



# Generation Expansion Planning and Renewable Energy Integration initiatives in Namibia

Maxwell Muyambo

Manager: Technical Regulation

Electricity Control Board (ECB)

Namibia



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# Background

- \* Namibia is endowed with abundant renewable energy resources: solar, biomass and wind.
- \* Namibian Energy Demand far exceeds Supply
- \* There is Urgent need to commercially exploit the RE resources for energy generation
- \* Both public and private sectors have a role to play.
- \* The biggest challenge is lack of capacity by the market to manage multiple risks
- \* Access to Electricity is no longer a luxury but an imperative for development



# Background: Namibia's Generation Statistics

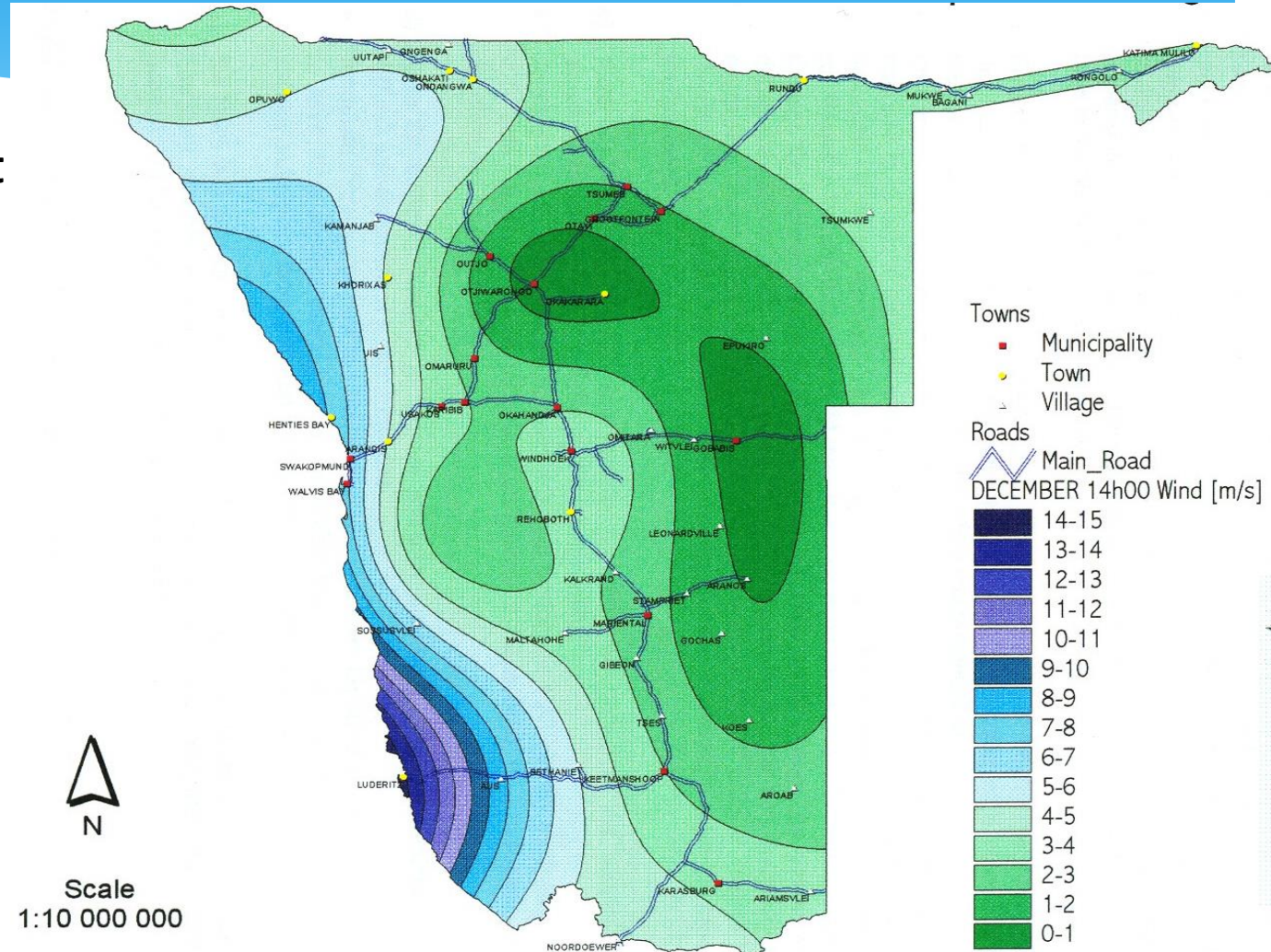
<b>Power Station/ Imports</b>	<b>kWh</b>	<b>% Generation</b>
Ruacana	1,130,052	32.7%
Van Eck	33,344	1.0%
Paratus	4,849	0.1%
<b>Total</b>	<b>1,436,502</b>	<b>41.5%</b>
Eskom	702,472	20.3%
Zesco	317,921	9.2%
Zesa	1,002,000	29.0%
<b>Total</b>	<b>2,022,392</b>	<b>58.5%</b>

<b>Power Station</b>	<b>Installed Capacity (MW)</b>
Ruacana	249
Van Eck	120
Paratus	24
Anixas	23
<b>Total</b>	<b>416</b>
<b>Maximum Demand</b>	<b>600</b>

