Welcome to WindTalks Namibia

Monday, November 7
Windhoek, Namibia

WindTalks
NAMIBIA

Welcome – Agenda for Introductory Session

WindTalks NAMIBIA

Master of Ceremonies:

Mr. Donovan Weimers,
Director, Institutional Development and Fundraising,
Polytechnic of Namibia

08:30 Welcome

Dr. Tjama Tjivikua, Rector, Polytechnic of Namibia

Mr. Hans Vestergaard, Senior Vice President of Vestas Sales

08:45 The UNDP Dialogue Development Forum™ Series

Mr. Neil Boyer, Deputy President Representative, UNDP

08:55 Discussion – Agenda Review and Expectations

Mr. Kudakwashe Ndhlukula, Coordinator at REEEI, Polytechnic of Namibia

09:00 Official Opening Remarks

Hon. Isak Katali, Minister of Mines & Energy

09:15 Why wind energy in Namibia?

Mr. Hans Vestergaard, Senior Vice President of Vestas Sales

09:30 Coffee break

09:45 Case Study - Lake Turkana Wind Power Project

Mr. Carlo van Wageningen, Chairman of Lake Turkana Wind Power

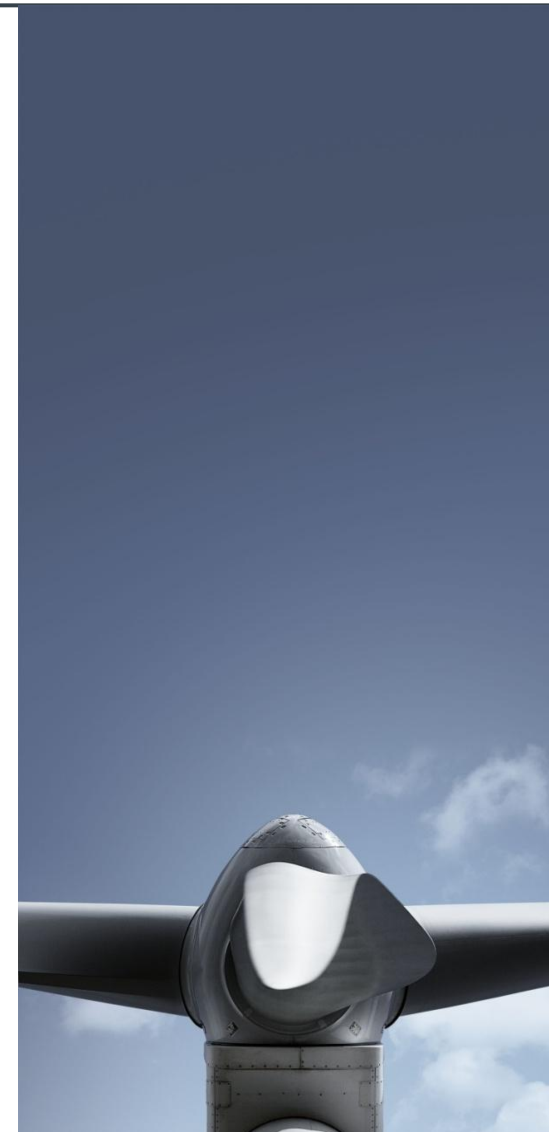
Welcome

Dr. Tjama Tjivikua,

Rector, Polytechnic of Namibia

TECHNOLOGY AND DEVELOPMENT

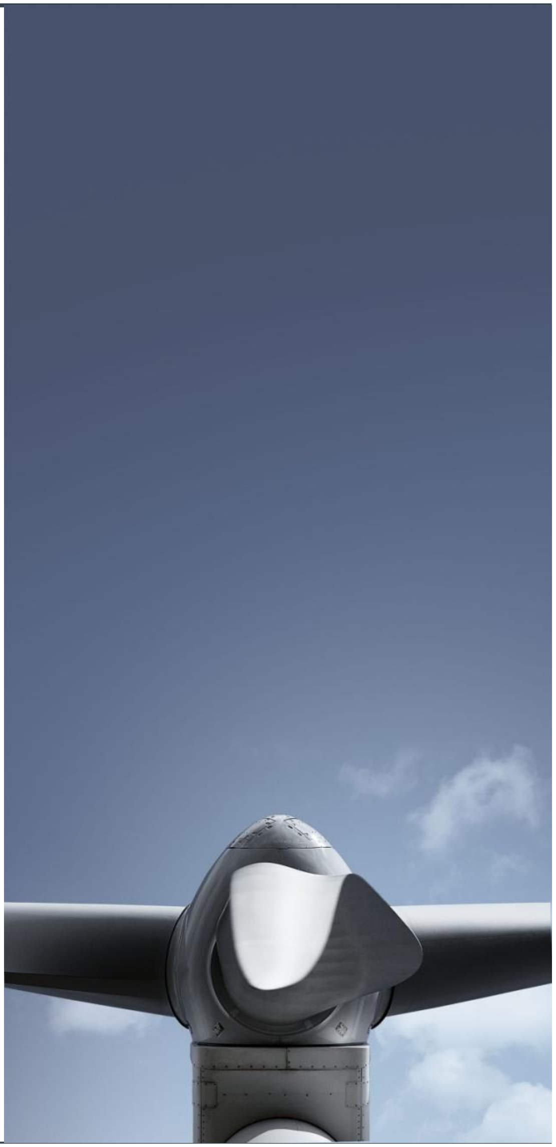
POLYTECHNIC OF NAMIBIA



Welcome

Mr. Hans Vestergaard,

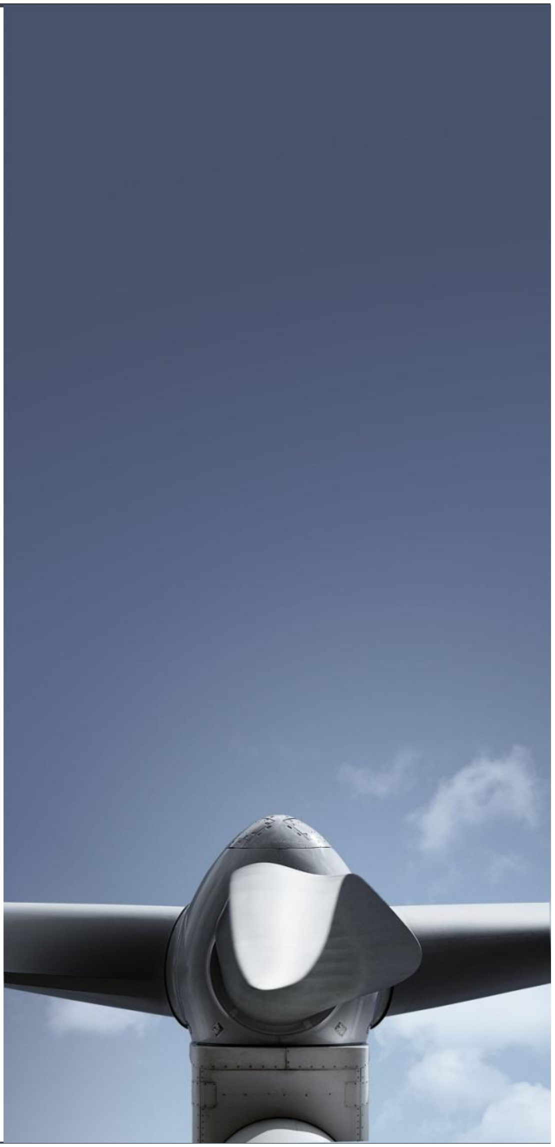
Senior Vice President of Sales for Vestas Central Europe



Mr. Neil Boyer,

Deputy President Representative, UNDP

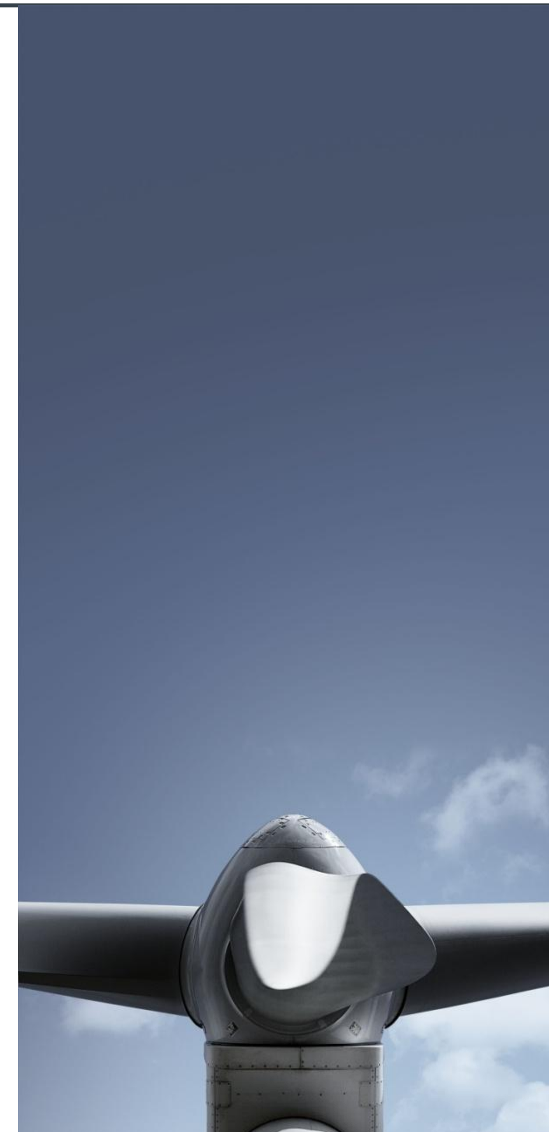
Empowered lives.
Resilient nations.



Discussion – Agenda Review and Expectations

Mr. Kudakwashe Ndhlukula,

Coordinator at REEEI, Polytechnic of Namibia



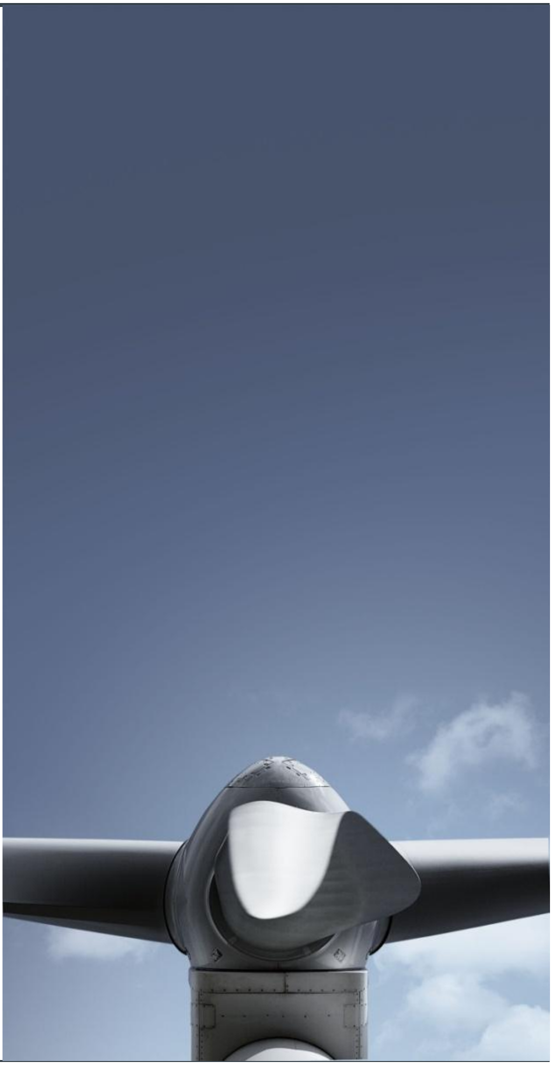
Session 1:
Political/Regulatory Framework for Wind Energy

10:15
Regulatory status and roadmap for wind energy in Namibia
Mr. Rojas Manyame,
GM Technical Regulation, ECB

10:45
Lessons learnt from other countries
Mr. Malte Meyer,
Director of Vestas Government Relations

11.15
Discussion – Political next steps
Mr. Kudakwashe Ndhlukula,
Coordinator at REEEI, Polytechnic of Namibia

11:45 **Coffee Break**



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Session 2:
Grid integration of wind energy

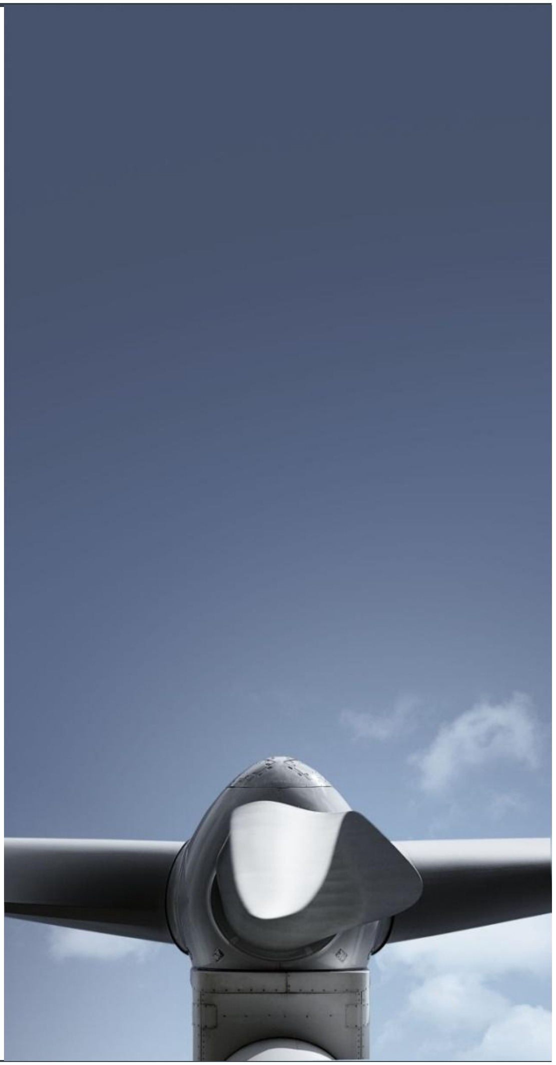
12:00
Grid situation in Namibia
Mr. Paulinus Shilamba, Managing Director of NamPower

12:15
International best practices
Mr. Erik K. Soerensen, Director, Grid Expert at Vestas

12:45
Wind integration in Namibia
Mr. Erik K. Soerensen, Grid Expert at Vestas

13:15
Discussion – Grid Integration next steps
Mr. Kudakwashe Ndhlukula,
Coordinator at REEEI, Polytechnic of Namibia

13:30 **Lunch**



Session 3:
Finding a feasible financial model

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14:00

Project economics in Namibia

Mr. Phylip Leferink, Vice President of Sales, Vestas

14:30

Overview of financing instruments to improve bankability

Mr. Stuart Smith, Director of Vestas Structured Finance

15:00

Practical challenges in securing financing for a wind project

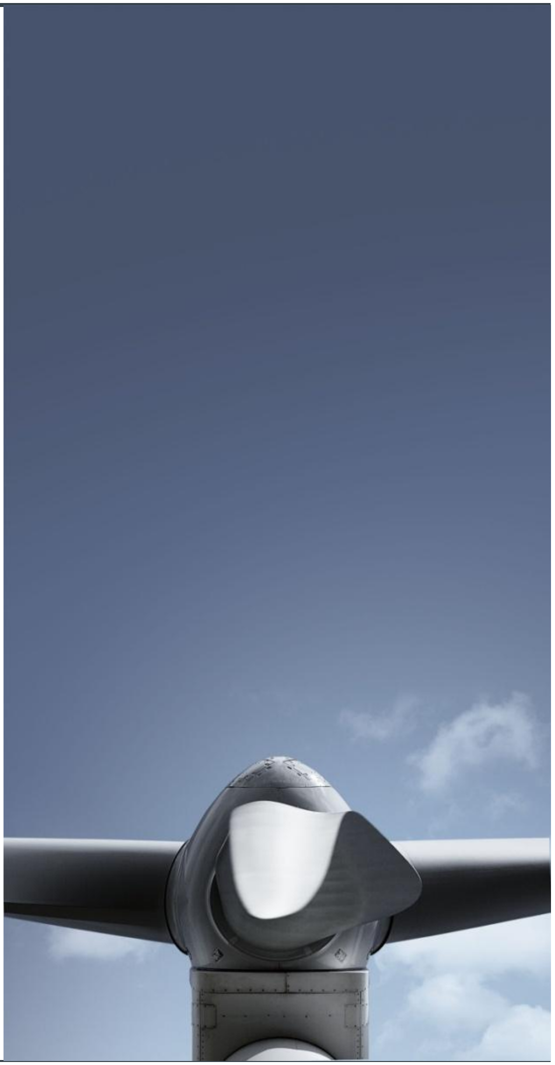
Mr. Carlo van Wageningen, Chairman of Lake Turkana Wind Power

15:30

Discussion – Financing next steps

Mr. Kudakwashe Ndhlukula, Polytechnic of Namibia

16:00 **Coffee break**



Wrap-up Session: Connecting the dots

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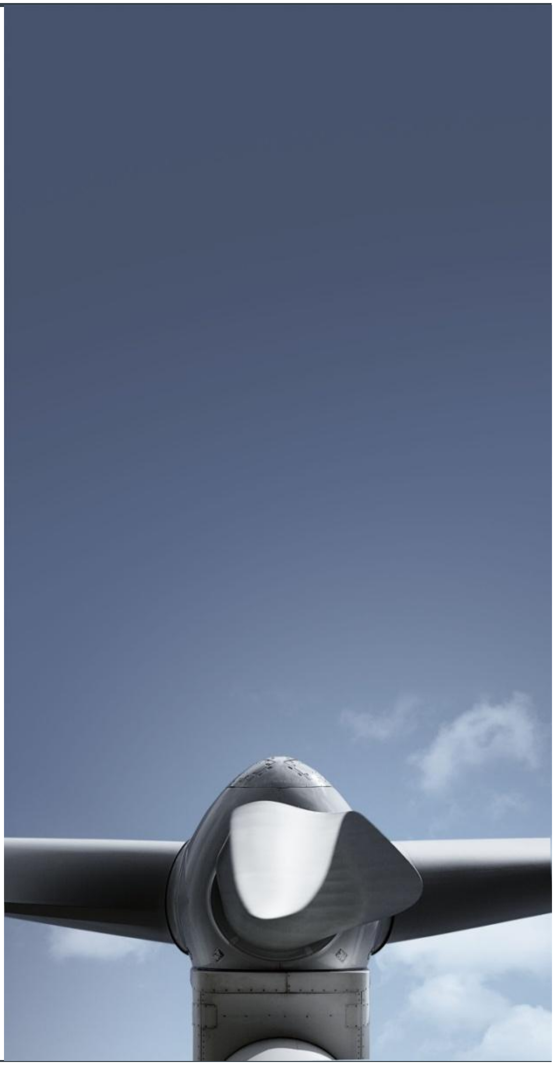
16:15
Summary: Steps towards the first wind farm project
Mr. Kudakwashe Ndhlukula,
Coordinator at REEEI, Polytechnic of Namibia

16:30
Way forward: next steps and future cooperation
Mr. Hans Vestergaard,
Senior Vice President of Vestas Sales

17:00
End of official program & Cocktail

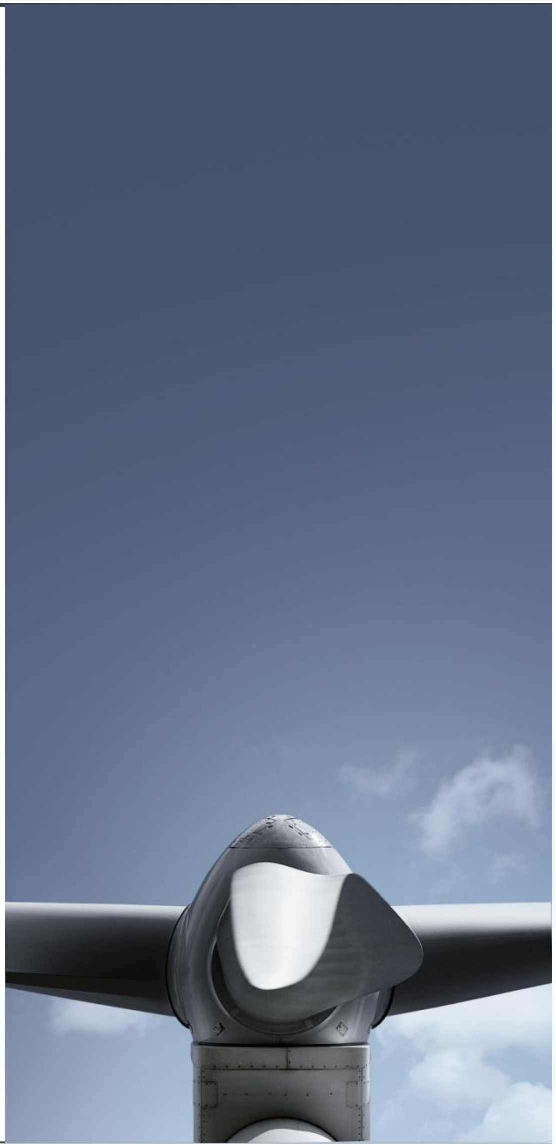
18:00
Dinner



Official Opening Remarks

Hon. Minister Isak Katali

Minister of Mines & Energy



Why Wind Energy in Namibia?

Hans Vestergaard
Senior Vice President of Sales
Vestas Central Europe

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Who are we? Vestas

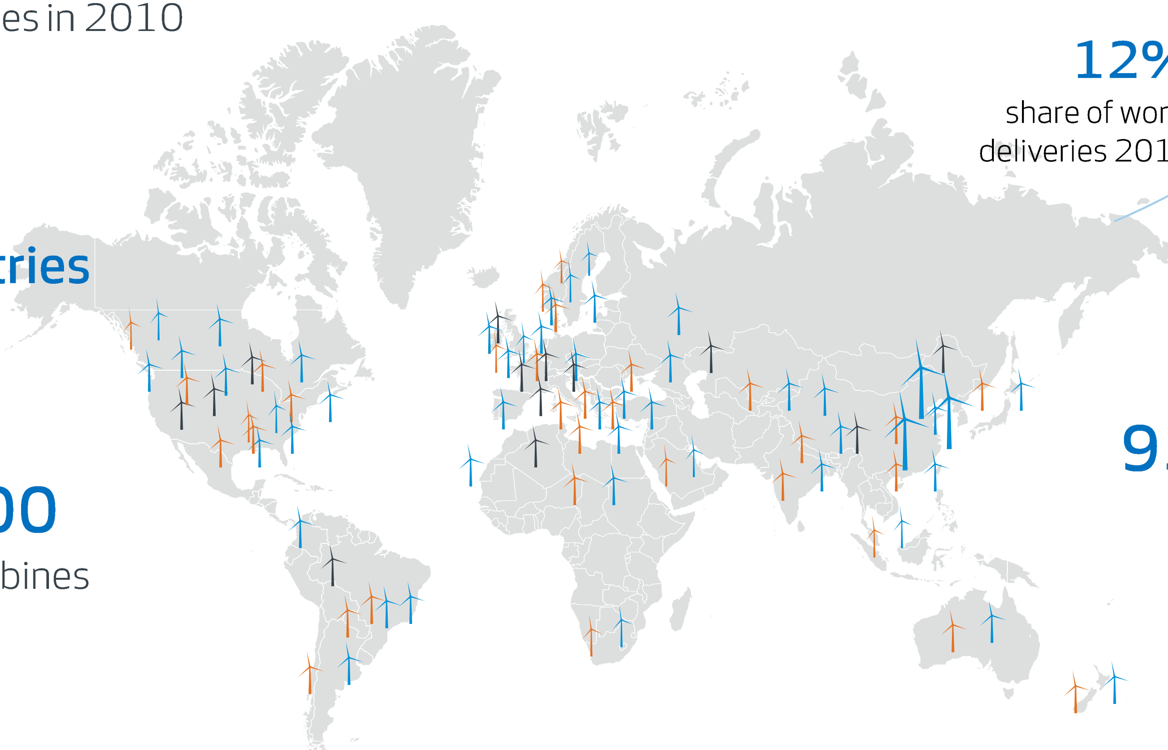
Global leader in wind energy

6.9 billion
Euro revenues in 2010

22,000
Employees

Activities in
67 countries

> 43,000
installed turbines



Wind, Oil and Gas

expresses the ambition of making wind an energy source on a par with fossil fuels.

12%
share of world deliveries 2010

25%
share of all installed capacity

95 billion kWh
clean energy per year

A focus on technology and innovation through the industry's largest Technology R&D Centre, data collection and wind and siting capabilities…

Wind Energy is working in Africa

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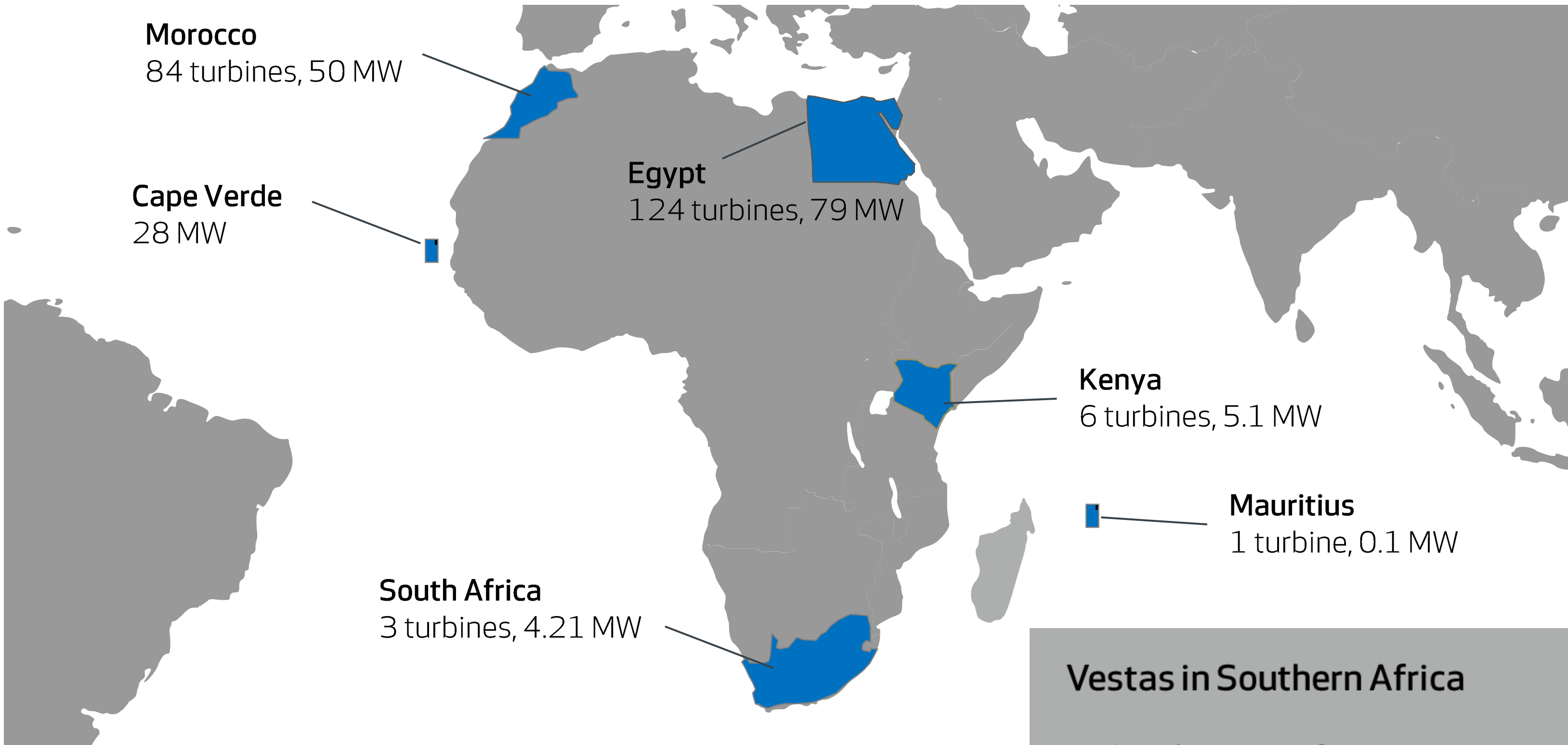
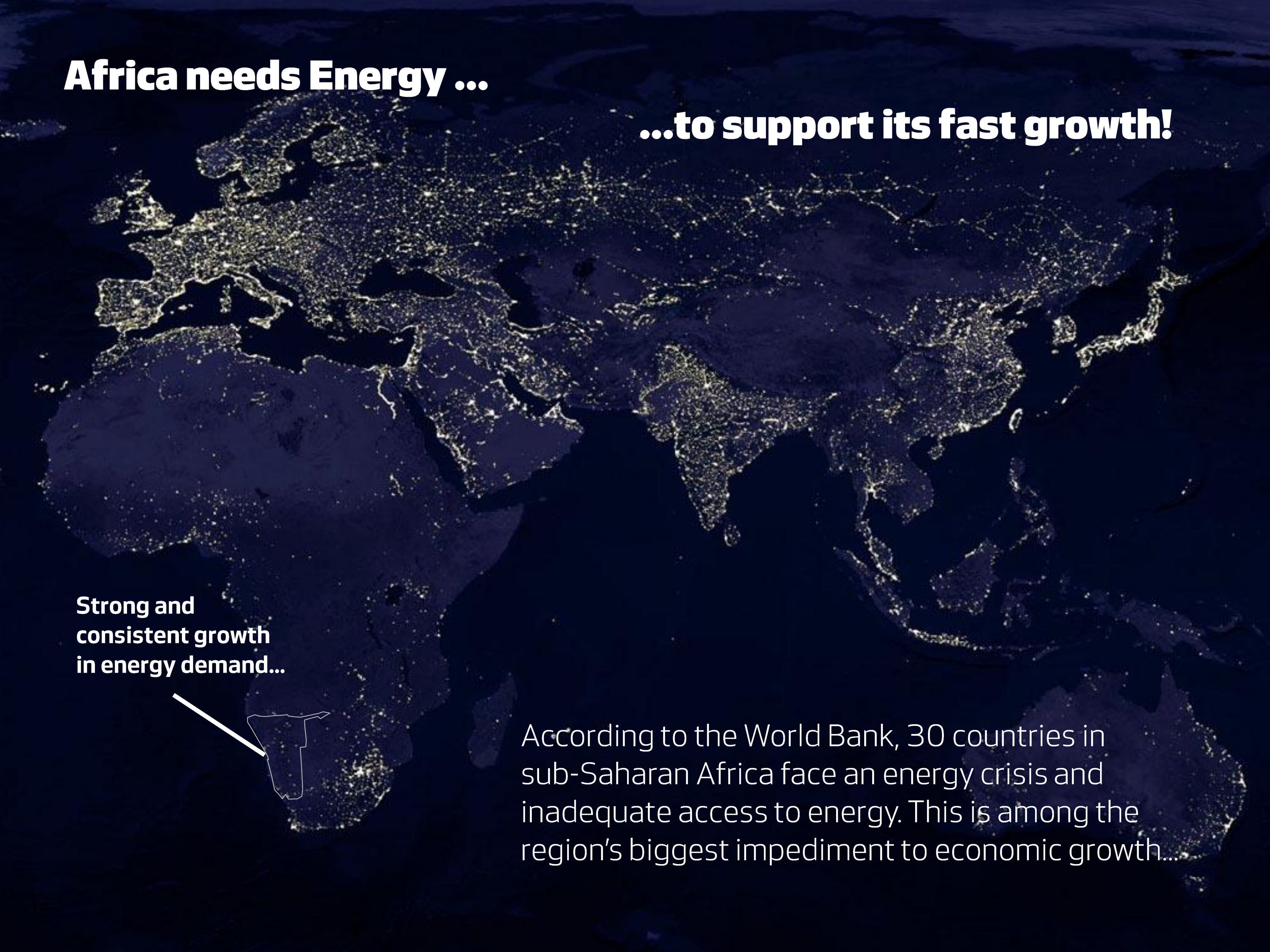
Vestas has been active in Africa for more than ten years

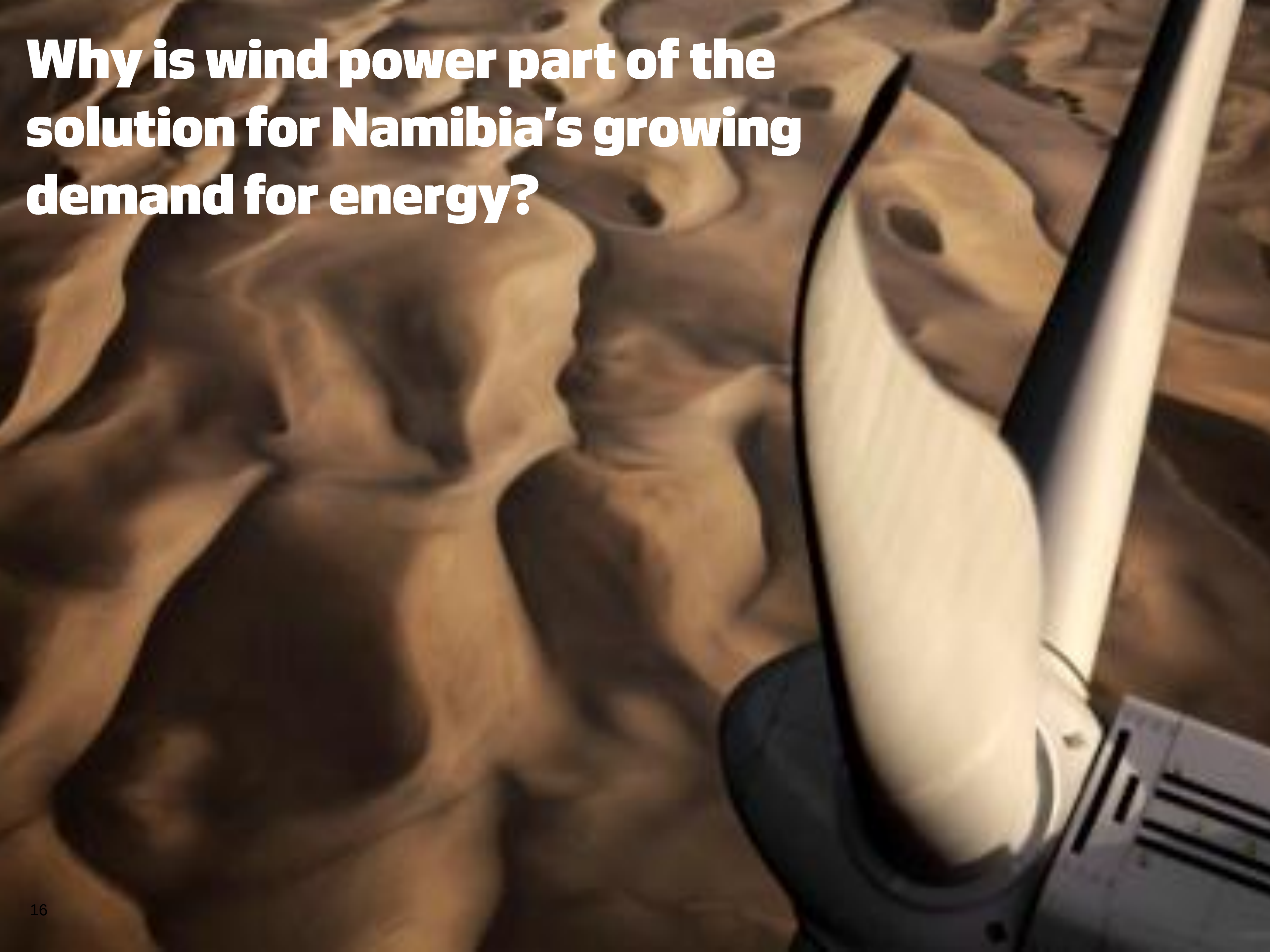


Vestas in Southern Africa

- Local activities for ten years in Johannesburg
- Office opened in 2010
- Very active in development of the African wind industry.

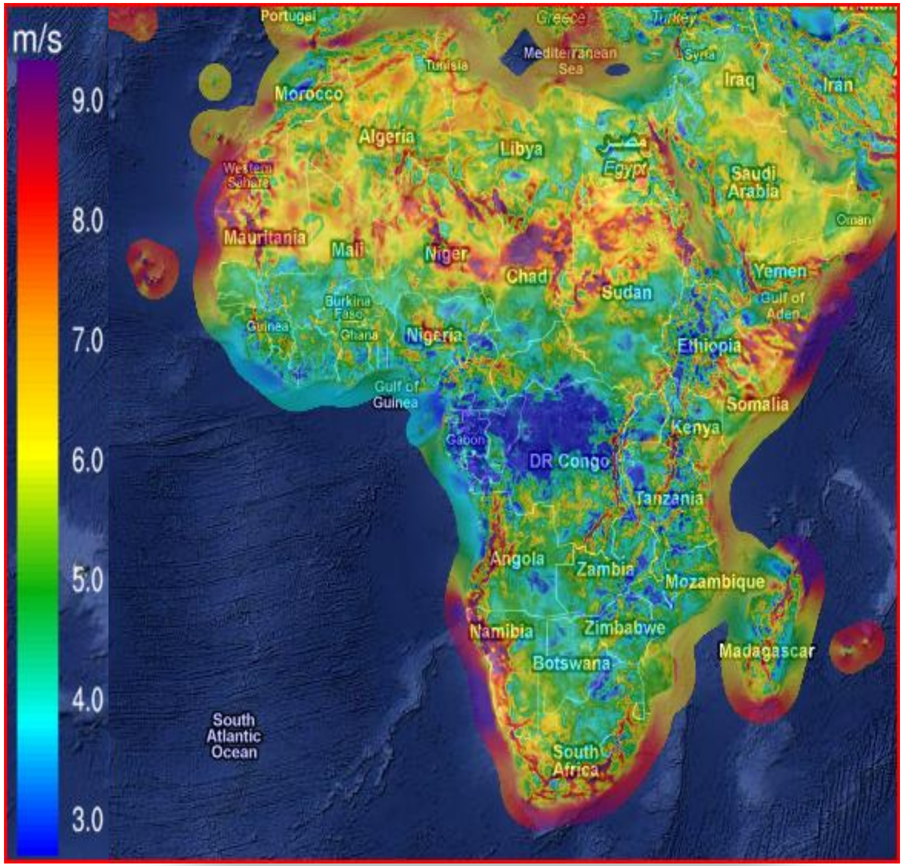

Africa needs Energy ...
...to support its fast growth!
Strong and consistent growth in energy demand...
According to the World Bank, 30 countries in sub-Saharan Africa face an energy crisis and inadequate access to energy. This is among the region's biggest impediment to economic growth...

Why is wind power part of the solution for Namibia's growing demand for energy?



Namibia has wind

Namibia is blessed with excellent natural resources for the use of wind energy.



