Nordex AG

gtz

TERNA Expert Dialogue 2008
New Markets in Latin America and the MENA Region

Jerusalemkirche, Lindenstrasse 85, 10969 Berlin
18 September 2008
Nordex Energy GmbH – Nordex AG

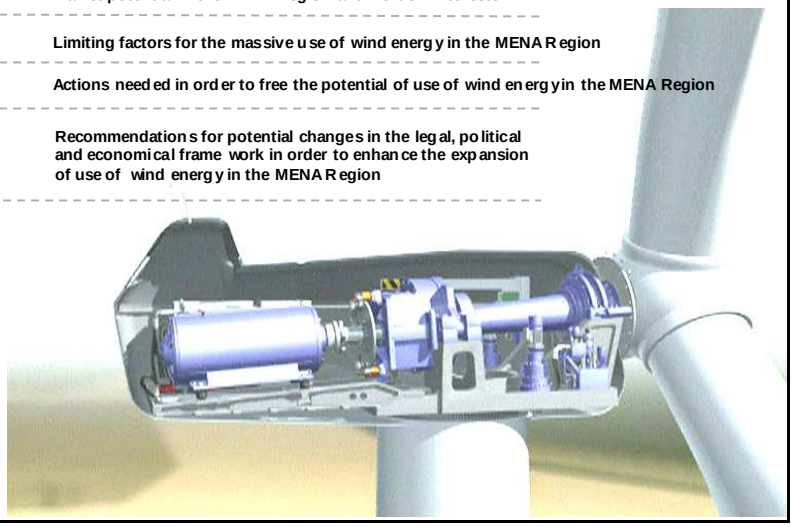
Exponent: Norbert Dwenger, Sales Director Mediterranean

Title:
Experience of the wind turbine manufacturer Nordex in the MENA Region

NORDEX
We´ve got the power.

Content

1. Experience in the MENA Region (example: Egypt)
2. Market potential in the MENA Region and Nordex' interests
3. Limiting factors for the massive use of wind energy in the MENA Region
4. Actions needed in order to free the potential of use of wind energy in the MENA Region
5. Recommendations for potential changes in the legal, political and economical frame work in order to enhance the expansion of use of wind energy in the MENA Region



Our Know-how in Wind Business

Project development marketing financing	Wind farm system planning	Technical realisation	Wind farm operation	Service and maintenance
■ Market leader in France ■ Development of one of the first commercially financed projects in China	■ Micrositing of 100% of signed projects to review customer layout ■ Supporting customers (co-development) to receive necessary approvals and to optimize the park layout	■ Core business: WTG assembly, production of selected components, installation on site, initial operation Turnkey solutions Turbine supply	■ Additional service offering: increasing demand due to new wind farm investors, who are only interested in stable cash flow	■ 2640 turbines are currently under Nordex service ■ Full service contract offering up to 9+3 years duration

Page 3

Nordex is more than a Manufacturer

Project Development	Turbine Assembly and Delivery	Civil Works	Electrical Infrastructure	Installation Commissioning	Hand over service
▪ Selection of location ▪ Ownership ▪ Optimal siting ▪ Wind measurements ▪ Soil survey ▪ Noise / shade emission ▪ Economic viability ▪ Grid connection ▪ Special purpose registration ▪ Environmental permitting ▪ Building permitting					

Page 4

1. Experience in the MENA Region (example: Egypt, execution of two public wind projects; 1999-2001) 1/2

Project description:

105 wind turbines (600 kW each, 63 MW in total) were installed in 2 projects close to Zafarana in the Red Sea area in the years 1999/2000. Nordex' turnkey scope included the balance of plant scope such as foundations and cabling and partially local production of towers.

Customer: NREA.

Energy production: > 220 GWh/a

Financing banks (soft loans): German KfW and Danish DANIDA bank.

Observations from the

- **Bidding/Contracting phase:**
  - Local agent obligatory – and helpful;
  - conflict area between NREA as final customer, the consulting company of the involved financing banks and Nordex;
  - very rigid contracts and financial terms due to soft loan restrictions (award of soft loans is ruled by parliaments!).