# Background: Wind Energy Potential

Av December at 14:00, 2m AGL

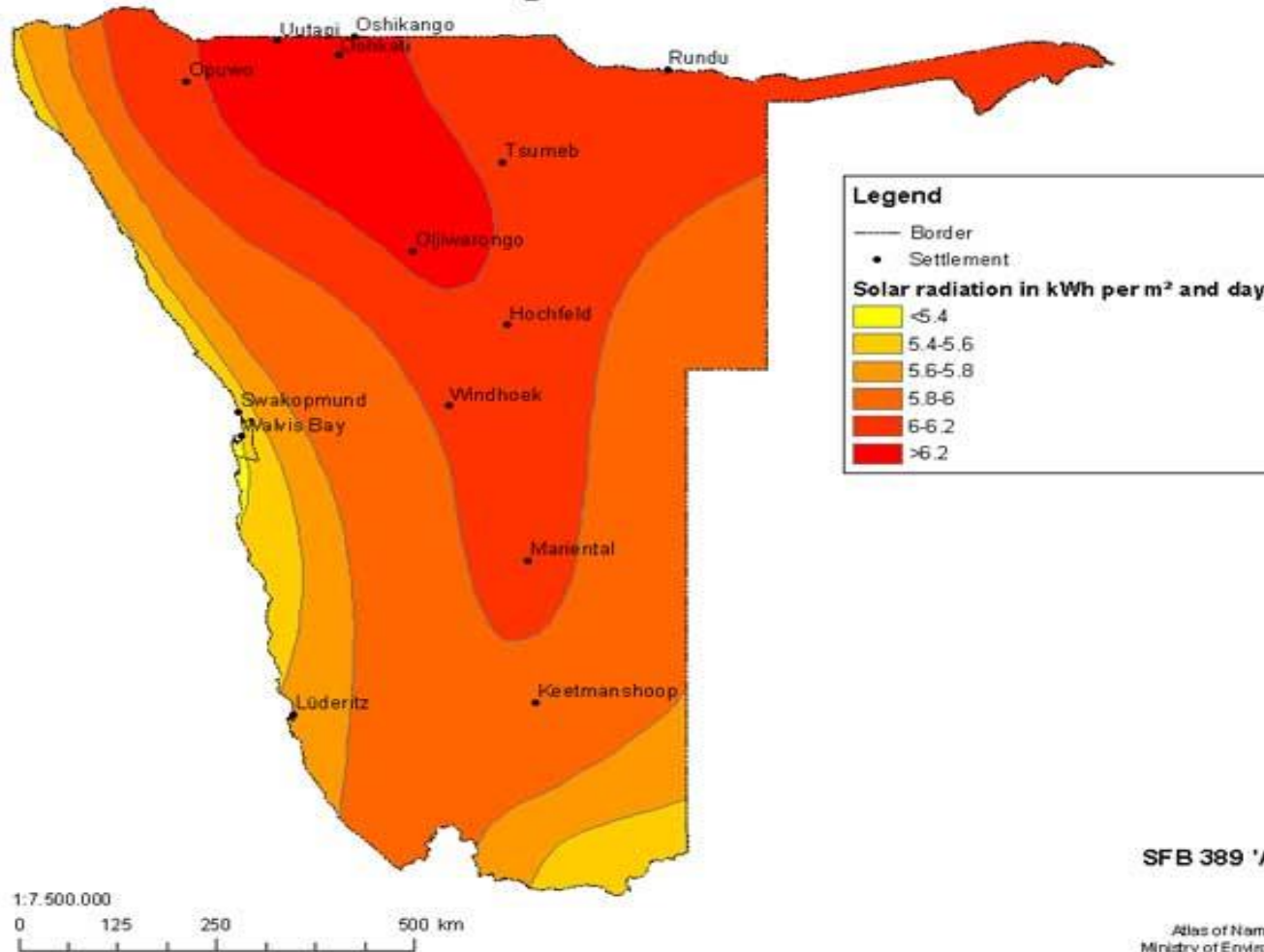
Wind Electricity potential > Current grid capacity



N  
Scale  
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# Background: Solar Radiation In Namibia