Sources: Vortex ; Vestas Wind & Site (2011)

Wind can bring economic benefits to Namibia

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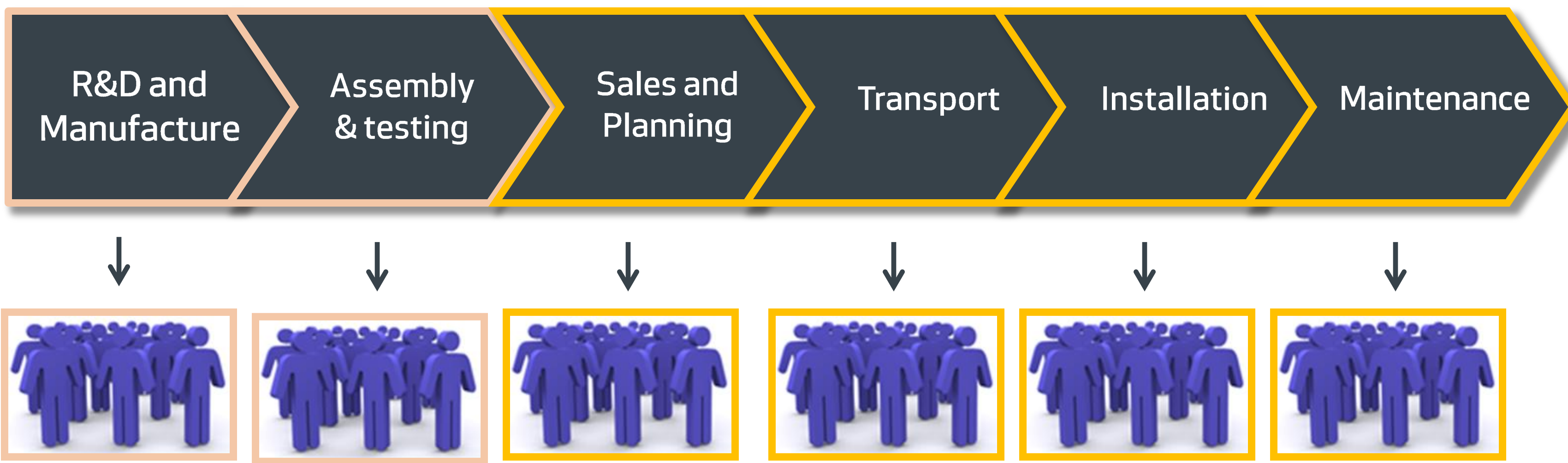
- ☑ Creation of skilled jobs
- ☑ Free Fuel
- ☑ Price Stability
- ☑ Comparable low cost of energy

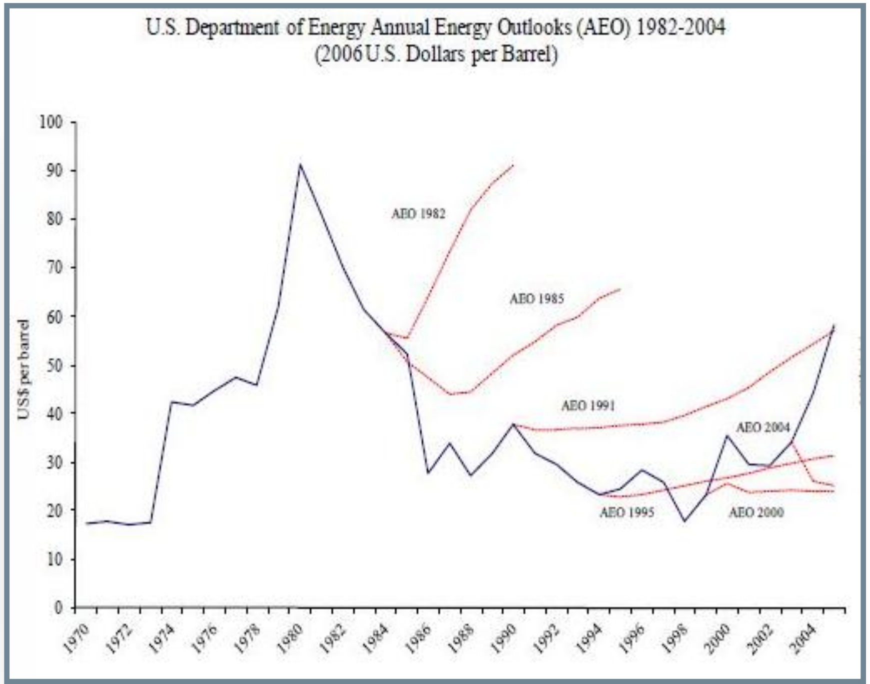
Wind Energy creates good jobs

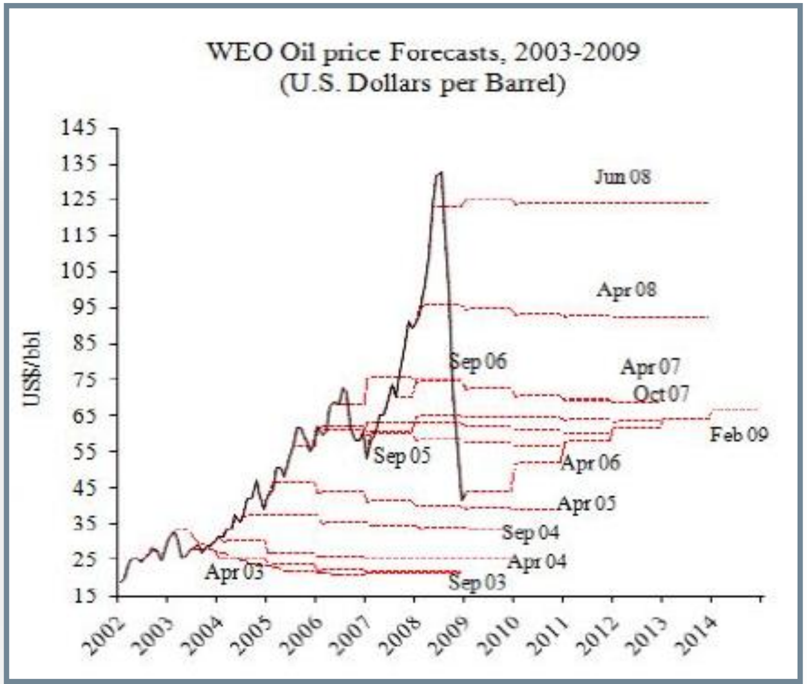
Industry	Wind	Coal	Gas	Nuclear
Jobs/MW	2.79	1.01	0.95	2.18-2.34



The higher the volume of wind energy, the more it makes sense to source locally as you move up the value chain

Wind is predictable: No price fluctuation, but forecasting fossil fuel Prices is very difficult . . .





. . . therefore, depending on imported fuel brings price and currency fluctuation risks

Note: Solid lines on the left chart are spot WTI oil prices, on the right chart are WEO average of WTI. The Dashed lines are price projections

Sources: US Department of Energy Outlook (1982, 1985, 1991, 1995, 200 and 2004); and IMF World Economic Outlook (2003, 2004, 2005, 2006, 2007, 2008 and 2009. After Ossowskia et. Al. (2008)

Wind is cost-competitive

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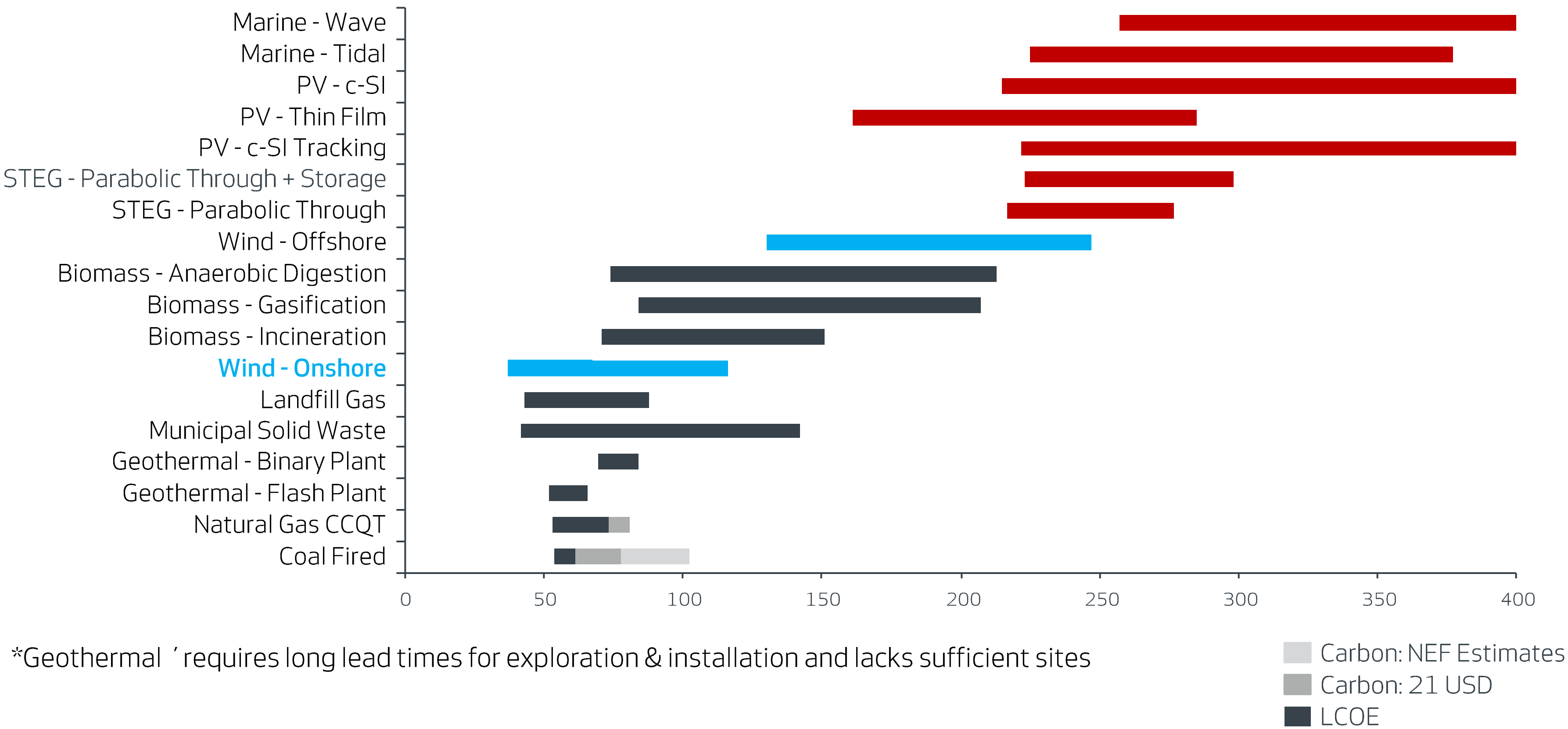
Apart from Geothermal* wind energy is the most competitive in terms of Cost-of-Energy amongst renewable energy sources.

Q3 2009 Levelised Cost of Energy: $US/MWh

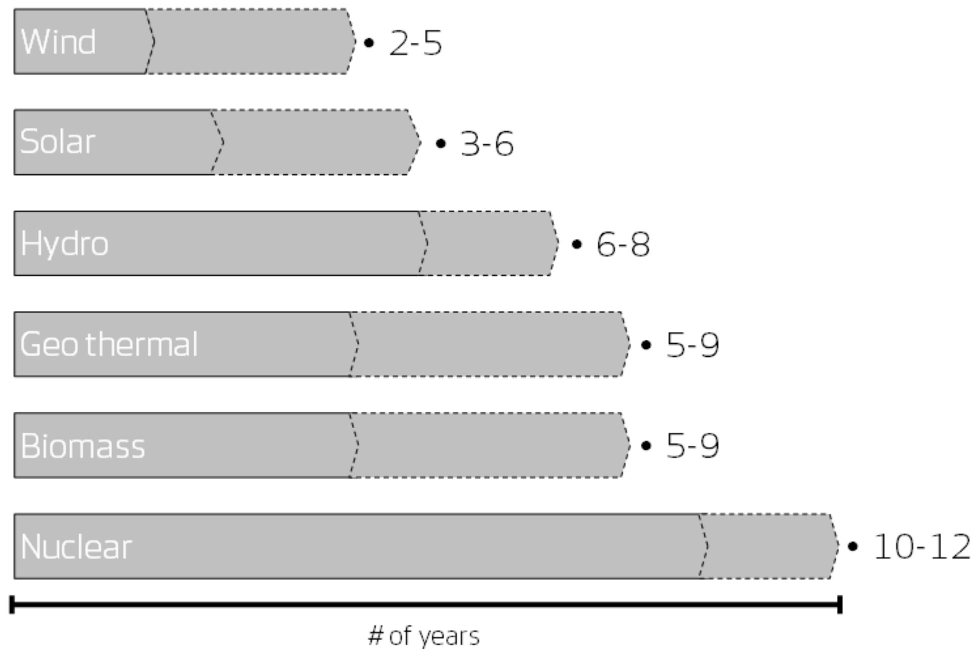


*Geothermal ′ requires long lead times for exploration & installation and lacks sufficient sites

Source: Bloomberg, New Energy Finance, 2009

Wind is fast:
A superior ramp-up time compared to other energy sources

With 2-5 years per site, wind has the shortest ramp-up time of any renewable source:

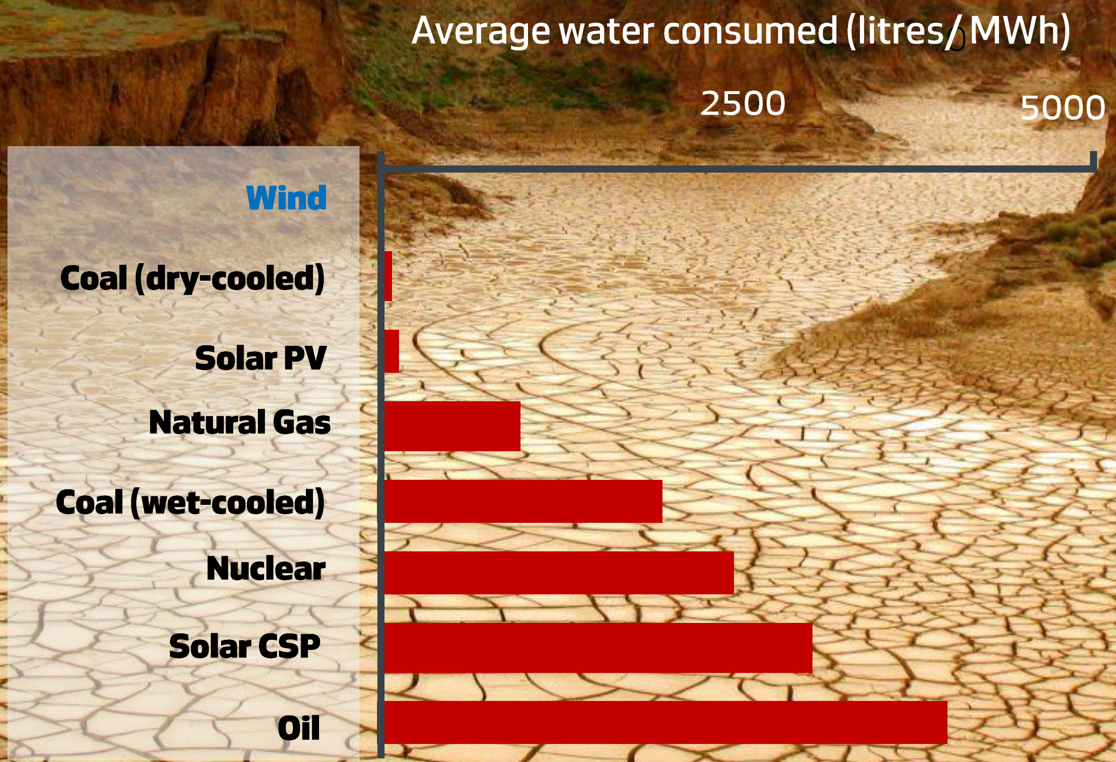


4 months were enough to construct the Vestas V90-1.8 MW turbine in Coega

Sources: FPL Energy 2008, IEA 2008, EWEA 2009

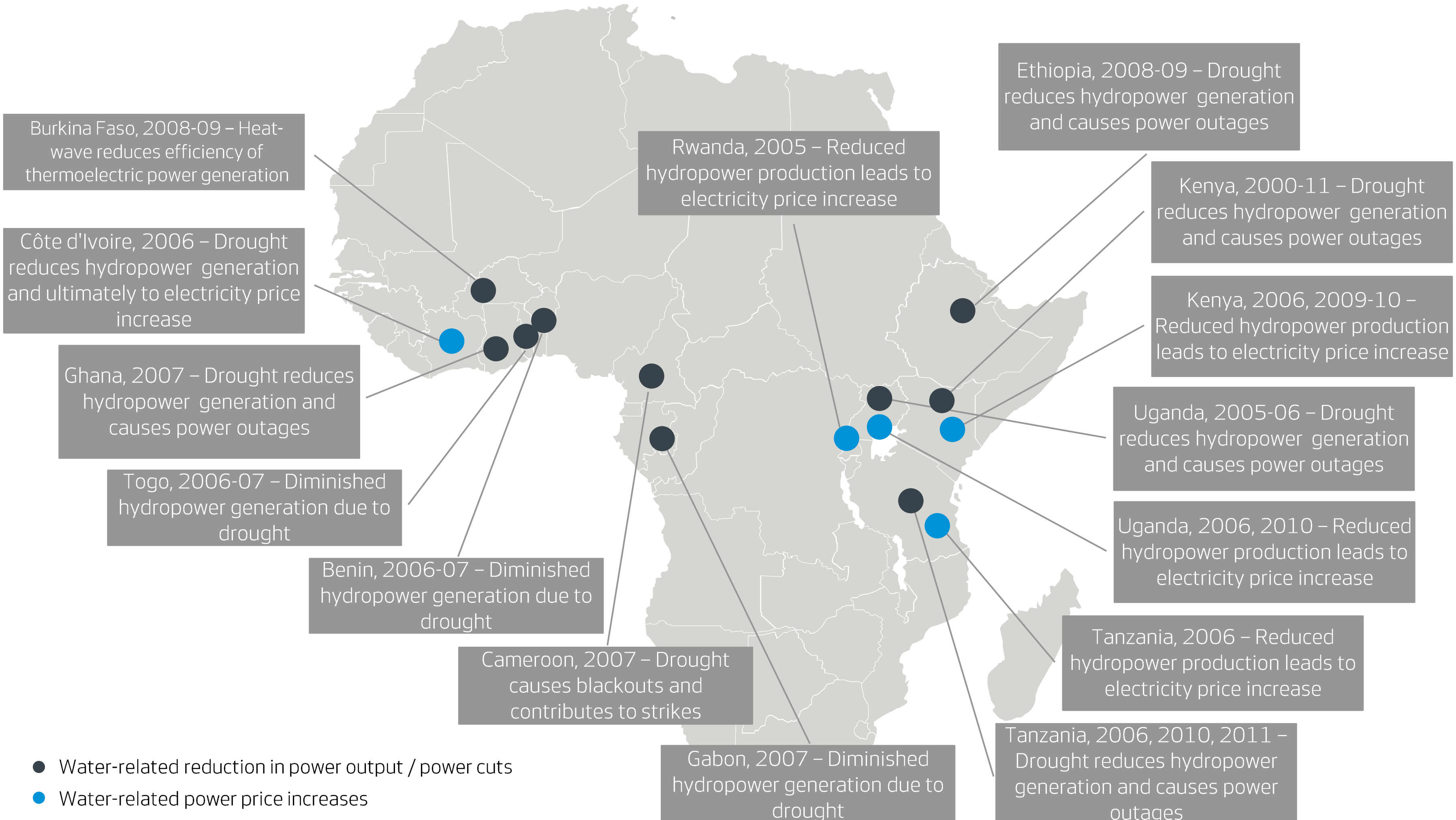
Wind is dry: Water scarcity is one of the greatest challenges facing Namibia

Wind power consumes no water – which is in short supply in many African countries , including Namibia



Source: Source: DHI 2010, WEF 2009, US DoE 2006, US DoE 2009, Stillwell et al. 2009, Photo from http://www.indiatalkies.com/images/water-scarcity39031o.jpg

Recent examples of water constraints in power production – Africa



- Water-related reduction in power output / power cuts
- Water-related power price increases
- Power plants with legal challenges due to water issues
- Power plants with public opposition due to impacts on water resources and aquatic species

[CH2MHill/Vestas, non exhaustive press survey 2005-2011]

Wind can support Namibia's sustainable development . . .

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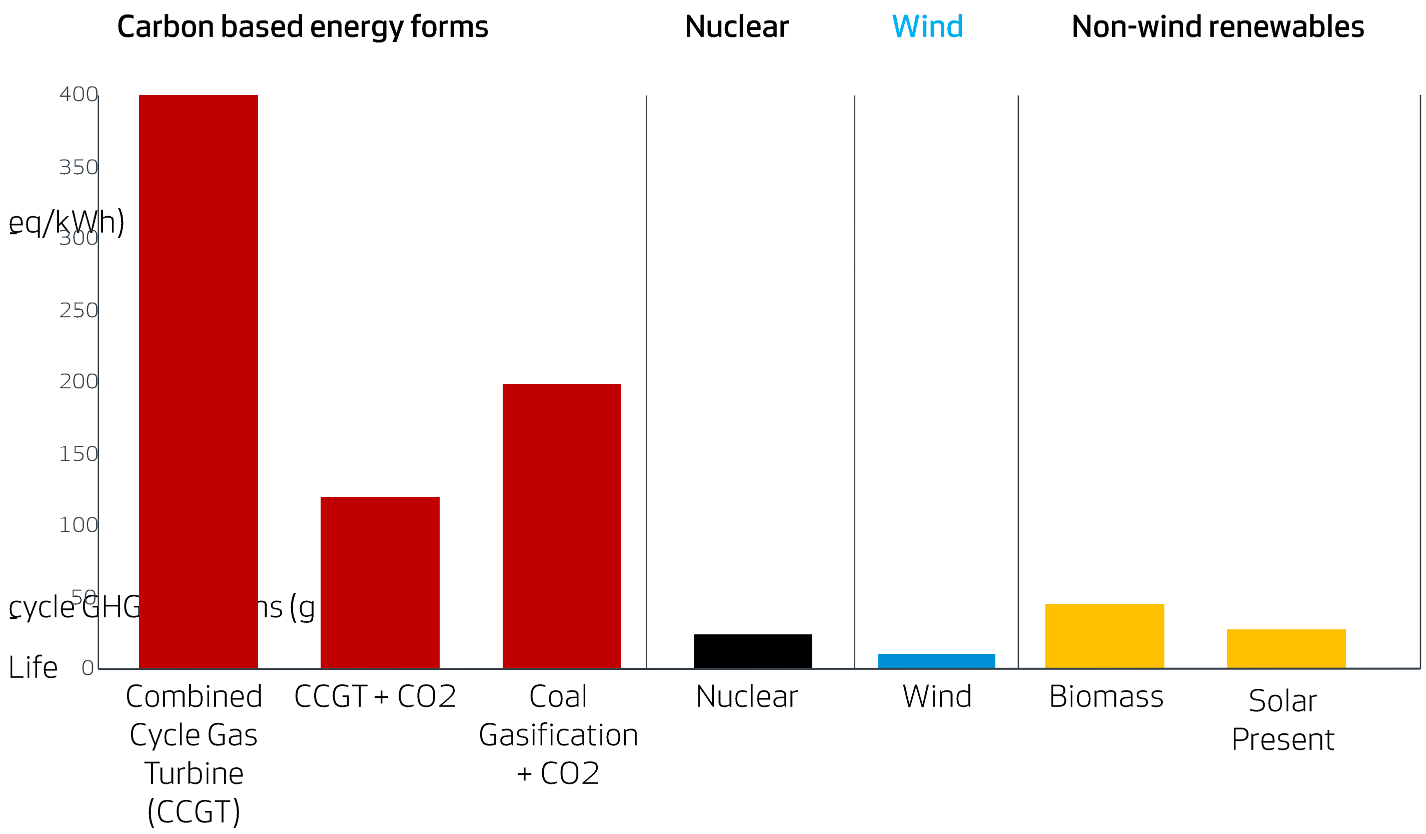
Wind is the lowest greenhouse gas (GHG) emissions energy source over its lifecycle.



Source: Singapore IEW Conference Key Takeaways, November 2009

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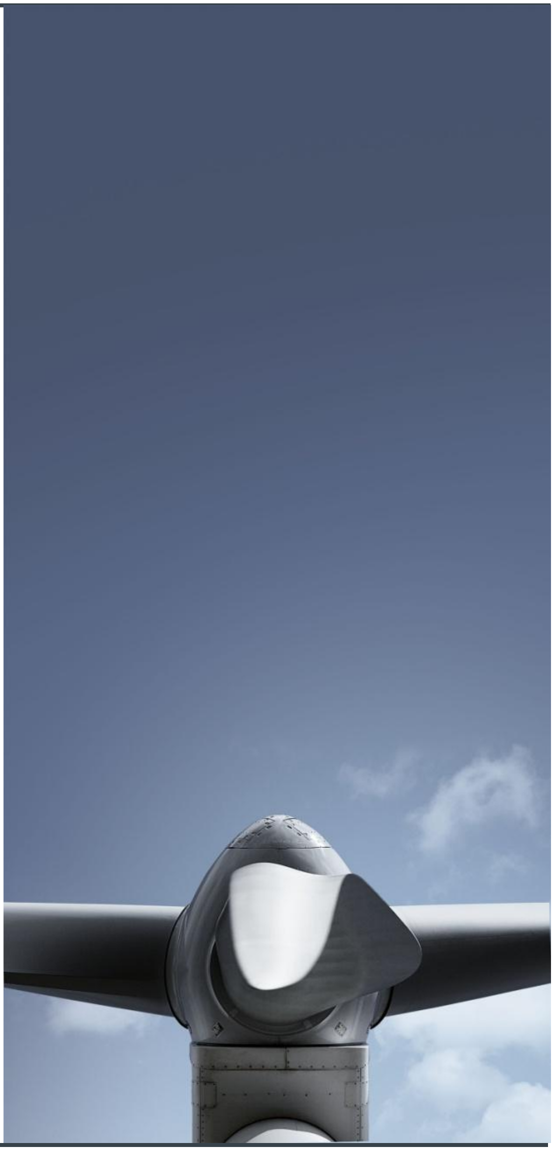
Mr. Hans Vestergaard,
Senior Vice President of Sales for Vestas Central Europe

Thank you



Vestas®

Coffee Break

We will resume in 15 minutes

Issue Sessions

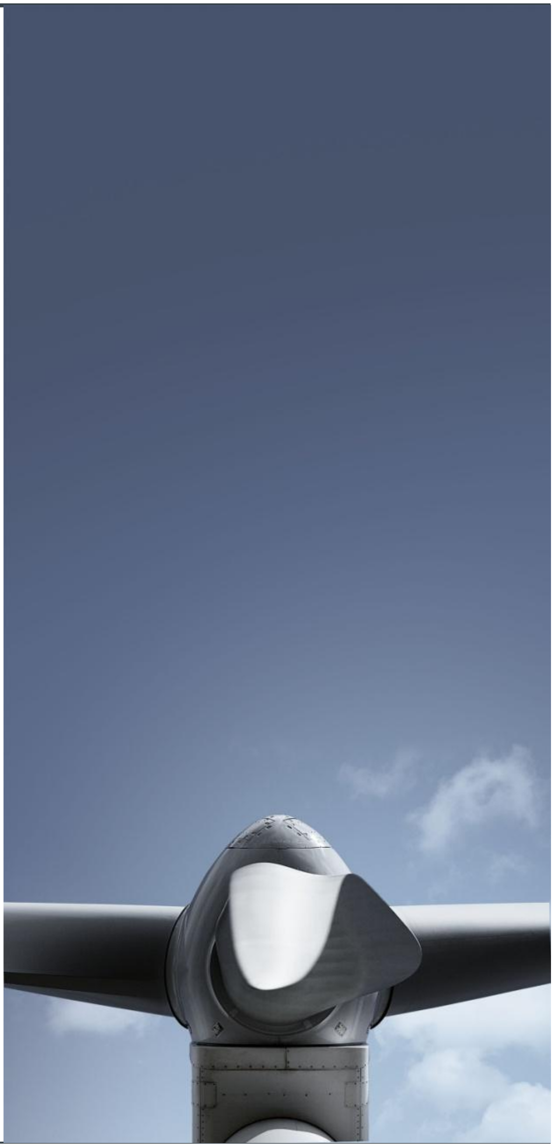
Moderator:

Mr. Kudakwashe Ndhlukula,

Coordinator at REEEI, Polytechnic of Namibia

TECHNOLOGY AND DEVELOPMENT

POLYTECHNIC OF NAMIBIA



Case Study: the Lake Turkana Wind Power project

Mr. Carlo van Wageningen
Chairman of Lake Turkana Wind Power

LAKE TURKANA
WIND POWER

WindTalks
NAMIBIA

Agenda

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1. How did it all start?

2. A unique wind resource

3. The logistic challenge

4. By whom and how is the project Financed?

5. Where are we?

The project's history dates back to 2004…

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One of the founding members of lake Turkana Wind Power (LTWP) had known about the site for years….

2004
Anset Africa approached to look at developing a wind power project on that site

2005
Oil prices soared to above $US 45/barrel, rendering wind power competitive in Kenya.

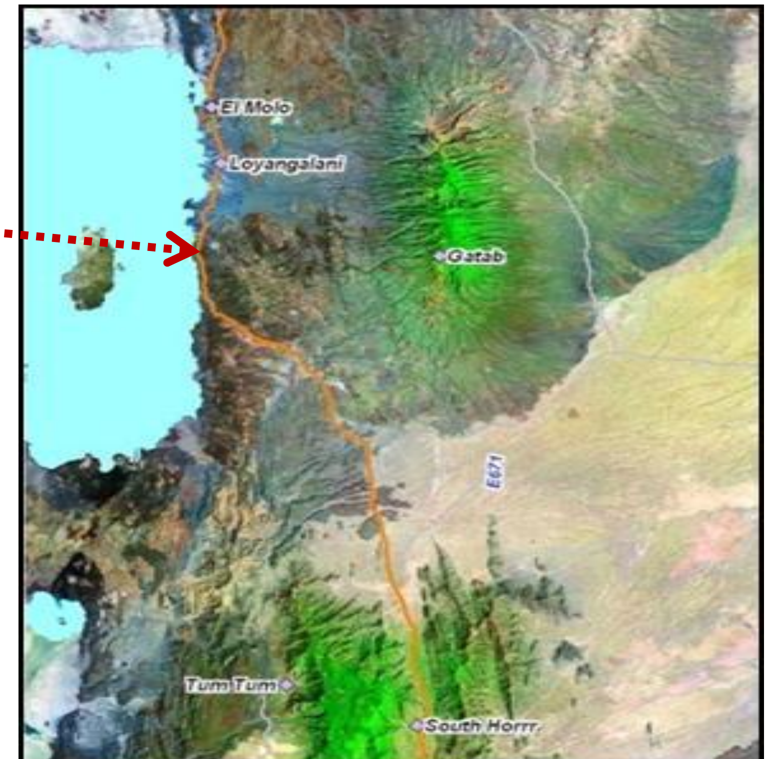
June 2005
KP&P of Netherlands was approached to come and visit the site.

September 2005
1st MOU signed between Anset Africa and KP&P – the beginning of the development of this challenging project.

.

Now??

Where in Kenya are we located?



Agenda

WindTalks NAMIBIA

1. How did it all start?

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We have an unparalleled and unique wind resource…

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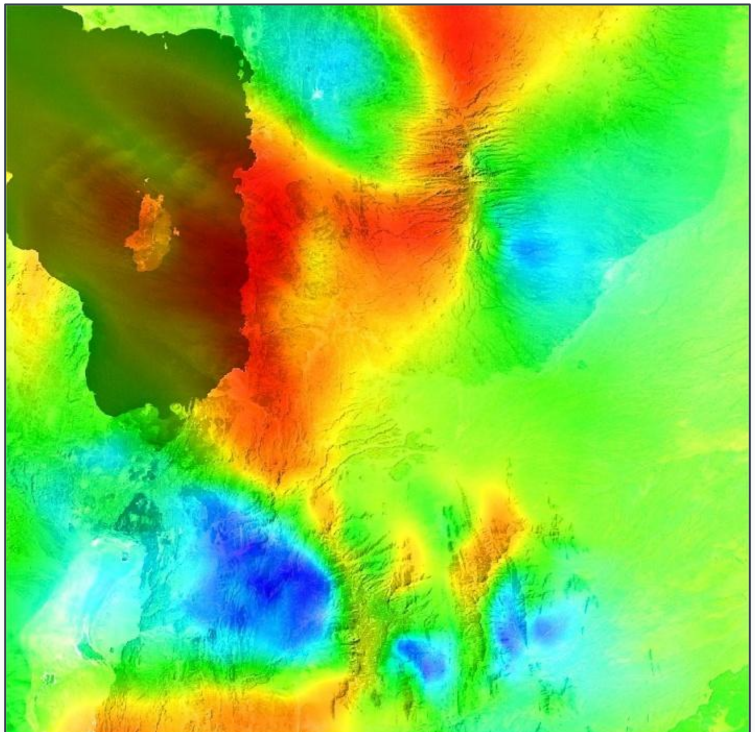
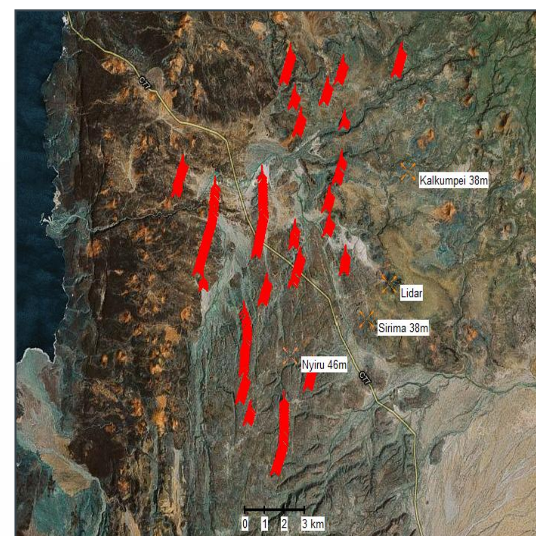


- Favourable location: Lies in the "Turkana Corridor", a low-level jet stream from the Indian Ocean creates strong and predictable winds
- Aided by the presence of Mount Kulal to the North and Mount Nyiru to the South, which act to produce a Venturi effect – accelerating the winds across the project site.



Equipment: 365 V-52 850kW wind turbines, carefully sited to optimize energy production

Stable winds – all day

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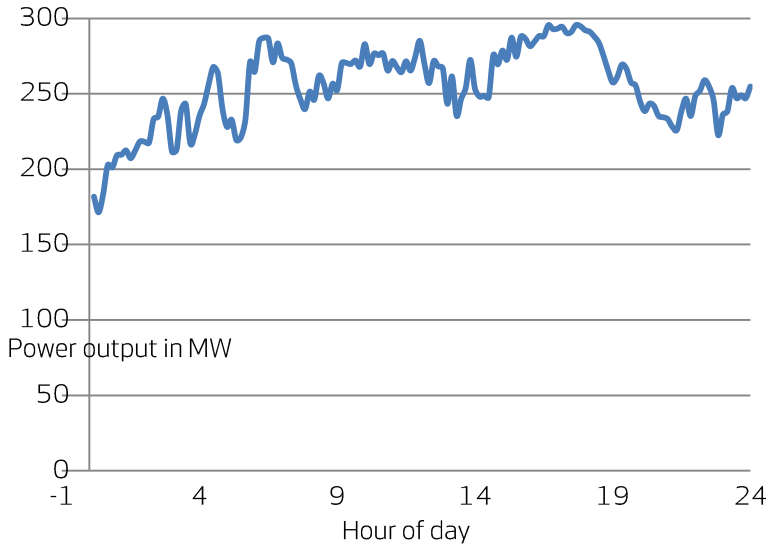
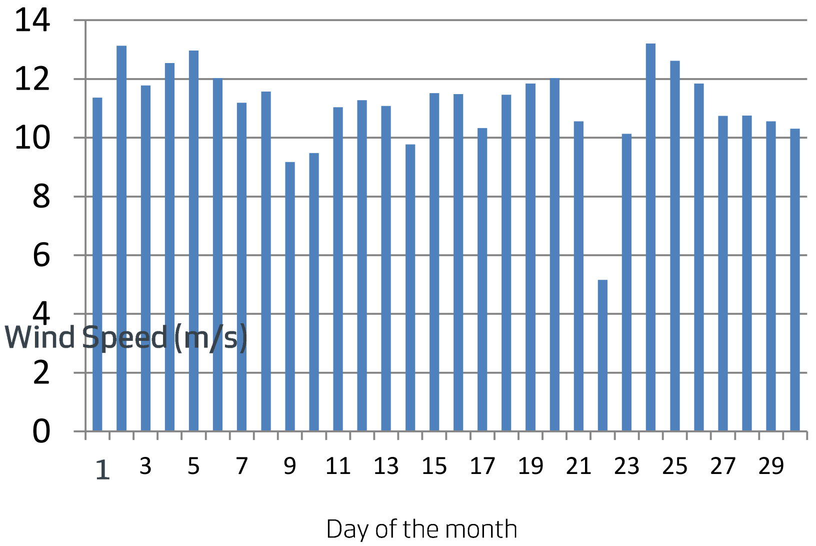
Estimated wind power output based on wind measurement for May 1, 2010



Wind Distribution April , 2010



Agenda

WindTalks NAMIBIA

1. How did it all start?

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The logistical challenges . . .

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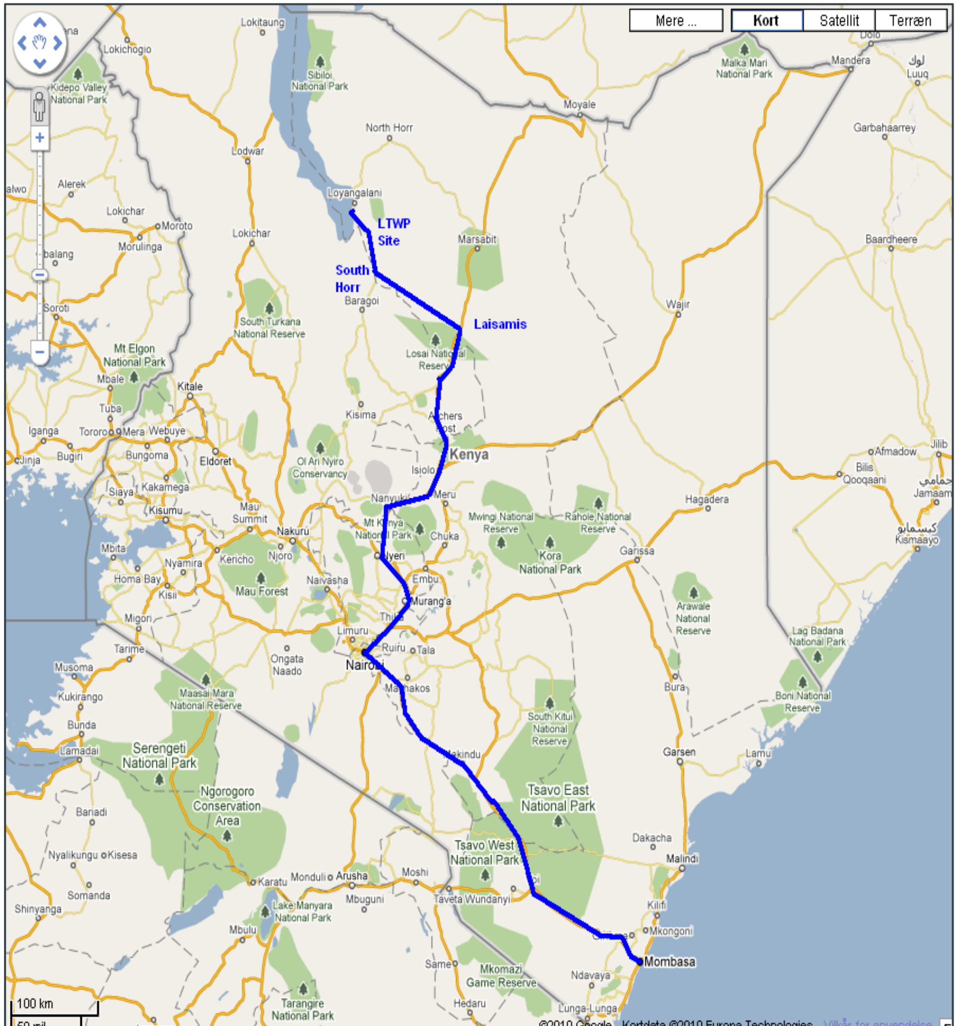
- ☑ The site is 1,200km from the nearest deep-sea port (Mombasa)
- ☑ The nearest Grid Interconnect Point was 428km from the site
- ☑ Upgrading of 206 km of Road
- ☑ Construction of 3 flood bridges
- ☑ Use of 6 wheel drive trucks from Laisamis to site
- ☑ Most demanding parts: 3 transformers 80 tonnes each, measuring 5m x 4m x 4m
- ☑ 1,200 truck-loads

. . . And solutions for the logistical challenges



4 Road surveys . . .

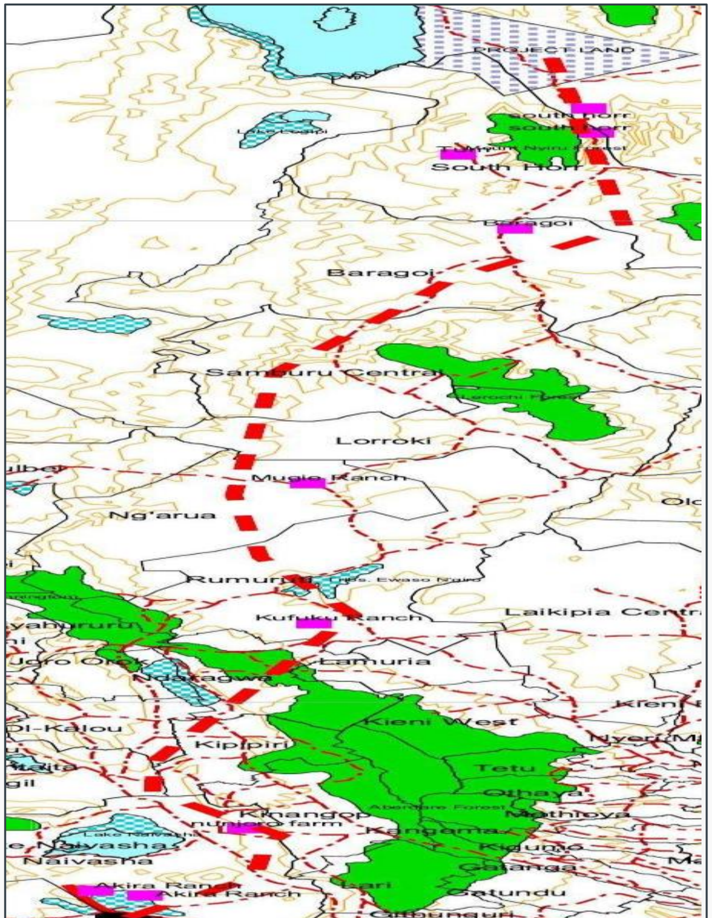
. . . by 3 transport and logistic companies

- Mammoet
- SDV Transami
- Civicon

. . . and by Vestas

Grid connection

400 kV T. line from the project site to Suswa – 428km.