Page 5

Example: Wind farm in the Zafarana area, Egypt

Foto taken during construction 1999/2000

Page 6

1. Experience in the MENA Region (example: Egypt, execution of two public wind projects; 1999-2001) 2/2

- **Construction phase:**
  - Customs clearance and payment of customs duties caused remarkable delays;
  - Complicate local taxation eating up profits – when not prepared.
- **Operation phase / training / pass-over of Know-How:**
  - During warranty and maintenance period local personnel (public workers) successfully trained, onside and abroad at Nordex premises;
  - Technically good experience; local personnel took over scheduled and unscheduled maintenance after 5 years of operation; no problem with fluctuation of personnel;
  - Motivation of local technicians could be improved by incentive schemes; could be important step in order to improve technical availability of wind turbines.
- **Over-all:**

Friendly working atmosphere, at no time any security issue; project management very personnel-intensive; difficult to earn money – when not well prepared.

Page 7

2. Market potential in the MENA Region and Nordex' interests 1/2

Summary Overview

Country	Currently installed capacity [MW]	Theoretical potential [MW]	Realistic potential [MW]
Egypt	230	100,000	20,000
Libya	0		15,000
Algeria	0		13,000
Iran	48	25,000	6,500
Morocco	124		6,000
Syria	0		4,500
Oman	0	16,000	3,000
Tunisia	20		2,000
Yemen	0		1,100
UAE	0.85		1,000
Jordan	1.5	41,000	800
Kuwait	0		
Qatar	0		
Saudi Arabia	0		
Total	**424**	**182,000**	**72,900**

Source: BTM Consult 2008

Page 8

2. Market potential in the MENA Region and Nordex' interests 2/2

- **Nordex** is actually looking at wind markets in **Egypt** (estimated potential: 20.000 MW) and **Morocco** (6.000 MW)
- **Libya** (15.000 MW) and **Algeria** (13.000 MW) are seen as politically difficult markets
- Lately 180 MW have been tendered by Libyan government
- Nordex: Double **threshold system** for start-up of marketing activities in a specific country/region:
  - One-off wind farm project > 75 MW (estimated 115 Mio. Euro total investment);
  - Market conditions in place where the forecast on new installations is exceeding 400 MW per year for a period of at least 5 years.

- Remark: In order to open local assembly line or blade manufacturing in a country or a region Nordex would require pre-agreements for the supply of 200 MW per year for the same period of at least 5 years.
- Nordex is open to partnerships with local companies intentioned by the target to lower the exposure to local risks.

Page 9

3. Limiting factors for the massive use of wind energy in the MENA Region 1/1

- **Limiting factors are not of technical nature** at wind turbine level (see Nordex experience above with wind farm in Egypt; for existing site conditions like hot climate, high content of sand and salt in the air, technical solutions are available on the market);
- May be there are some **limitations in regards of grid connection/capacity** caused by huge distances between windy areas and points of consumption (cities, industries etc.)
- Nevertheless the actual product range of Nordex (especially the 2,5 MW model) would need **an up-grade** for ambient temperatures beyond 40°C, since this type of wind turbine is more sensible to higher temperatures; but no doubt: technically feasible!!
- Prejudices and old thinking: "wind is not competitive, wind turbines are not adequate for our climate; we favour big conventional power plants, use of decentral renewable energy sources does not help us to solve our problems";

  >>> OBTAIN COMPLETE INFORMATION!!!!!!

Page 10

4. Actions needed in order to free the potential of use of wind energy in the MENA Region 1/1

- **Compare real electricity generation cost**; wind should become more and more competitive with generation costs of 5 to 6 €-Cent / kWh at windy areas (average wind speeds > 8 m/s)
- **Investigate wind potential** per country/region and include wind energy as a source in the energy mix within the country politics for energy – if wind is found competitive.
- **Promote stable market conditions**; guaranteed take-of, sustainable price level (preferably fix price system) in order to attract also private investment for this area.
- **Open new alternatives** for wind farm installations others than public investment in combination with soft loans such as private investment (see above).
- **Motivate local industry and local sponsors** to take the lead by installing the right frame work (market continuity for several years and mitigate/reduce/eliminate exchange rate risk at investor level).
- **Walk away from bureaucratic, over-specified tenders and unattractive conditions** and apply purchase conditions in accordance with international practices of the industry.

Page 11

5. Recommendations for potential changes in the legal, political and economical frame work in order to enhance the expansion of use of wind energy in the MENA Region 1/2

- In general: **Underestimation of potential of the wind energy sector to create new local jobs** (during construction and maintenance phase at the wind farm level, but also at supply level by local supply of towers, blades etc. depending on local industrial grid).
  - Success stories: e.g.: Spain, Germany, Denmark, Portugal, India, China, USA.
- Motivate **existing players** to invest locally by award of bigger wind farm lots initially (> 400 MW).
- **Institutions of public interest and ministries should achieve cooperation** in order to set the right frame work, which could incentive the expansion of the use of wind energy in the country/region, and to eliminate obstacles.
  - Example: existence of a height limitation of 100 m for wind turbines in Egypt. The vast majority of wind turbines installed nowadays (1,5 MW to 3 MW) reaches total heights between 120 m and 150 m (exception: regions with bird migration);
  - Temporal import tax exemption on wind equipment; simplification of custom clearance procedures.