Average values of solar radiation in Namibia



Map produced by  
SFB 389 'ACACIA', subproject E1  
University of Cologne

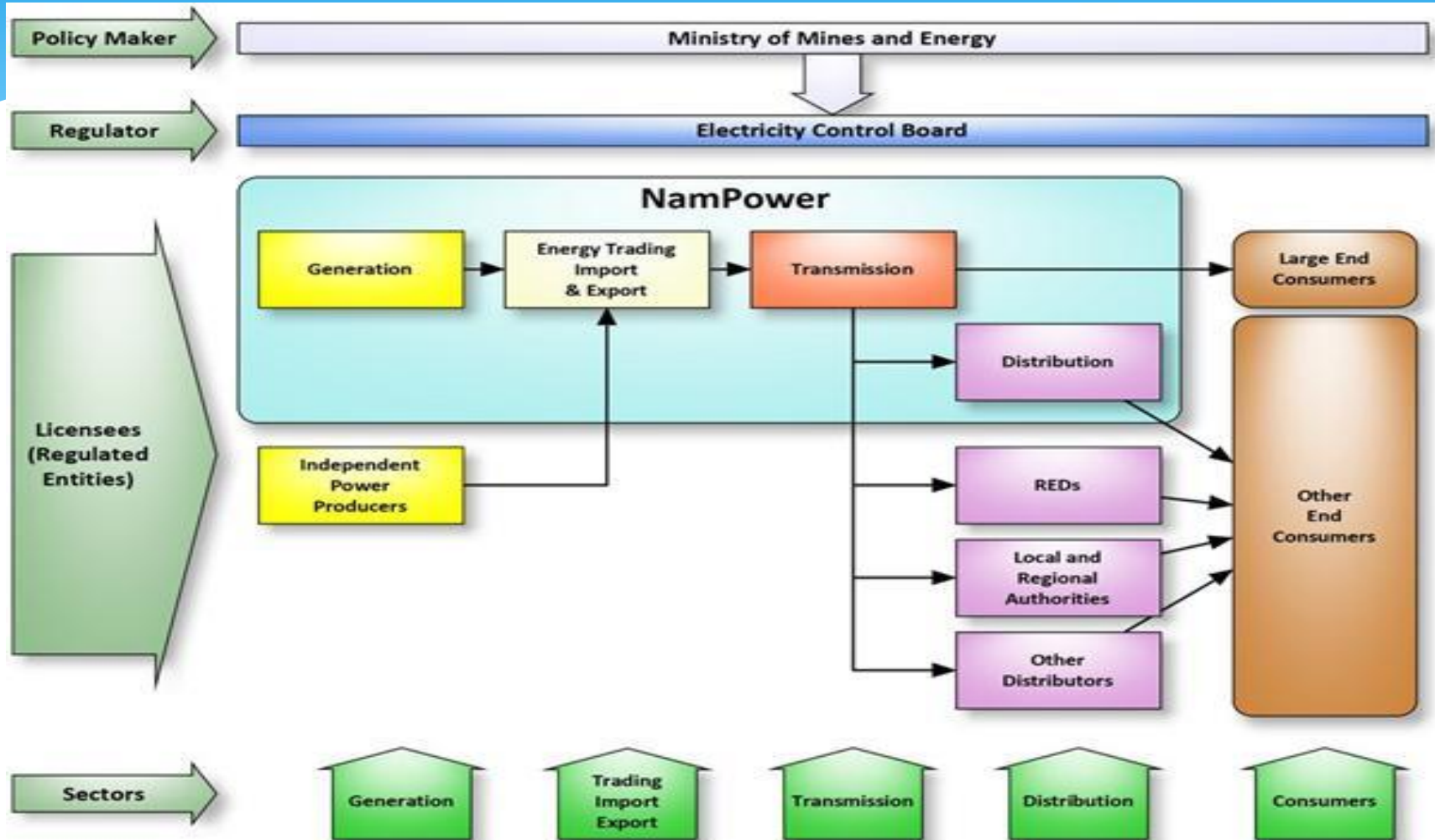


Data source:  
Atlas of Namibia Project, 2002, Directorate of Environmental Affairs,  
Ministry of Environment and Tourism. <http://www.dea.met.gov.na> (2003)

# Institutional Framework

- \* Ministry of Mines and Energy (MME)
  - \* Policy Maker
- \* Electricity Control Board (ECB)
  - \* Policy Implementer
- \* Electricity Licensees
  - \* Service Providers

# Namibia's Electricity Supply Industry





# Regulatory Regime: ECB's Mandate

- \* The ECB is on the verge of expanding its regulatory scope from electricity to energy.
- \* Its legal mandate is derived from the Electricity Act (Act 4 of 2007) and envisages:
  - \* Exercising control over and regulating the provision, use and consumption of electricity in Namibia;
  - \* Overseeing the efficient functioning and development of the electricity industry and security of electricity provision;
  - \* Ensuring a competitive environment in the electricity industry in Namibia
  - \* Promoting private sector investment in the electricity industry

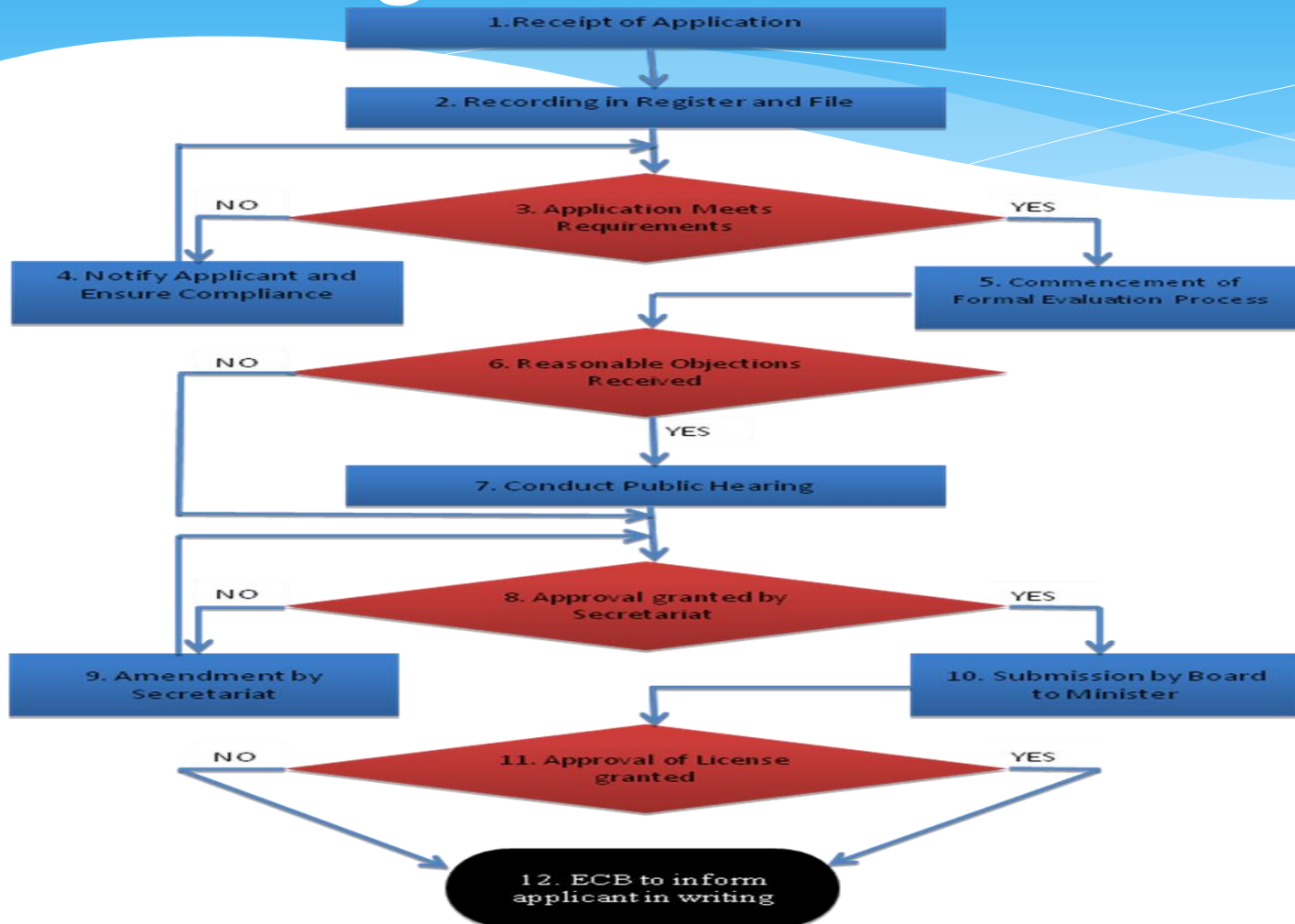
# Regulatory Regime: ECB's Main Regulatory Functions