International procurement process:

- Task Force – MOE, KPLC, KETRACO, KEMA, KPMG, LTWP
- Public Sector Implementation.
- Contract awarded to ISOLUX Corsan. (Spain).
- Contract negotiations completed on 25.2.2011
- Execution period 22 months.
- Cost Euro 142.5M of which 110M from Spain and balance from the Kenyan government

Agenda

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1. How did it all start?

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4. **By whom and how is the project Financed?**

5. Where are we?

How is the project financed?

Total Project Cost: 617 M Euro (Wind Farm + Balance of Plant only)

Debt/Equity Ratio: 70% Debt (432M) – 30% Equity (185M)

Debt Lead Arranger: African Development Bank (AfDB)

Co-Arrangers: STANDARD BANK & NEDBANK

Power Purchase Agreement details

Power sold to Kenya Power and Light Corporation

<u>PPA terms:</u>

- fixed price (20 years): 7.52 Euro cents per kWh
- Escalation only on O&M part of the costs
- Take or pay
- 20 years term after full commissioning

<u>Status:</u>

SIGNED on 29th January 2010 and restated on 30th September 2011

Carbon Credits: Approx. 780.000 CER's/y of which the 1st US Cent/KWhr returned to Kenya.

The project has an extensive corporate social responsibility component

Well designed Corporate Social Responsibility programme over 20 years, implemented in 4 x 5-year development plans

Focusing on:

- Water
- Health and sanitation
- Education
- Electrification

Carbon Credits: Up to US$ 16.5 Million/year to be devoted to the development of the areas surrounding the project site and along the transmission line route

Agenda

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1. How did it all start?

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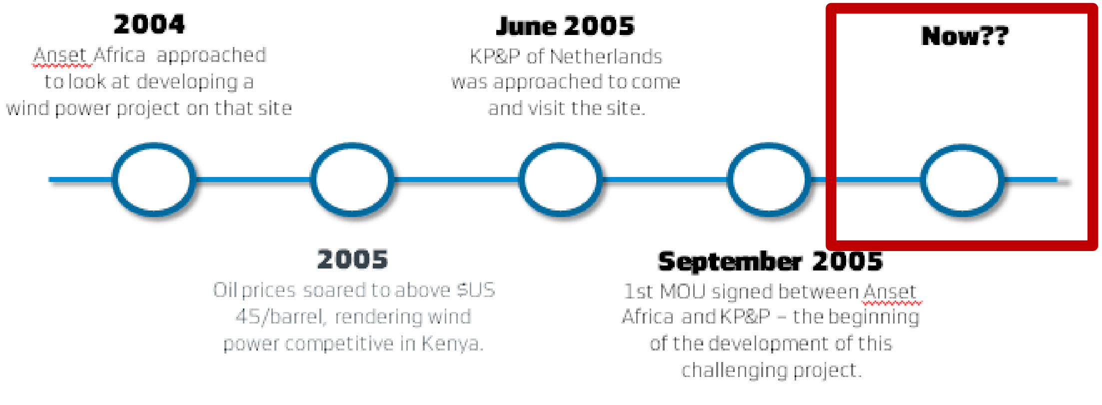
Where are we now?



Current Status

- All EPC Contracts completed and initialled.
- PPA in place.
- IPP license in place.
- Government of Kenya Letter of Support in place.
- Multilateral Investment Guarantee Agency (MIGA) and International Development Association guarantees, applications in process.
- Transmission of final Project Information Memorandum and all documentation to Lenders completed on 10th August 2011
- By mid-November lenders Term Sheet expected
- Financial Close expected by 31st March 2012
- Ground-breaking expected in April 2012

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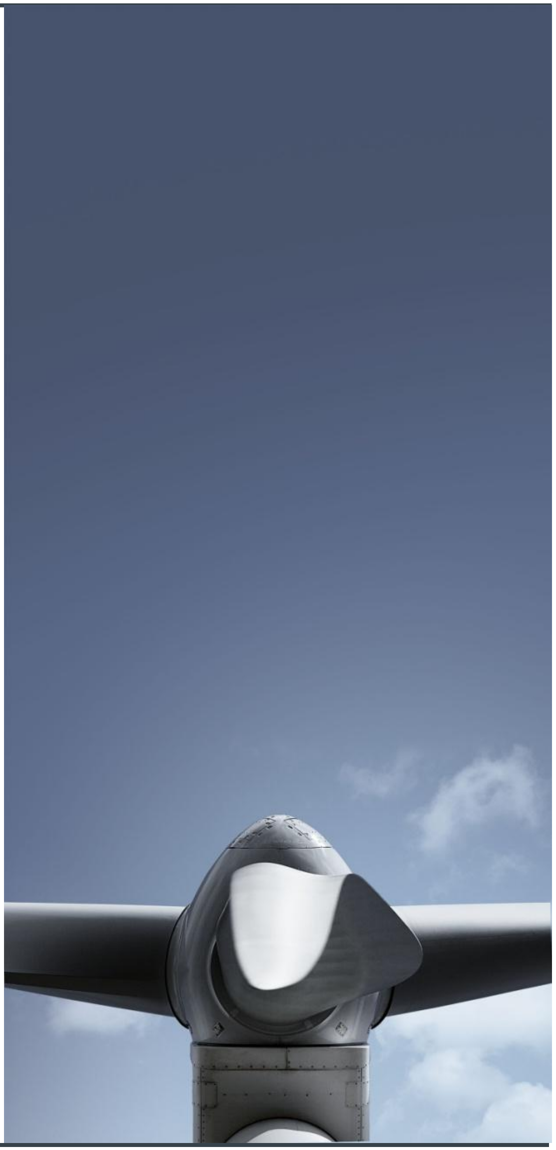
Mr. Carlo van Wageningen,

Chairman of Lake Turkana Wind Power

Thank you

We take this opportunity to extend our gratitude to the Government of Kenya, KPLC, ERC. and KETRACO for the unwavering support and faith they have extended to this challenging project

It is our sincere hope that other African Governments will want to follow in Kenya's footsteps as this is a perfect example of a successful Public-Private- Partnership that can pave the way for further large foreign direct investment opportunities in the region



LAKE TURKANA WIND POWER

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Session 1:
Political/Regulatory Framework for Wind Energy

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Regulatory status and roadmap for wind energy in Namibia
Mr. Rojas Manyame,
GM Regulation, ECB

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Lessons learnt from other countries
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Director of Vestas Government Relations

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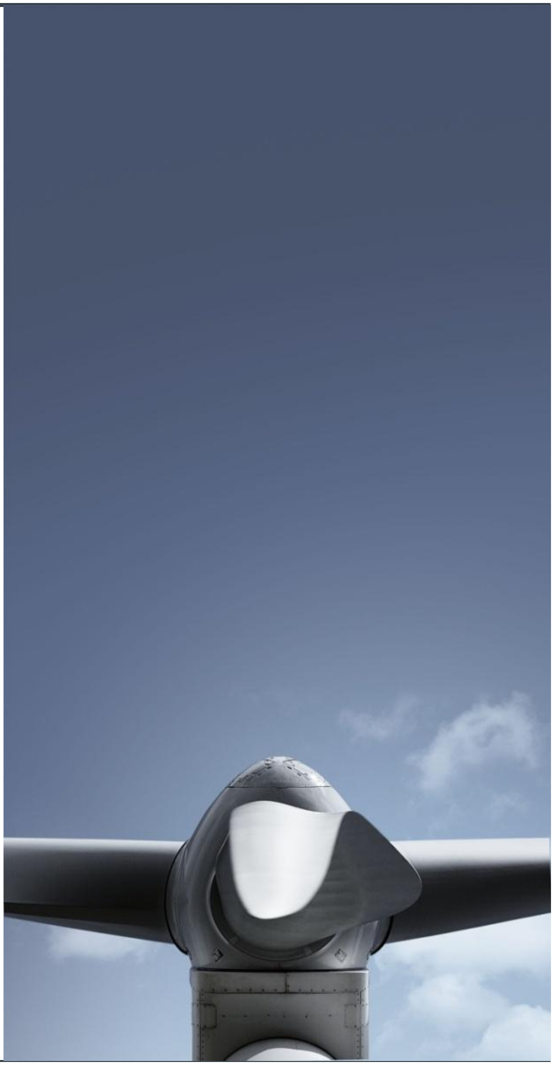
12:00 **Coffee Break**

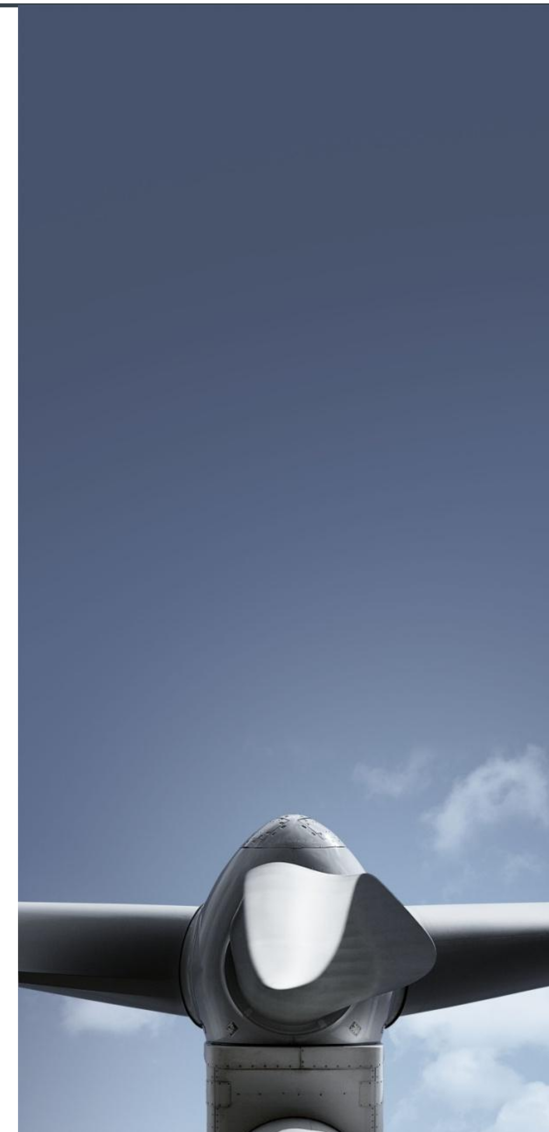


Regulatory status and roadmap for wind energy in Namibia

Mr. Rojas Manyame

ECB, General Manager: Regulation

ELECTRICITY CONTROL BOARD



Regulatory Status and Road Map for Wind Energy in Namibia

R Manyame

General Manager: Regulation

CONTENTS

* ECB Mandate
* ECB Functions
* Licensing
* RE Procurement Mechanisms
* Policy on Tariffs
* Support Projects for IPPs
  * Grid Code
  * IPP and Investment market Framework
  * RE Procurement Mechanisms
  * NIRP
* Challenges
* Conclusion

ECB Mandate

* Derived from the Electricity Act (Act 4 of 2007)
* 5 Main Objectives
  * To exercise control over and regulate the provision, use and consumption of electricity in Namibia;
  * To oversee the efficient functioning and development of the electricity industry and security of electricity provision;
  * To ensure the efficient provision of electricity;
  * To ensure a competitive environment in the electricity industry in Namibia
  * To promote private sector investment in the electricity industry

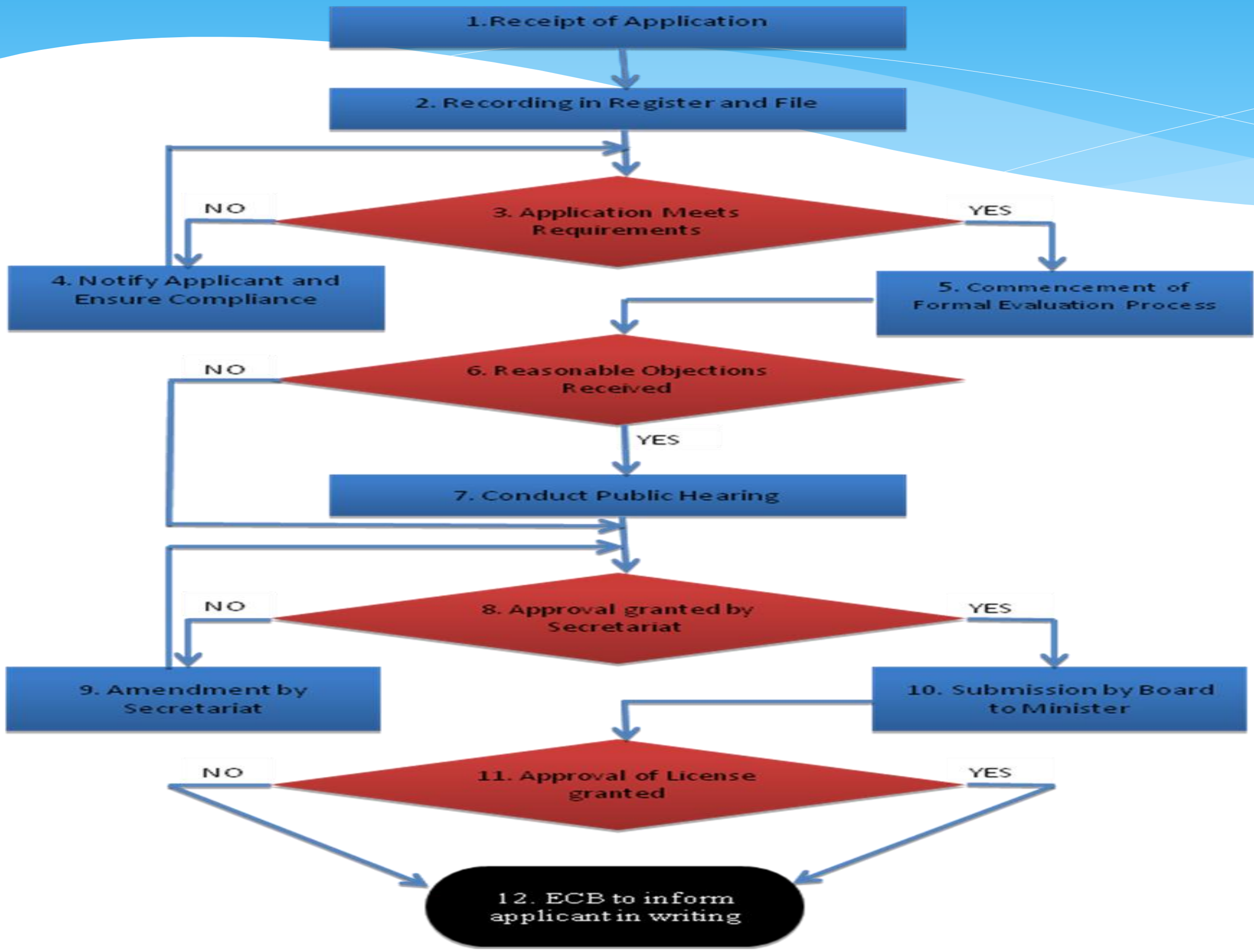
ECB Functions..

- Determining the ***economic conditions*** of supply
  - by way of suitable tariff regimes:
- Determining the ***technical conditions*** of supply
  - by means of standards, regulations and rules:
- ***Managing licenses*** for suppliers in the ESI
  - by means of issuing, transfer, amendment, renewal, suspension and/or cancellation:
  - and the approval of the conditions on which electricity may be provided by a licensee;
- ***Verifying adherence*** to license conditions
  - by means of regular monitoring, evaluation and feedback:

ECB Functions..

- ***Advising the Minister*** on ESI matters
  - by means of recommendations on various issues license issues
- ***Mediation***
  - Between licensees
  - Between licensees and their customers/prospective customers
  - On matters including installation and functioning of meters, suitability of equipment and delays or refusal to supply
- ***Understanding the industry***,
  - stakeholders and their needs through regular consultations and investigations:

Licensing Procedures



Current RE Procurement Mechanism

* Project developer approaches the ECB with project motivation
* ECB evaluates and issues conditional licenses
* Now moving towards bidding process for large projects
* Study done on procurement mechanism
* Outcomes support tendering for large projects
* Outcomes approved by the Board

Policy on Tariffs

- Government Policy states 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 Methodology Developed
- Cost Plus
- Cabinet decided that bulk tariffs should be cost reflective in 2011/2012.

[1] CCGT stands for Combined Cycle Gas Turbine (Technology)

IPP Licenses Issued to Date

Licensee	Fuel Type	Date Issued	Plant Size (MW)	License Period (yrs)
Aeolus Power Generation	Wind	01-04-07	92	22
BINVIS/ Atlantic Energy Coast	Coal	01-11-07	700	25
Bush Energy Namibia (CBEND)	Solid Biomass	01-05-10	0.250	5
Electrawinds	Wind	01-11-09	50	20
Innowind	Wind	01-03-10	60	20
Namibia International Mining Co. (NIMC)	Diesel /CCGT	01-06-07	210 (68)	20
Vizion Energy Resources	Coal	13-03-08	800 (400)	25
VTB Capital	Hydro	15-07-07	30	20
GreeNam	Solar		30	

Wind Licenses Issued to Date

Licensee	Type	Size	Date Issued	Validity period (yrs)
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

IPP Support Projects

* Grid Code
* IPP and Investment Market Framework
* RE Procurement Mechanisms
* NIRP

RE Procurement Mechanism Project

- Project aim was to develop an 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

Grid Code

- Deal with Access issues
- Five Parts
  - Network
  - System Operations
  - Metering
  - Governance
  - Information Exchange
- Will include a Wind Code

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

NIRP Objectives

* Reduction in the vulnerability of electricity supply to disruptions in supply caused by events outside of the country;
* Increase in diversification, security, reliability and efficiency of electricity supply, including the substitution of electricity by other energy sources such as oil, gas, biofuels and solar in order to improve efficiency;
* Development and implementation of the demand side management measures and programs;
* Minimization of costs and negative environmental and social impacts of electricity supply;
* Increase in use of local resources for generation of electricity;
* Provision of social benefits through increased economic growth, rural electrification and employment;
* Increase the use of local resources to provide electricity services.

NIRP Tasks

* 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

NIRP Status

- Funded by MME and World Bank
- Hatch is the Consultant
- Steering Committee is driving the Project
- 1st Meeting held in August 2011
- Next meeting is in December 2011
- Workshop will be held thereafter in February 2012
- Project to be concluded in July 2012

Challenges

- Absence of specific RE policy
  - RE included in White Paper on Energy Policy
- Lack of enabling RE Framework
- Procurement mechanism refinement
- Introduction of special instruments to ensure a greater share of RET in the electricity supply (like quotas, REFIT and others).

Conclusion

- Namibia has abundant RE resources
- Need to set up mechanisms for exploiting these resources
- Need to develop specific RE policy
- Need for Robust RE Framework
- Minister to proclaim regulations to govern the renewable energy resources procurement (empowered by Section 43 of Electricity Act of 2007)
- NEF to support RE uptake to mitigate tariff impact

Thank You

Political/Regulatory Framework for Wind Energy: Lessons Learnt from Other Countries

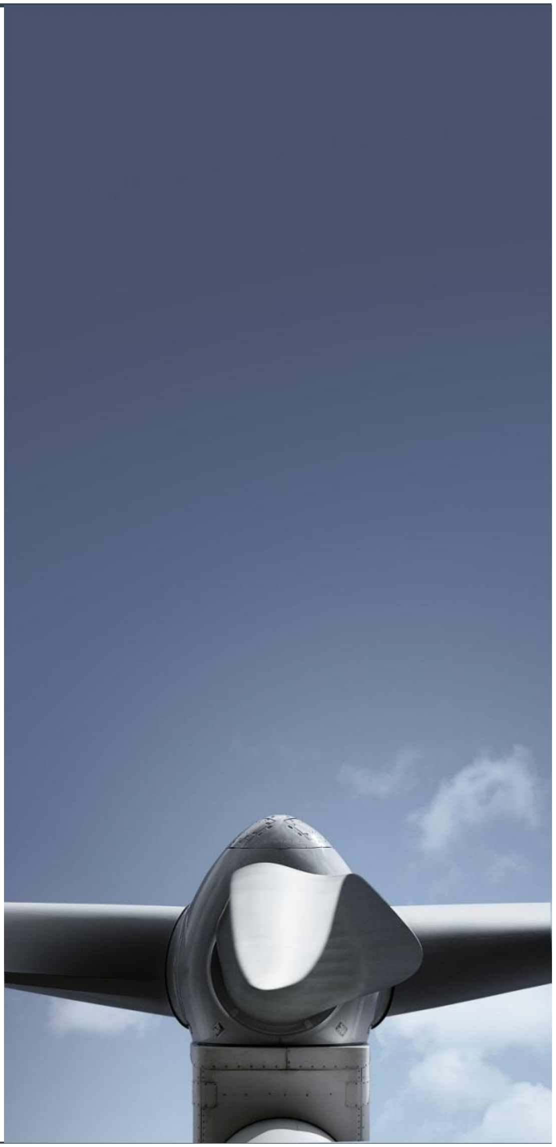
Malte Meyer
Director, Government Relations
Vestas Central Europe

WindTalks

Agenda

WindTalks NAMIBIA

1. Government Support
2. PPA Structuring



As first steps to kick-start wind energy, Governments are well advised to . . .

- → Offer a suitable procurement mechanism
- → Provide assurance that wind tariff costs will be covered
- → Set renewable energy targets

Procurement Mechanisms: Tenders or REFITs suit larger volumes, but single project PPAs can be fast and low risk option for Namibia

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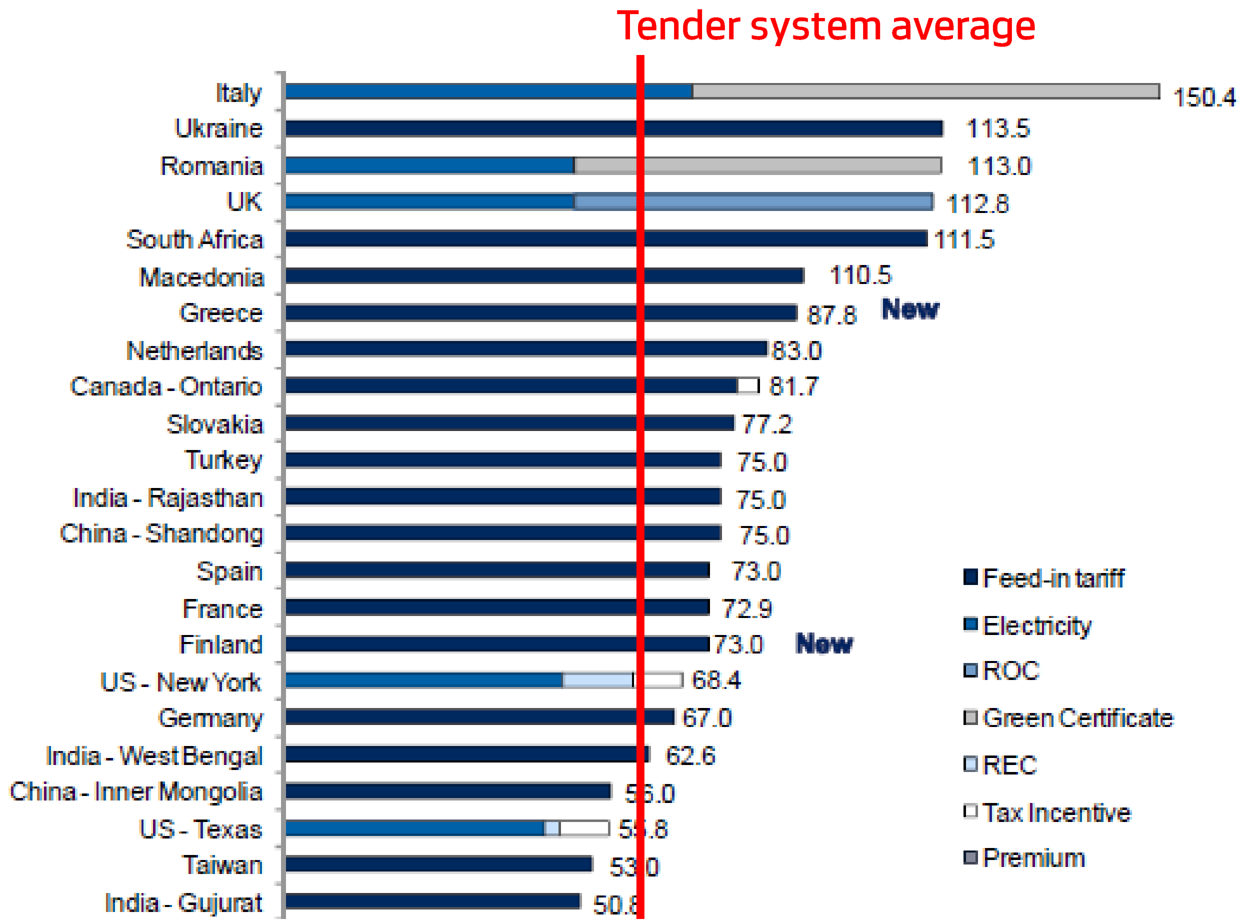
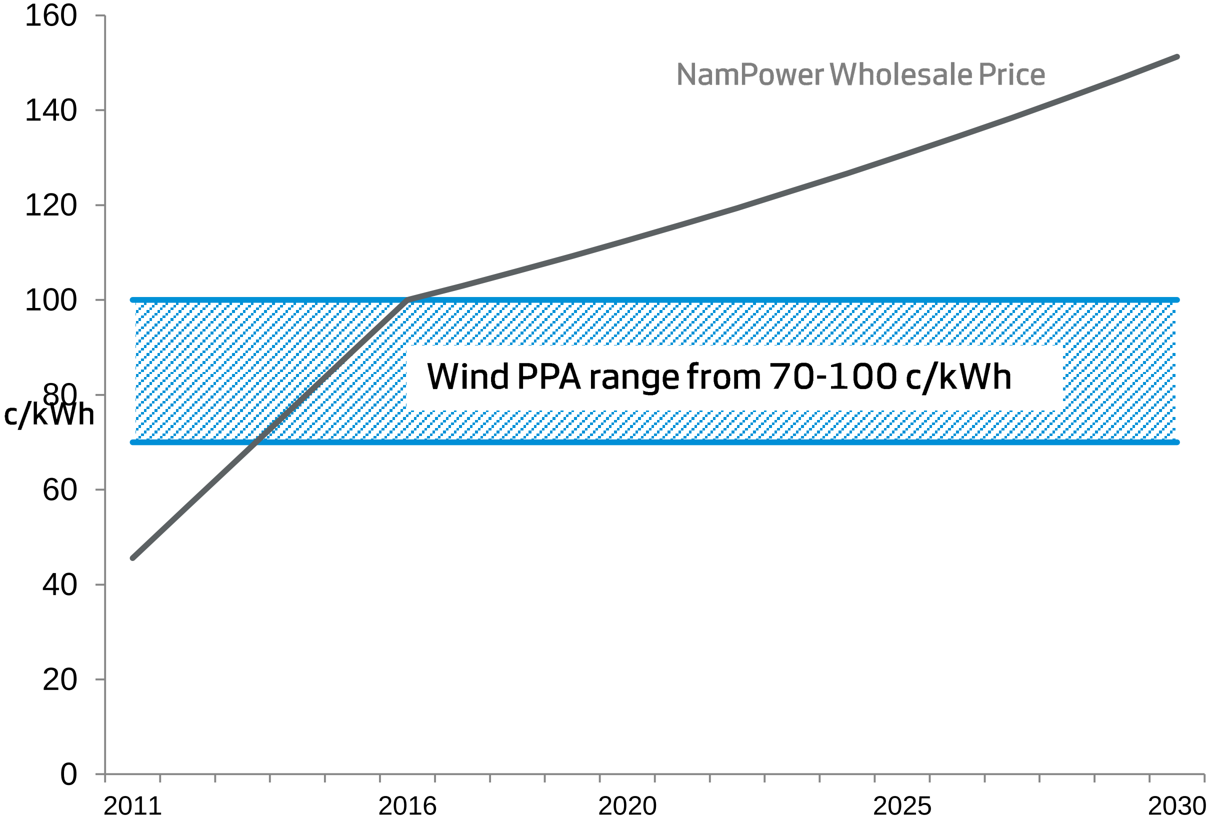
Policy tool	Advantages	Disadvantages	Implementation	Recommended for Namibia?
Quota/ Certificates	• Market image	• High costs, windfall profits • Favors larger players	Lengthy	Low
Tender	• Cost competition - price transparency • Implicit cap (control over capacity addition)	• Risk of project failures • More efficient with larger volumes • Stop-and-go market risk	Lengthy	Medium-High* * for larger market Volumes
REFIT	• Mobilizes small or community IPPs • Stable market volume better for industry development	• Complex cost monitoring	Lengthy	High
Capital grants	• Direct CAPEX support lowers marginal costs	• Power market / merit order distortion	Fast	Medium
PPA (single projects)	• Limited overall cost exposure • Reference projects	• Tariff / risk sharing negotiations can be difficult	Fast	High

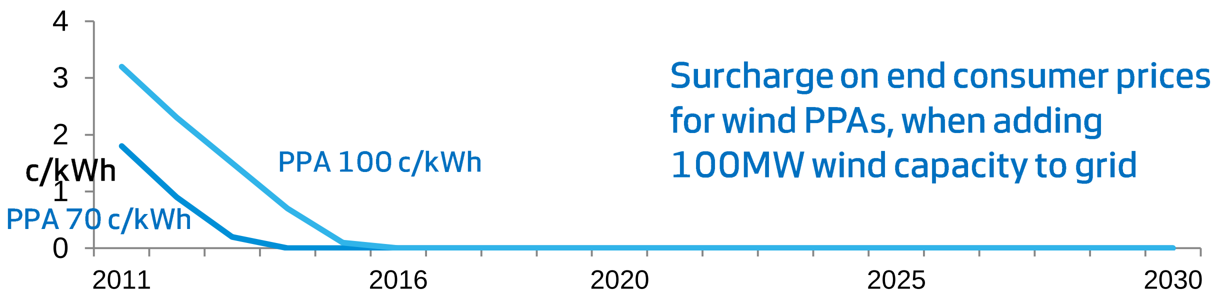
Procurement Mechanisms: REFITs are most wide-spread and can be very low-cost



Wind energy tariffs over 20 years by country (€/MWh)
Source: BNEF

An expected strong increase in wholesale power prices in Namibia will reduce the need for wind support costs





"The average wholesale power supply tariff will more than double by 2016."

Honorable Minister Isak Katali

Assumptions: Wholesale price 100 ct/kWh (2016); thereafter 5% growth p.a.; total national consumption 3.6 bn kWh, grows at wholesale price rate

Setting clear and binding renewable/wind energy targets will motivate and guide the market

Renewable Electricity Shares

- Can be Renewable Portfolio Standard (RPS) imposed on utilities
- Often binding, with penalties

MW build-out targets

- Often only guidance, but combined with effective REFIT etc
- Can be precisely achieved when combined with tenders
- Based on demand-supply forecast/planning (NIRP)

Country	Target
Algeria	10% by 2020
Cameroon	50% by 2015
Cape Verde	50% by 2020
Egypt	20% by 2020
Ghana	10% by 2020
Morocco	20% by 2012
Nigeria	7% by 2025
South Africa	13% by 2020

Source: REN 21 Global Status Report 2010, REEEP Report for ECB 2011

Government Support Tools - Conclusion

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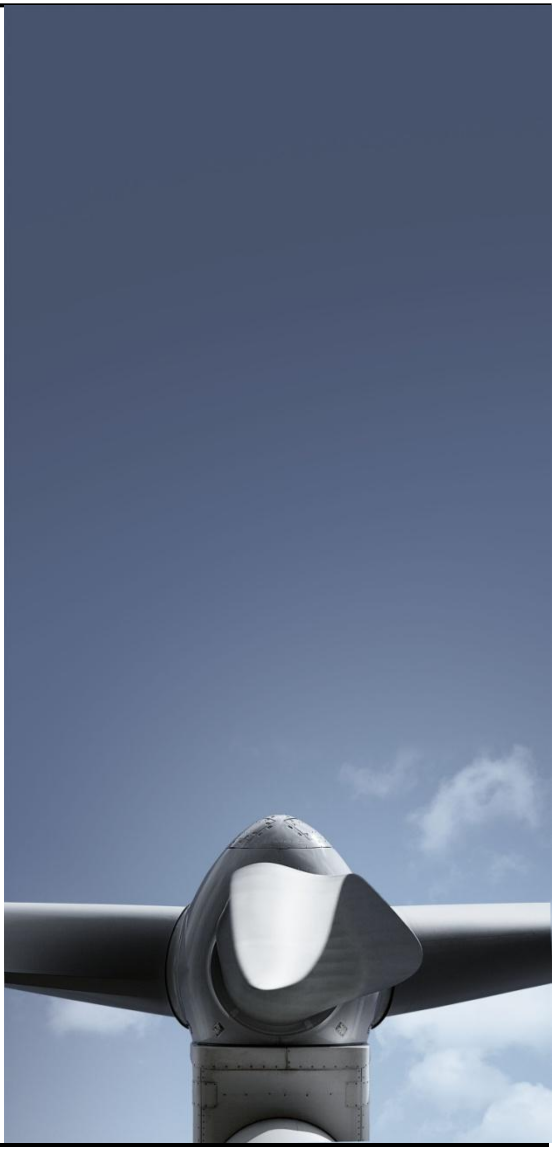
- Clear political signals are instrumental
- As a fast first step, Governments can create reference projects with single project PPAs
- Differential costs should be spread over all consumers, but impact of wind power is minimal

PPA Structuring - Conclusions

- ➔ First developers need guidance on planning conditions through Government agreement
- ➔ Long-term PPAs on must-take electricity best option
- ➔ Escrow accounts can reduce direct exposure if Government guarantees PPA

Mr. Malte Meyer
Director of Government Relations, Vestas Central Europe

Thank you



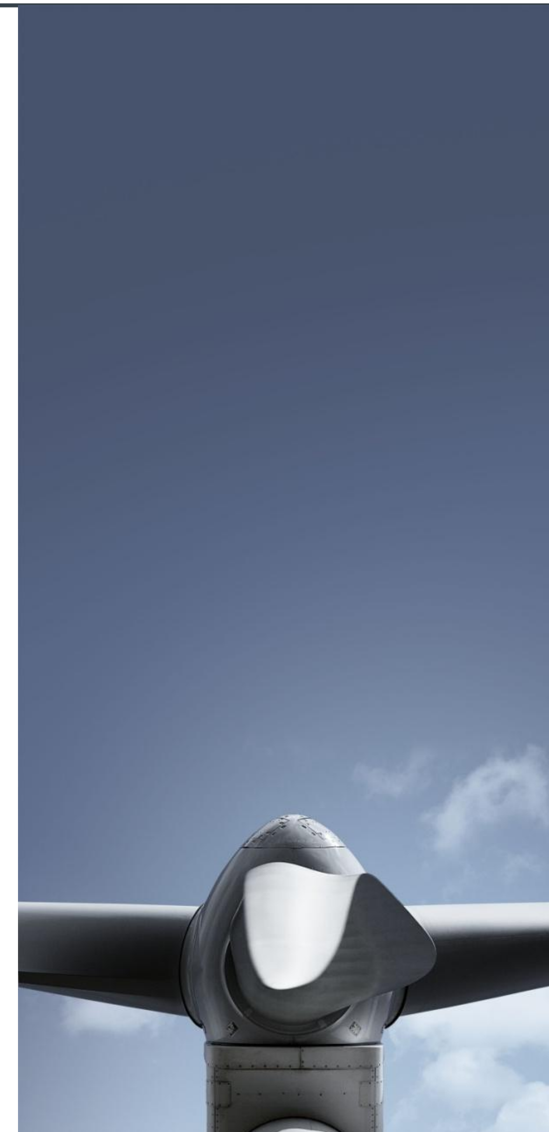
Discussion – Political next steps

Mr. Kudakwashe Ndhlukula,

Coordinator at REEEI, Polytechnic of Namibia

TECHNOLOGY AND DEVELOPMENT

POLYTECHNIC OF NAMIBIA



Lunch break

We will resume in 30 minutes

Session 2:
Grid integration of wind energy

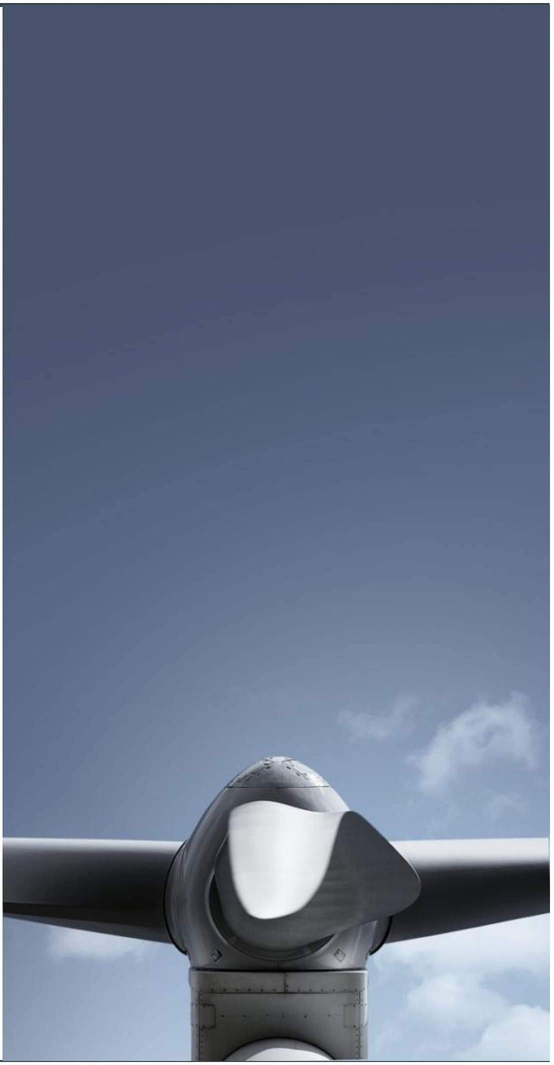
WindTalks NAMIBIA

12:30
Grid situation in Namibia
Mr. Paulinus Shilamba, Managing Director of NamPower