Page 12

5. Recommendations for potential changes in the legal, political and economical frame work in order to enhance the expansion of use of wind energy in the MENA Region 2/2

- Allow for **private investment** into wind farms fostering independent power producing **(IPP)** including solutions for B.O.O. or B.O.T. models by giving sufficient guarantees to national and international project sponsors; offer viable conditions within the power purchase agreements (PPAs).
- Include in the electrical infrastructure **planning process the high voltage lines** necessary to connect the remote wind areas with the metropolis.

Nordex has delivered to most key customers…

Selected Key Customers – Delivered Projects

Customers	Country	Selected Projects (Names)	# WTG	MW	Total MW Installed
BABCOCK & BROWN	Germany	Niederrhein	8	12	**52**
enerTrag	Germany	Roth	15	23	
	France	Brachy	5	12	
e.on	UK	Bow Beat	24	31	**111**
e.dis Natur	Germany	Ketzin	8	18	
	Germany	Schortewitz	6	15	
	Germany	Hoppenrade	5	12	
	Poland	Lebcz	4	10	
npower	UK	Wharrels Hill	8	10	**18**
	UK	Burgar Hill	2	5	
IBERDROLA	France	Fitou 2	8	10	**12**
	France	Fitou Extension	1	1	
bp	Netherlands	Nerefco	9	23	**23**
Energias de Portugal	Portugal	Carrezo	9	21	**41**
Electrabel	Portugal	Vergao	10	13	
	Portugal	Chamine	3	7	
HYDRO NUON	Norway	Havøygavlen	16	40	**40**
Fred. Olsen	UK	Chrystal Rig	20	50	**63**
	UK	Chrystal Rig Extension	5	13	
Airtricity	UK	Kings Mountain	10	25	**25**

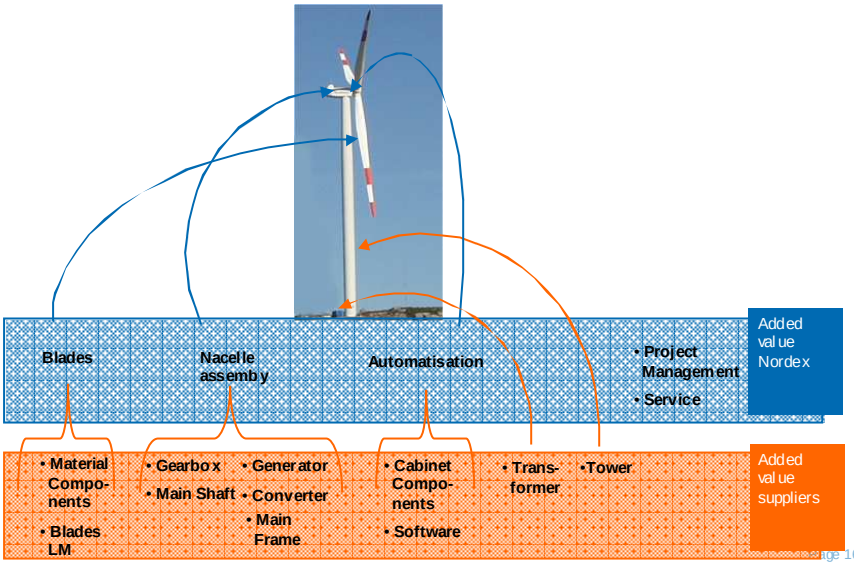
…and continues to do so. Demand on MW-turbines increases significantly

Selected Customers – Capacities Under Construction

Customer	Country	Selected Projects (Names)	# WTG	MW	Total MW Under Construction
	Italy	Minervino Murge	26	60	**182**
	UK	Kilbraur	19	48	
	UK	Millenium	16	40	
	UK	Earlsburne	14	35	
ERG CESA Eolica	Italy	Fossa del Lupo	36	90	**215**
	Italy	Capo Rizzuto	32	80	
	Italy	Vicari	18	45	
e.on e.dis Netz	Poland	Dolice	21	53	**53**
npower	UK	Little Cheney Court	26	60	**66**
	UK	Bilbster	3	4	
RES	UK	Slievedivena	10	25	**50**
	UK	Gruig	10	25	
GREENTECH ENERGY SYSTEMS	Italy	Grighine	43	99	**206**
	Italy	Messina	21	48	
	Italy	Energia Alternativa	25	38	
	Italy	Cadau	14	21	
IBERDROLA	France	Boulay	12	30	**76**
	France	Erize	5	12	
	France	Amelecourt	5	12	
	France	Saint Aubin sur Aire	5	12	
	France	Courcelles sur Aire	5	12	
DTP 大唐发电	China	Taonan Jilin	33	50	**50**

