

Namibia Power Supply Outlook and Demand Side Management

16 March 2017

Presented to:

AMEU/AEDU



Contents



- Power supply overview,
- Current generations and possible options
- Demand Forecast and Transmission Master Plan Projects
- NamPower security of supply strategy
- Renewable and Energy efficient projects
- SHEW
- Network Operation and Safety
- Conclusion

NamPower overview



- Operational Power Stations: 3
- Power lines: 23,930.42km ranging from 11kV to 400kV (11,553km is HV)
- In 2015/16
 - ✓ electricity imports accounted for 63% versus local generation of 37%
 - ✓ electricity imports 56% Eskom, 14% ZPC, 14% ZESCO, 13% Aggreko & 3% ZESA/EDM
 - ✓ local generation, 97% hydro, 1% thermal, 1% Diesel and 1% Solar
 - ✓ electricity customers: more than 2,792 (Including REDs)
- Net maximum installed capacity: 508.5MW (Incl. PV)
- Maximum recorded demand 614MW / 677MW (in Oct '16 - excl./Incl. SZM)
 - ✓ Nored 85.5MW, Cenored 73.5MW, ErongoRed 132MW, Central (208MW, 160MW of CoW), Sored 46MW
- Employees: 1073

Power supply overview



- The SADC Region is still experiencing power supply deficits. The supply situation in Namibia will remain challenging at least until the commissioning of the base power plant.
- NamPower has managed to find solutions for the period 2015/2016 and no power supply deficit is expected during 2017.
- Due to high economic growth and expiry of our supply contracts with RSA, Zimbabwe & Mozambique, to some extent power supply challenges might be experienced from 2018 onwards, if certain proposed solutions are not approved and commissioned on time.
- Despite the introduction of Kudu (after 2022), without possible CSP with Storage (2019) and Baynes, power supply deficits will further be experienced as from 2027 onwards.
- Higher cost of import contracts and introduction of new power projects will result in electricity tariffs to increase at above CPI rate, after which prices will stabilize, in real terms, after the introduction of Kudu after 2022.

Current Generations and Imports



Generation / Source	MW
Ruacana	347
Van Eck	120
Anixas	22
Paratus	Decommissioned (To be upgraded by 2018)
ZPC, Zimbabwe	80 (31 March 2025)
ZESCO, Zambia	50 (31 Dec 2020)
REFIT Programme	15MW is installed (Karibib, Grootfontein and Osona)
Innosun- Omburu PV, Omburu	4.5
ESKOM, South Africa	150 firm and supplements on a day- ahead requests.