12:45
International best practices
Mr. Erik K. Soerensen, Director, Grid Expert at Vestas

13:30
Wind integration in Namibia
Mr. Erik K. Soerensen, Grid Expert at Vestas

14:00
Discussion – Grid Integration next steps
Mr. Kudakwashe Ndhlukula,
Coordinator at REEEI, Polytechnic of Namibia

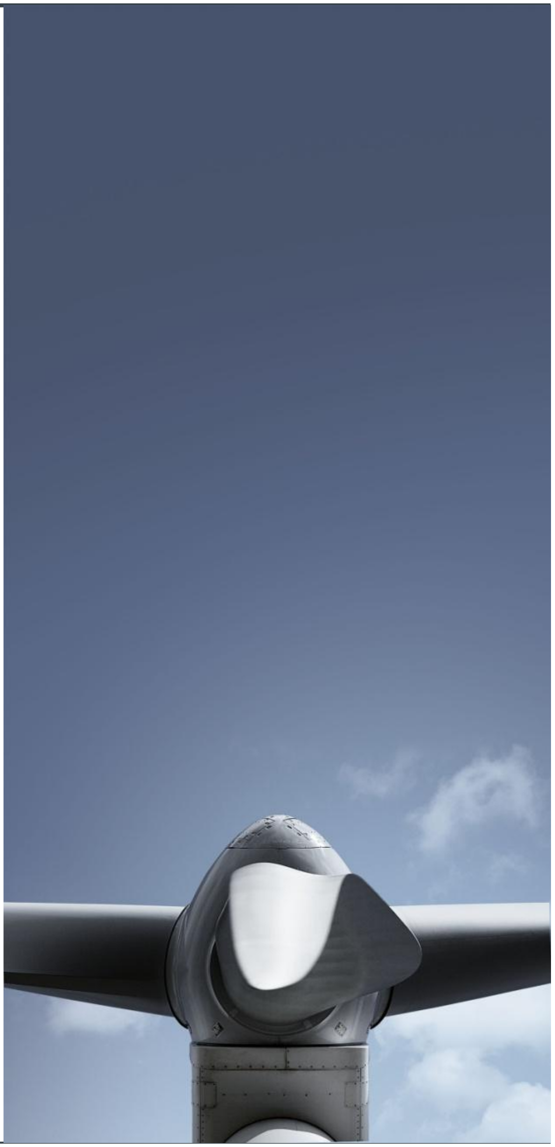


Session 2: Grid integration of wind energy

Grid situation in Namibia

Mr. Paulinus Shilamba,
Managing Director of NamPower

NamPower



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Grid Situation in Namibia

P.I. Shilamba

Managing Director

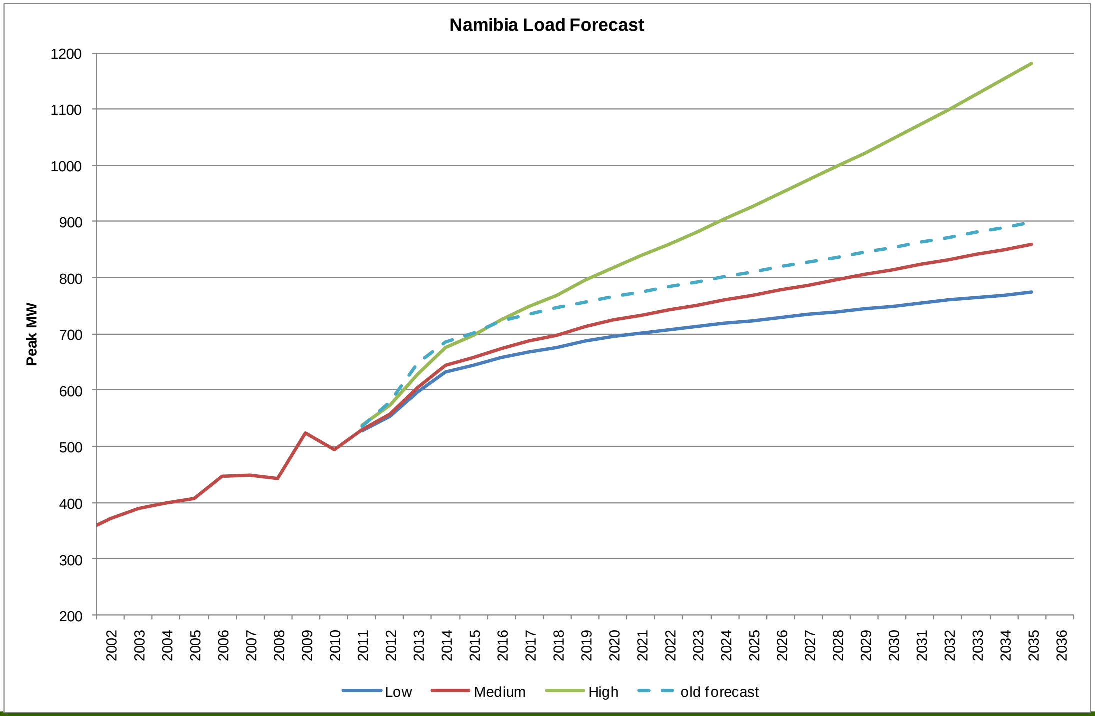
7 November 2011, Windhoek

Introduction

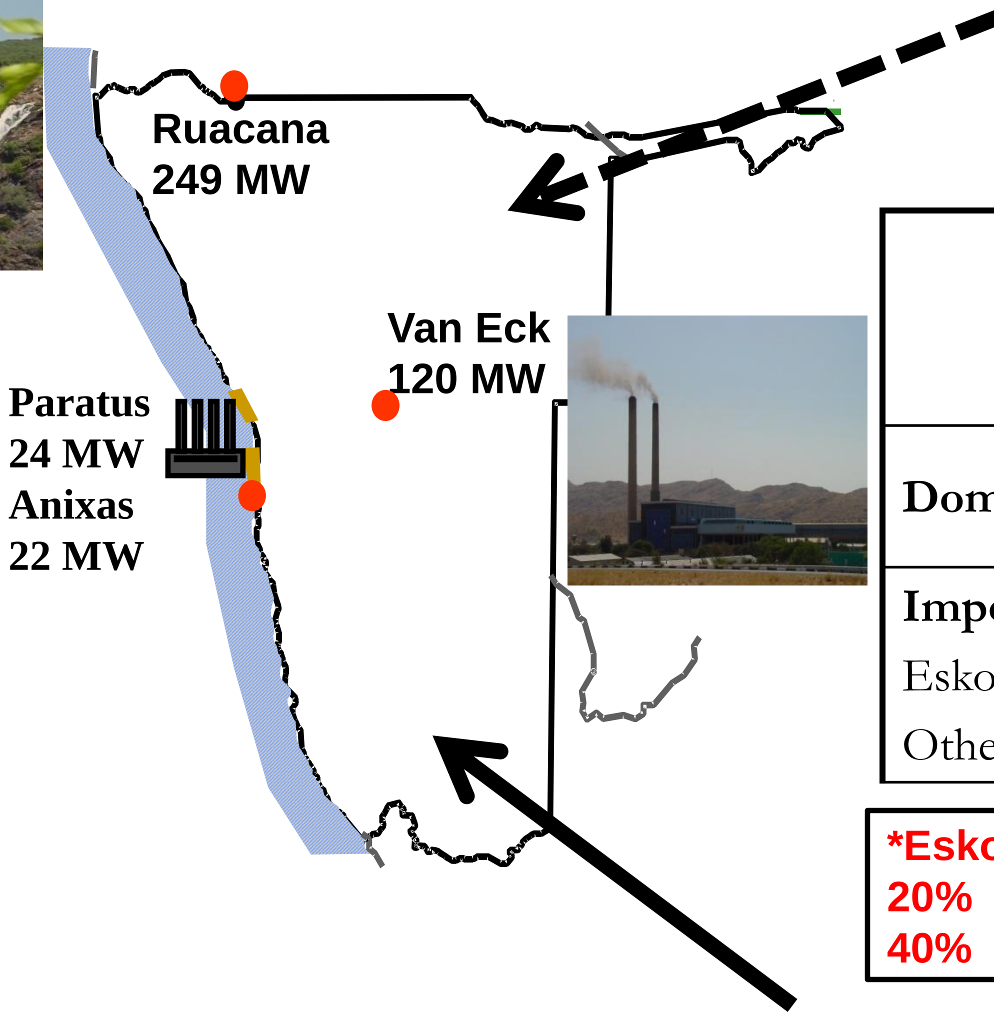
- Presentation on the Energy and Grid Situation in Namibia
- Sharing of Information on:
  - Power Supply Situation
  - NamPower Grid and its Challenges
  - Issues with regards to Grid Integration of Wind Energy

Demand Situation in Nambia

- 2011 Maximum Demand Registered (5 July 2011)
  - 511.482MW excluding Skorpion Mine
  - 593.812MW including Skorpion Mine
- Load Forecast
  - Latest August 2011



Power Generation in Namibia



	2009	2008
Domestic	40%	42%
Imports		
Eskom	41%	53%
Others	19%	5%

***Eskom import down to 20% and others up to 40% in 2010**

Recent Success Stories

- Hwange Investment
  - 150MW PPA (2008 – 2013)
  - Good example of regional cooperation
- Caprivi Link Interconnector
  - 300MW transfer capacity, currently limited due to AC network constraints
  - Completed June 2010 with official commissioning on 12 November 2010 by 4 Heads of States
  - Opportunity to implement phase 2 (additional 300 MW)
- Anixas Emergency Diesel Power Station
  - 22MW capacity, operational since July 2011
  - Commissioned 3 November 2011

Current Generation Projects

- Ruacana 4th Unit
  - Installation to increase capacity with 90 MW to 330 MW
  - Project Dates:
    - Commencement date: 27 March 2009
    - Work on site commenced: July 2010
    - Commercial operation: expected March 2012



Conventional Power Generation Projects under Feasibility Study Phase

- Kudu Gas-to-Power
  - Approximately 800MW generating capacity
  - Final Investment Decision expected by middle 2012
- Erongo Coal
  - Modular units of 150MW to 300MW, extendable if required
  - Similar timing as Kudu
  - Parallel preparation with Kudu till final decision as to which project to develop first
- Baynes Hydro Power Station
  - 500MW mid-merit/peaking
  - Coordinated by governments of Angola and Namibia through PJTC
  - Expect commissioning by 2018

Renewable Energy Projects under Feasibility Study Phase

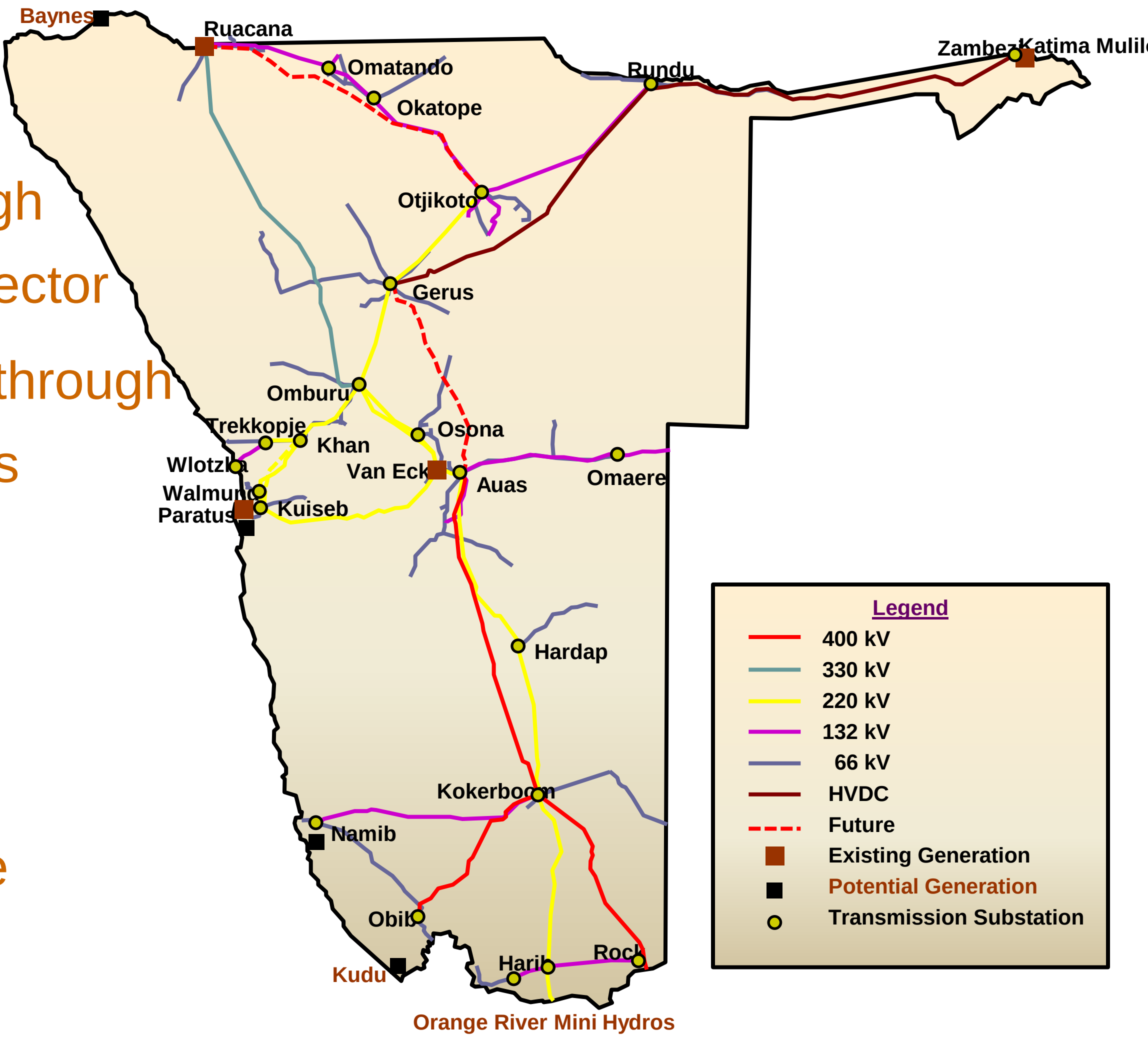
- Wind
  - Walvis Bay (±60MW)
  - Lüderitz (±44MW)
  - PPA discussions ongoing
- Solar
  - Large scale (3 x ±10MW)
    - PPA discussions ongoing
  - Small scale connected to grid – discussion ongoing with ECB
- Biomass (Invader Bush)
  - Feasibility study in progress, draft report by December 2011
  - Objective to determine logistics around feedstock

Short Term Critical Supply Project (STCS)

- Any base load power station for commissioning only by 2015/2016
- Power supply deficit of 80 MW by the 2012 winter, increasing to 300 MW by 2015.
  - Worsened by expiry of ZESA agreement in 2013
- A dedicated team appointed to the project
- Solutions will include one or a combination of the following:
  - New power purchase agreements with SAPP trading partners
  - New renewable energy projects and PPA with renewable energy IPP's
  - Increased DSM programs
  - Upgrading of existing plants (Van Eck, Ruacana, Paratus, Anixas)
  - PPA's with other IPP (Arandis Power)
- Final project plan expected by Dec 2011

Transmission Grid

- Interconnected to
  - Zambia (Zesco) through Caprivi Link Interconnector
  - South Africa (Eskom) through 400kV and 220kV lines
- Characteristic
  - Long radial network
  - Low fault levels
  - Near 50 Hz resonance phenomenon



Issues Pertaining to Wind Integration in Namibia - Regulatory

- NamPower support government policy on renewable energies
  - ✓ promotion of the use of renewable sources of energy
  - ✓ renewable energy to be part of the supply mix
- Challenges with integration of renewable energies
  - ✓ High cost in comparison to conventional sources
  - ✓ Absence of Namibian Grid Code on Wind Integration
- NamPower Renewable Energy Target
  - ✓ Ten percent of capacity from renewable energies
  - ✓ This target presently under review

Issues Pertaining to Wind Integration in Namibia - Technical

- Issues to be considered and investigated when connecting a wind farm
  - Communication – control and monitoring of the wind farm
  - Protection of the transmission connection – unitised protection throughout
  - Voltage / reactive power control by the wind farm
  - Low Voltage Ride Through Capability
  - Fault level contribution
  - Ramp up / ramp down gradient
  - Tripping frequencies during island mode
  - Harmonics – filter requirements

Conclusion

- Namibia needs a base load generation plant, Kudu or coal, by January 2016
- Opportunity exists in Namibia to generate power through wind farms and other renewable energy resources
- Wind farms and other renewable energy sources could play an important role during the interim STCS period until 2016, as they can be developed faster
- NamPower is currently revisiting its renewable energy target
- Grid code on integration of wind farms required for the successful integration of wind farms into the national transmission network

END

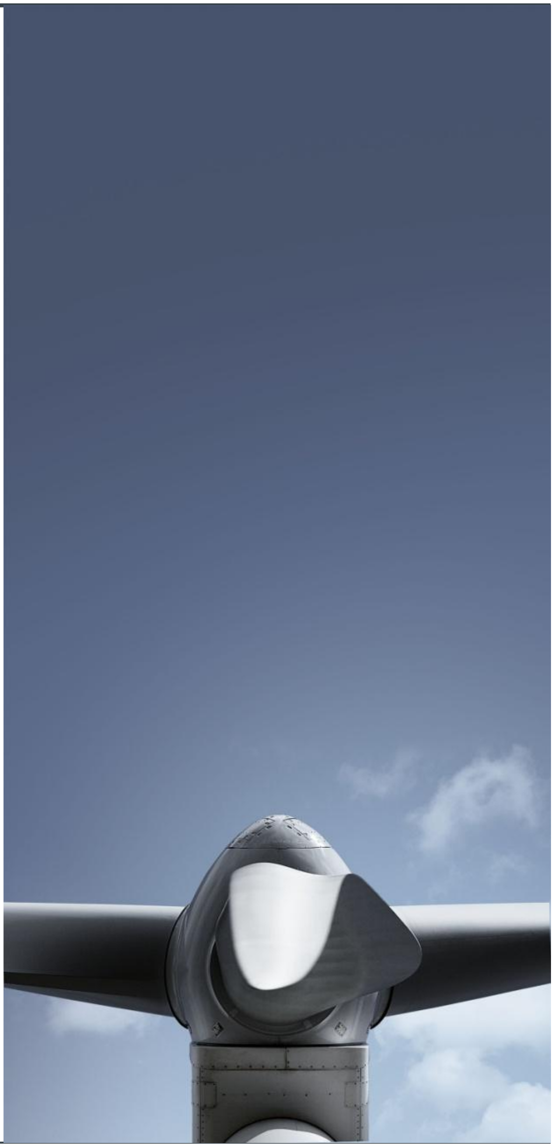
I thank you

for your attention

WindTalks NAMIBIA

International best practices

Mr. Erik K. Soerensen,
Grid Expert at Vestas Group Government Relations



Vestas®

High wind penetration levels are entirely possible

Wind Penetration Levels by end 2009
- showing wind's share of domestic electricity consumption

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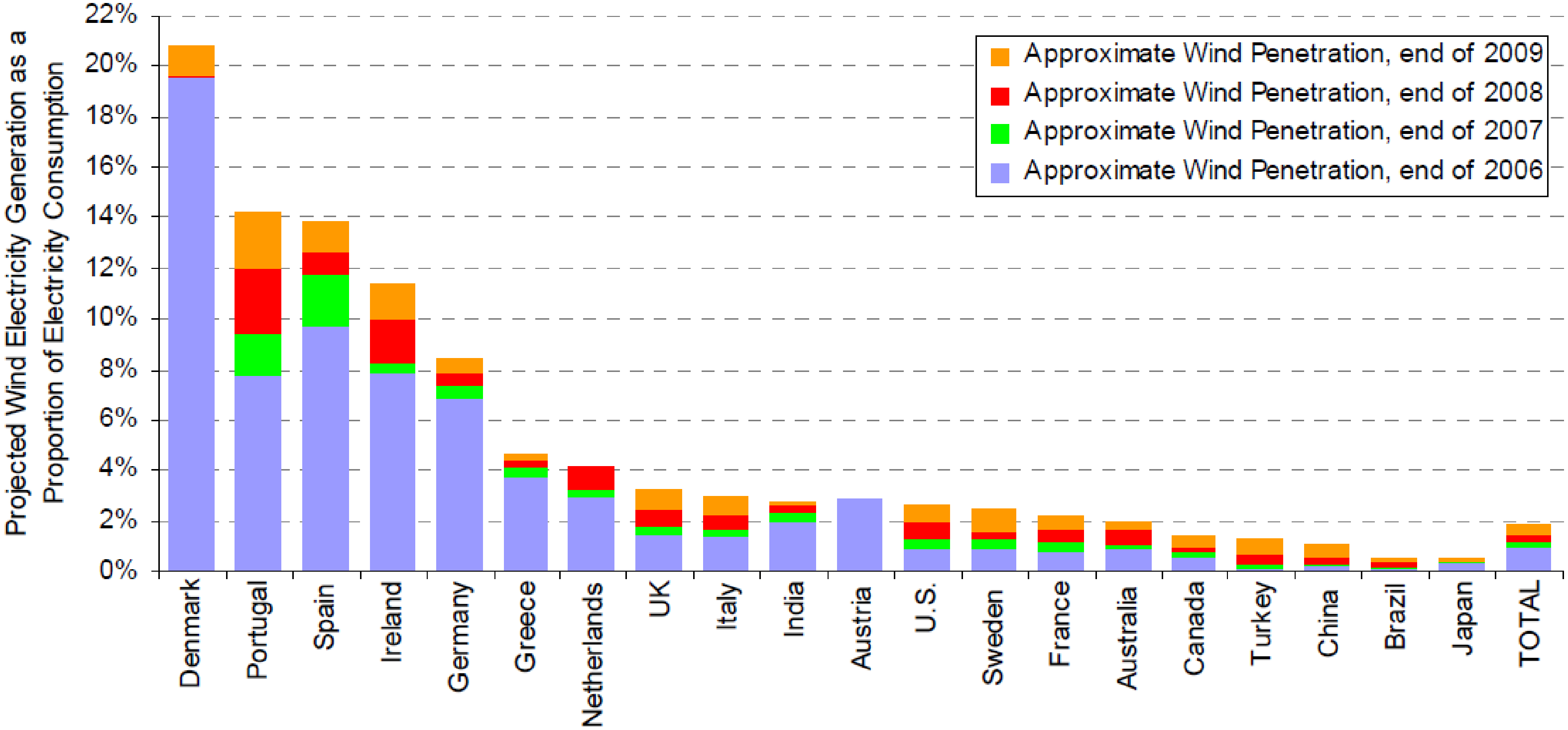


Source: Wiser & Bolinger 2010

How have different countries achieved their high wind penetration shares?

In Denmark, balancing is handled via strong interconnectors and a well functioning market

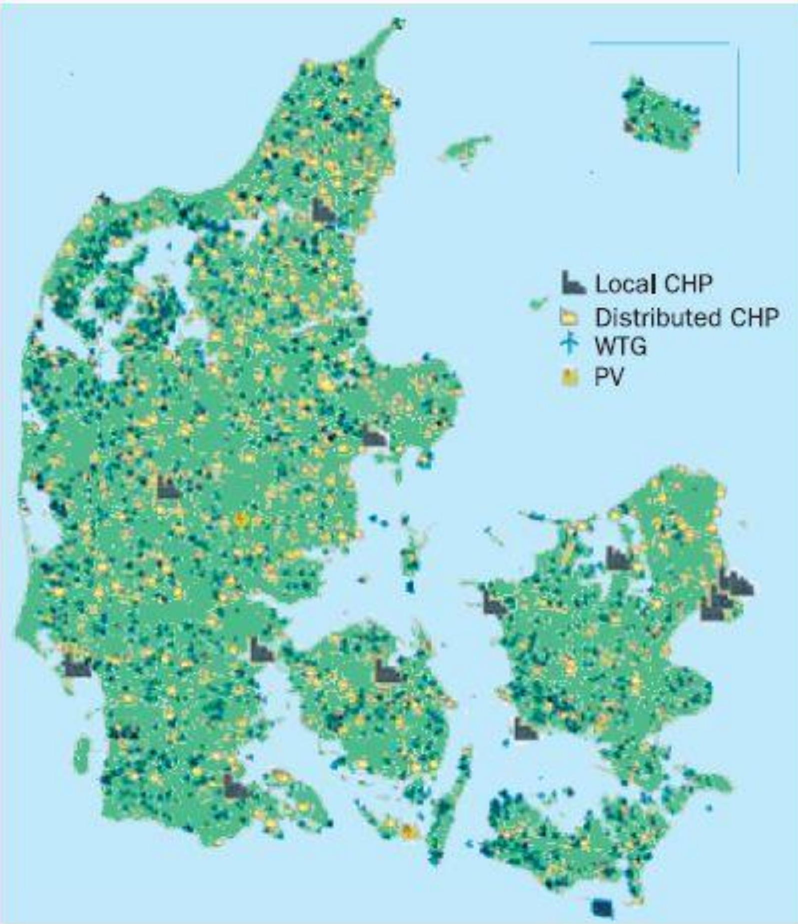


Figure 9-4 Distribution of Wind Power Installations in Denmark in 2009
(Source: Energinet.dk)

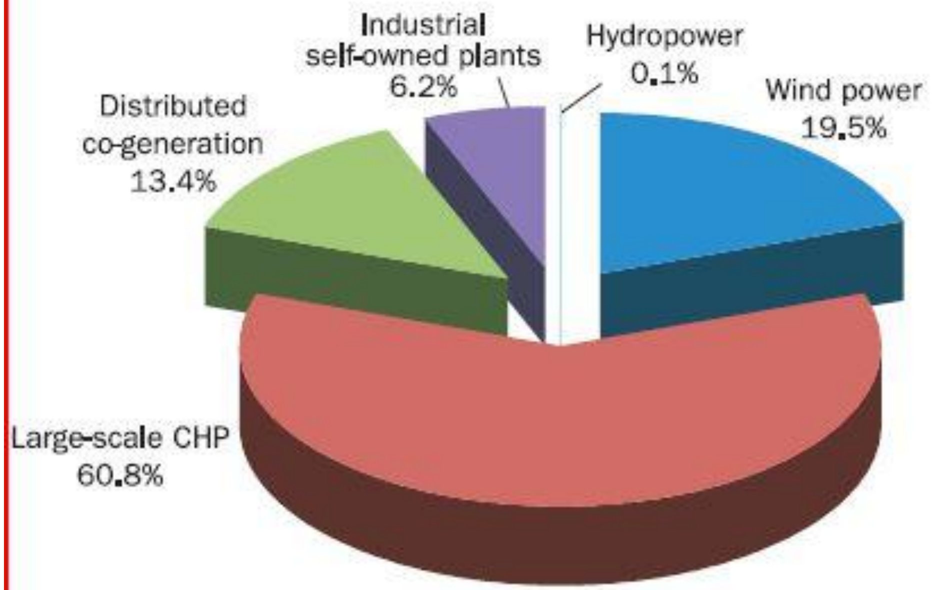


Figure 9-2 Denmark's Power Output Makeup in 2009

Balancing is handled via the Nordic Electricity Market.

Denmark has set a target of 50% wind penetration by 2020.

In Germany the high wind share is also handled via interconnectors and market. Geographic dispersion helps.

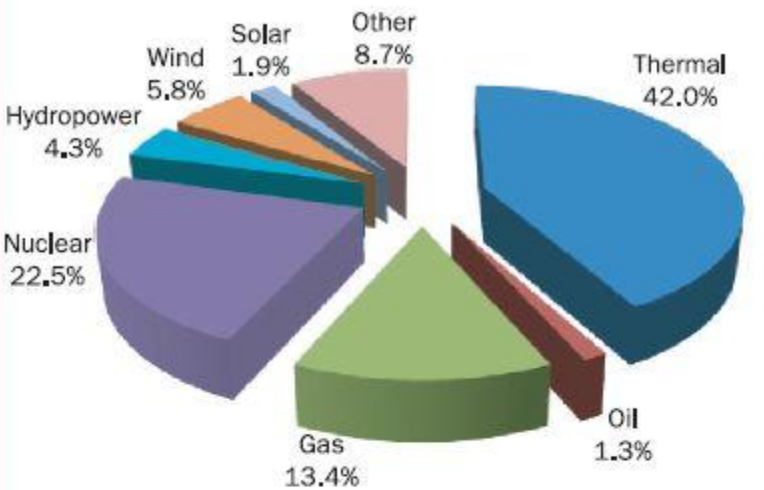


Figure 9-17 Germany's Power Generation Output Makeup in 2010

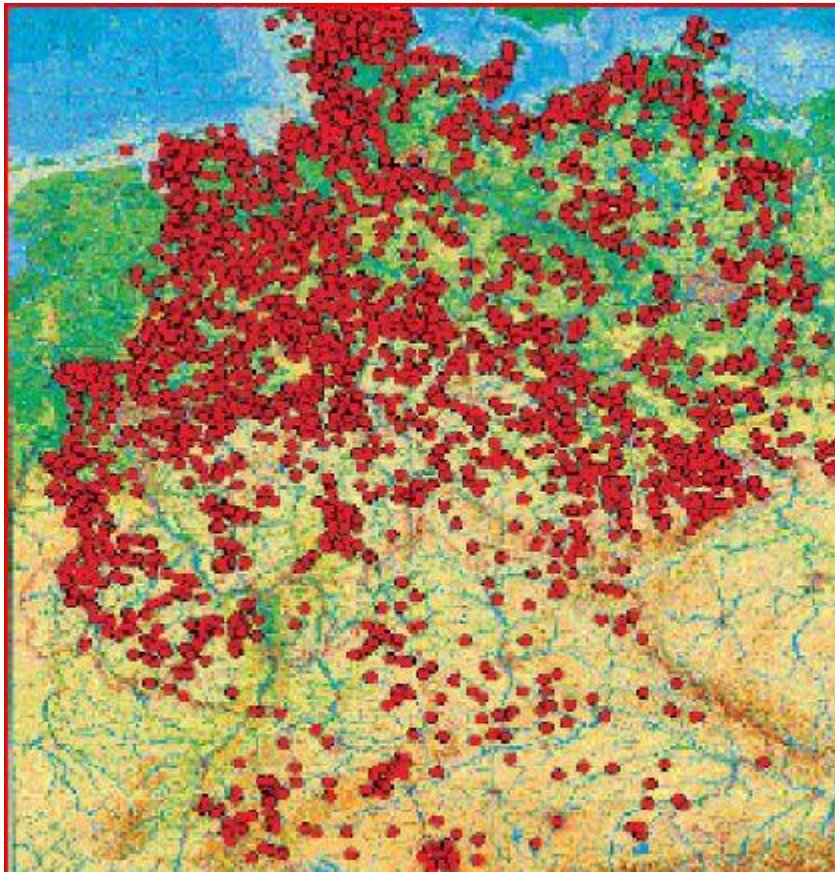


Figure 9-19 Germany's Wind Power Locations
(Source: German Wind Power Association)

Germany has approx. 6% wind production onshore, and a very ambitious programme for offshore installations (25,000 MW by 2030).

Spain is essentially "an electrical island". Balancing via the rest of the generation mix. Geographic dispersion is helpful.

Figure 9-11 Wind Farm Distribution in Spain in 2009
(Source: Endesa)

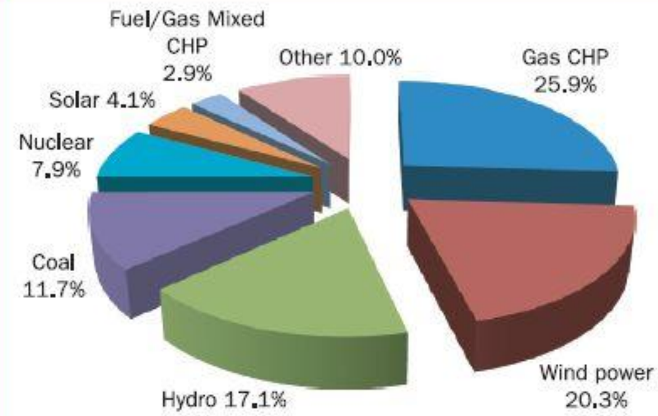


Figure 9-8 Power Generating Installation Make-up in Spain in 2010

Figure 9-12 Spain's Installed Wind Power Capacity and Proportion 2001-2010
(Source: Ea Energy Analyses)

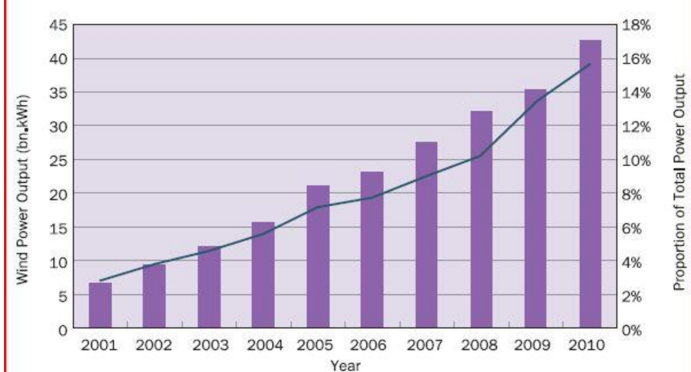


Figure 9-13 Spain's Wind Power Output and Proportion from 2001-2010
(Source: Ea Energy Analyses)

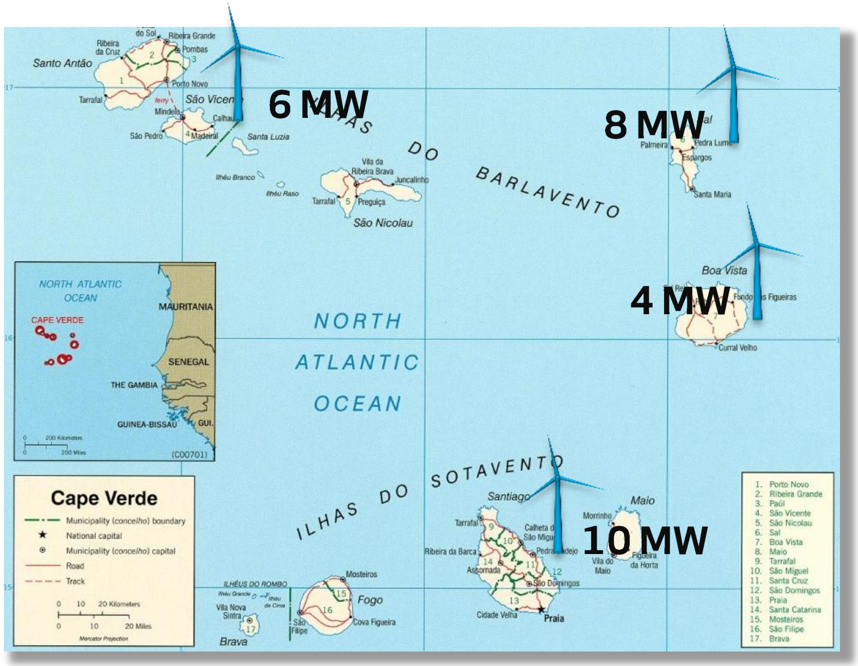
Spain has had a very rapid growth in onshore wind installations. Now more than 20,700 MW in operation. By 2020 capacity is expected to be 38,000 MW.
Focus on forecasting.

Other examples - Cape Verde. Small islanding systems.

The Telegraph

Cape Verde to be entirely wind-powered

Britain is to spend £26 million building a wind farm to power the entire Cape Verde, the isolated archipelago off the west coast of Africa.



