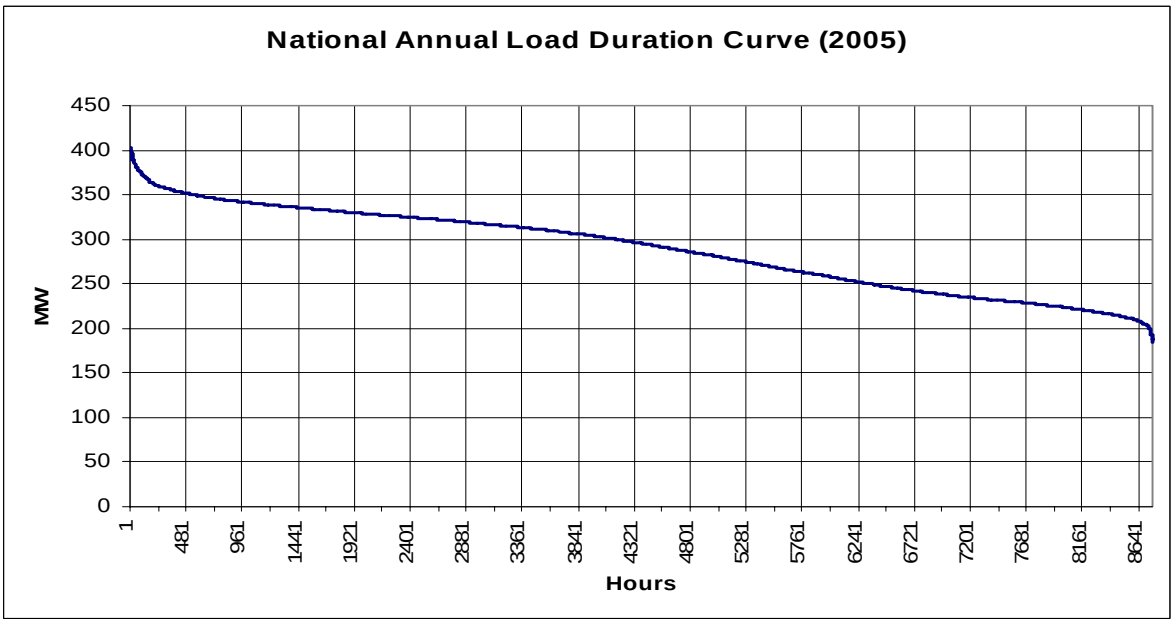
a. Expected Increases in Demand

i. Annual increase in domestic demand



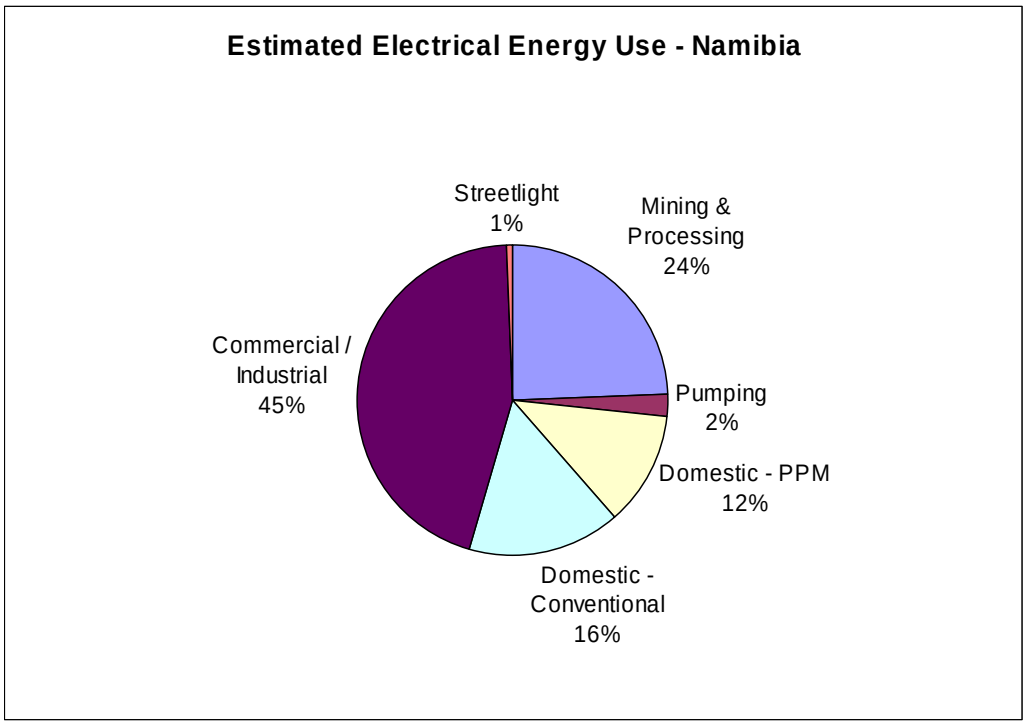
The above graph depicts NamPower's projections for annual demand growth, based on a number of growth scenarios.

ii. Nature of domestic demand



The figure above depicts the annual hourly load duration curve for the Namibian interconnected system for 2005. it is clear that there is a peaking requirement of at least 50MW and a base load requirement of between 200MW and 300MW. While Ruacana is a