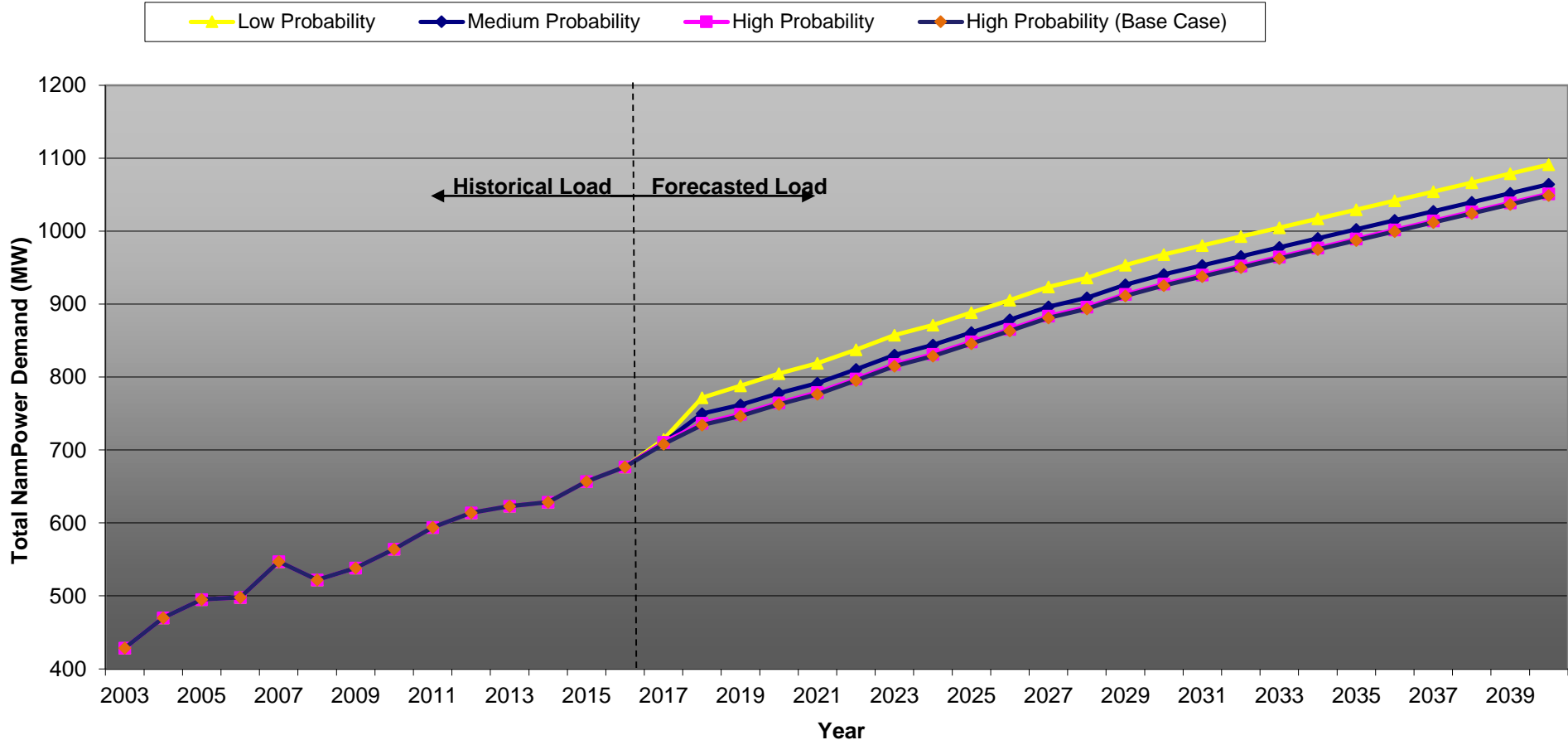
Possible energy solutions for Namibia



To address the supply situation the following generations are the possible options for Namibia or under consideration:

- **Coal** - None
- **Gas** - Kudu Power Station 885MW
- **HFO or Diesel** - Upgrade Paratus PS to 40MW & 120MW Arandis Power
- **Nuclear** - None
- **Renewable energy**
 - ✓ **Wind** - Diaz Wind 44MW
 - ✓ **Solar PV** – Hardap PV 37MW, Greenam 20MW and REFIT (55MW)
 - ✓ **CSP with storage** – 150MW near Arandis
 - ✓ **Biomass** – (5MW – 100MW different sites)
- **Hydro** - Baynes 600MW
- **Imports** - 200MW firm with Eskom 1st April 2017, ZESCO (50MW)

DEMAND FORECAST – CAPACITY PLANNING



HP : Offer accepted and PSA signed.

MP : Formal load application paid by Customer (valid for 12 months).