Note: islands are not interconnected – average numbers

Total power generation (2008): 257 GWh
Total power consumption (2008): 239 GWh

Total wind capacity 28 MW
Assuming 2,000 full load hours per year, wind will generate 56 GWh per year.
Corresponding wind penetration is 23%

Wind integration measures

Increasing flexibility of both generation and demand is key to achieving large wind penetrations

Minimum loads on conventional power plants

- Example: Danish grid code requires 30% minimum load. Due to market incentives, most plants now able to stay on grid with only 10-15% load
- Both existing and new power stations
- For CHP: decouple heat constraints through heat storage
- Negative prices in spot markets (example Denmark and Germany)

Faster dynamic characteristics for all generating units

- Faster ramp rates (MW/min.)
- Shorter start-up times and lower start-up costs

Creating flexibility in demand

- Disconnectable loads on contract
- Electric heaters for district heating
- Heat pumps, small scale and large scale

New means of integrating wind power; Tools proposed by Danish TSO en route to 50% penetration

Means	Short term	Medium term	Long term
Primary focus: Power system balancing	• Expansion of intercon-nections - cross-border electricity trade • Reinforcement and expansion of existing grid • Downward regulation of production through nega-tive spot prices	• Geographical spread of offshore wind farms • Demand response • Flexible electricity generation	• Electricity storage in hydrogen for fuel cells • Compressed Air Energy Storage • Electricity storage in batteries
Primary focus: Electricity integration in other energy sectors	• Heat pumps in power stations • Electric boilers in power stations	• Heat pumps in private households • Plug-in hybrid cars • Electric cars	• Use of (electrolysis-based) hydrogen in transport sector • Use of (electrolysis-based) hydrogen in natural gas grid

Source: Energinet.dk

In Spain, the independent TSO focuses on short-term forecasting of wind generation

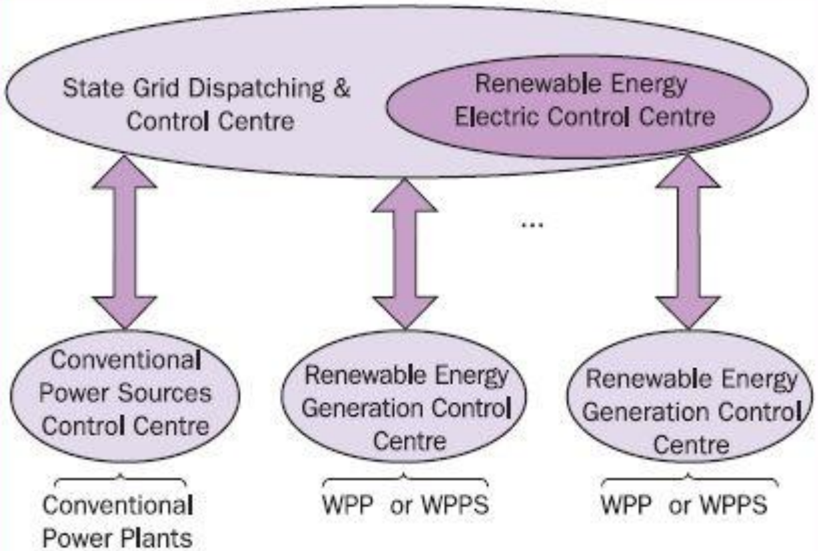
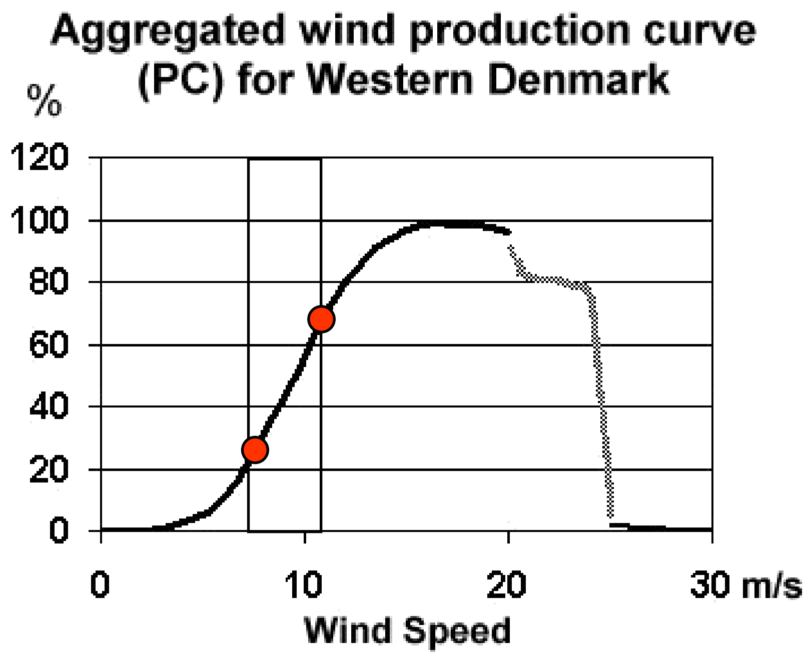


Figure 9-15 Spanish Power Dispatching Organizational Structure Demonstration

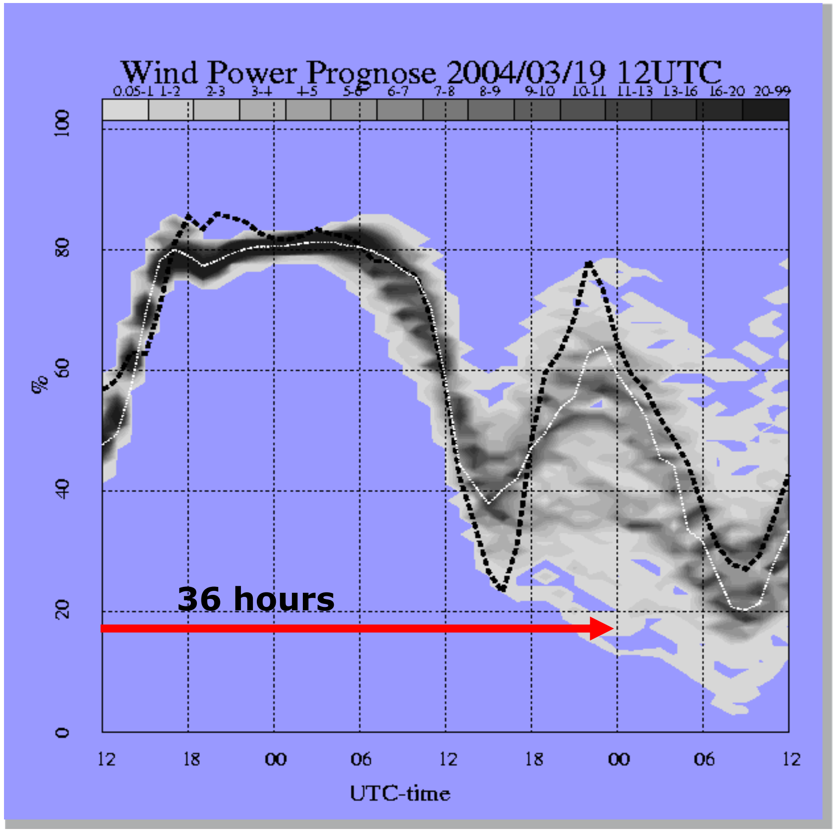
The Spanish Electric Power Law stipulates that wind farms must forecast their energy output and present their wind power generation plans to grid enterprises in advance. When the forecast differs from actual output by over 20%, wind farm operators must pay a penalty to the grid company, Spanish wind power development enterprises and research institutions have undertaken a large amount of research in the fields of wind resource and wind short-term power forecasting, and have achieved very high levels of prediction precision. Short-term wind energy power forecasting technology has also been applied widely throughout Spanish wind farms and power system dispatching centers.

Spain has very low capacity on international connectors, and has therefore been very focused on efficient and accurate forecasting of wind production, to be able to balance their system - at the lowest possible cost.

Importance of Wind Power Forecasting



"Fresh breeze" results in a production between 600 and 1.600 MW out of 2,400 MW!



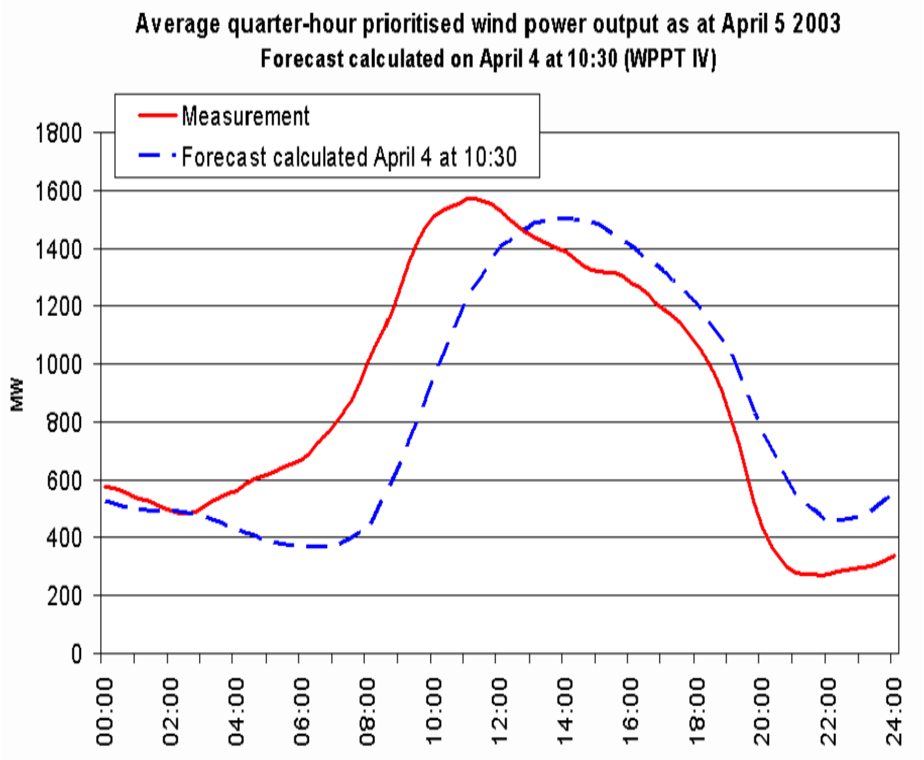
Forecast error 2007:

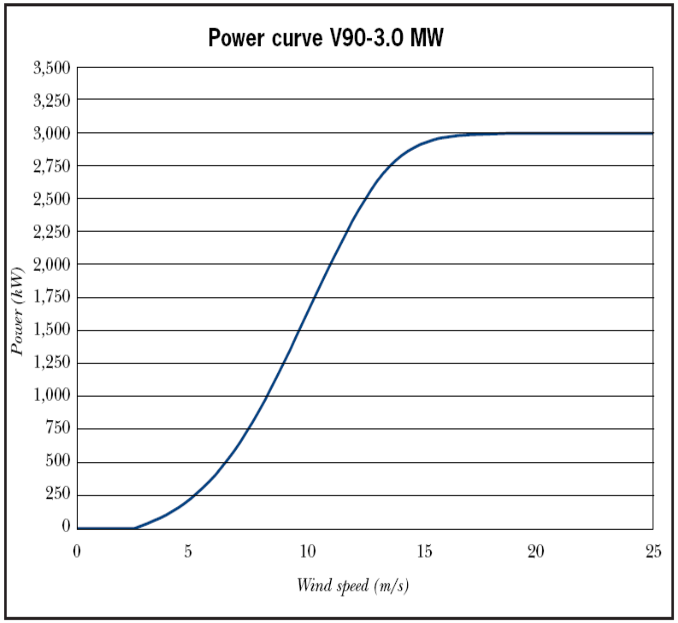
6% of installed capacity 24% of wind generation

Improved wind forecasts leads to an increased value of wind power in the market and the system

Short term forecasting is an art under continual development

WindTalks NAMIBIA





- Accuracy of forecasts improve when considering larger areas, “spatial smoothing”
- With large penetrations and large spreads, the forecasting errors will cancel out each other
- To the system, it is less important that the forecasted generation of the individual wind farm is accurate. What matters is accuracy of the aggregate forecast
- Aggregate forecasts must be updated continually (e.g. every 3 hours)

In addition to forecasting, it is important that installed capacity is reliable and available when the wind is blowing

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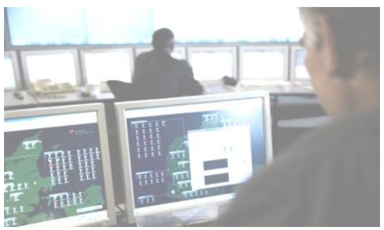
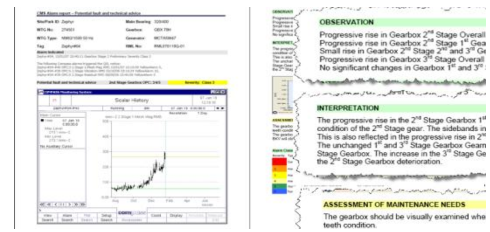
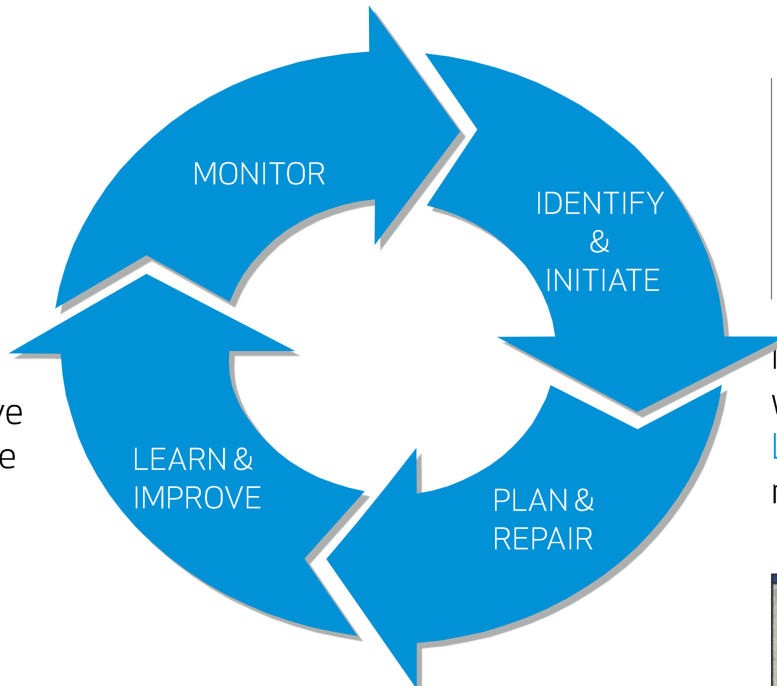
Through our advanced condition monitoring solution and the world's largest diagnostic center Vestas minimizes lost production by predicting time to failure and taking preventative actions

Real time monitoring of 130+ SENSORS IN 16,000+ TURBINES globally

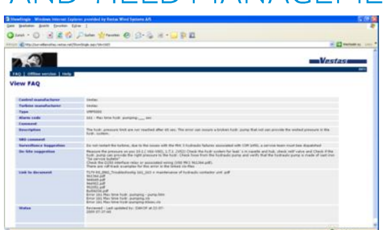


Identify performance deviations in the fleet based on predictive models and INITIATE PREVENTATIVE MAINTENANCE

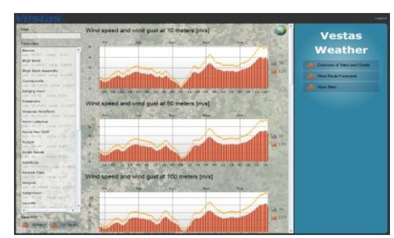




Findings are used to improve predictive models to provide RELIABLE PERFORMANCE AND YIELD MANAGEMENT



Maintenance plans based on weather forecast to MINIMIZE LOST PRODUCTION while making repairs



Power Plants and their characteristics determine the flexibility of the overall system

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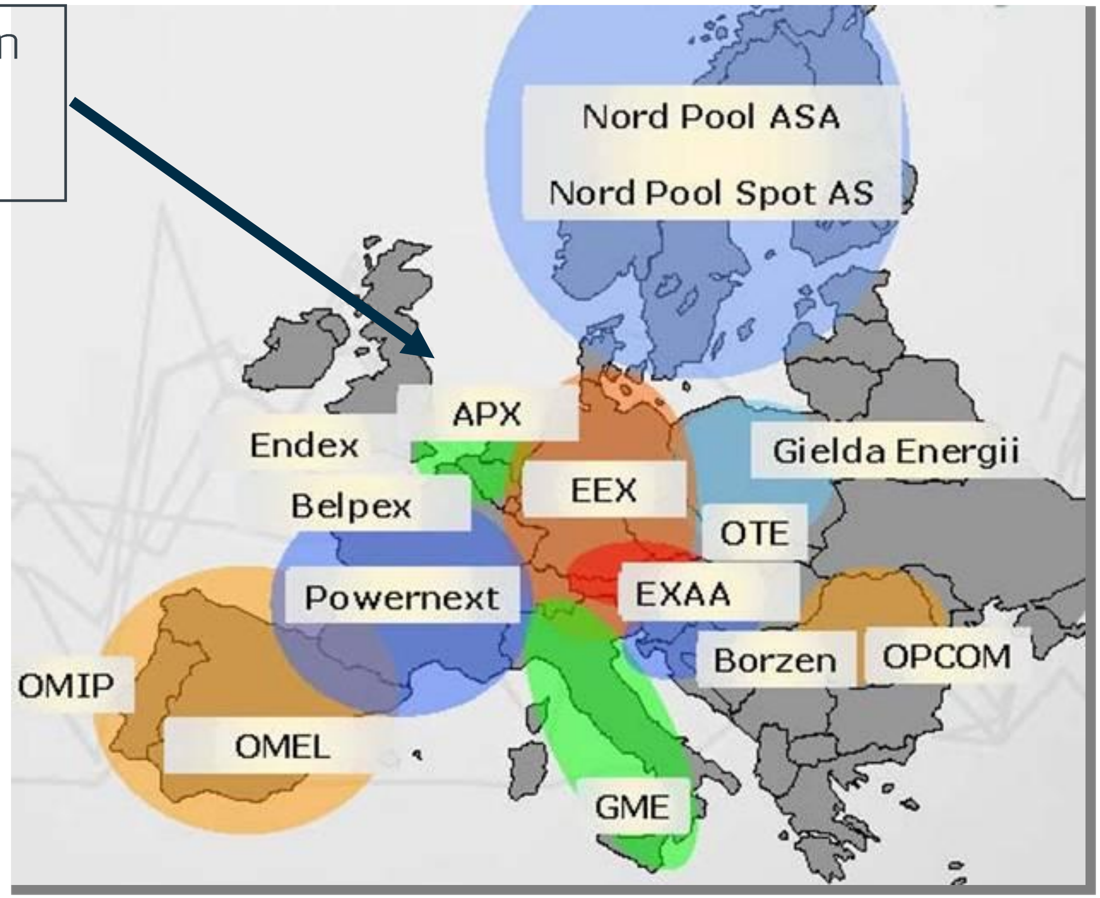
Type	Operation	Capital Cost	Fuel Cost	Dynamics
Nuclear	Base	High	Low	Low
Coal	Base	High	Low	Low-medium
Biomass	Medium	High	High	Medium
Gas (CCGT)	Base-peak	Low	High	High
Hydro	Base-peak	High-low	Low-low	High-high
Diesel	Base-peak	Low	High	High
Wind	Base	High	Low-low	Low-high
Solar PV	Base	High	Low-low	Low-high
Intercon-nector	Base-peak	High-low	High-low	High

European Power Exchanges moving towards closer integration but bottlenecks holding back the "inner electricity marker"

Efficient coupling between market areas is still a challenge!

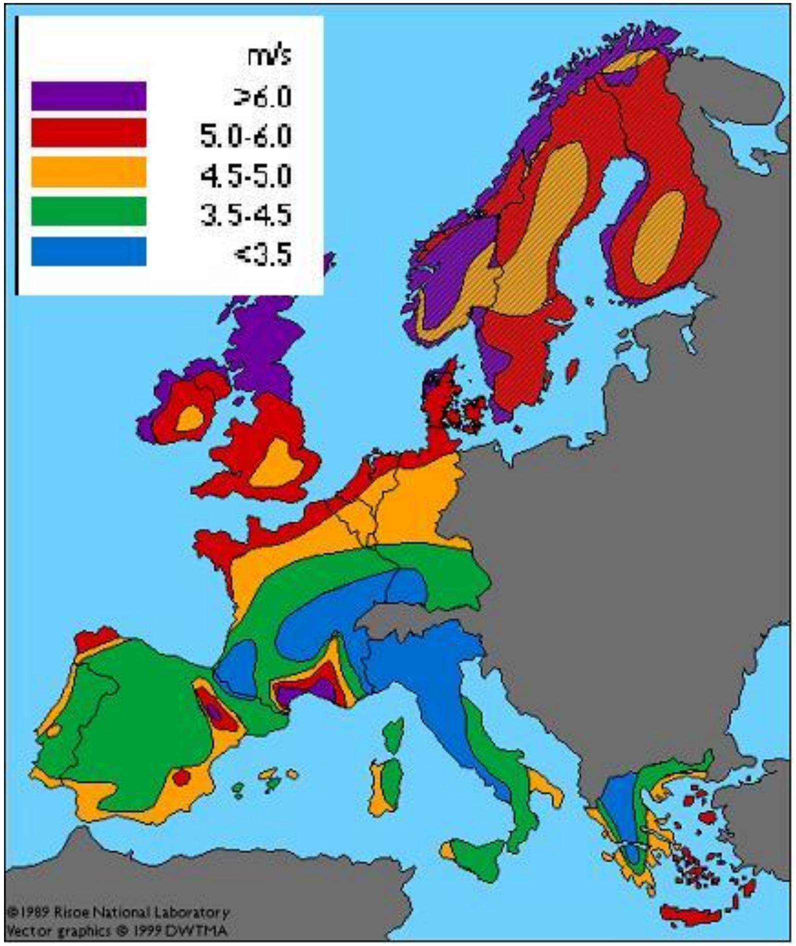


- European Commission has decided that market coupling across the EU must be achieved by the end of 2014
- Auctioning of scarce capacity at bottlenecks will help provide financing for reinforcements

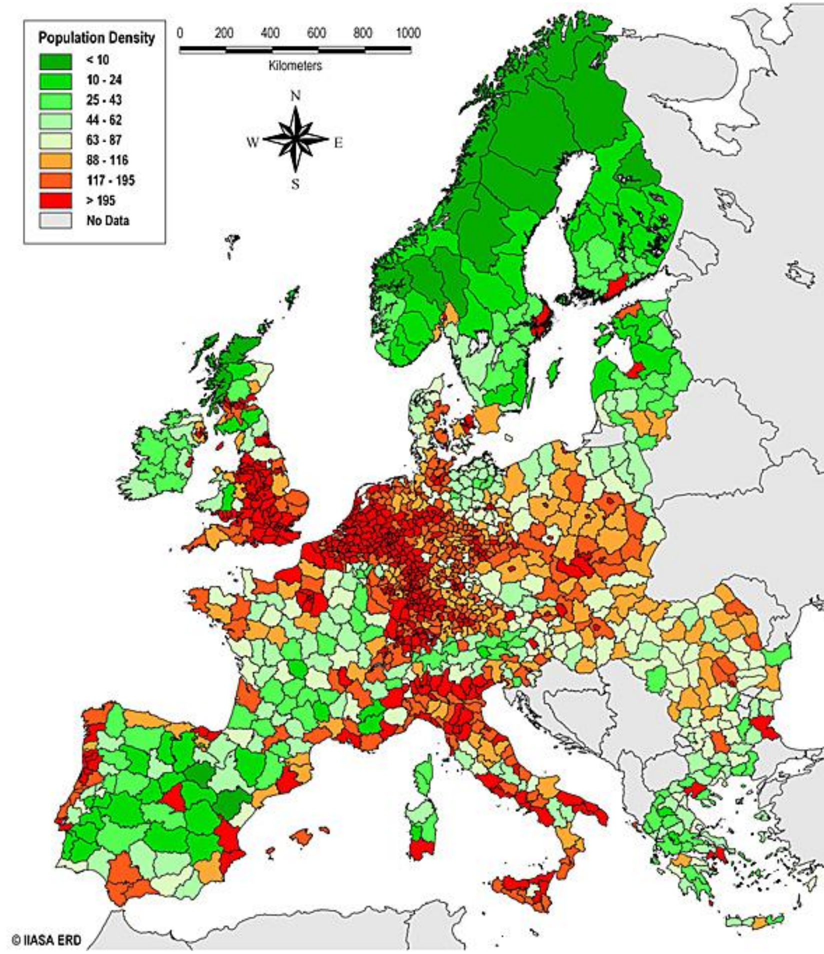
The Overall Wind Power Challenge in Europe

- good wind location and consumption doesn't match!

Wind potential



Population density



Interconnectors required to solve this!

Generation: Electricity markets in Europe facing challenges similar to Southern Africa

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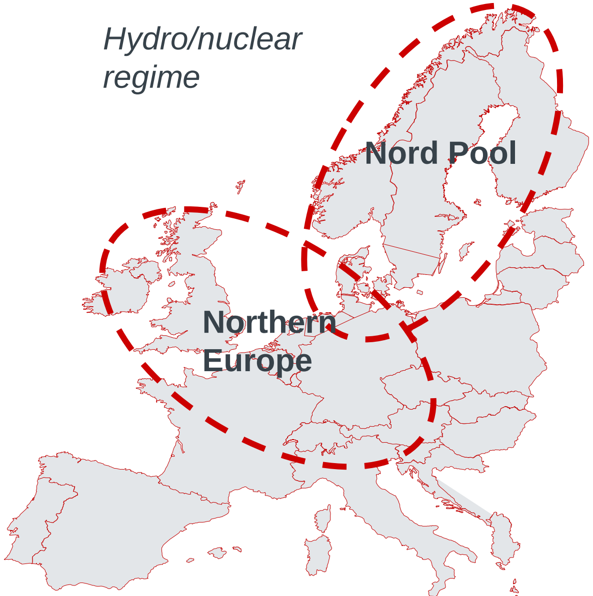
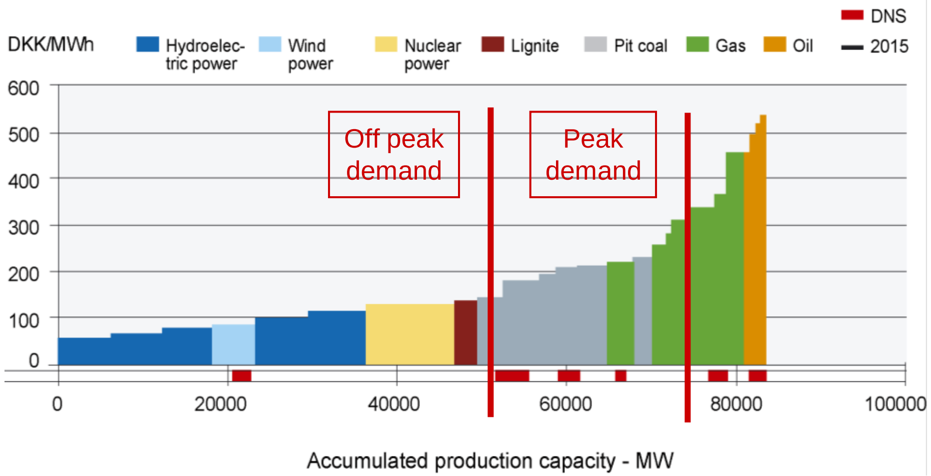


Nord Pool market development

- Nord Pool dominated by hydro and nuclear supply from Sweden, and Norway – at low marginal cost
- New capacity either gas, nuclear or wind power as no new hydro sites are available. Coal is not an option at the moment in Norway and Sweden
- One single power market

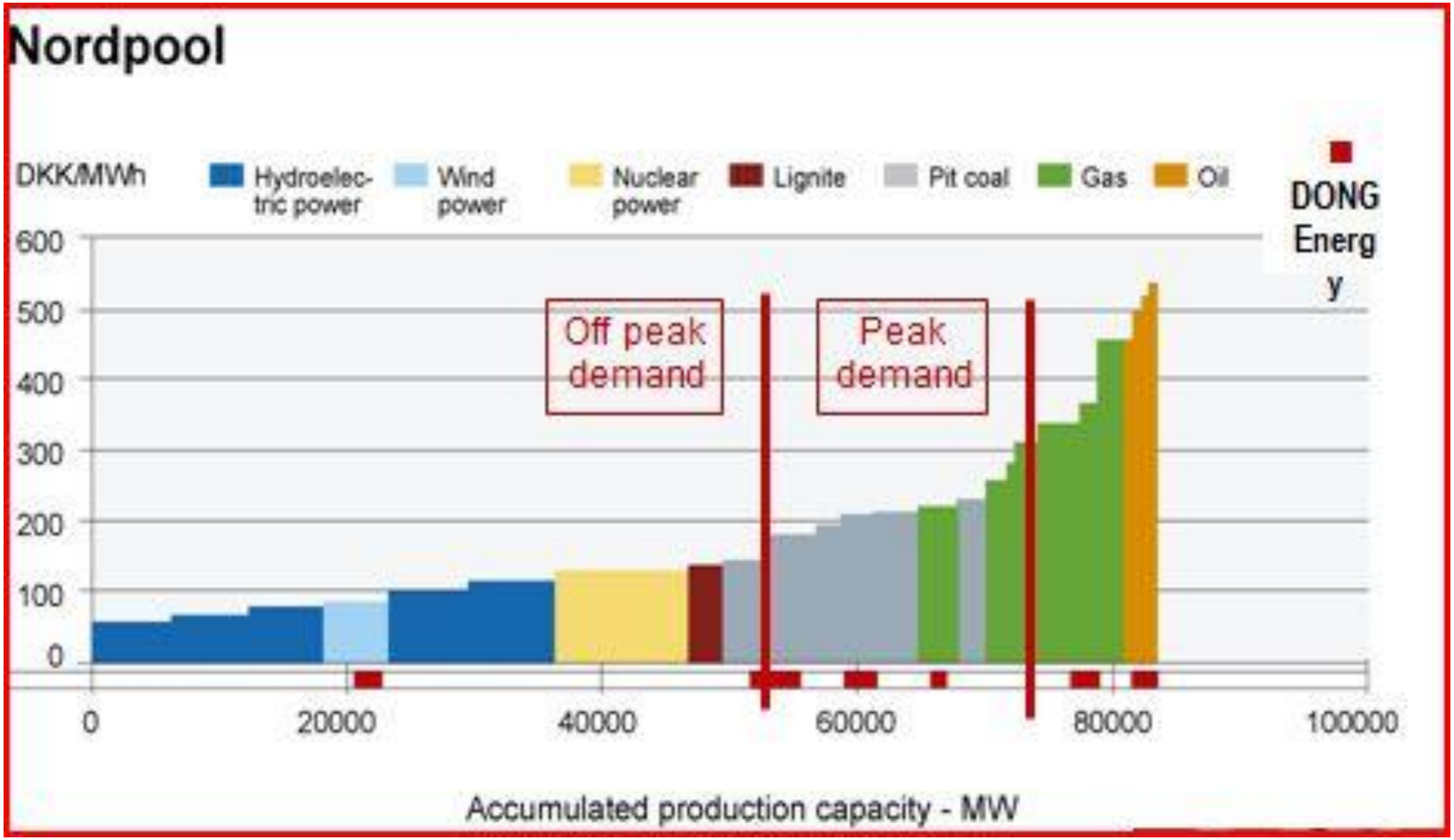
Nordpool



Nord Pool price setting from a DONG perspective

- DONG Energy is a swing producer in the Nordpool area. They only produce when electricity prices are above production costs. Prices depends heavily on precipitation
- In a normal year, only 60% of production capacity is utilized
- When prices are low, DONG can reduce production (down to the mandatory production for heat generation) and when prices are high, production will be increased

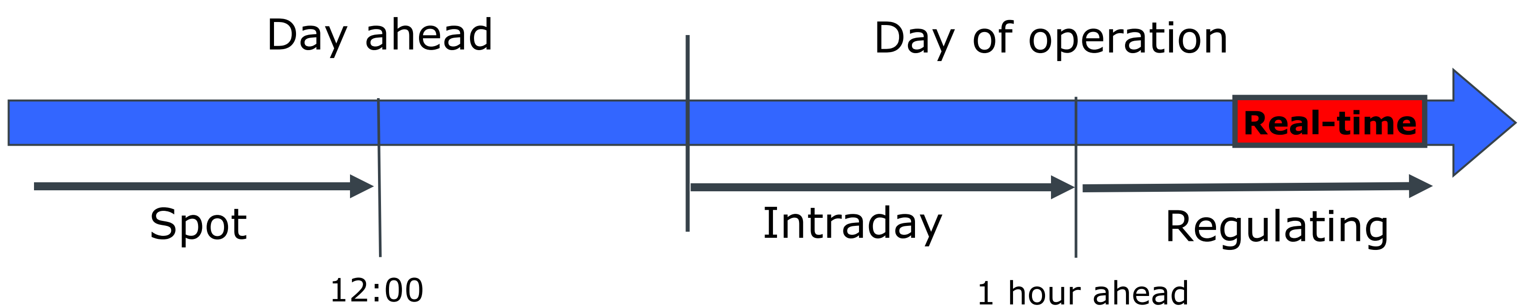
Generation: Electricity markets in Europe facing challenges similar to Southern Africa



Nordpool has four market places on a daily basis.
The Intraday market is very important for wind balancing

Daily markets on Nordpool:

1. Reserve market (option market)
2. Spot market (NordPool Spot)
3. Intraday market (NordPool Elbas)
4. Regulating market (real-time market - NOIS)



Measures to meet higher wind power penetration levels

- Increased transmission capacity
- Increased flexibility in generation and demand
- Efficient markets
  - use of market price signals in system control
  - congestion management
  - price elastic demand response
- Revised power system control architecture
- Detailed connection requirements (for all generators)
- Coupling between energy systems

How big are the balancing needs of wind power?

- Well sited onshore wind farms typically have 1,500 – 3,000 full load hours per year
- The corresponding capacity factors are 0.17- 0.34
- With good geographical dispersion and good forecasting, wind's capacity credit is in the range of 0.1 – 0.35, depending upon local factors (Europe)

How can modern wind power plants support the grid?

Planning wind development is important; below are some important elements to consider from a system perspective

Characteristics of WindPower

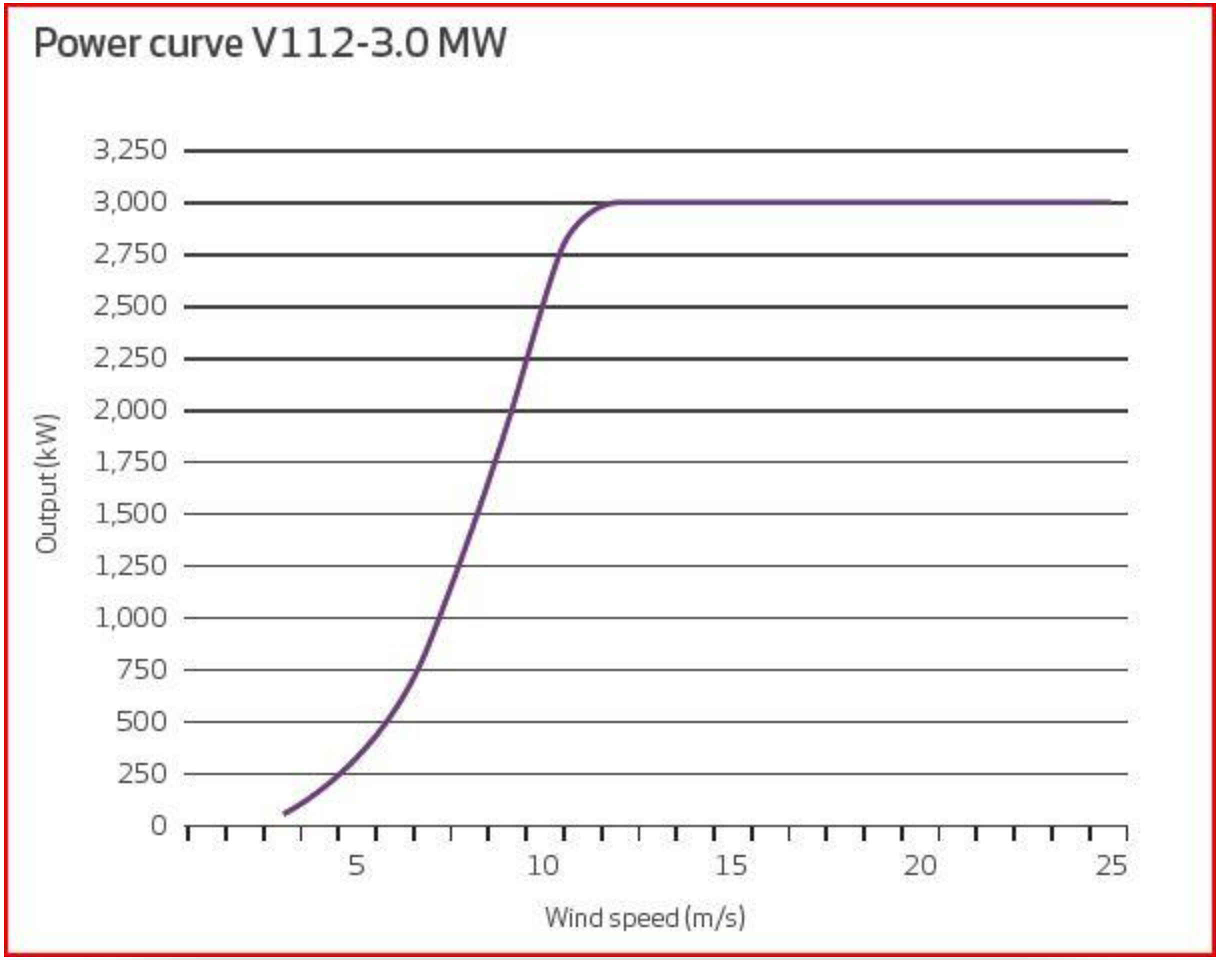
- Forecasting of production
- Power quality, stability
- Grid connection and grid codes, voltage levels
- Grid capacity and priority access
- Balancing of production

Important Parameters

- Wind Regime
  - Power Source
  - Turbine type, specific rotor area
  - Geographic dispersion
- How many MWs by when?
  - Defining capex for grid and wind power plant investments
- MWh produced, expected load factors
  - Defining income

Planning, planning, planning . . .

Power curve for Vestas V112



Annual Energy Output depends heavily on wind speeds - apologies for stating the obvious!

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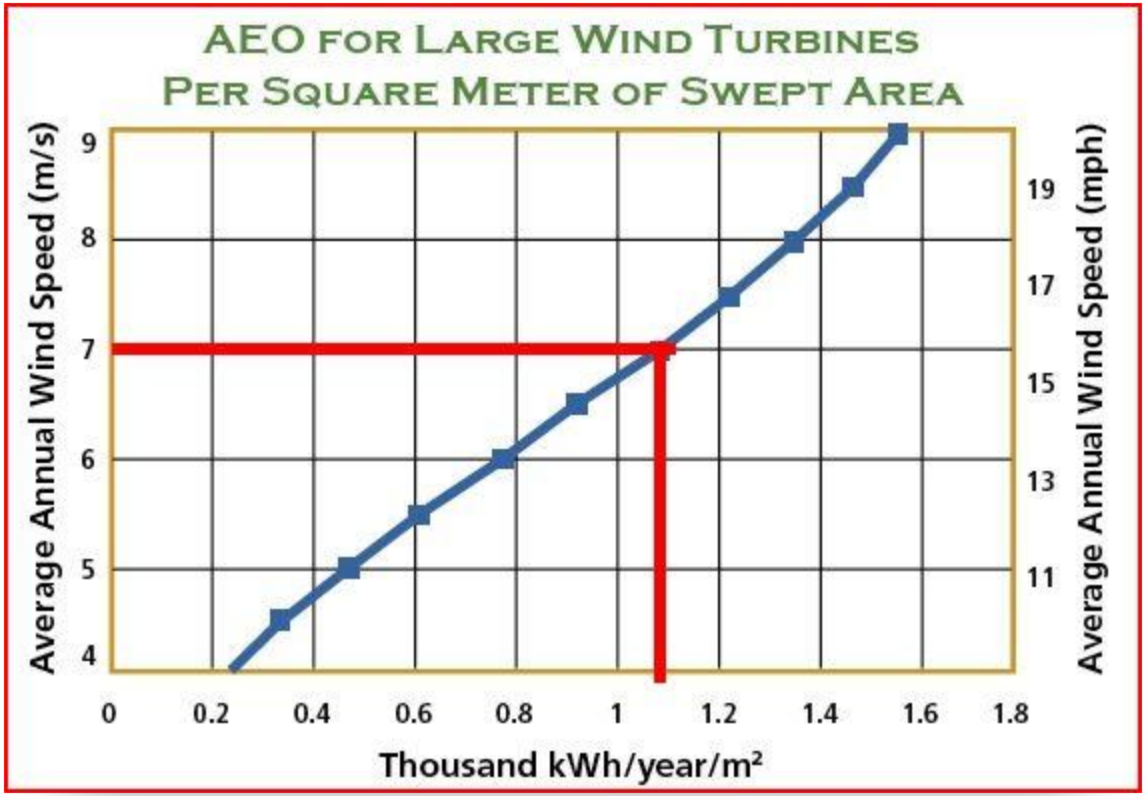


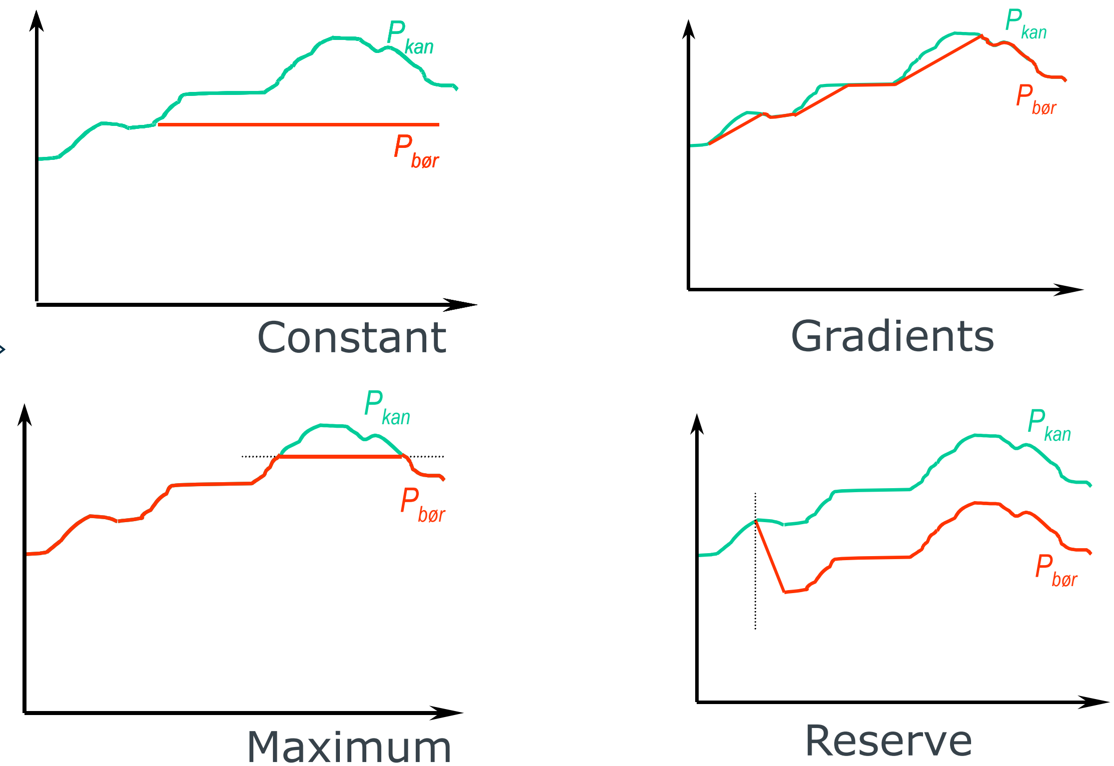
Grid Friendly Wind Power Plants will greatly assist the grid

- Power Plant Controller
- Load following
- Voltage Control
- Fault Ride Through
  - Low Voltage Fault Ride Through (LVRT)

Optimal utilization of all resources – including wind power.