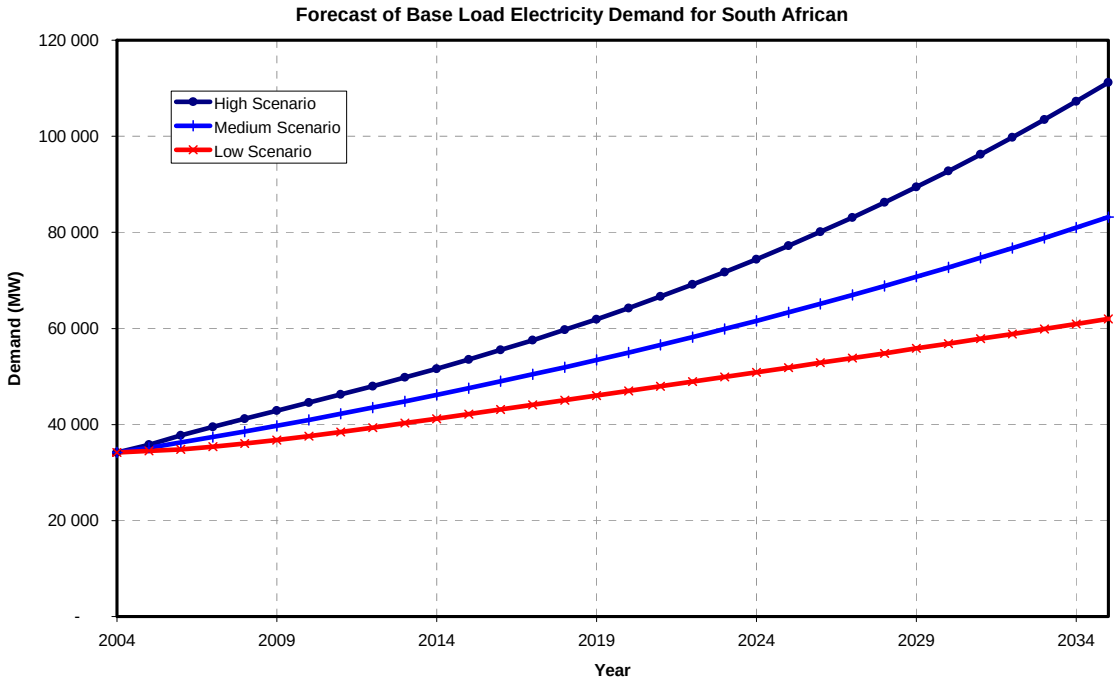
good source for the peaking requirement through much of the year, there is not enough economically feasible generation capacity in the country to serve the base load, since Ruacana does not have enough water for full output during much of the year, and NamPower's thermal stations are very expensive to run.



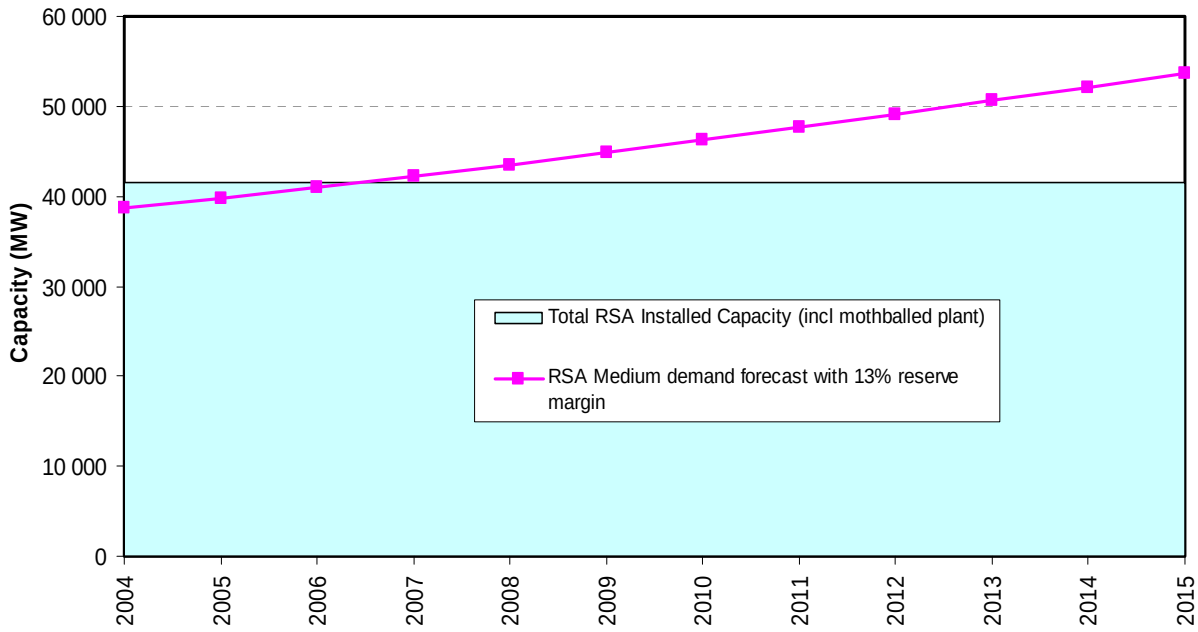
The above figure presents an estimate of energy consumption in Namibia by the various main consumer sectors. It shows that domestic consumption is around one quarter, heavy industry and mining another quarter with the rest made up by commercial and institutional consumption.

b. SA power sales opportunities

i. Power



The above figure shows the South African demand forecast for three scenarios. Currently actual growth in RSA is high, which has exposed serious transmission constraints and exposure to limited generation capacity in the western Cape region. Strong growth is forecast to continue for some time.



The above figure shows a RSA demand forecast vs existing capacity (source: NamPower). In 2006/2007 demand will overtake supply (or encroach on reserve margin). Significant amounts of new generation capacity have to be constructed to supply the forecast demand, and this does represent opportunities also for Namibian IPPs to sell into that market.