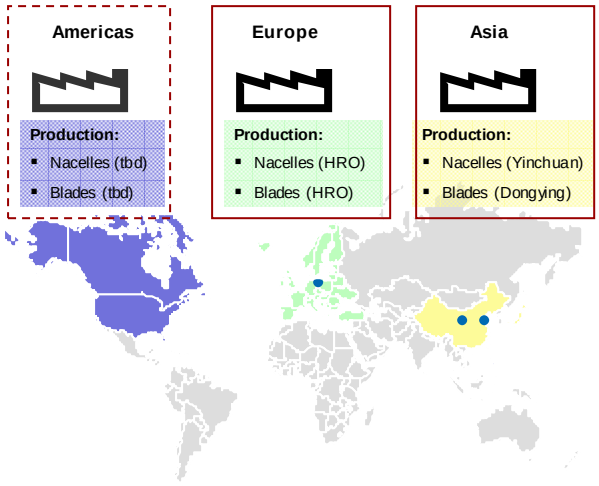
Page 15

Core Competences of Nordex: Integration of Components and Blade Production



Page 16

Nordex has a global operational footprint



Production

- Production focus on nacelle assembly & blades
- Core production (new types, high end) in Rostock, Germany (HRO)
- New facilities in China established to supply markets in Asia
- Facilities to be established in North America by 2009e

Current production focuses on 2.5 MW Class in Europe and 1.5 MW Class in Asia

Rostock (Germany) – Nacelle

WTG: 2.3 - 2.5 MW (N80/90, N100)

	2007	2011e
Max. Capacity	850 MW	2,500 MW
Employees	229	646

Rostock (Germany) – Blades

Type: NR 45 (2.3/2.5 MW turbine N90)

	2007	2011e
Capacity	350 MW	1,200 MW [1]
Employees	162	768

Yinchuan (China) – Nacelle

WTG: 1.5 MW (S70/77)

	2007	2011e
Capacity	300 MW	1,200 MW
Employees	61	333

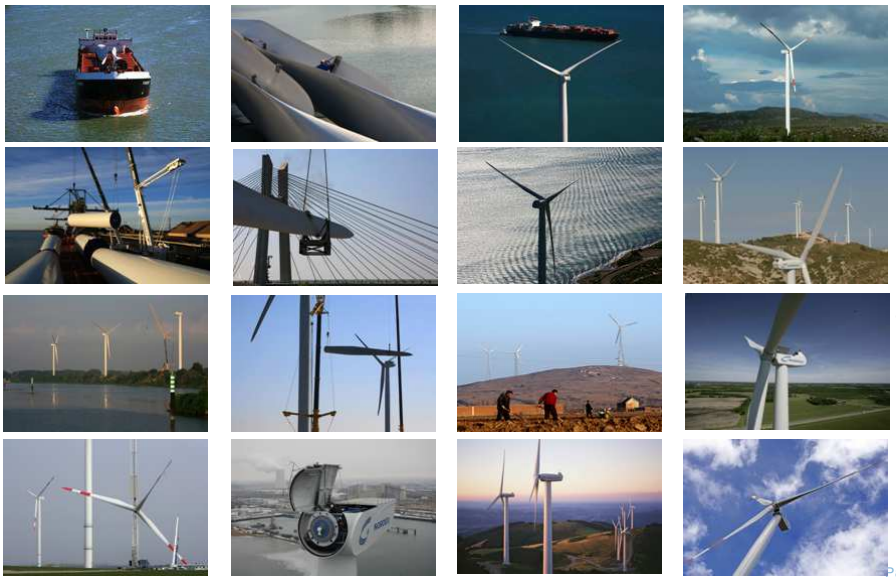
Dongying (China) – Blades

Type: NR 34/37 (1.5 MW turbine S70/77)

	2007	2011e
Capacity	300 MW	1,200 MW
Employees	186	924

[1] further extension to 2,400 MW included in long-term investment plan

Thank You …..



…. and don‘t hesitate to contact us!!!!!!!