Technical requirements will prove important with increasing penetrations…

Requirements on wind turbines



Technical and operational requirements on wind turbines leads to increased value in the market and the system

Regulating Windpower – an real case

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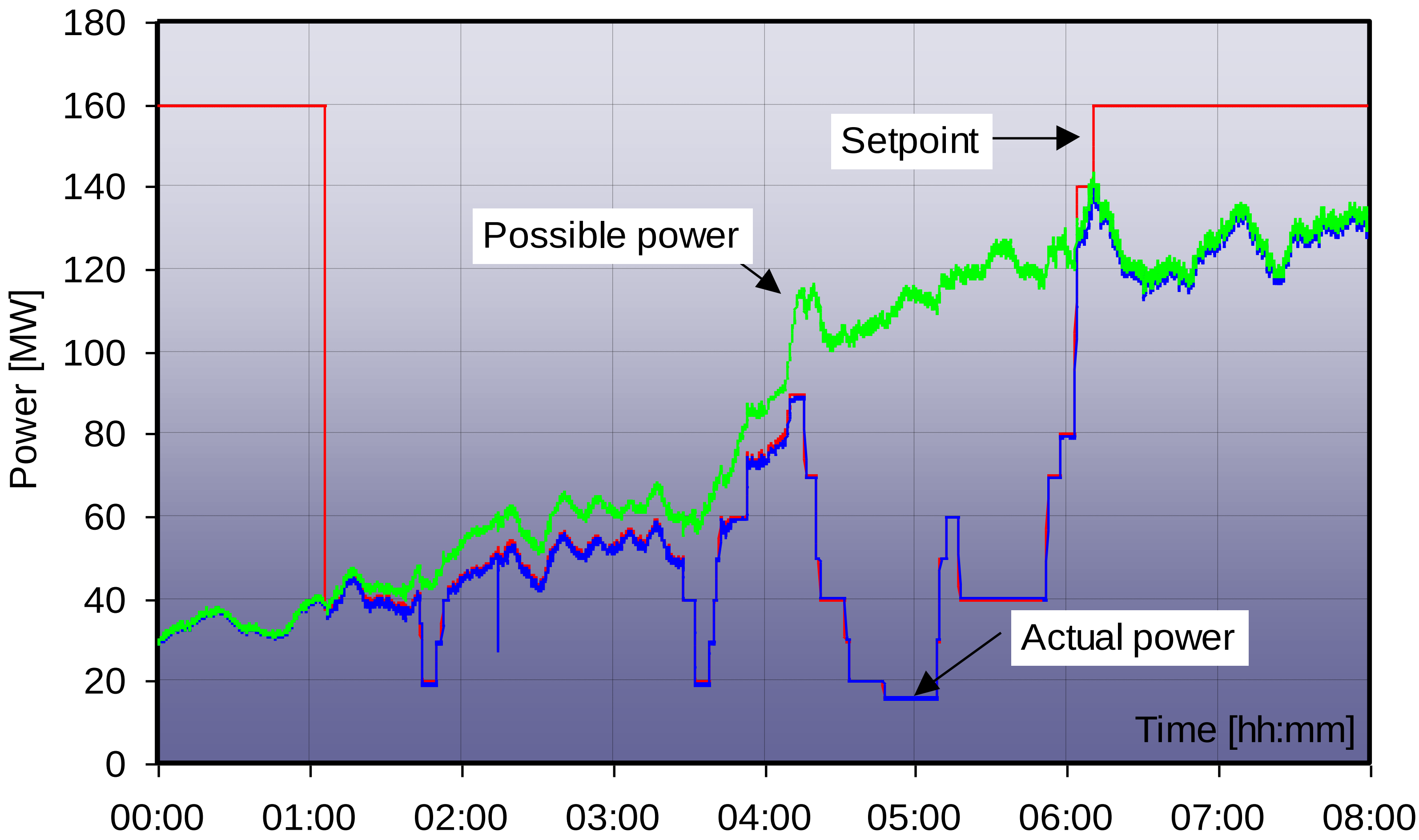
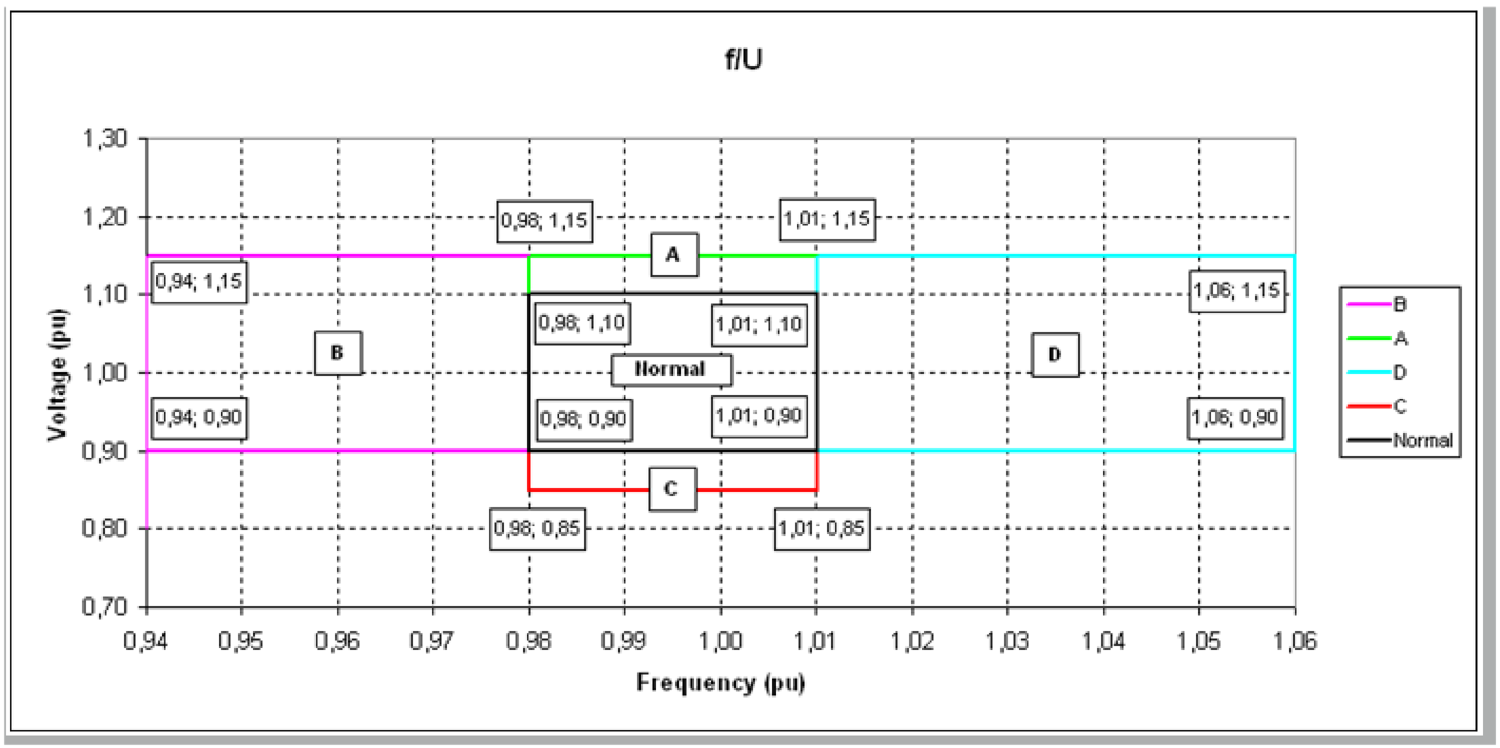


Windpower can contribute to system stability

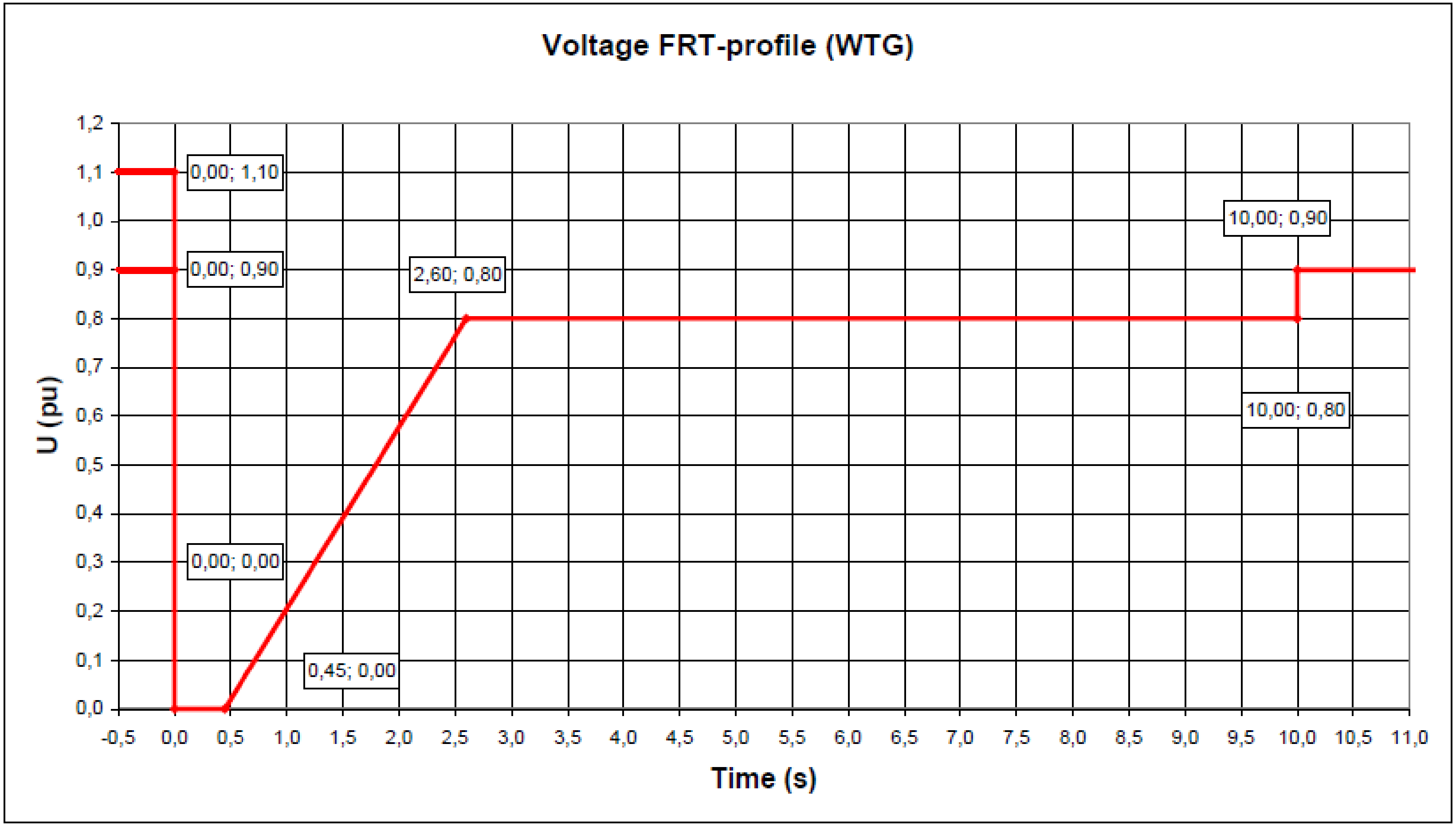
Wind. It means the world to us.™

Voltage/Frequency range of a grid friendly turbine

Normal:	P=1.0 p.u.,	Time = continuously
Area A:	P_A= 1.0 p.u.	Time A = 60 min
Area B:	P_B= 0.95 p.u.	Time B = 60 min
Area C:	P_C= 0.90 p.u.	Time C = 60 min
Area D:	P_D= 1.0 p.u.	Time D = 30 min



Fault ride through is an important grid code requirement

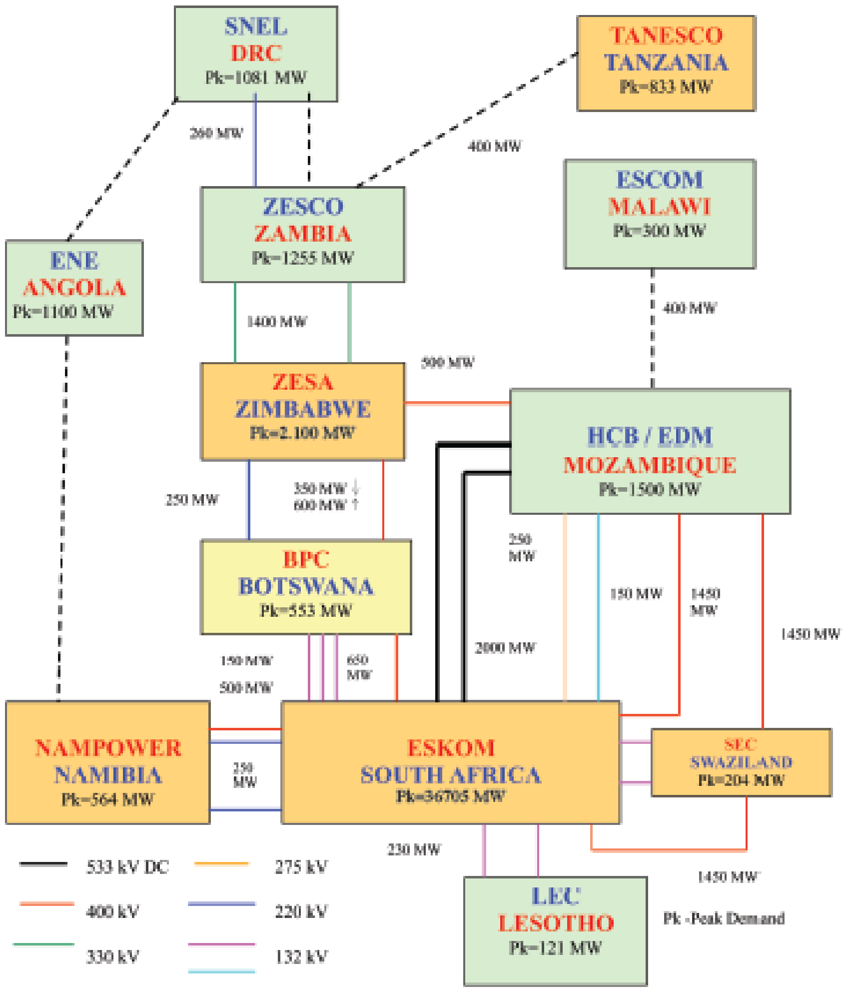


Do not forget: Wind reduces power losses in the grid

- Wind is often connected at lower voltage levels closer to consumers.
- Wind power likely to change the flow direction in regional supply lines.

Wind Integration in Namibia

Namibia is an integral part of the wider SAPP. Optimisation (read: trading) across the entire market will lower cost of electricity and increase flexibility



Source: SAPP Annual Report 2010

Namibia has sufficient balancing capacity to facilitate an immediate build-out of wind energy in the order of 100MW

Various balancing options are available to Namibia, which can unlock a substantial MW wind potential

Balancing Measure	Implementation	Costs	Wind MW unlocked	Recommendations
Diesel Substitution	Short-term	Save 1-3 NAD/kWh	=diesel capacity 45MW	High
Hydro	Short-term		=hydro storage capacity	Low
Complementary RES	Mid-term	?	=bio/solar built-out plans	High
Trading – take-or-pay	Short-term	200c/kWh (TBC)	Contractual cap??	Low
Trading Spot real-time	Mid-long term	Lower?	Unlimited	High

Can Namibia and its neighbours increase hydro storage capacity?

Complementarity of renewables

Wind integration through geographic diversification

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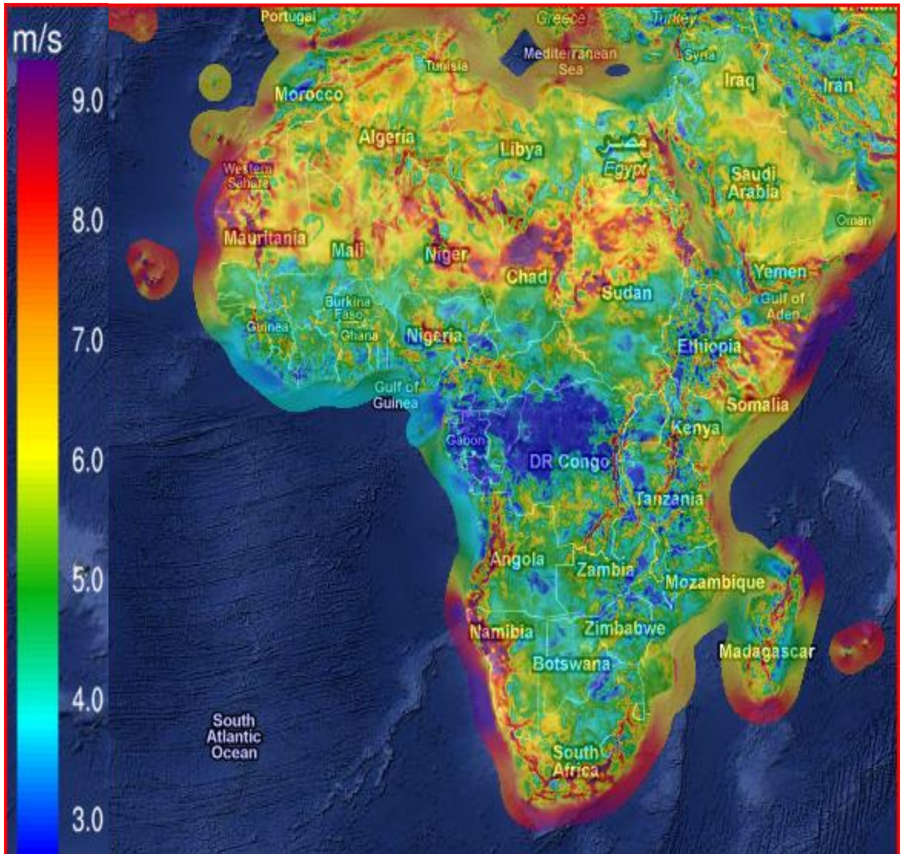
Namibia is blessed with excellent natural resources for the use of wind energy.



Plan for a portfolio effect with geographic spread

Sources: Vortex ; Vestas Wind & Site (2011)

Shaving the noon and evening peaks with PV and wind fits neatly with system loads.

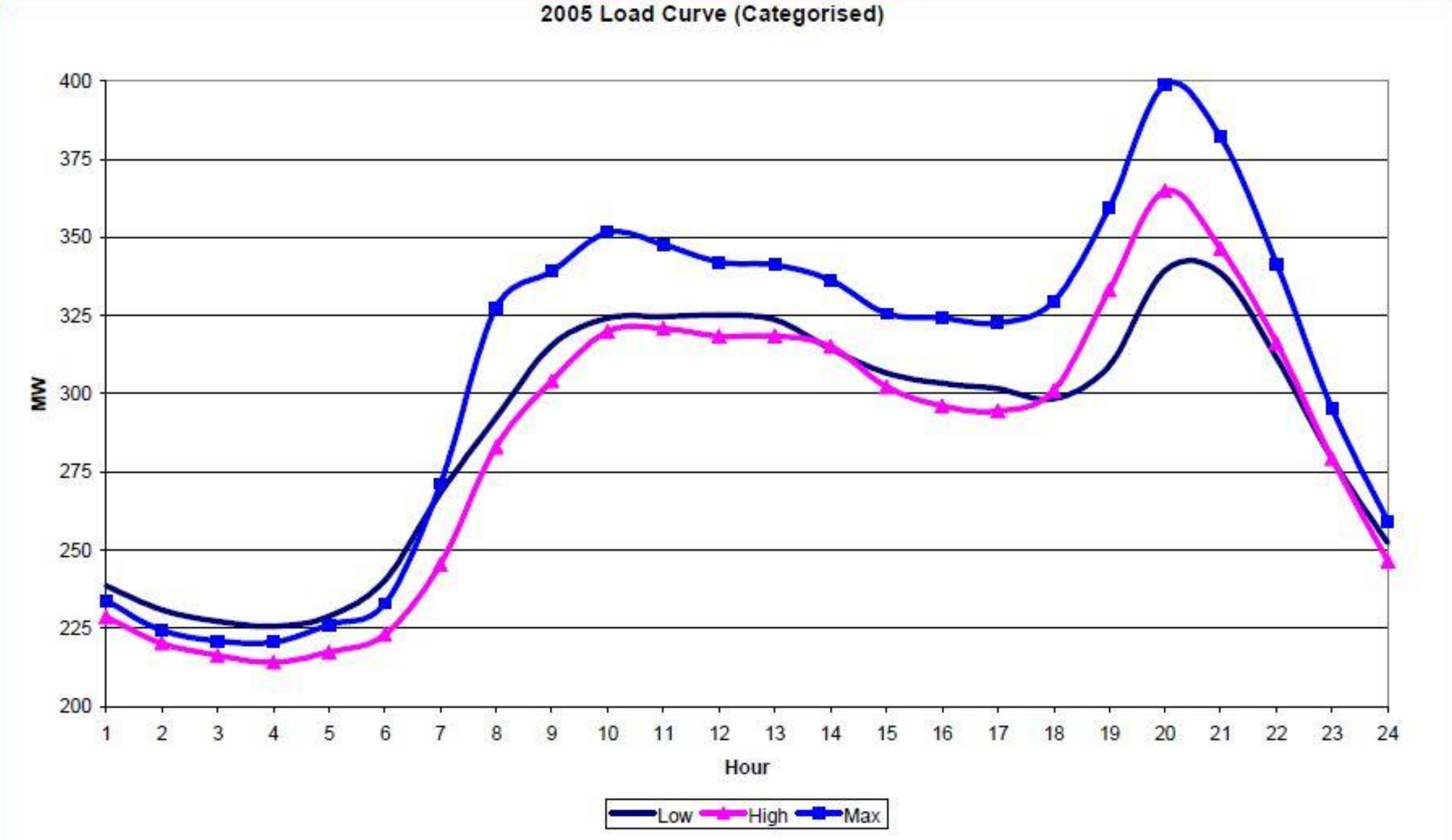
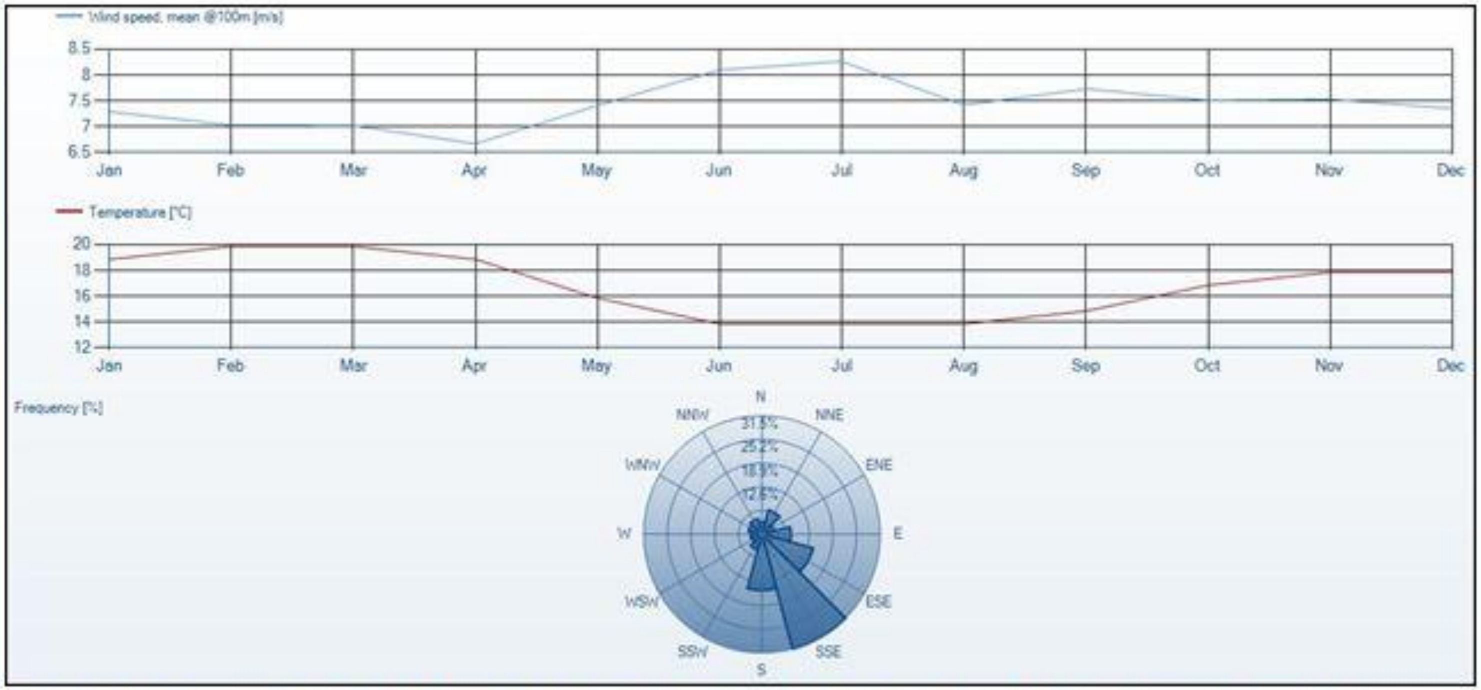


Figure 2-4: 2005 Load Curve

Fairly stable wind resource will ensure stable year-round output (illustrative example from Lüderitz)



Estimated monthly wind and temperatures along with wind frequency rose for Southern area.

Source: Vestas Wind & Site

Near-term forecasting of wind production in Namibia – some initial thoughts

At wind farm level

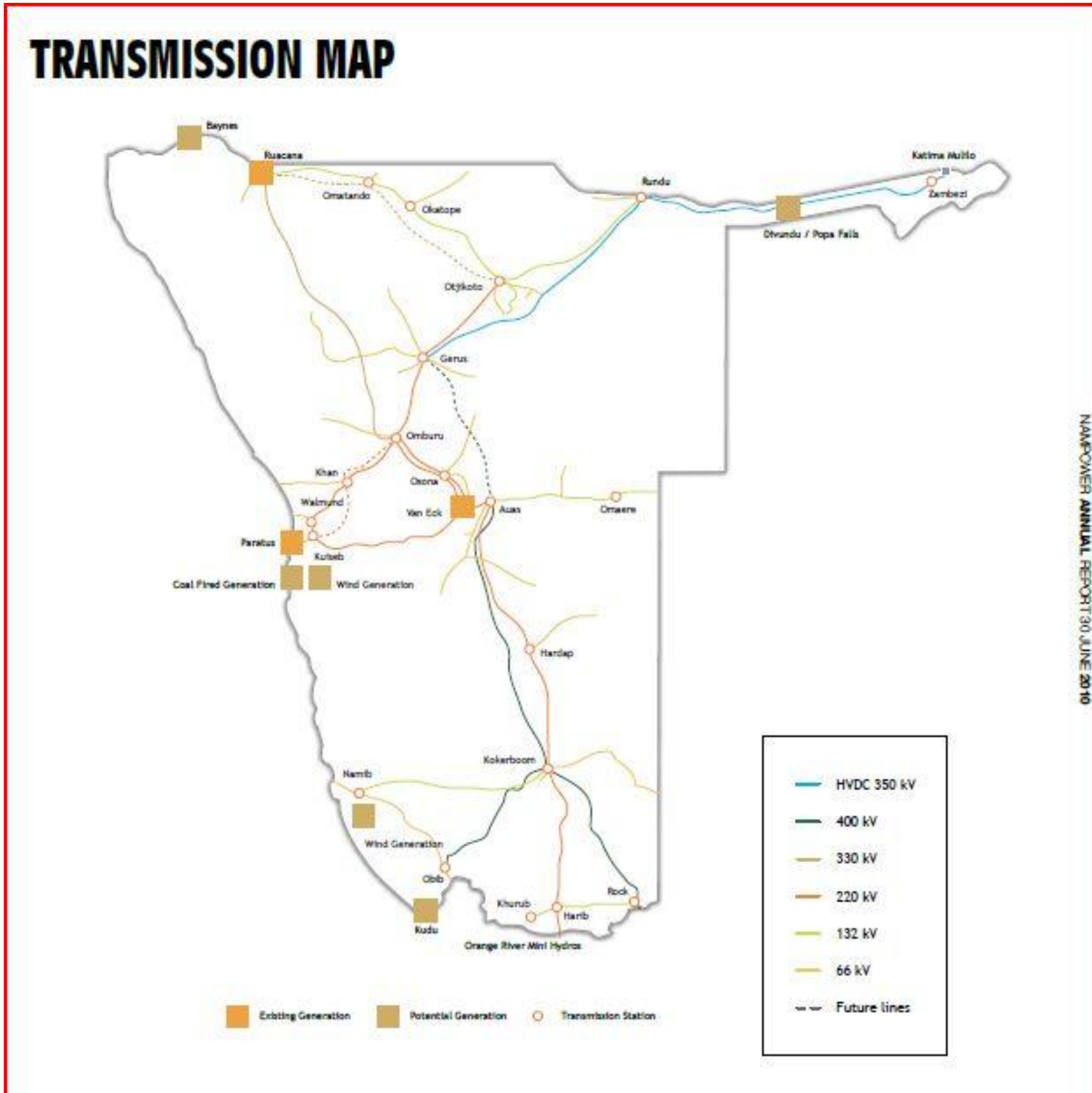
- Owner or his appointed representative should carry an obligation to submit day-ahead forecasts of hourly generation
- If deviations of more that 25% (?) within each hour, balance power must be paid for
- As long as no market for intra-day balancing power exists, a modest fixed price may be the route forward
- Careful consideration must be given to implications for wind farm business cases

At system level

- The TSO responsible for security of supply must do his own aggregated wind forecasts updated every 3-5 hours on an on-going basis
- The quality of these forecasts will be better than the individual forecasts because:
  - Continually updated using best available weather forecasts
  - Takes portfolio effects into account (geographic spread, smoothing effects)

Balancing through trading . . .

Balancing through trading . . .



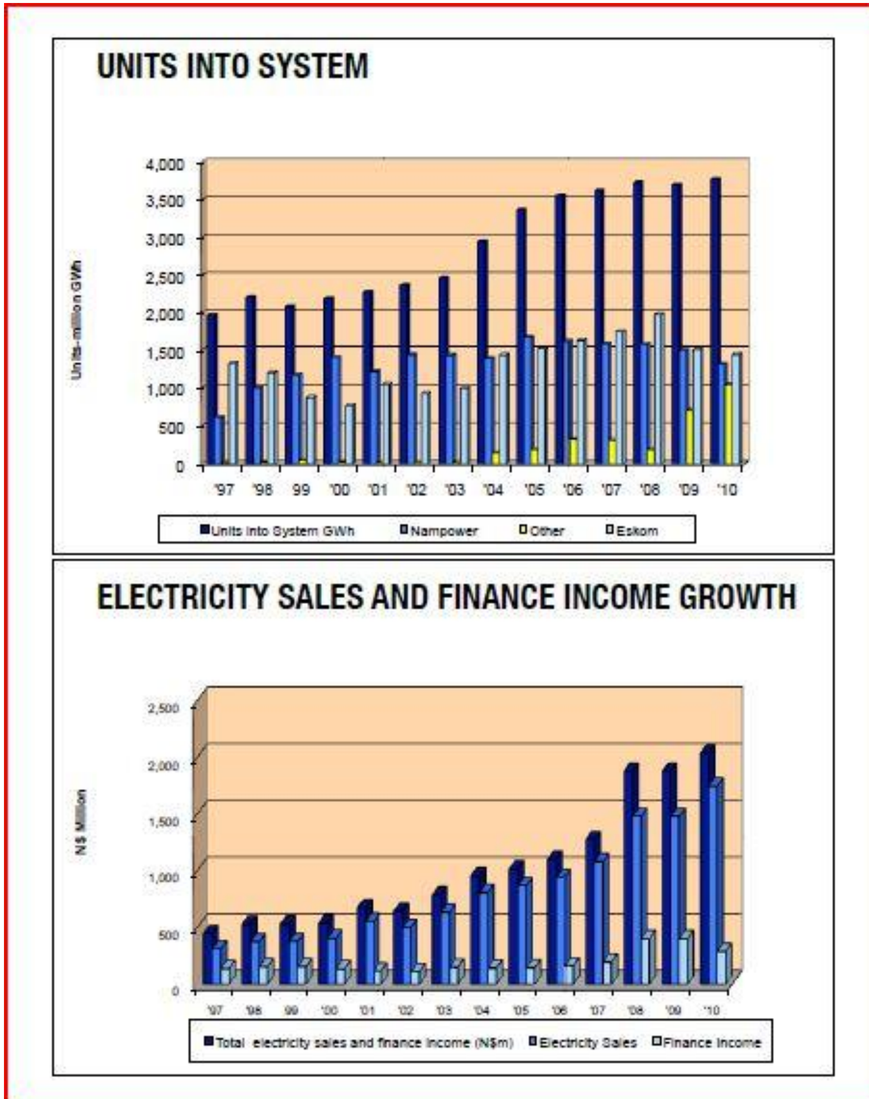
Namibian grid
is very wide, but
with strong connectors.

Wind turbines will not
be connected on the
main grid, but at a
lower voltage.

Balancing of production
will take place far
away from turbines

Wind farms as active
grid supporters is an
important feature.

A very big part of consumption is imported. If possible, the connectors should be activated for balancing.



Imports becoming more uncertain due to reduced reserve margins in SA

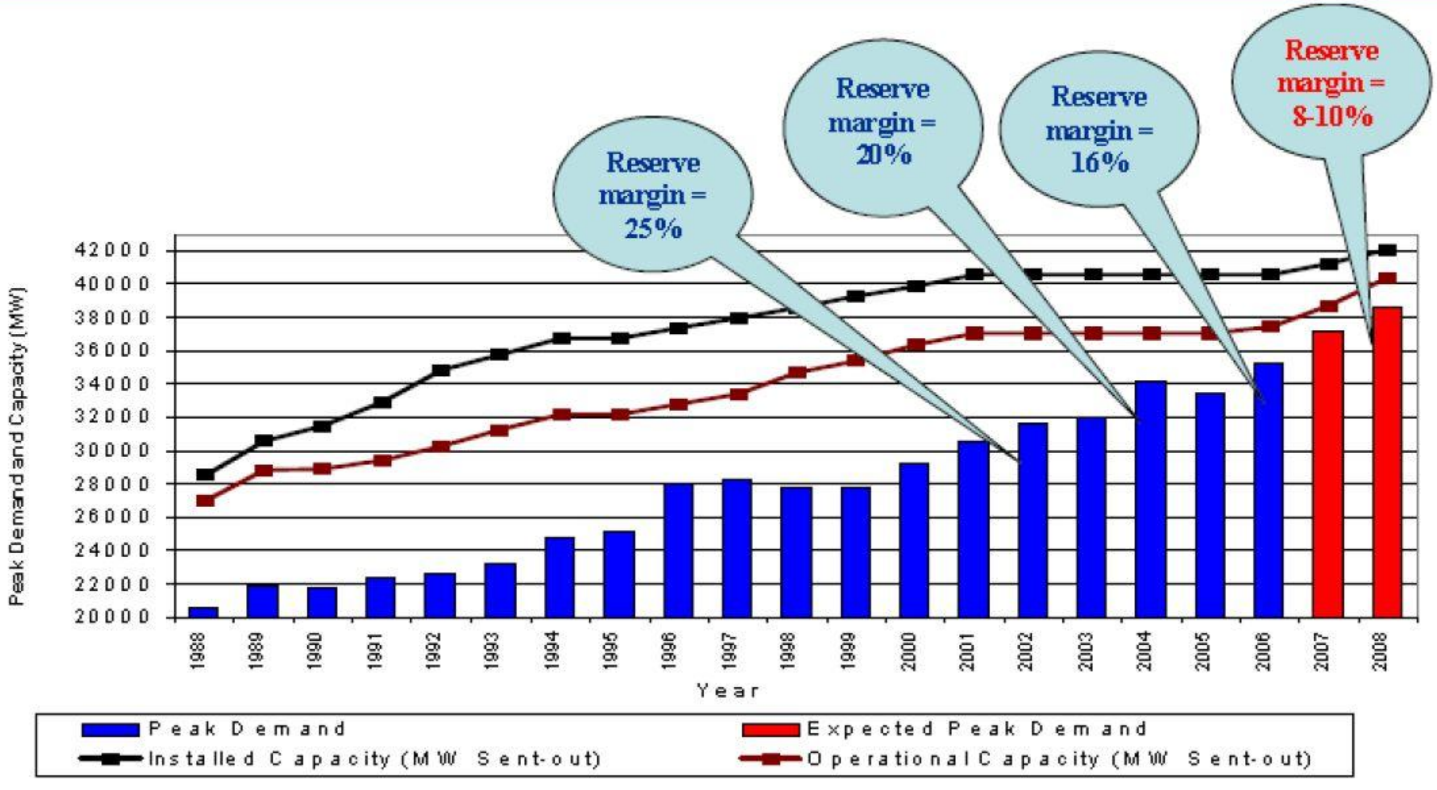


Figure 2-9: South African Demand and Capacity

A plan to gradually transition away from bulk imports but rather use interconnectors for balancing should be considered

How can the Namibian grid be protected against failures?

- **Grid codes for wind power plants**
  - To be based on international best practice and standards (Some TSOs having worked with high penetrations for some years offer assistance as consultant (e.g. the Danish TSO Energinet.dk, whose grid codes are available on their website)
  - LVRT should be required from the start to avoid situations as seen recently in China
  - Require centralized monitoring from TSO control room including emergency shutdown (for wind farms over a certain size, e.g. 30-40MW)

- **Grid codes for all other generators**
  - Gradual move towards more flexible generation and lower minimum loads etc.