- \* Economic functions : **Tariff setting (\$)**
- \* Technical functions : **Standards setting**
- \* Licensing: **Issuing and amending**
- \* Monitoring above for compliance
- \* *Mediation : in cases involving licensees and their customers/prospective customers*
- \* Creating level playing field for industry participants (Utilities, IPPs and Investors)

# Regulatory Regime: Policy on Tariffs

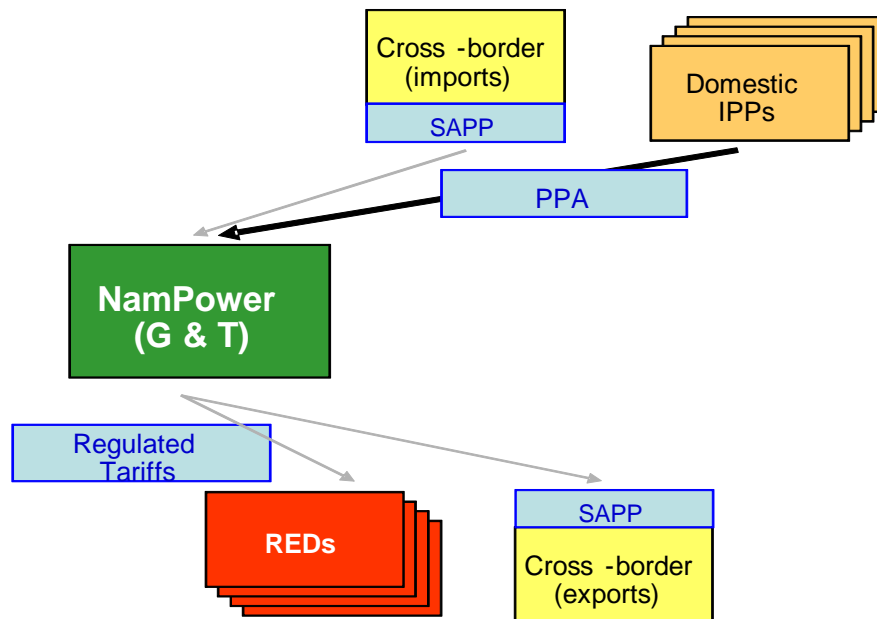
- \* The ECB is responsible for tariff setting and approval in consultation with relevant key stakeholders including Gvt
- \* Government Policy prescribes that tariffs should be:
  - \* Be cost reflective
  - \* Be Based on sound economic principles
  - \* Create a level playing field for all ESI participants
  - \* Reflect long Run Marginal Cost
- \* Generation Tariff (Cost Plus) Methodology Developed
- \* Cabinet decided that bulk tariffs should be cost reflective in 2011/2012.
  - \* Above was achieved

# Regulatory Regime: Licensing Procedures



# Old Market Model: Classic Single Buyer

*IPPs introduced and NamPower acts as exclusive (monopoly) Single Buyer*



## Advantages

- Allows IPP entry (private investment)
- Relatively small structural, transactional and cultural changes
- Clear roles and responsibilities
- Simplified backup and balancing arrangements - NamPower retains responsibility as "supplier of last resort"

## Disadvantages

- Conflict of interest for utility
- Centralised Planning and decision -making
- Only one buyer of IPP power resulting in limited contracting options and choices (e.g. currency & commodity risks, size, etc.)
- All funding requirements and contractual commitments will fall in NamPower - creating bottlenecks