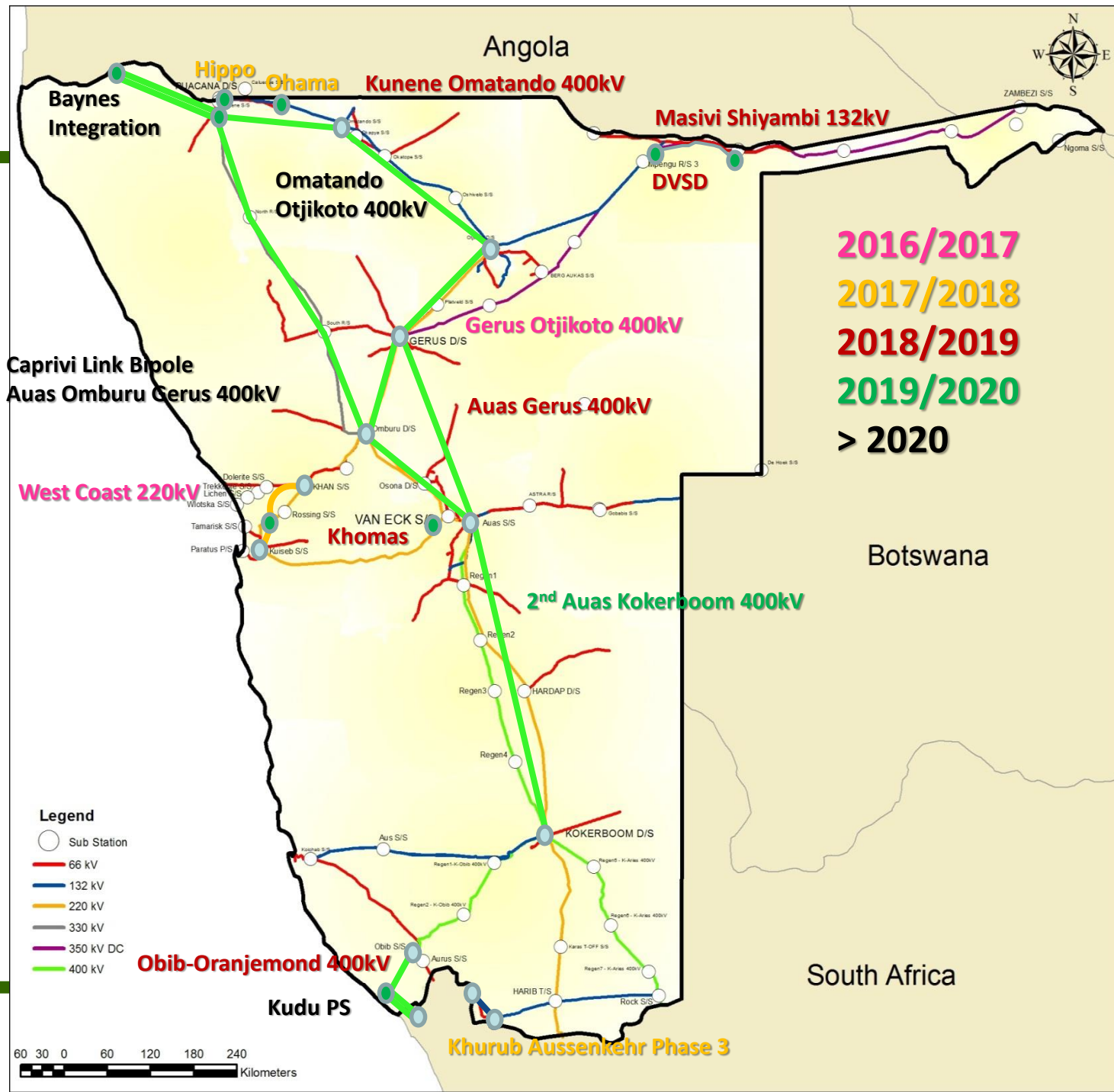
Transmission Projects under Construction



□ More than 14 Approved Tx projects:

- ✓ Hippo 132kV substation and Ruacana 330/132kV
- ✓ Ohama 132/66kV substation (in Kunene Area)
- ✓ Kunene-Omatando 400kV project (in Northern Area)
- ✓ Gerus – Otjikoto 400kV Line
- ✓ West Coast 220kV strengthening
- ✓ Otjikoto 220kV busbar reactor (part of Gerus-Otjikoto 400kV line project)
- ✓ Masivi & Shiyambi 132kV substations, DVSD at Masivi (in Kavango East Area)
- ✓ Khurub-Aussenkehr 132kV Development (in the South – Noordoweer Area)
- ✓ Brakwater 20MVA 66kV Substation (in Windhoek)