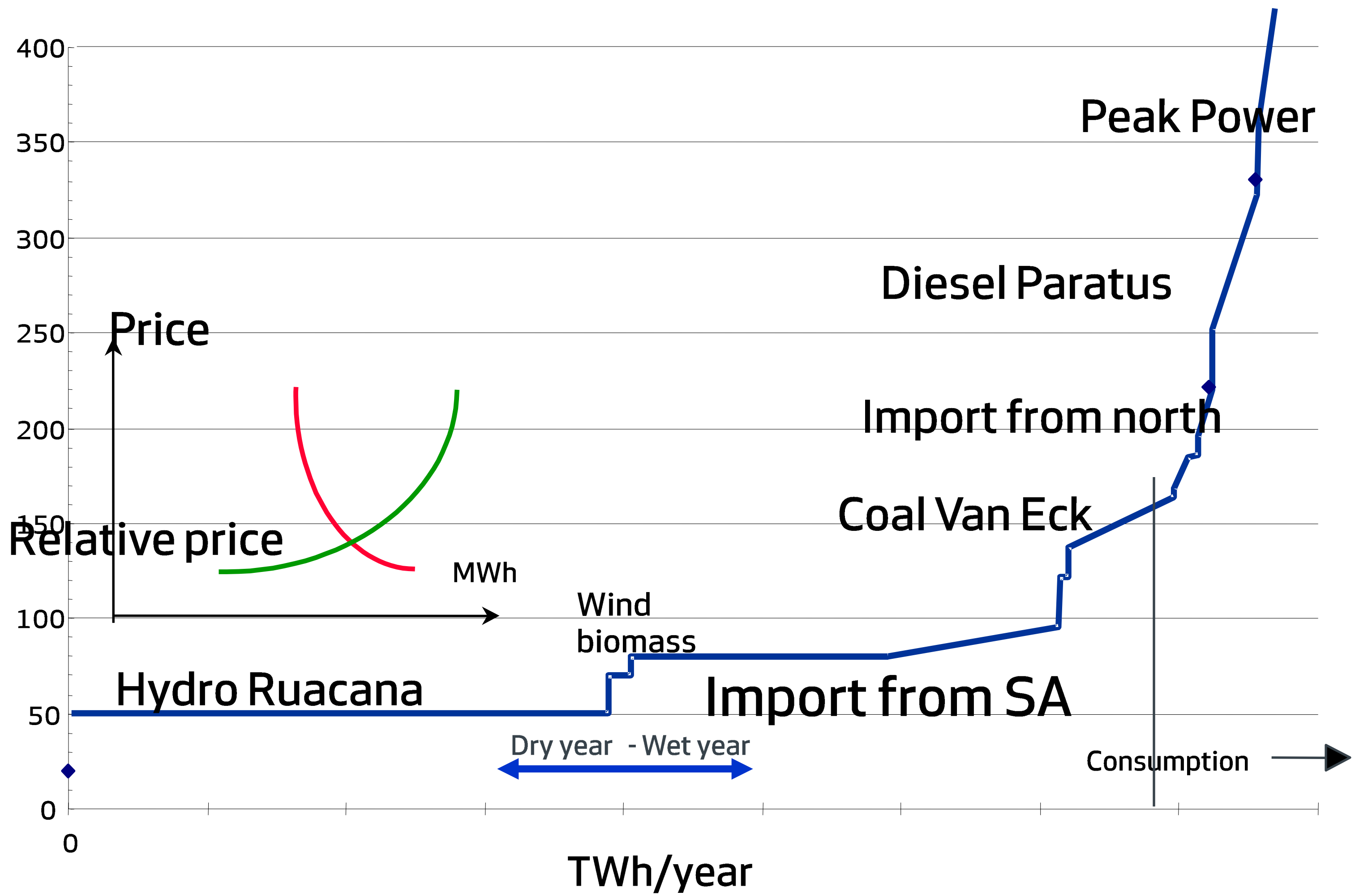
Assumed (theoretical) merit order in Namibia (marginal costs)

1. Hydro
2. Import
3. Coal firing
4. Diesel plants
5. Distributed Peak Power
6. Demand response options

Wind Power Plants will be ranked according to a very low marginal cost corresponding to O&M costs

However, it is imperative for the business case certainty, that a wind power plant is guaranteed offtake. If curtailed, the owner must be compensated proportionally. In the EU such priority access is required by the EU Commission.

Assumed merit order model Namibia Right or wrong?



Major power system challenges in Namibia calling for action

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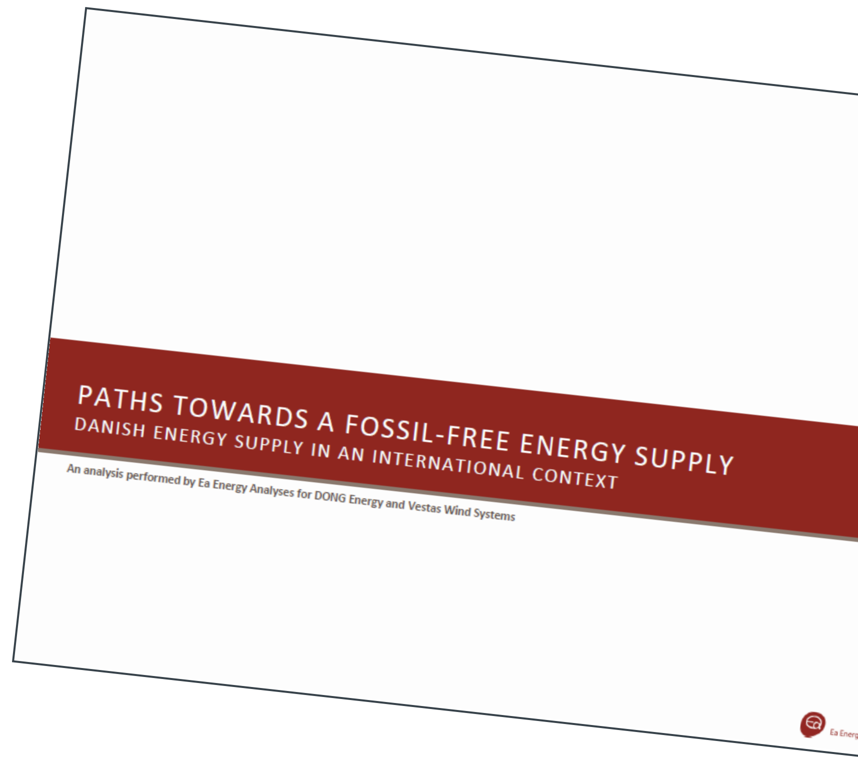
- High imports from neighbouring countries at increasing prices
- Reserve margin in SA reducing. Ageing generation mix in SA and high growth in their own demand
- Security of supply
- Reducing fuel price volatility
- Growth of energy demand - need for new capacity
- Grid stability
- Cost efficient system operation. Stable electricity prices facilitates growth in economy

Planning tools capable of simulating the least cost route for development of the Namibian power system

It is possible to simulate the operation of the total grid in Namibia with various combinations of Wind power and eventually other new plants to find the best way of operating the system securing supply at lowest cost.

Examples of use of the open source Balmorel model

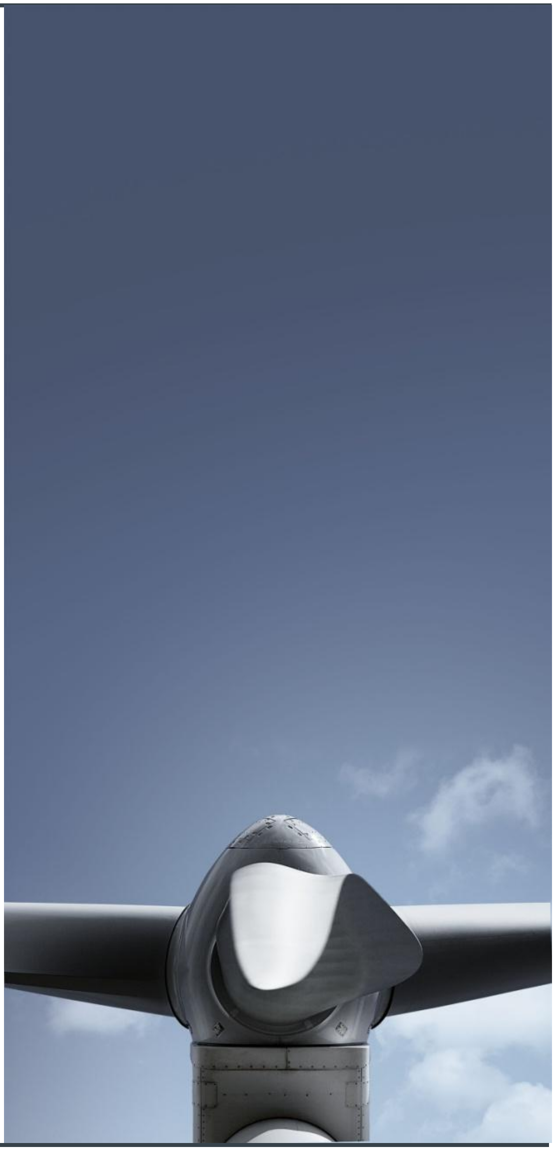
- South Africa
- Denmark



Conclusion/recommendation

- Namibian system able to balance around 100MW of wind power short-term
- In the mid-term, more flexibility can be added via hydro storage and activation of interconnectors for balancing (SAPP). This will enable capacity to balance more wind
- Strict grid-friendly grid codes for wind should be enforced early on
- Forecasting requirement on owners of wind farms should be considered.
- NamPower should consider building in-house wind forecasting capability
- Wind and solar PV complements each other and fits well with Namibian load curve

Thank you



Discussion – Grid integration next steps

Mr. Kudakwashe Ndhlukula,
Coordinator at REEEI, Polytechnic of Namibia

TECHNOLOGY AND DEVELOPMENT
POLYTECHNIC OF NAMIBIA

Coffee Break

We will resume in 15 minutes

Session 3:
Finding a feasible financial model

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14:30

Project economics in Namibia

Mr. Phylip Leferink, Vice President of Sales, Vestas

15:00

Overview of financing instruments to improve bankability

Mr. Stuart Smith, Director of Vestas Structured Finance

15:30

Practical challenges in securing financing for a wind project

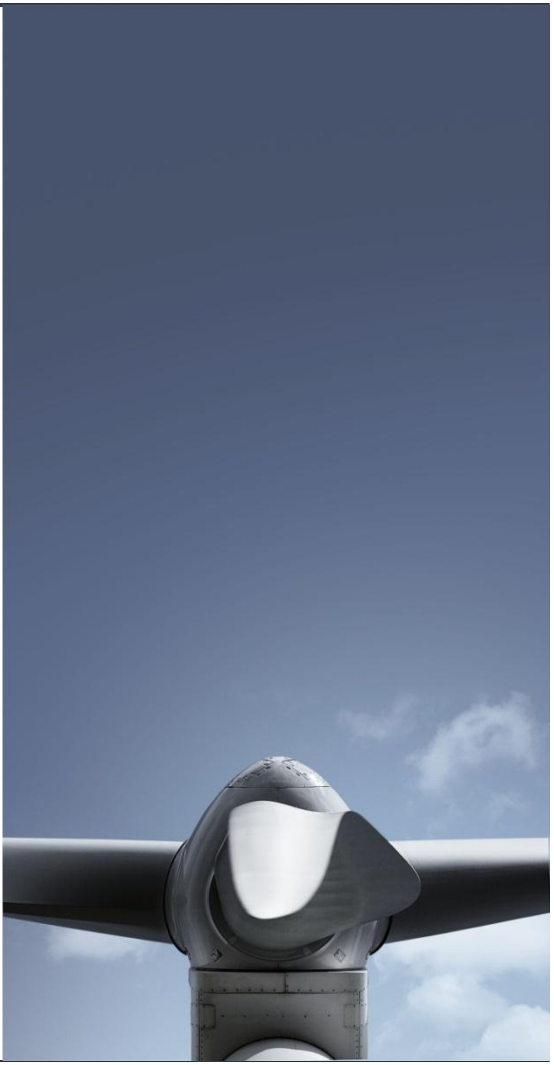
Mr. Carlo van Wageningen, Chairman of Lake Turkana Wind Power

16:00

Discussion – Financing next steps

Mr. Kudakwashe Ndhlukula, Polytechnic of Namibia

16:15 **Coffee break**



Project Economics in Namibia

Mr. Phylip Leferink
VP Sales, Benelux and Southern Africa
Vestas Central Europe

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Agenda

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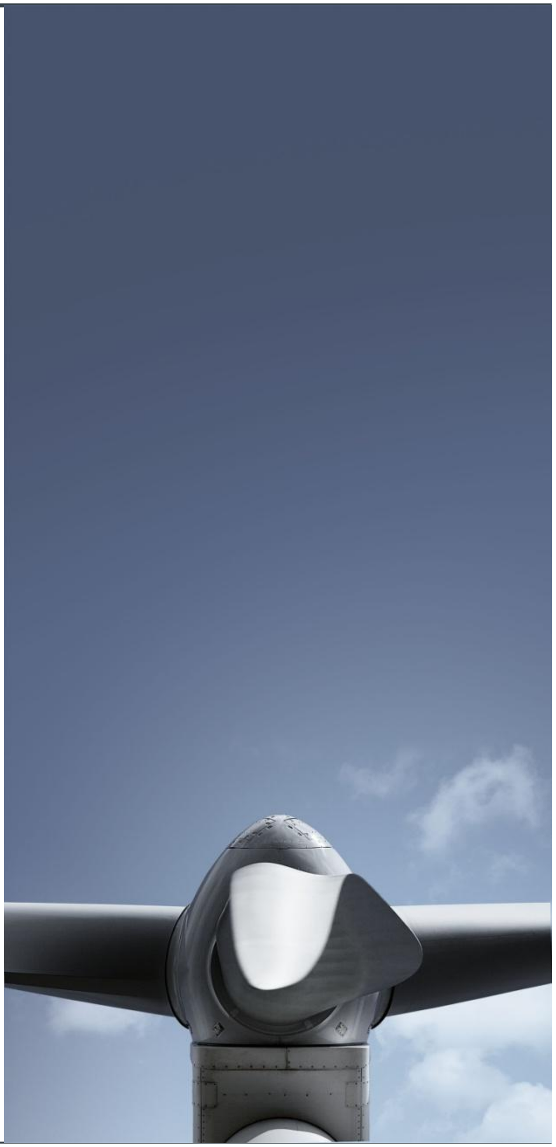
1. Cost of Energy (CoE)
2. Cost and Pricing Structure of a Wind project
3. Unique challenges and opportunities in Southern Africa



CoE in Namibia is expected to increase further

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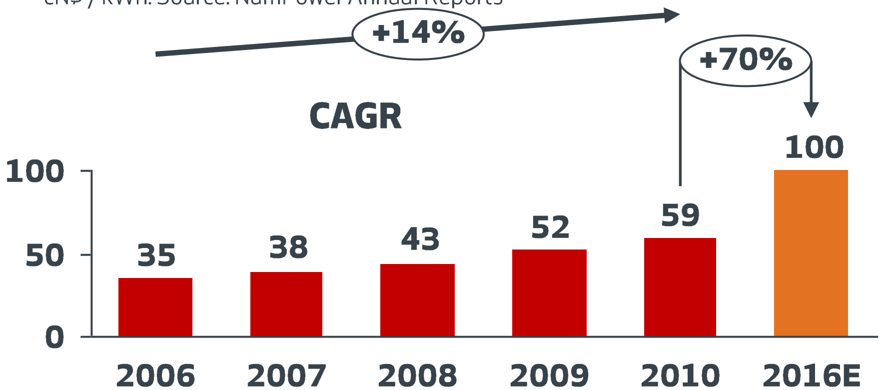
Global fuel prices and local economic growth drive electricity prices

Average price per kWh sold

cN$ / kWh. Source: NamPower Annual Reports



Wholesale electricity price is expected to increase to 1 n$ per kWh by 2016

Increasing global demand for oil drives prices

International Monetary Fund, World Economic Outlook (WEO), 2011 Edition:

"The persistent increase in oil prices over the past decade suggests that global oil markets have entered a period of increased scarcity. Given the expected rapid growth in oil demand in emerging market economies and a downshift in the trend growth of oil supply, a return to abundance is unlikely in the near term."

Externalities not considered in Cost of Energy

Impact per kWh	Coal	Lig-nite	Gas CC	Nu-clear	PV	Wind
Health effects	0.73	0.99	0.34	0.17	0.45	0.01
Crop effects	0	0	0	0.00	0.00	0.00
Noise	0.00	0.00	0.00	0.00	0.00	0.01
Ecosystems	0.2	0.8	0.04	0.05	0.04	0.04
Global warming	1.6	2	0.73	0.03	0.3	0.04
Total	**2.55**	**3.79**	**1.12**	**0.25**	**0.83**	**0.16**

Source: Ministry of Mines and Energy, *DEVELOPMENT OF A REGULATORY FRAMEWORK FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY WITHIN THE ELECTRICITY SECTOR*, January 2007

Annual Energy Production and Cost of Energy

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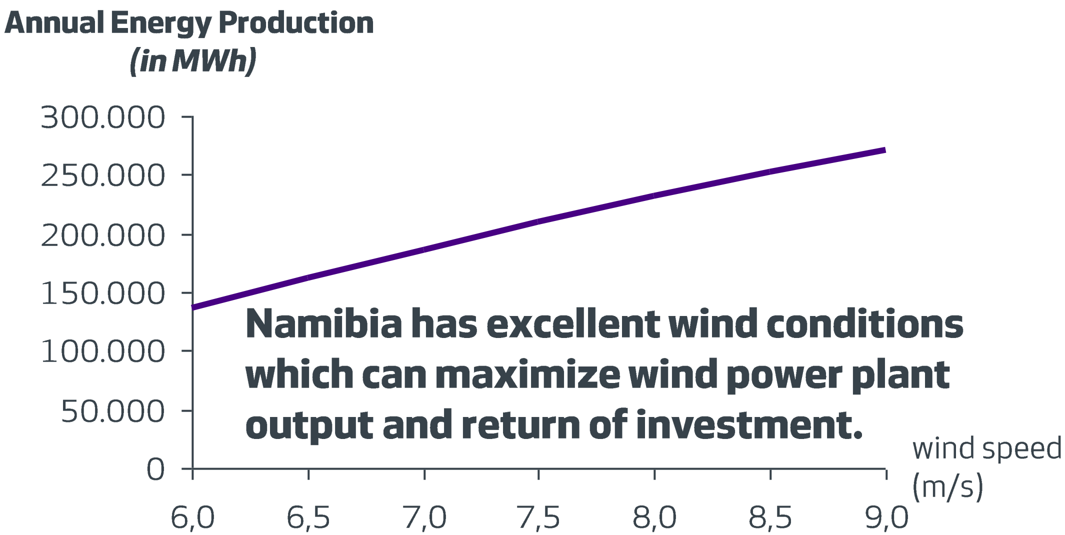

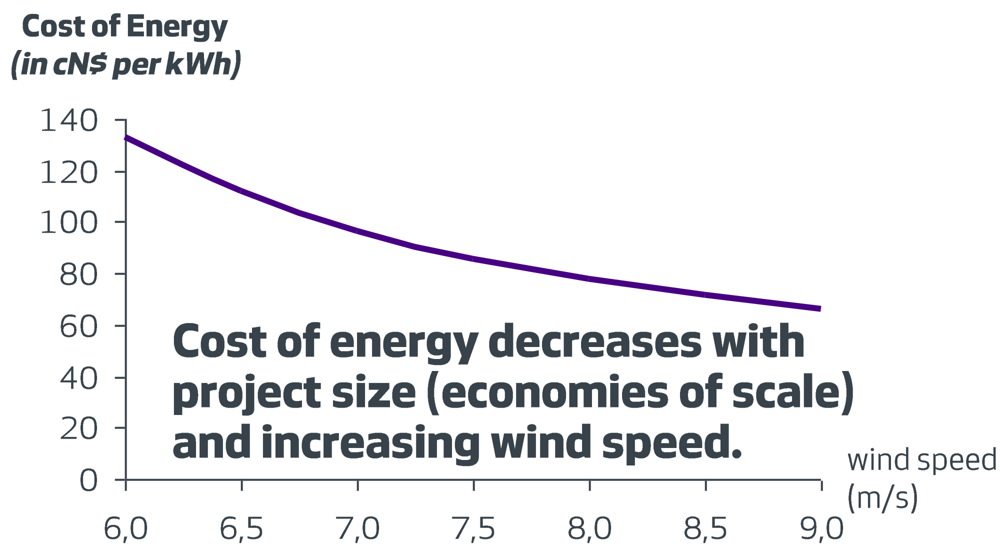

AEP numbers based on 66 a V112 MW wind park, assuming standard air density 1.225 kg/m3, 95% availability, 3 % transmission losses, 93% park efficiency

Agenda

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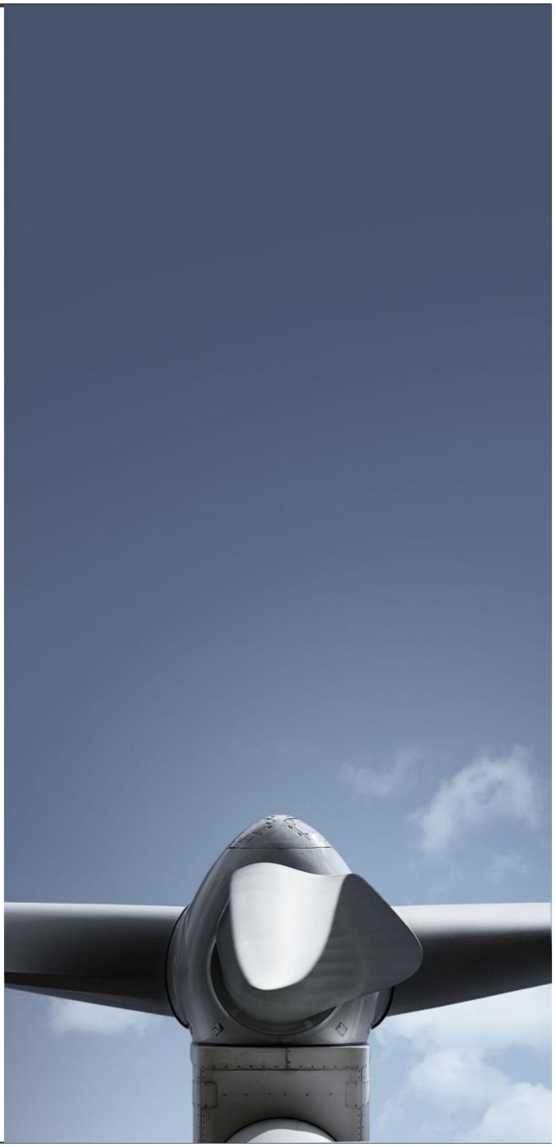
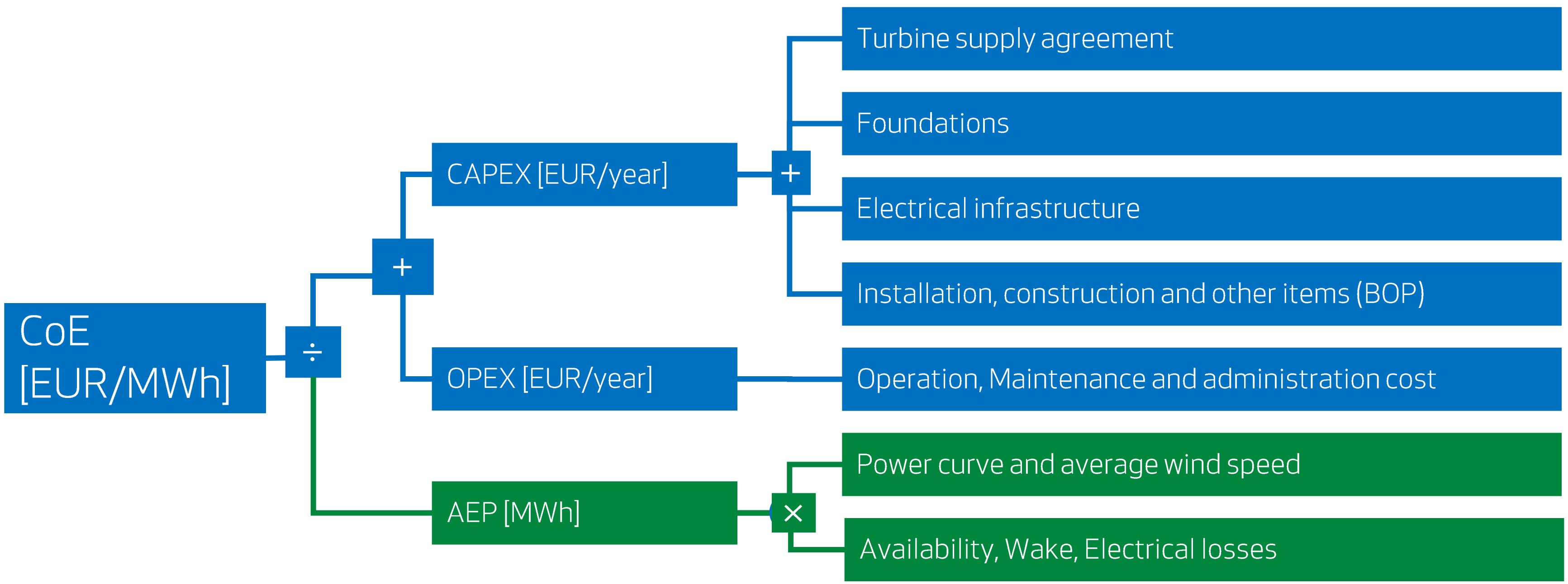


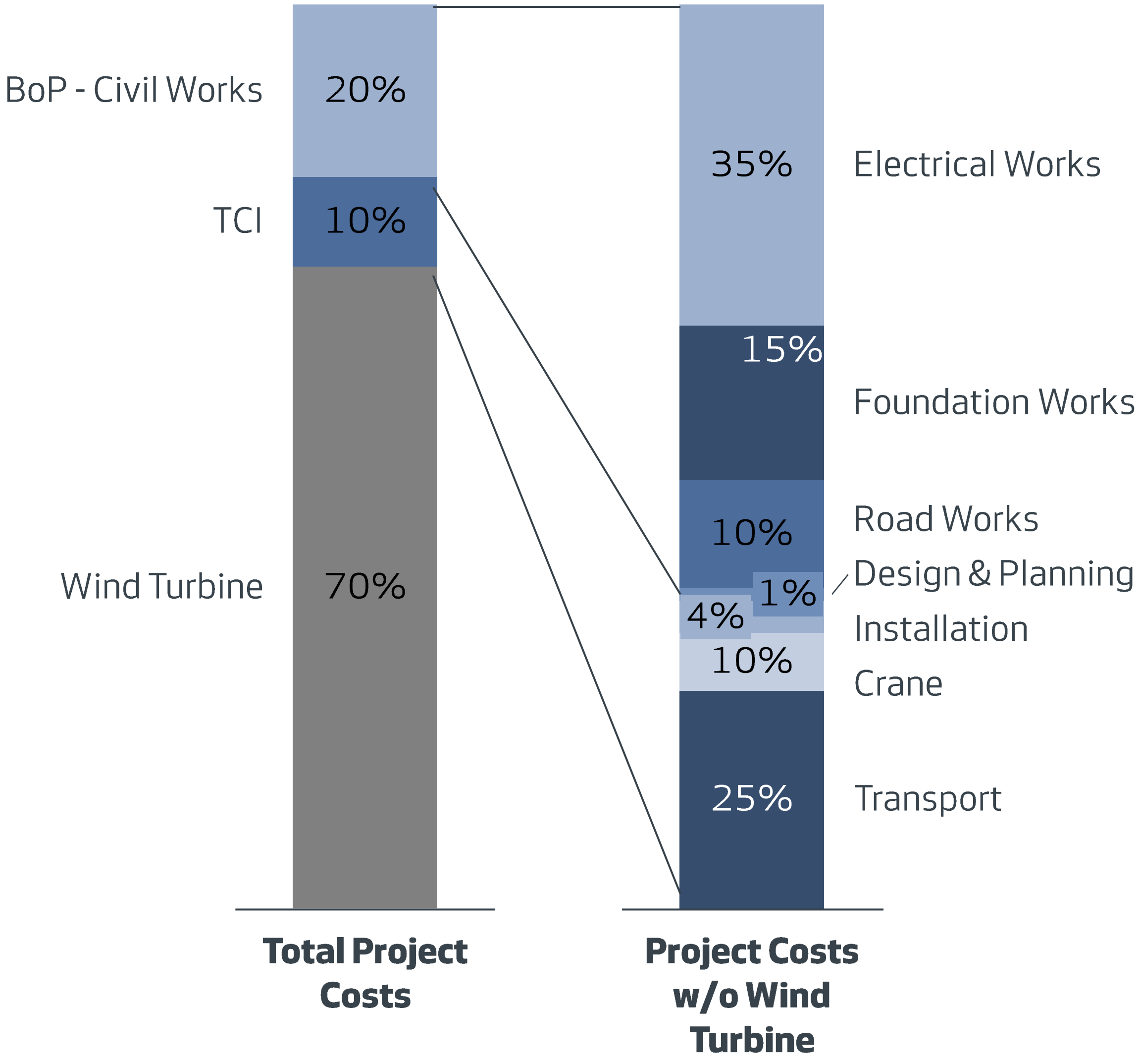
Cost of Energy embraces all aspects in wind power performance

$$CoE = \frac{\text{Annualized CAPEX} + \text{Annualized OPEX}}{\text{Annual Energy Production}}$$



Estimated Project Costs of a typical wind park in Southern Africa

Cost levels vary on location, project size, turbine type and grid connectivity



Besides wind turbine costs, a project faces many costs that are not directly linked to park / project size:

- pre-development
- legal fees
- project / construction management
- grid connection

Wind Project Pricing: Foreign Currency vs. Namibian Dollars

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	Foreign Currency	Namibian Dollars
WTG	WTG components: (Nacelles , Blades, Towers, Control Systems)	
TCI	Ocean Freight (shipping) - V90 2MW, V112, V100: mainly from Europe	Local transportation, cranage, Installation
BOP	Balance of plant, foreign labour Remaining BOP components not available locally	Balance of Plant, local labour All BOP components if available locally
Service	Spare Parts for Service (65%)	Local labour costs for maintenance (35%)

At time of financial close, clients normally hedge currency risk with positions that are aligned to payment milestones to the project.

Cost of hedging can be compared to South African costs

Project Economics – Typical Cash Flow Calculation

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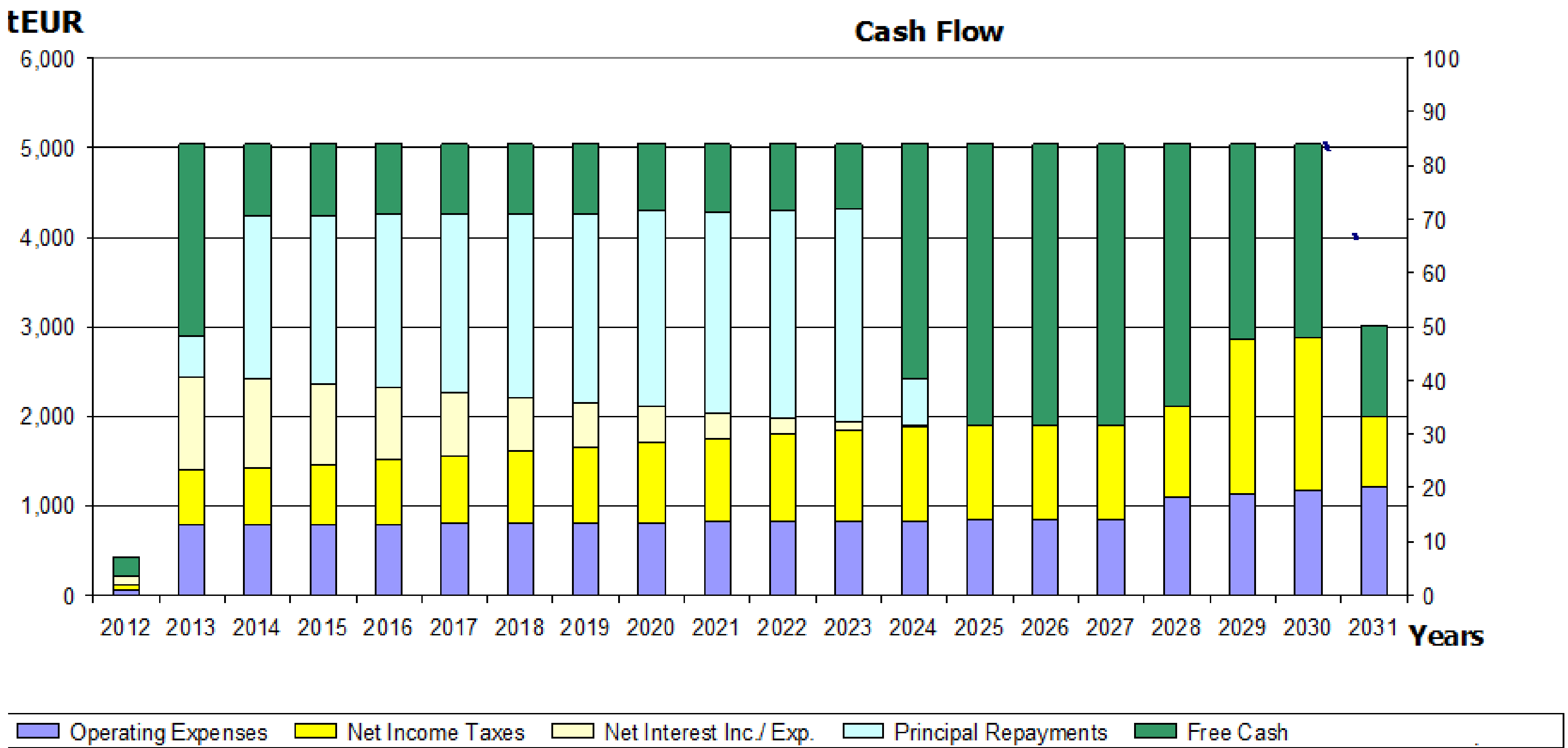

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How to secure Business Case and improve CoE?
Value of certainty

The wind turbine represents 60-70% of the initial project costs.

100% of a project's revenue requires that the wind turbine performs to specifications.

Cost Certainty

- Experience in project development
- Long term service agreement covering main components
- (Active Output Management)

Revenue Certainty

- Qualified wind measurement checks
- Selecting the right turbine for the site
- Optimal site design (CFD modeling, site check, jetstream, etc)
- Guaranteed turbine availability

Agenda

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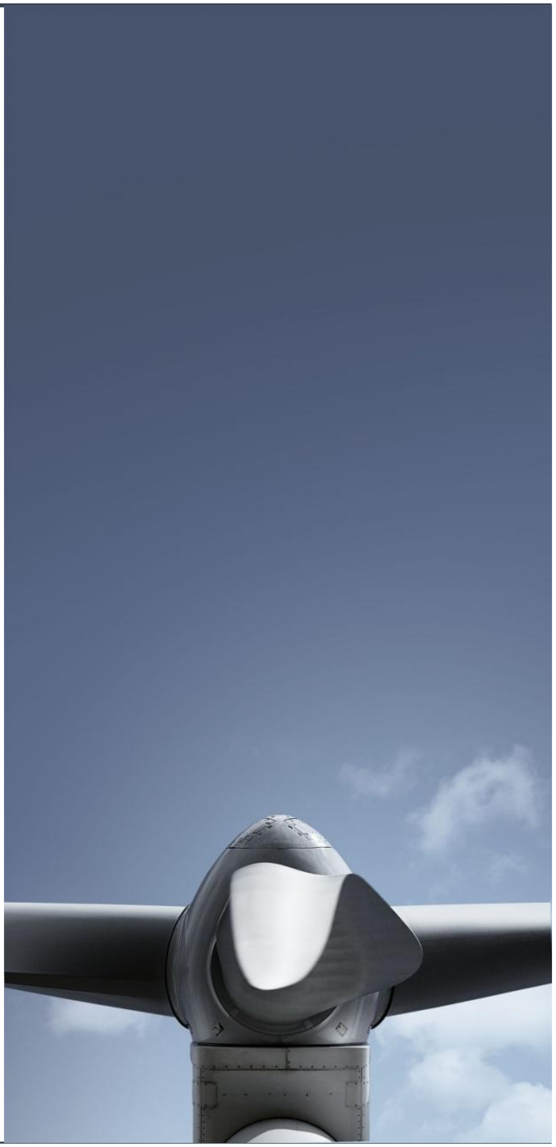

Challenges & Opportunities

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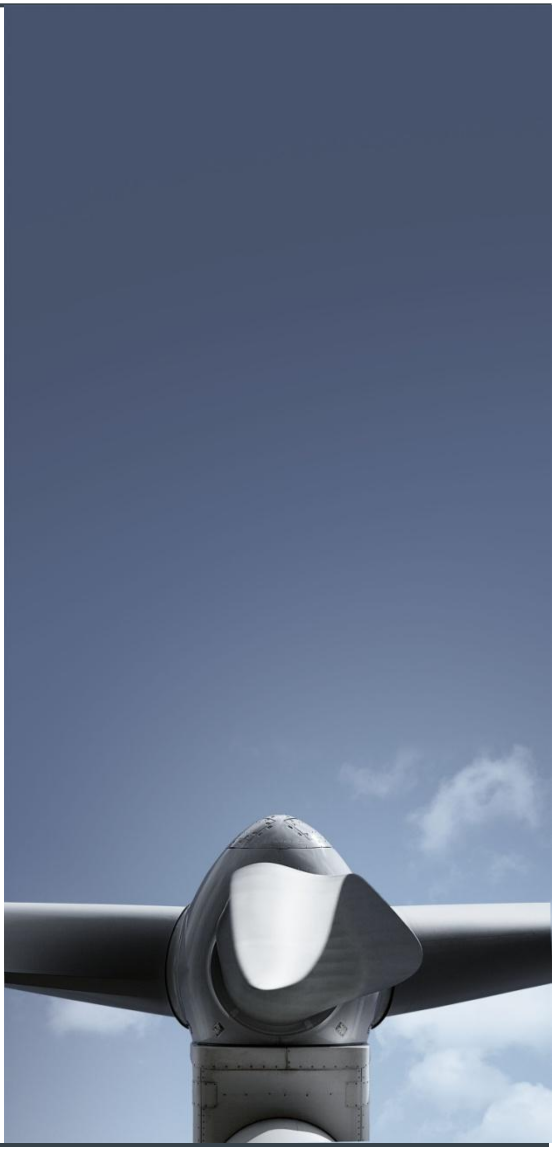
Challenges:

- Limited (if any) TCI resources
- Sites may be remote; (high logistical and power transmission/distribution costs)
- Grid integration of WF's may prove to be challenging at times
- Providing a stable and predictable regulatory environment

Opportunities:

- New markets with rapidly growing energy demand
- Rapid growth requires swift generation capacity increases.
- Renewables in general, but wind energy in particular, can be realized on short timelines.
- Projects are generally of substantial size
- Perceived risk higher than the reality; potential for safe and higher returns

Thank you



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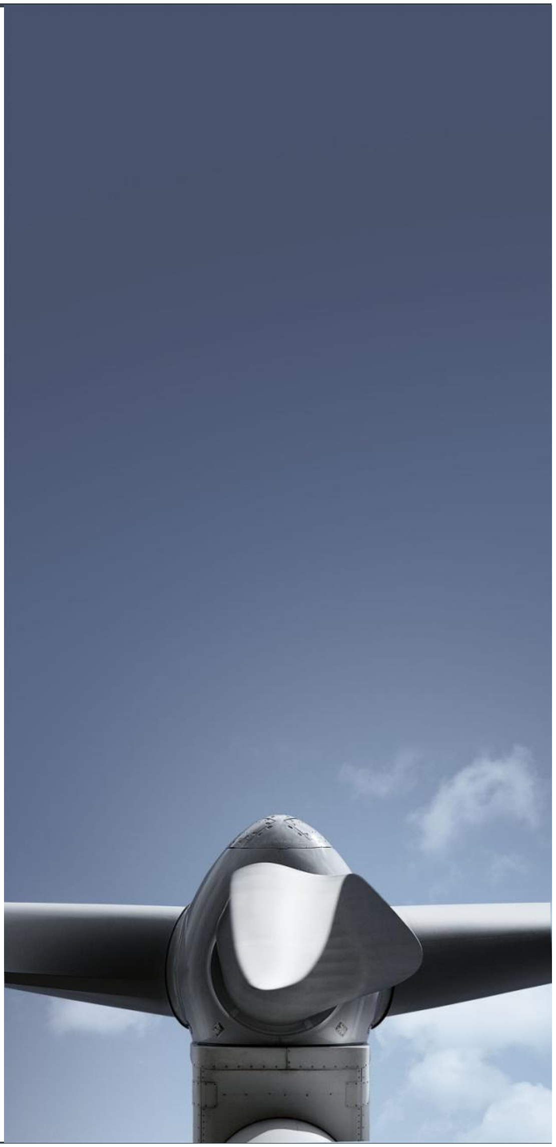
Overview of financing instruments to improve bankability

Mr. Stuart Smith,
Director, Vestas Structured Finance



Agenda

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1.	Global Financing Environment
2.	Potential Financing Solutions - Namibia
3.	Vestas' relationship with ECA's, DFI's and Multilaterals
4.	EKF & its involvement in Vestas contracts
5.	Structured Finance at Vestas

Global Financing Environment

1

Financing Environment

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Deleveraging continues

Rebalancing

- Difficulty funding dollars (again)
- Recent project finance portfolio sale occurred at an 8% discount to par
- Multiple European project finance asset sales now occurring – pricing precedent
- Asset sales below par may be expected to reduce market capacity

Basel III

- Additional pressure on capital

Support

- ECAs active in supporting OECD deals
- ECA-insurance cover is very attractive for lenders
- Development banks raised their financing of clean energy projects in 2010 by over 4 bn USD to 13 bn USD
- Similar performance expected for 2011
- Regional development banks also more active

- Markets will remain dynamic
- Vacuums get filled – the ECAs and multilaterals have stepped up
- New players will get drawn in

Financing Environment

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Behavioural changes

Flight to quality

- Infrastructure projects, executed in stable legal/regulatory framework, generating predictable cash flows are still attractive tolenders – but availability of long term funding is a growing challenge
- Credit committees are cautious and unpredictable

Relationship driven

- Banks are relationship rather than deal driven
- Fewer banks active in each region, with less competition
- Basel III forces a focus on core relationships

From syndicated loans to clubs

- Smaller positions per project, more banks around the table

Keep your options open

- Volatility may continue, players may shift or drop over night
- Pursue multiple paths
- Keep your eye on the market sweet spot for fund availability

- Minimize execution risk first

Financing Environment

The policy players step up

Borrowers finding "new friends"

- More "public" participation available and under utilization

Project limits

- Multilaterals can max. fund 50% of project costs
- ECA's are restricted by OECD rules on export

Credit limits

- Multilaterals and ECA's have portfolio management in place and have "one obligor" exposures. This is also the case for strong investment grade utilities
- Both parties can syndicate/re-insure with relevant parties

Political mandate

- ECA's, DFI's (global and regional) and Multilaterals have different focus from banks
- Political mandates have been expanded throughout crisis – "counter cyclical" action

---

- Multilaterals, Development Banks and ECA's have expanded their mandates but are not a 100% substitute to banks
- Combining 2 or more IFI's can often bridge funding gap where banks are not present/active

Financing Environment

Regional

Demand
- Potentially significant activity in South Africa may stretch regional players

International participation
- Choppiness likely to continue (but will pass)
- Support from policy lenders highly desirable, at minimum

Basics
- Regulatory structure, mandate, policy mechanism, cost recovery and funding
- Solid PPA that's good for both counterparts
- P50 1.5x, P90 1.2x, P99 1.0x

Scarcity value
- A well structured Namibian power deal will draw attention
- More so for a renewables opportunity

- Thoughtful market approach required
- Get the basics right
- Opportunity to create competitive tension

Potential Options

2

Potential Options

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EKF (Danish ECA)

- Provides guarantee so funding banks face AAA-credit
- Can provide long-term loans (15-18 yrs)
- Subject to country limits

Export Credit Agencies

- Asia (Kexim, JBIC, Cexim, etc.)
- Europe (CESCE, SACE)

Development Banks

- IFU (Denmark)
- African Development Bank
- Development Bank of South Africa
- DEG (Germany)

Commercial Banks

- Standard Bank, Nedbank, Standard Chartered, and others.