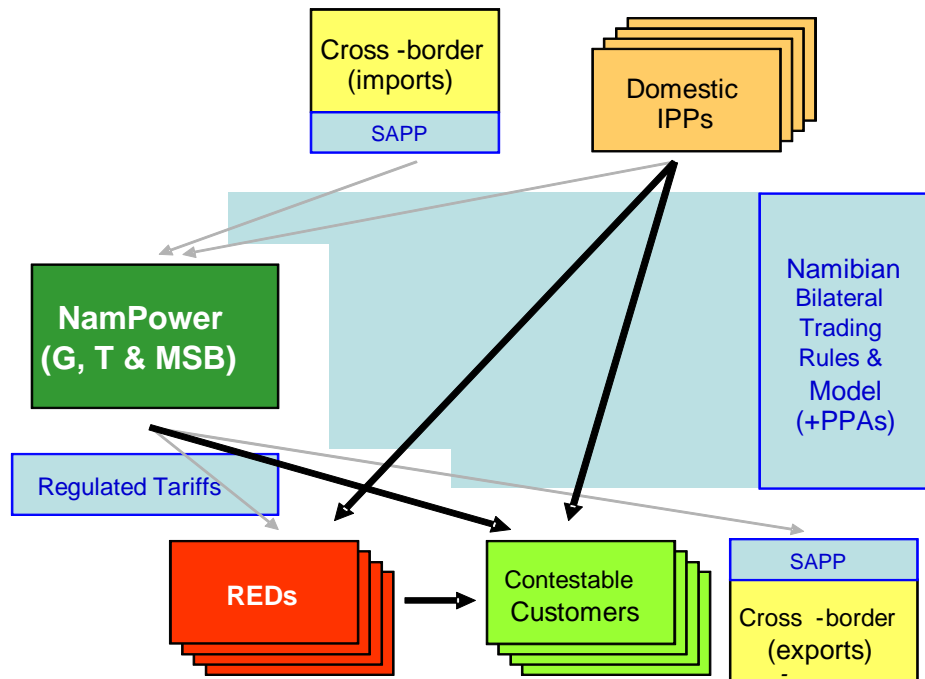
## Risks

- No/limited market entry by IPPs
- Alternatively, excessive PPA contracting may result in stranded investments
- Contingent liabilities on Government - full PPA off-take by the Single Buyer
- Sub-optimal outcomes (contracting, price and dispatch)

# New Market Model: Modified Single Buyer - no IPP exports

*(non-exclusive central purchasing)*

**NamPower acts as non-exclusive Single Buyer for domestic trade - IPPs can sell to NamPower, REDs and Contestable Customers. NamPower retains exclusive rights to cross-border trade.**



## Advantages

- Reduces need for "independence" of SB
- IPP and Single Buyer risks diversified
- More buyers mean more contractual options and choices
- Improved ability to attract private capital
- No changes in NamPower structure

## Disadvantages

- More complex structural, transactional changes necessary
- Transmission access and pricing
- More sophisticated backup and balancing arrangements
- More complex dispatch, settlement & planning

## Risks

- Volume risk vests primarily with NamPower (but reduced by bilaterals)
- Capacity expansion (IPP investment) risk shared by SB & bilateral counterparties
- Fear of allowing IPPs and bilaterals

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# Expansion Planning

- \* Availability of resources should be accompanied by robust exploitation plans and capacity
- \* Namibia recently completed development of its NIRP
- \* The Ministry of Mines and Energy is the custodian of the Plan
- \* The ECB was requested to spearhead and lead the plan development.
- \* Funded by MME and World Bank
- \* Hatch (Canada) was the Consultant



# NIRP:

# Development Events

## Meetings

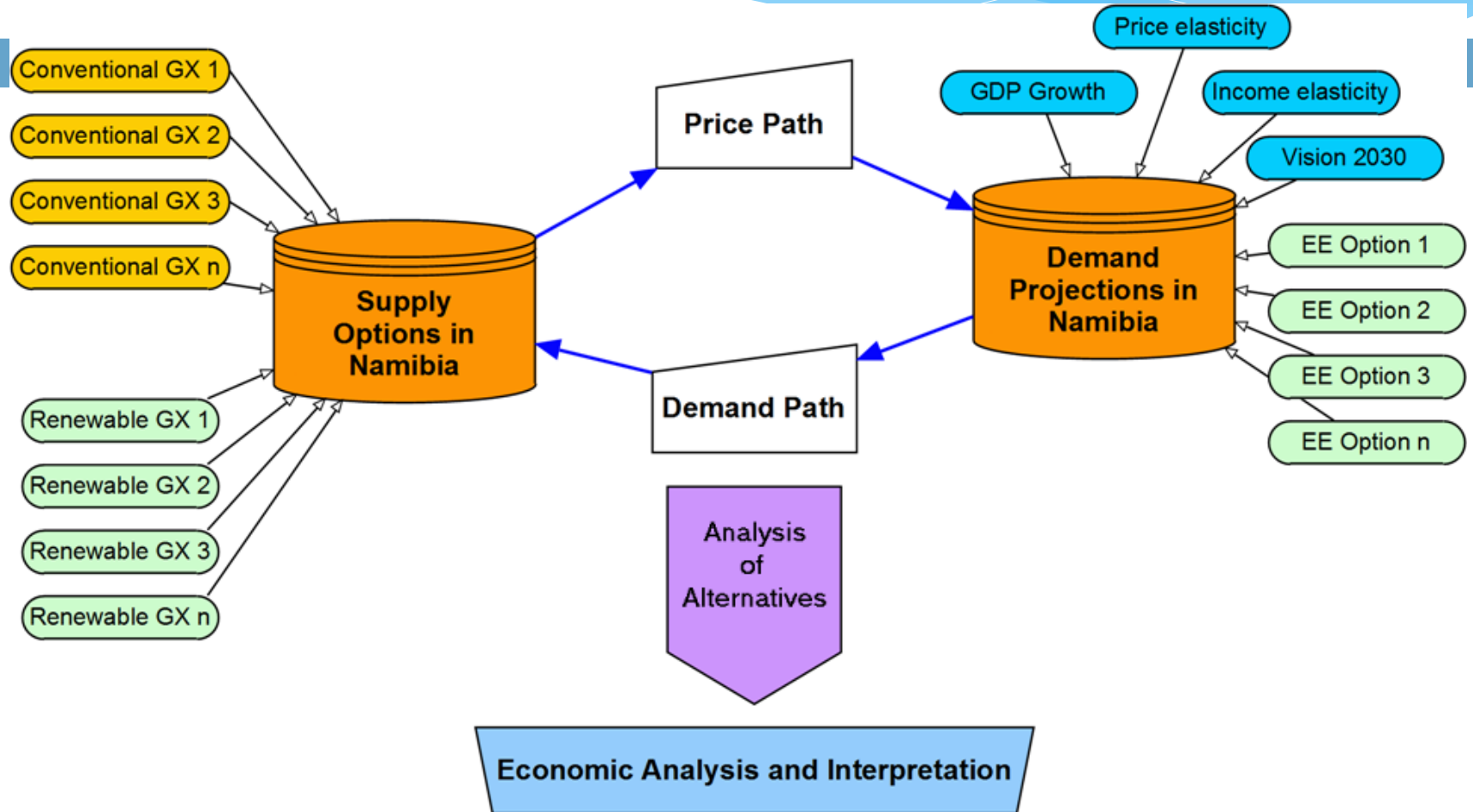
- Start of project July 1, 2011
- Initial Stakeholder Meeting July 27, 2011
- SC Meeting No. 1 September 23, 2011
- SC Meeting No. 2 January 26, 2012
- Stakeholder Workshop on the Load Forecast February 22, 2012
- SC Meeting No. 3 & Stakeholder Workshop May 10, 2012
- SC Meeting No. 4 & Stakeholder Workshop October 24, 2012
- Task 5 Planning February 2013
- **SC Meeting No. 5 & Stakeholder Workshop early April**