Master Plan...Transmission



- 2016/2017
- 2017/2018
- 2018/2019
- 2019/2020
- > 2020

Transmission Projects required



□ Auas – Gerus 400kV Line (by 2019):

- ✓ Strengthen the AC network to Gerus, thereby allowing increased power transfer to / from Gerus substation
- ✓ Increased transfer / wheeling capacity for SAPP utilities and IPPs via the Gerus-Zambezi HVDC link, whether on short notice (day ahead) or through long term agreements
- ✓ Support the Omburu – Van Eck 220kV network during contingencies
- ✓ Improved network stability and network losses

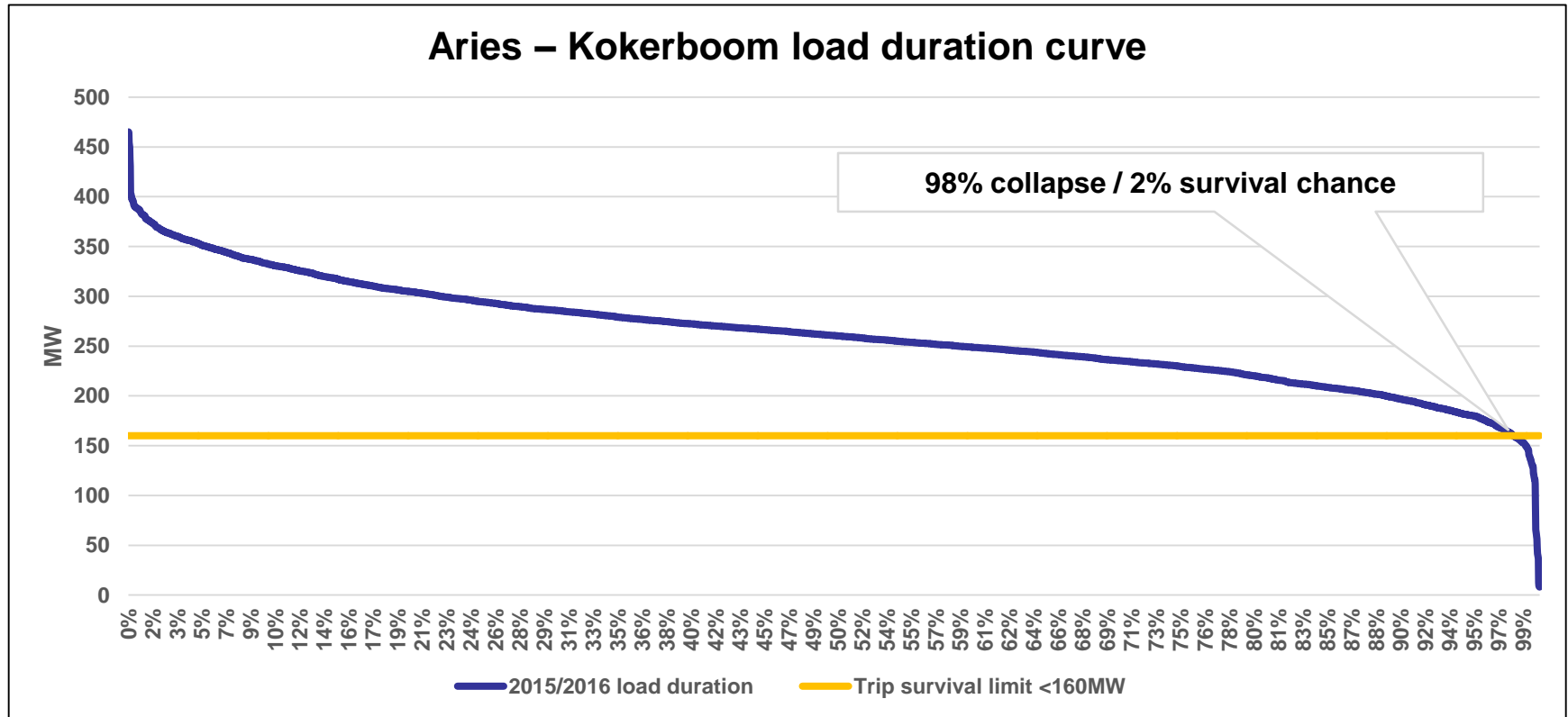
□ 2nd Auas – Kokerboom (by 2020):