US Exim/OPIC

- Can fund turbines produced in USA

IFC, MIGA (World Bank Group)

- Mulltilaterals
- Special relationships with developing world governments can mitigate political risk

Potential Options

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A Closer Look at IFC and MIGA

IFC (International Finance Corporation)

- Can provide up to 50% funding
- Commercial banks more willing to participate with "B" loans due to the political mitigation of IFC and de facto preferred creditor status
- IFC are w/h tax exempt and this extends to the commercial banks in B-loans, which broadens participant bank group

Future EU Guarantee Facility?

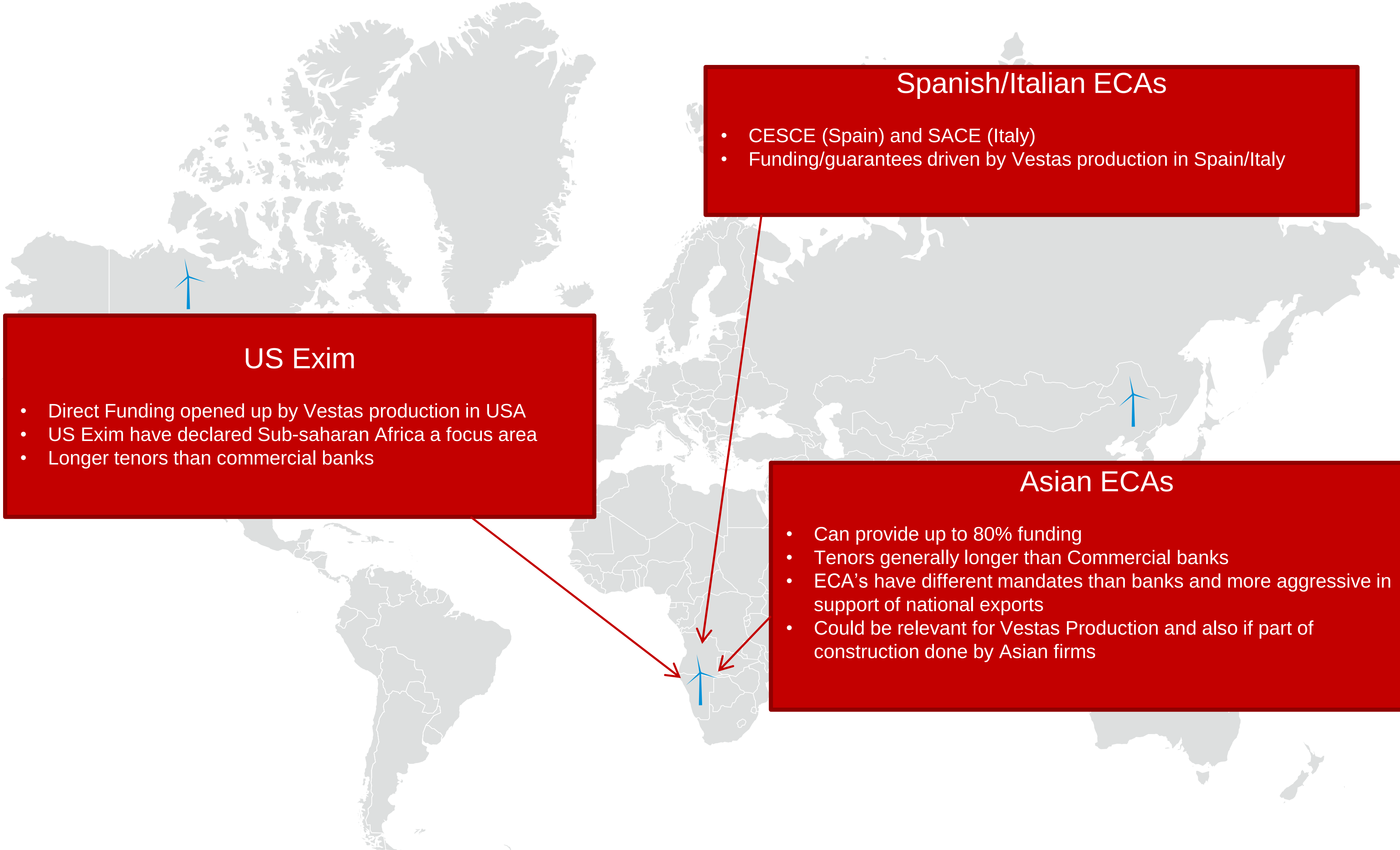
- Bilateral initiative by Vestas/EU under discussion
- Proposal for EU to create a guarantee facility for investments in sub-saharan Africa

MIGA (Multilateral Investment Guarantee Agency)

- Provide political risk insurance to investors and lenders
- MIGA Guarantees may be backed by Government indemnity or may be given independent of a government counter-indemnity

Potential Options

Vestas' Global Sourcing Opens up Financing Opportunities



Spanish/Italian ECAs

- CESCE (Spain) and SACE (Italy)
- Funding/guarantees driven by Vestas production in Spain/Italy

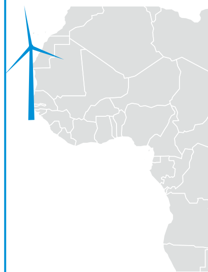
US Exim

- Direct Funding opened up by Vestas production in USA
- US Exim have declared Sub-saharan Africa a focus area
- Longer tenors than commercial banks

Asian ECAs

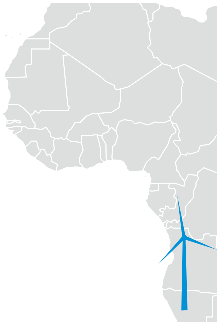
- Can provide up to 80% funding
- Tenors generally longer than Commercial banks
- ECA's have different mandates than banks and more aggressive in support of national exports
- Could be relevant for Vestas Production and also if part of construction done by Asian firms

Case Study: Vestas Turbines in Cape Verde



- Project Cape Verde: 30 x V52-850 kW
- First large-scale wind power plant in Cape Verde and one of the first in Africa
- 30 mn € direct loan by EIB
- 15 mn € direct loan by African Development Bank (AfDB)
- Owner: local utility Electra

Case Study Namibia: Ohorongo Cement Factory EIB Financing



OHORONGO cement member of the SCHWENK family

- Ohorongo Cement Plant: EUR 250 mill. Project
- 82 mn € direct loan from EIB
- Additional loan amounts from DEG (Part of KfW Banking Group) and Development Bank of South Africa (DBSA)


Potential Options with Vestas
3

Vestas Relationships Help Build the Credit Story

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Strong global and regional contacts

Vestas

&

ECA's, DFI's Multilaterals

Vestas has strong co-operation with ECA's, DFI's and Multilaterals.

- Vestas production base opens up co-operation with multiple ECA's (EKF Denmark, SACE Italy, CESCE Spain, US Exim , OPIC US and China Exim/CDB/Sinosure - China) and sub-supplier base widens this further
- Deal expertise with DFI's (IFU, DEG and FMO)
- Deal expertise with Multilaterals (IFC, EIB)
- Deal expertise with Regional development banks (AfDB)

Vestas and EKF

Vestas

&

EKF

Vestas and Eksport Kredit Fonden (EKF) have been partners for many years. This has resulted in landmark deals to the benefit of Vestas' customers in OECD markets as well as emerging markets.

- Vestas is EKF's largest customer (size and number)
- USD 365 mill. Project Finance + first use of export lending scheme in Australia
- First Offshore Project Finance deal in Europe (Q7) + multiple offshore transactions thereafter
- Numerous transactions in developing economies

EKF & its Involvement in Vestas Contracts

4

What does EKF do?

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- The Danish Export Credit Agency
- Guaranteed by the Danish Government
- AAA-rated sovereign risk cover
- Supports and supplements private sector lending
- Insures against risks in the financing of export- and investment projects
- Cover pre- and post construction
- Operates on commercial terms and conditions
- Temporary EKF funding scheme introduced in 2009 – extended until 2015
- The ECA with largest renewable energy (wind) portfolio
- Sourcing flexibility – Vestas production in Denmark and elsewhere

General Issues

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Danish Interest	• Involvement due to Vestas contracts • Made by Vestas vs. made in Denmark • EKF reinsurance with other ECA's
Terms & conditions	• Tenor up to 18y tenor post completion (AWL 11y) • On project finance typically 80% risk cover • EKF risk premium reflects bank's risk pricing
Project due diligence	• EKF project due diligence similar to commercial banks • EKF risk sharing with banks • EKF assumes documentation risk (part of negotiation)
Environmental due diligence	• EKF due diligence on environmental issues. In Project finance deal, the Equator Principles will apply, i.e. EIA and monitoring
Confidentiality	• EKF will sign NDA if so requested • EKF operates with Chinese walls as banks do • EKF requires openness "post closing"
EKF declaration	• Vestas, Financier(s) and Customer must sign "EKF declaration" on "non bribery and openness"

5

Structured Finance at Vestas

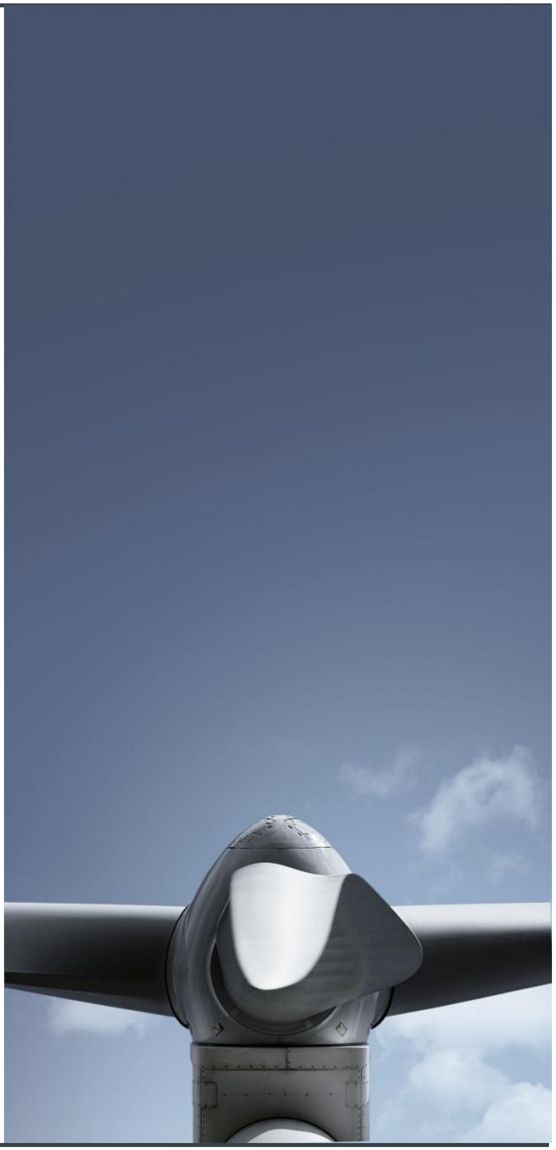
Structured Finance in Vestas

Newly established with global responsibility

Structured Finance

- *Part of Vestas Group Treasury, based in Zurich, Switzerland*
- *Former energy investment bankers (e.g. ABN Amro, Credit Suisse, Morgan Stanley) and ECA project finance specialists (EKF, Maersk)*
- *Strong relationships with financiers active in renewable energy - banks, infrastructure funds, pension funds, export credit agencies, multilaterals, development finance institutions, and institutional investors*
- *Capabilities in debt and equity advisory services, deal structuring and deal execution*
- *Currently a team of five, plus a legal and risk team*

Thank you



Vestas®

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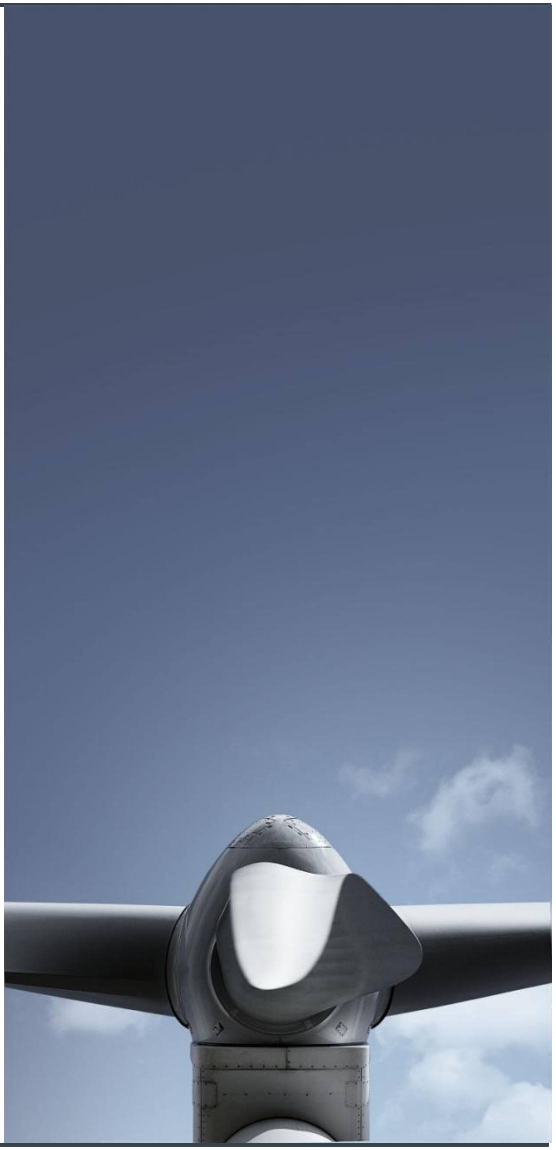

Practical challenges in securing financing for a wind project:
The Lake Turkana Wind Power experience

Mr. Carlo van Wageningen
Chairman of Lake Turkana Wind Power

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WIND POWER

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First, the good news

WindTalks NAMIBIA

1) Money is out there: More than USD 7 Billion are available for bankable infrastructure projects in Africa. Mainly with Development Financial Institutions (DFI)

2) Strong Interest: Appetite by Equity funds to invest is high. Returns on investment in Africa are high, and in Developed economies they are getting lower by the day.

3) Governments are on-side: Most African Governments have come to the realization that economic growth can only be achieved with through improving infrastructure to meet the demands of a growing economy. Large investments in the Energy, Transport and Communication sectors are needed.

4) Public to Private: African Governments have turned to the Private sector to achieve this growth. Traditionally these were state monopoly sectors.

5) Partnerships: In order to attract Foreign Direct Investment and local private sector participation, many African Countries have put in place attractive tax incentives. Public-Private Partnerships are now possible, and in many cases they are governed by sound guidelines and policies.

Now, the bad news

WindTalks NAMIBIA

1. Static Financing Models: There are few players and little competition in the DFI community, therefore no innovation in financing models which are often punitive to the project developers and investors

2. Africa Risk Premium: Perceptions of "Africa Risk" are costly; State Corporations in Sub-Saharan Africa have no international credit ratings, so risk perception on them is therefore high. The mitigating factors are consequently very time-consuming and very expensive to investors and State Corporations – increasing project costs by approximately 30% compared to the same project in Developed economies

3. Debt/Equity challenges: In Europe you can achieve a 97% to 3% Debt/Equity ratio on a Wind Power project. In Sub-Saharan Africa, the range is 70% to 30%, which is expensive to the developer

4. Large Infrastructure Costs: Often, limited infrastructure network (roads, electrical grid...etc) require direct capital interventions, further increasing project costs and above all generates interface risks which lenders want mitigated through "Wrap" solutions. Again more cost!

5. Penalty on Success: If you are a local successful Project Developer in Africa then you are also suspicious, which triggers all kinds of Governance issues which are again punitive on the Developer.

The weakest link!

WindTalks NAMIBIA

1. Cost: Developing a Wind Power project is expensive – generally between 3% and 5% of total project cost

2. Development Costs: There are only a few financial institutions who provide limited contribution towards Project Development Costs. Capital Market Authorities in Sub-Saharan Africa (where they exist) do not allow Start-up IPO's and Private placements are illegal

   Project Developers are expected to meet these costs from their own resources or they need to be inventive and innovative in raising needed seed capital to develop the project. This is not easy and not in everyone's reach

3. High-risk capital: Unless the Developer has deep pockets, appetite for high risk and thorough knowledge of Project Finance and the financing requirements, then think twice before you venture into it

So how did LTWP manage the process?

WindTalks NAMIBIA

The 6 founders of LTWP bring thorough and proven experience in:

- Project development in Africa.
- Development of wind farms in Europe
- Entrepreneurial skills
- A solid banking and financial knowledge

LAKE TURKANA WIND POWER

They quickly proved to be a formidable and dedicated team:

- Everyone's input was valued by the rest
- Each one recognized, respected and trusted the advice and experience of the others
- No-one tried to overshadow the other
- All carried equal weight in decision-making

They knew they had identified a potentially excellent wind site, but they also realized that the challenges to erect 365 wind turbines on this site and connect them to the national grid was going to be a mammoth task

What were the specific challenges?

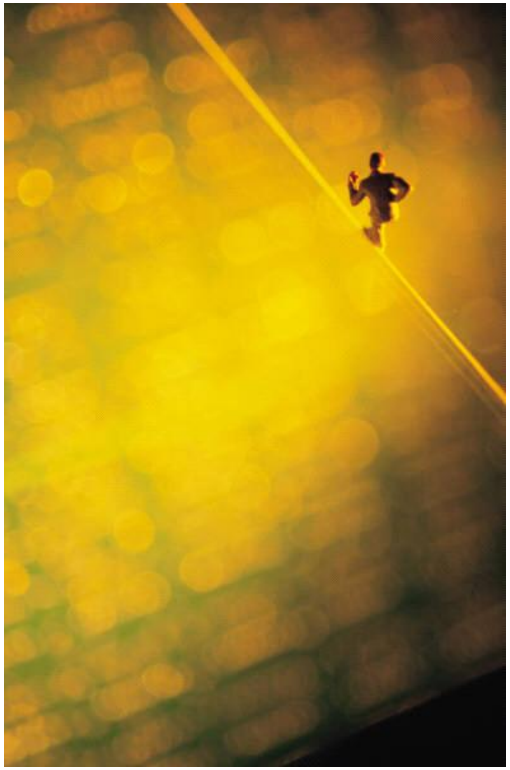
WindTalks NAMIBIA

Site: 1,200 km from the nearest deep-sea port (Mombasa); logistics a major challenge

Grid: Nearest grid interconnect was 428 km south of the site

Experience: The 6 founders, while experienced in their own right, did not have the International stature and credibility required to pull off a project of this size and complexity

First-of-its-kind project: There was very limited prior local experience or knowledge on wind energy or wind energy Power Purchase Agreements. Obtaining the required government, electricity off-taker and regulator support was going to be a challenge



To create the necessary credibility to successfully execute the project, we had to:

WindTalks NAMIBIA

- Acquire land rights: Using the best Law firm in the country to ensure that the process was done legally and accroding to procede

- Commence wind measurement campaign: Recruit internationally recognized Wind Energy Institute or company to measure and evaluate the site's true wind potential

- Identify the best technologies for the site: Need to have a proven track record and able to handle local wind and weather conditions

. . . and we also had to:

- Find potential suppliers: Start selection process for wind turbine manufacturers and identify most suitable and willing supplier to meet the desired requirements.

- Carry out port and road surveys: Confirm that it would be possible to get all the heavy and bulky equipment to site and select an experienced and internationally-recognized logistics company to carry out surveys

- Do an environmental assessment: This is paramount to get financing; for wind you also need a bird study and even a bat study! Recruit the specialists to carry out these studies and ensure you perform them to 'Equator Principles' or 'IFC Standards' – as local standards are normally not accepted by international financial institutions

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WindTalks NAMIBIA

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Build robust and credible business model, feasibility study and financial model: Recruit one of the top 4 corporate management and audit companies for these tasks

To make the project bankable and to meet stringent Project Finance requirements, all the above studies needed to be completed to the highest standards by the most qualified consultants

To work with the consultants, we had to:

WindTalks NAMIBIA

Recruit experienced and qualified LTWP staff/consultants who could interact with the consulting companies to understand their reports.

- 1 Experienced Wind Power specialist.
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With the human resources and the project development plan in place

- Search and then retention of the top-quality consulting companies to perform the needed studies,
- Our budget forecast came to 5 Million Euro, but more money would be required to make the project bankable.
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Raising Risk Capital

WindTalks NAMIBIA

We could not raise the required risk capital locally, we decided to register another Special Purpose Vehicle in the Netherlands, KP&P Africa B.V.

Why this choice:

1) Knowledge in wind power, its benefits and potential returns are well-known.

2) Individual capital wealth is high, wind risk is understood

3) Banks were paying very low interest on deposits

4) People with high cash deposits were looking for better capital gain opportunities "High risk High Gain".

We successfully marketed the project and over a period of 3 years we raised Euro 5.5 Million

With the initial capital raised . . .

WindTalks NAMIBIA

Able to complete feasibility study – but we were far from done.

More capital to bring the project to a BANKABLE stage.

Still required:

- In-depth studies
- Tender documents
- Detailed technical and engineering designs
- Contracts needed to be drafted and negotiated
- Employ a highly skilled international legal firm to guide us through the contract preparations to meet Project Finance expectations for BANKABILITY.

More funds needed, but this time we felt we were ready to approach Equity funds and other project development companies to with whom to co-develop the project further and share the costs.

We were again successful and concluded a Joint Development Agreement.

The new partners

WindTalks NAMIBIA

- Pledged to buy shares in LTWP
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And this is how it was done !

The LTWP consortium has thus far spent:

- Euro 17 Million on project Development costs
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- For a total of Euro 20 Million (3% OF TOTAL Project cost).
- Of this, over Euro 5 Million will have been spent on Legal Fees alone.

The Power Purchase Agreement negotiations

WindTalks NAMIBIA

- LTWP: First Wind Power PPA to have ever been signed in Kenya
- 14 Months of negotiation
- KENYA POWER had concluded numerous PPA's with IPP's over the last 14 years, but mainly on fossil fuel generation
- We went through many presentations from the independent consultants to address issues such as:
  - a) Dispatching wind energy
  - b) Managing Wind Energy at the Dispatch Centre
  - c) The "Take-or-pay" principle
  - d) Deemed Generated Energy
  - e) Commissioning of a Wind Farm
  - f) Grid Stability issues

It was a trying experience for both parties.

Recommendation: Wind developers in countries where there is no wind experience should promote capacity building with the relevant authorities

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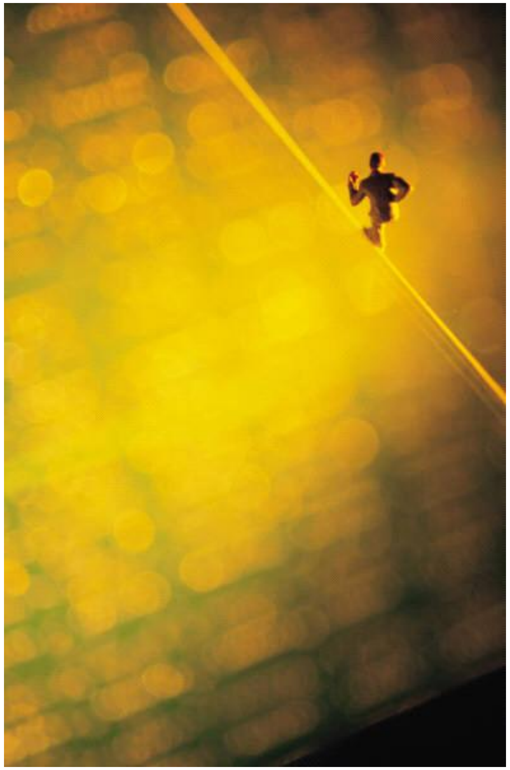

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The Power Purchase Agreement negotiations

WindTalks NAMIBIA

- LTWP: First Wind Power PPA to have ever been signed in Kenya
- 14 Months of negotiation
- KENYA POWER had concluded numerous PPA's with IPP's over the last 14 years, but mainly on fossil fuel generation
- We went through many presentations from the independent consultants to address issues such as:

  a) Dispatching wind energy
  b) Managing Wind Energy at the Dispatch Centre
  c) The "Take-or-pay" principle
  d) Deemed Generated Energy
  e) Commissioning of a Wind Farm
  f) Grid Stability issues

It was a trying experience for both parties.

Recommendation: Wind developers in countries where there is no wind experience should promote capacity building with the relevant authorities

Mr. Carlo van Wageningen,

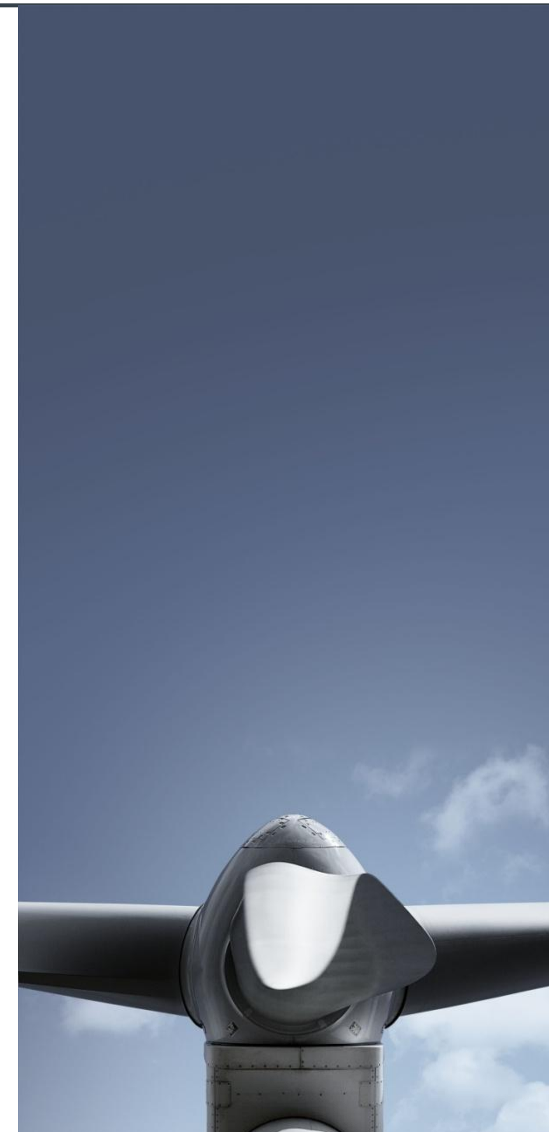
Chairman of Lake Turkana Wind Power

Thank you

We take this opportunity to extend our gratitude to the Government of Kenya, KPLC, ERC. and KETRACO for the unwavering support and faith they have extended to this challenging project

It is our sincere hope that other African Governments will want to follow in Kenya's footsteps as this is a perfect example of a successful Public-Private- Partnership that can pave the way for further large foreign direct investment opportunities in the region

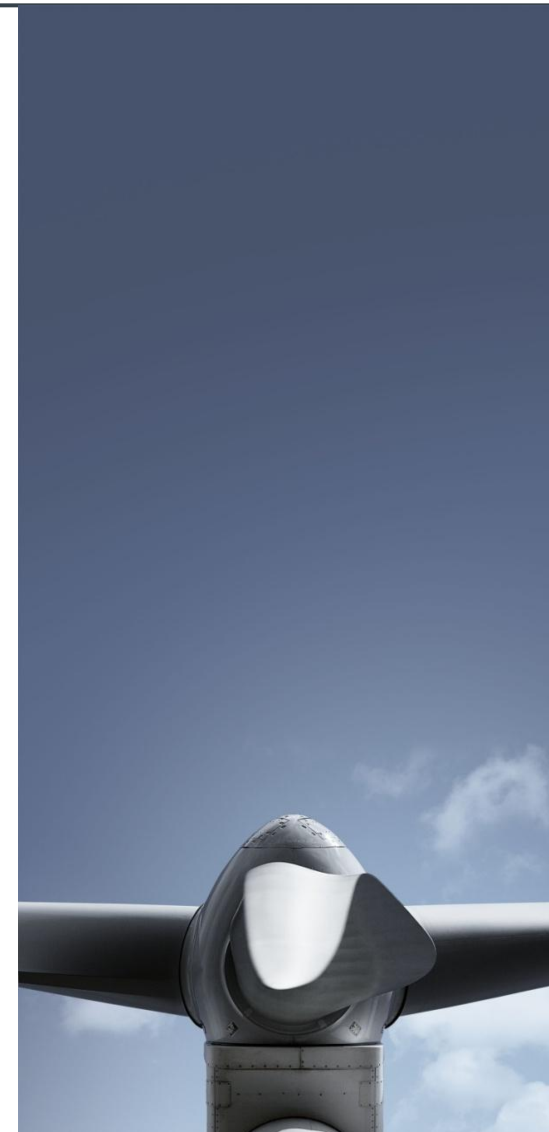
LAKE TURKANA
WIND POWER



Discussion – Financing next steps

Mr. Kudakwashe Ndhlukula,

Coordinator at REEEI, Polytechnic of Namibia



Coffee Break

We will resume in 15 minutes

Wrap-up Session: Connecting the dots

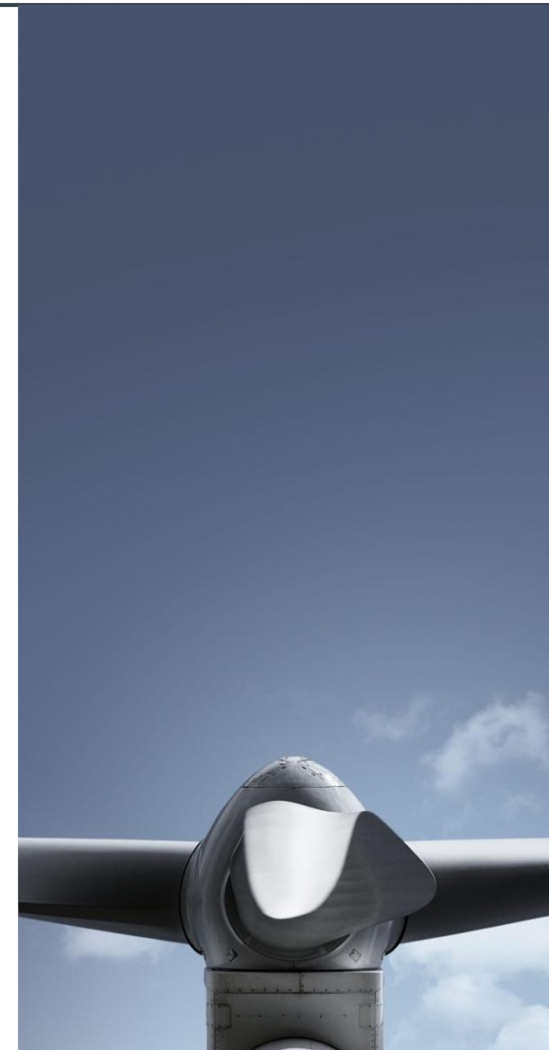
WindTalks NAMIBIA

16:30
Summary: Steps towards the first wind farm project
Mr. Kudakwashe Ndhlukula,
Coordinator at REEEI, Polytechnic of Namibia

16:45
Way forward: next steps and future cooperation
Mr. Hans Vestergaard,
Senior Vice President of Vestas Sales

17:00
End of official program & Cocktail

18:00 **Dinner**



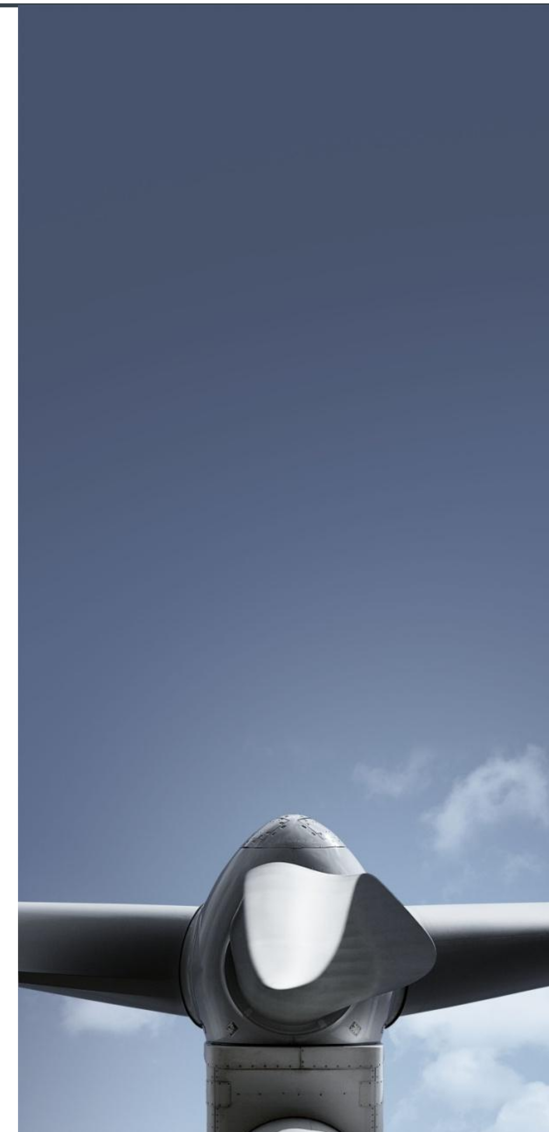
Summary: Steps towards the first wind farm project

Mr. Kudakwashe Ndhlukula,

Coordinator at REEEI, Polytechnic of Namibia

TECHNOLOGY AND DEVELOPMENT

POLYTECHNIC OF NAMIBIA

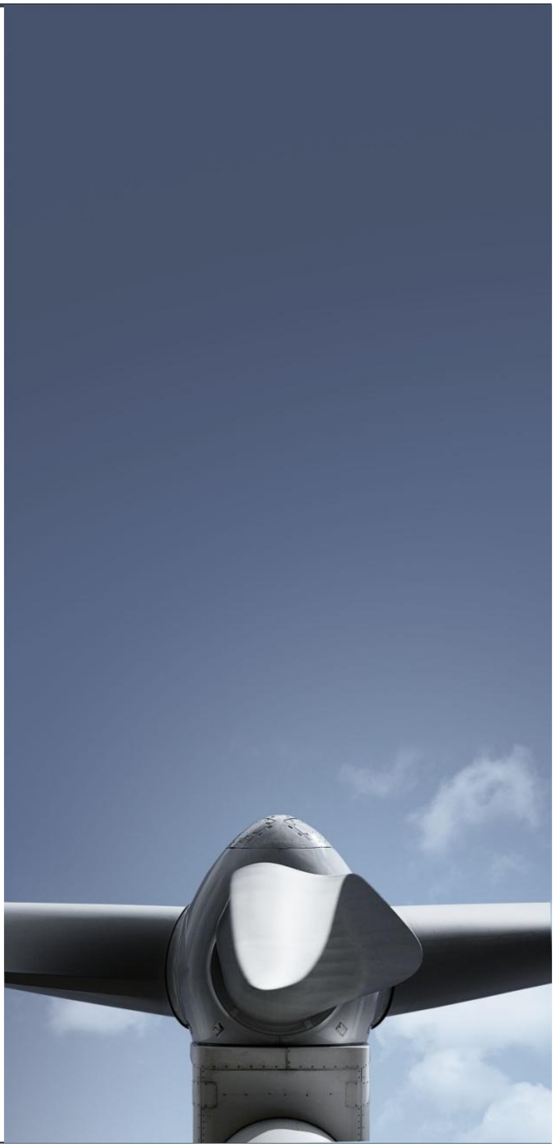


The way forward: next steps and future cooperation

Mr. Hans Vestergaard,

Senior Vice President of Sales for Vestas Central Europe

Vestas®



End of official program & Cocktail

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Thank you

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UNDP

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