# NIRP Development Phases

- \* Development of Economic and Cost Assumptions
- \* Development of a Demand Forecast
- \* Definition and Evaluation of Generation Options, Import Sources and Demand Management Options
- \* Development and Analysis of Policy Implementation Scenarios
- \* Conclusions and Documentation of the Outcome and Results

# Simplified NIRP Process



# NIRP:

## Policy Objectives

### Policy Objectives

- In order to reduce the risk of supply insecurity, the Gvt had initially set targets entailing that by 2010, Namibia should have been able to:
  - meet 100% of the system peak demand with internal resources
  - supply 75% of annual energy demand from local sources
- Supply based on a balance of economically efficient and sustainable sources
- Promoting private investment in the electricity sector
- Establishment of high voltage interconnections to neighbouring countries to increase regional electricity trading capabilities
- Ensuring environmental and socio-economic sustainability
- Electricity prices to be based on sound economic principles and reflect the long run marginal cost of supply

# NIRP:

## Planning Parameters and Criteria

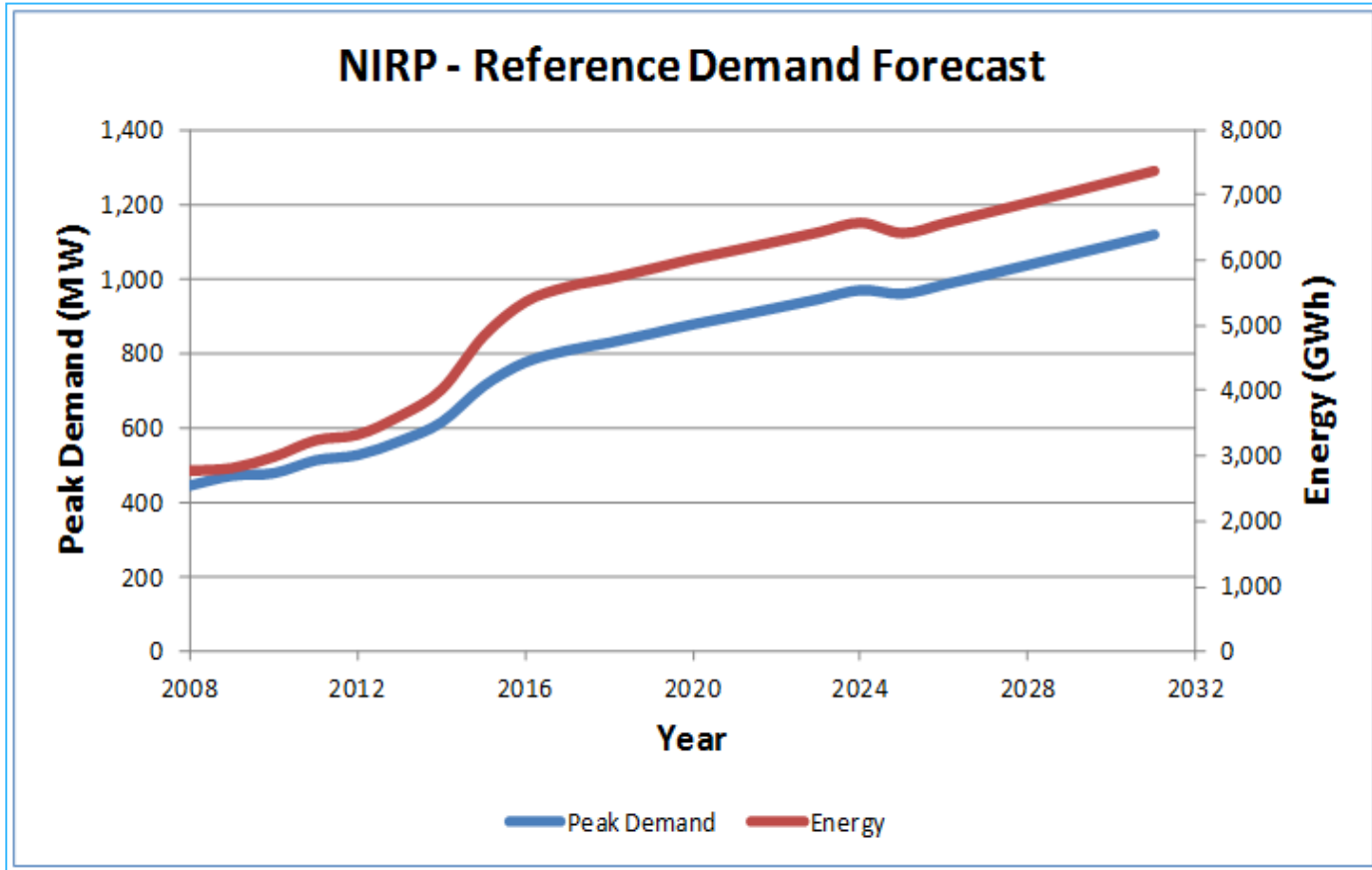
### General and Generation System

1. Planning horizon: 2012 – 2031