- ✓ Improve the reliability and stability of the network during contingencies **(prevent possible BLACKOUTS!)**
- ✓ Facilitate the transfer or wheeling of power through Namibia.

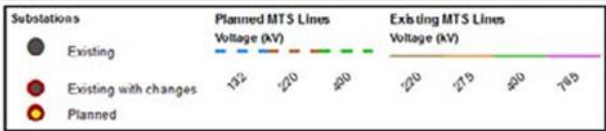
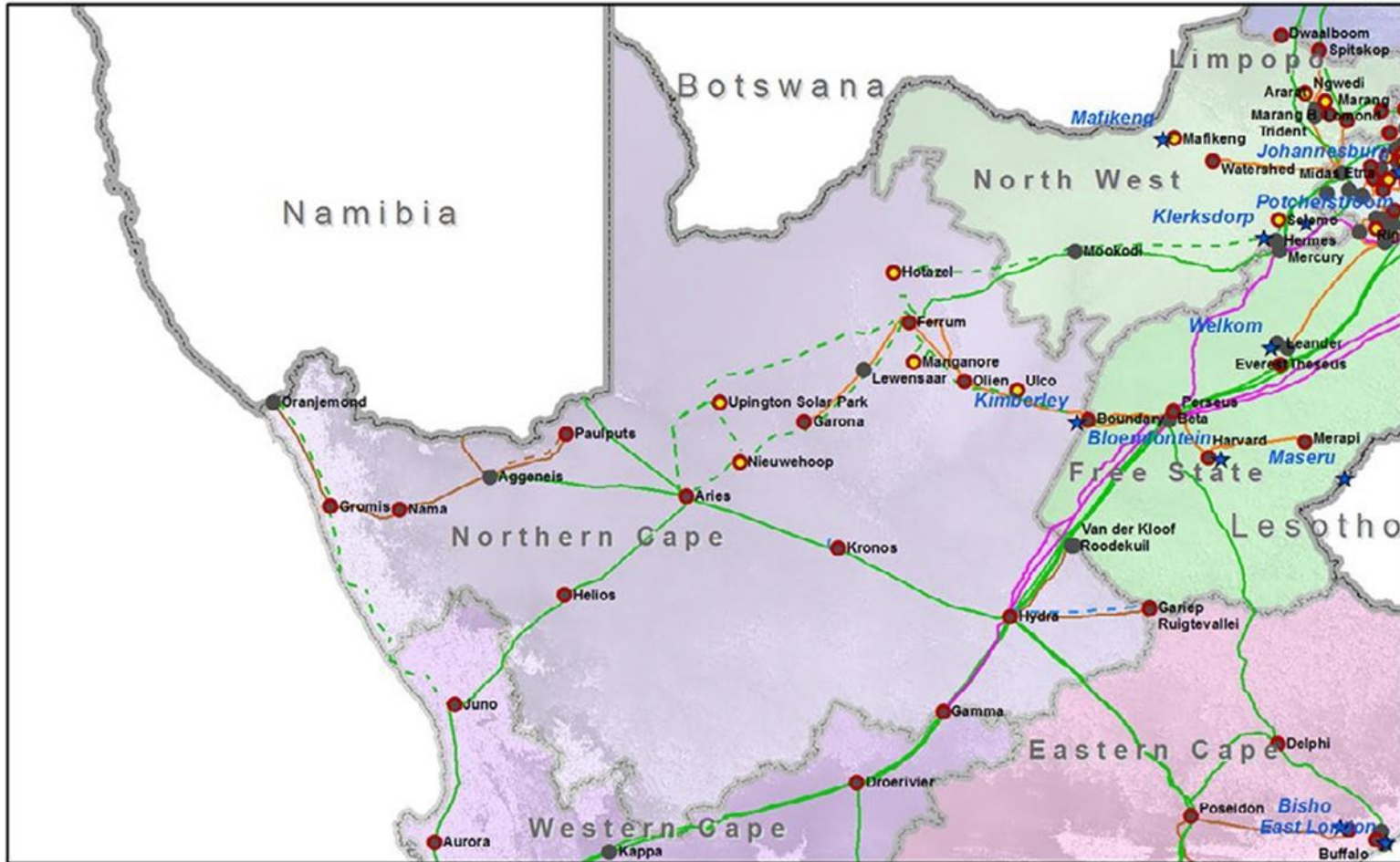
Network South of Auas