2. Cost and present worth base -- January 2012
3. No escalation for economic analysis
4. Currency: Namibia dollar (N\$) 1 US\$ = 7.5 N\$ (then)
5. Base discount rate: 10%; alternative cases, 8% and 12%
6. Cost of unserved energy: N\$20/kWh
7. Duties and taxes are not included in economic study
8. Reliability criteria: LOLP (5 Days/Year from 2012 to 2020, 2 Days/Year for the remaining years)
9. Emissions offset allowance: N\$40/Tonne

# NIRP:

# Demand Forecast

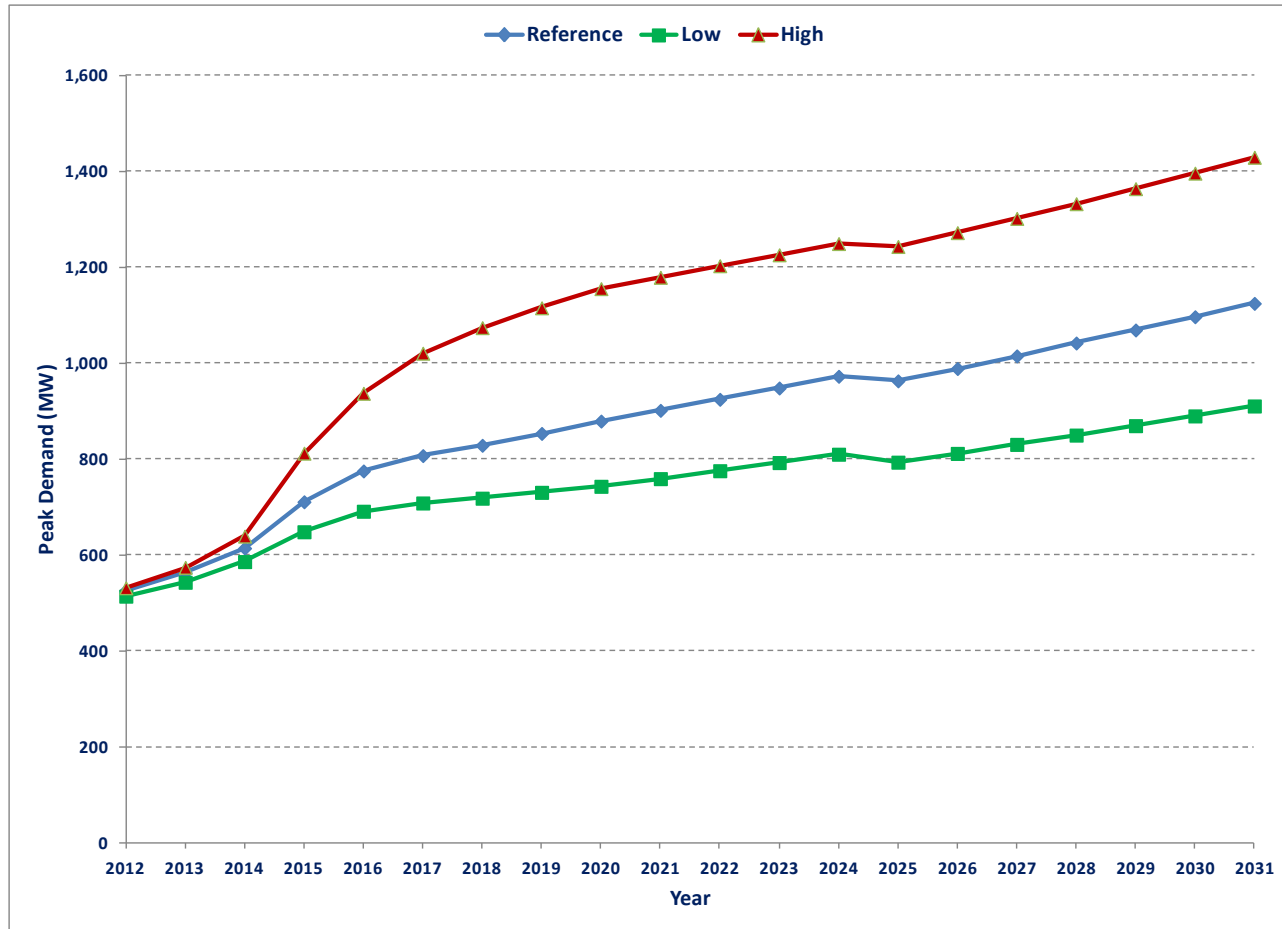
Reference Demand Forecast



# NIRP:

# Demand Forecast

## Peak Load Forecast



## Common Addition and Retirement Schedules - Revised

- 1) Paratus: To be retired in January 2017
- 2) Van Eck: Refurbishment (81 MW) by January 2015, to be retired in January 2025
- 3) Ruacana: To be Upgraded (additional 11 MW) by February 2014
- 4) Solar PV: 10 MW in January 2014; 10 MW in August 2014 plus 30 MW in January 2015 from Gvt tender, making a total of 50 MW
- 5) Wind: 44 MW in November 2014
- 6) Zimbabwe Imports: 150 MW Contract expires in October 2014
- 7) Zambia Imports: 50 MW Contract expires at the end of 2020
- 8) Expiration of the current SPSA with ESKOM (up to 450 MW) in January 2016 and start of a new SPSA (up to 550 MW) from that date.