Statistical Survival Rate When Tripping 400kV Aries – Kokerboom



Eskom TDP 2016-2025 Northern Cape



TDP 2016-2025 Northern Cape

Created by:
Grid Planning
Transmission
2015/09/01



Security of supply strategy – (1)



NAMPOWER ELECTRICITY SUPPLY STRATEGY:

Develop our own power stations in the country as main source of supply and use imports only to fill gaps

❑ **Challenges associated with more import contracts**

- ✓ Dispatch not in our own hands (possible disconnection as experienced with Eskom)
- ✓ Power supply not reliable due to transmission constraints (in other countries)
- ✓ High cost of imports:
- ✓ High tariffs based on new power plants being commissioned in neighboring countries and PPA's reflecting these investments

❑ **Benefits for the development of our own power stations**

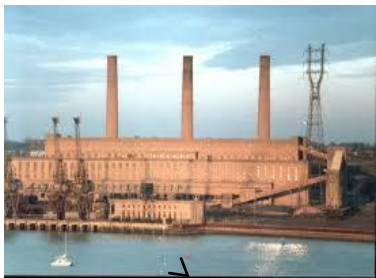
- ✓ Dispatch in our own hands
- ✓ Creation of national assets and stimulation of economic growth
- ✓ Regulated and sustainable tariff levels (in some cases cheaper than imports)
- ✓ Socio-economic benefits (jobs, taxes, etc.)
- ✓ Foreign/ Private sector investment (IPPs) in the power sector
- ✓ Participation of Previously Disadvantaged Namibians [BEE] through partnerships

Security of supply strategy (2)

Ensuring that 100% of the peak demand and at least 75% of the electricity energy demand will be supplied from internal sources by 2020.

Support from all our stakeholders required for the successful implementation of the supply strategy

Refurbishment program



- Van Eck refurbishment
- Ruacana Runner Replacement

New Power Stations



- Kudu Gas Power Station
- CSP Power Station
- Biomass Power Station
- Baynes Hydro Power Station
- Paratus Powe Station

STCS Project



- Renewables
- DSM
- Small to medium size renewables
- IPPs
- PPA (Imports)

Transmission



- Transmission Master Plan
- ZIZABONA
- Kudu Transmission

- ❑ Biomass Power Station (20 MW)
 - ✓ Pre-Feasibility study concluded
 - ✓ Full feasibility study started
 - First power station expected by 2019/2020

- ❑ Concentrated Solar Power (50 - 150MW)
 - ✓ Feasibility study launched together with MME
 - ✓ First power station expected by 2019/2020 – 150MW at the Coast near Arandis.