# RE Status:

## Current RE Procurement Mechanism

- ❖ Set clear policy guidelines on procurement of non conventional /renewable energy sources based primarily on capacity and technology.
- ❖ Laid the foundation for migrating from the cumbersome unsolicited bidding approach to competitive bidding for relatively large capacities.
- ❖ As an example, the threshold for Solar PV is 0.5 MW. For capacities equal to and above 0.5 MW, competitive bidding is recommended while REFIT is recommended for capacities below 0.5 MW.
- ❖ The Regulator issues conditional licenses as a way of encouraging investment

# RE Status:

## Conditional RE Licences Issued to Date

<b>Licensee</b>	<b>Type</b>	<b>Size</b>	<b>Date Issued</b>	<b>Validity period (yrs)</b>
Diaz Wind Power (Pty) Ltd	Wind	44 MW	1-Apr-07	22
Electrawinds (Pty) Ltd	Wind	50 MW	1-Nov-09	20
Innowind (Pty) Ltd	Wind	60 MW	1-Mar-10	20
GreeNam	Solar	30 MW	1-Jun – 11	20
CBEND (Bush Energy Namibia)	Biomass	250 kW	1-May-10	5

# IPP Licences Issued to Date

Licensee	Type	Size	Date Issued	Validity period (yrs)
CBEND (Bush Energy Namibia)	Biomass	250 kW	1-May-10	5
Vizion Energy Resources (Pty) Ltd	Coal (CFB)	300 MW	4-Apr-08	25
Namibia International Mining Company (NIMC)	Diesel CCGT	210 (68) MW	1-Jun-07	20
VTB Capital	Small Hydro	30 MW	15-Jul-07	20
Atlantic Coast Energy Company (Pty)	Coal (pulverized)	700MW	1-Nov-07	25
Diaz Wind Power (Pty) Ltd	Wind	44 MW	1-Apr-07	22
Electrawinds (Pty) Ltd	Wind	50 MW	1-Nov-09	20
Innowind (Pty) Ltd	Wind	60 MW	1-Mar-10	20
GreeNam	Solar	30 MW	1-Jun – 11	20
Total		1254MW		

# RE Status: New Solar Licence Applications Received

#	Name of the company	Power station site	Capacity	First Engagement	Application Submitted
1	EcoNam Energy Namibia	Rehoboth	20MW	16 April 2010	6 June 11
2	Innowind Energy Namibia	Walvis Bay	4MW	22 Sept 2010	6 June 11
3	Namibia Solar World	Farm Quinta 976 Gobabis district	40MW	10 May 2011	27 Sept 11
4	Momentous Energy Namibia	Keetmanshoop	20MW	Nov 2010	10 June 11
5	Evofield Energy Holdings	Farm Safier 62 Karibib district	20-240MW	Unknown	7 Nov 2011
6	Africa Energy Corporation	Farm 37 Walvis Bay	500MW	9 Aug 2011	10 Aug 11
7	Verasco & Tama Consortium	Khorixas	22MW CSP	4 Aug 2011	31 Oct 2011
8	NamEnergy Solar	Arandis	30MW	Unknown	7 Nov 11
9	Uprise Investment	Keetmanshoop	10MW	Unknown	11 Jan 2012

# RE Status: Instruments Supporting IPPs

- \* RE Procurement Mechanisms
- \* NIRP
- \* IPP and Investment Market Framework

# RE Procurement Mechanism Project

- Project aim was to develop a RE procurement mechanism for Namibia
- \* Outcomes
  - \* REFIT for landfill, small hydro, small wind and biomass (less than 5MW)
  - \* Tendering for large wind power plants and CSP facilities
  - \* Net metering for PV
  - \* Supporting measures like soft loans, tax incentives, etc.
- \* ECB Board Approval done
- \* Implementation Phase
- \* Implementation Project Steering Committee (PSC) was established
- \* Will drive tendering process

# RE Status:

## IPP and Investment Market Framework

- \* Study commissioned to find ways of attracting IPPs
- \* Aimed at Creating a conducive environment for IPPs
- \* Completed in 2008
- \* On ECB Website
- \* Discussions on Market model and rules with NP started after conclusion of this project



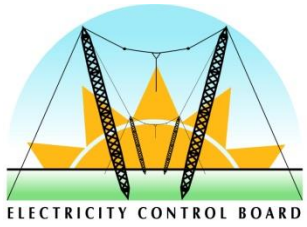
# Challenges

- \* Stakeholder buy in for the NIRP implementation
- \* Maintenance of cost reflectivity to attract private sector participation
- \* Lack of RE Uptake Support Mechanisms
  - \* Absence of specific RE policy
    - \* RE included in White Paper on Energy Policy
  - \* Lack of enabling RE Framework
  - \* Refined Procurement mechanism
- \* Introduction of special instruments to ensure a greater share of RET in the electricity supply (like quotas, REFIT and others).

# Conclusion

- There is urgent need for exploiting Namibia generation resources including RE resources
- \* Robust planning is essential for security of supply
- \* Namibian NIRP is a crucial planning tool for the Namibian ESI.
- \* RE Uptake is also essential through:
  - \* Specific RE policy to attract RE investment
  - \* Robust RE Framework
  - \* Subsidies to support RE uptake to mitigate tariff impact
- \* Need for private sector participation for the NIRP implementation





The End  
Thank You