NAMPOWER RENEWABLE AND ENERGY EFFICIENT PROJECTS



- **Energy Efficient technology implemented as part of the Demand-Side Management Project**
 - ✓ 1million Light Emitting Diode Campaign (1mLED) (Sept 2016 – June 2017)
 - ✓ Estimated to reduce 30MW and 43.8GWh in energy saving, at 4hrs/day
 - ✓ Currently only 29.5% installed i.e. 206 108 LED bulbs
 - ✓ 36 Towns completed and 7 towns remaining.
 - ✓ Only 0.641MW overall savings reached i.e. 172.02MWh.
 - ✓ 46% of household uses CFL, 42% incandescent, 12% LED, hence will not achieve the 1million LED target.
 - ✓ 20 000 Solar Water Heater Campaign (20kSWH) (Ongoing)
- **37MW Solar PV tender**
 - ✓ Awarded to Altern Energy Consortium, and PPA at 80,7 N\$/KWh.
- **Less than 5 MW renewable projects**
 - ✓ NamPower and ECB agreed standard PPA and TCA
 - ✓ Selection based on price

❑ < 500 kVA

- ✓ Small Solar PV (roof tops) connected to grid in accordance to net-metering rules/guidelines – which is now in effect.

❑ >500kW and < 5MW

- ✓ REFIT tariffs proposed – under development by ECB
- ✓ Both NamPower and ECB are conducting studies to see how much of such PV can be integrated on the National Grid.
- ✓ 14 IPPs (each 5MW). 3 plants commissioned, while others by November 2017.

❑ >5MW

- ✓ Transparent and open tender process
- ✓ Initiated by steering committee consisting of MME, ECB and NP

□ Environmental Management Act 2007 (Act 7 of 2007)

- ✓ To promote the sustainable management of the environment and the use of natural resources by establishing principles for decision making on matters affecting the environment;

□ SHEW Policy:

- ✓ Drafted by SHEW section and policies are approved by the Exco & the Board
- ✓ It is applicable to all NamPower employees, contract workers, visitors and service providers such as contractors, consultants.
- ✓ This document has a full list of all relevant policies and procedures for SHEW.
 - **Contractor management procedure**, Fitness to work during pregnancy and breastfeeding, **PPE Policy**, Emergency Action Plan, Occupational Disease Policy, Health Policy, **Environmental Policy**, Waste management Policy, Injury on Duty Procedure, **Incident/Accident investigation procedure**, **Motor accident procedure etc.,...**

Safety, Health, Environment and Wellness Continues.....



□ Environmental Management Plan:

- ✓ To provide regulations, regarding the environment, to any contractor whom NamPower appoints for any construction activity (this includes outside contractors as well as NamPower's own construction people).
- ✓ Address social and natural environment issues – Technical specs are dealt separately in contract.
- ✓ Becomes part the contract and contractor must adhere to the EMP – Project manager insures compliance.

❑ **ORHVS of 2008:**

- ✓ Is an extension of the NESC, and read in conjunction with NESC, Electricity Act, 2007 (Act no. 4 of 2007) and Labour Act 1992 (Act no. 6 of 1992).
- ✓ All operating rules are based as stipulated in the ORHVS book (System controllers, Operators, Authorized persons, working in substations, commissioning, and daily operations etc.,).
- ✓ Currently, the ORHVS has been revised and amendment to be adopted in the NESC by NSI.

❑ **Copper theft:**

- ✓ Increase of copper theft in 2016 to date
- ✓ When detected, the substation/load is switched off until when rectified.

Conclusion: We need to work together as a team

- Policy and legislation
- NIRP development
- GRN strategic support

- Regulation and licensing
- Ensure level playing field
- Protection of investors and consumers
- Ensure cost reflective tariffs

Government

ECB

**Ensure security
of supply**

NamPower

**Private
sector**

- Supplier of last resort
- Operate & maintain plants efficiently
- Finalise IPP power purchase agreements
- Expand generation & transmission network

- Initiate & invest in new capacity based on NIRP
- Contribute to energy conservation
- Technological innovation for affordable and quality products and services
- Must be prepared to take risks

Thank you