

# fascination **off**shore



Dipl.-Ing. Klaus-Peter Lehmann • Dipl. Volkswirt Klaus Övermöhle • HUSUMwind • September 23 - 27, 2003 • Hall 3 • Stand A 337

## fascination **off**shore

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### **Press Conference *Pressekonferenz***

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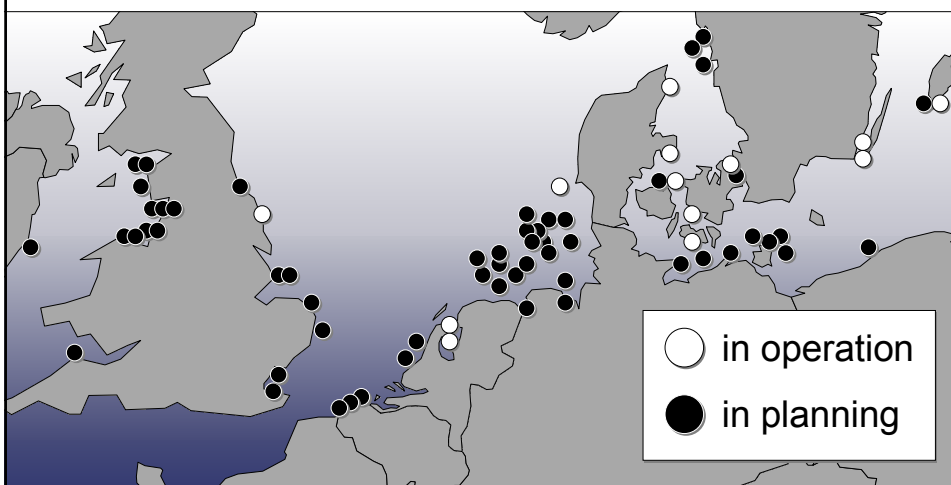
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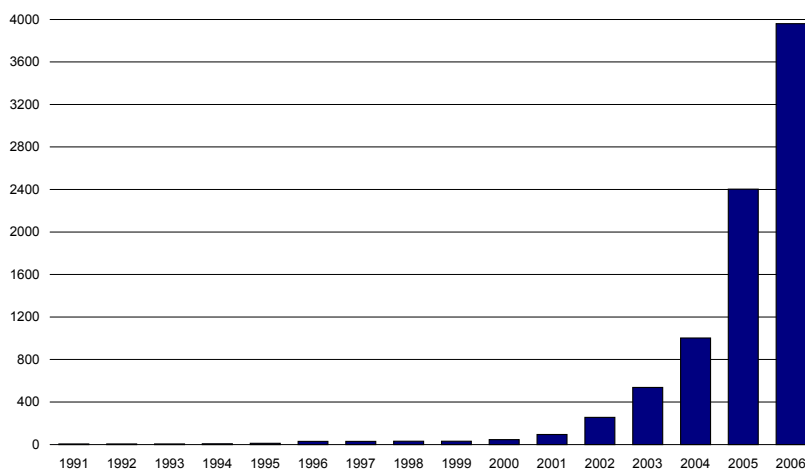
**Projects in EU / Projekte in EU**



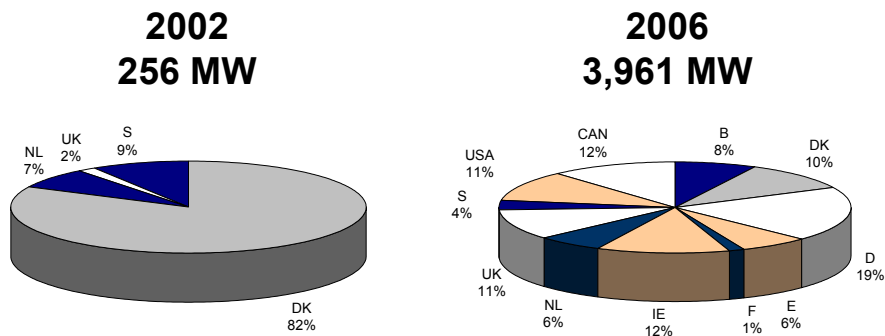
**Projects End 2003 / Projekte Ende 2003**

Year	Country	Project	Farm (MW)	Total (MW)
1991	DK	Vindeby	4.95	4.95
1994	NL	Lely	2.00	6.95
1995	DK	Tuno Knob	5.00	11.95
1996	NL	Dronten	16.80	28.75
1998	S	Bockstigen	2.75	31.50
2000	UK	Blyth	4.00	35.50
2000	S	Utgrunden	10.08	45.58
2001	DK	Middelgrunden	40.00	85.58
2001	S	Yttre Stengrund	10.00	95.58
2002	DK	Horns Rev	160.00	255.58
2003	DK	Frederikshavn	10.60	266.18
2003	DK	Nystedt	158.40	424.58
2003	DK	Samsø	23.00	447.58
2003	IE	Arklow Bank 1	25.20	472.78
2003	UK	North Hoyle	60.00	532.78
2003	D	Wilhelmshaven	4.50	537.28

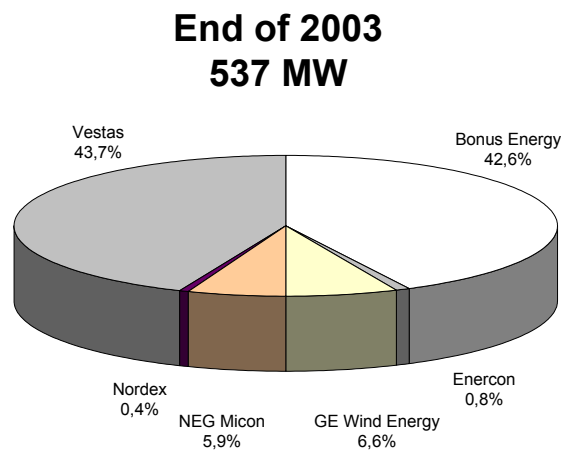
**Capacity 2006 (MW) / Leistung 2006 [MW]**



Country Shares (%) / Marktanteile Länder [%]



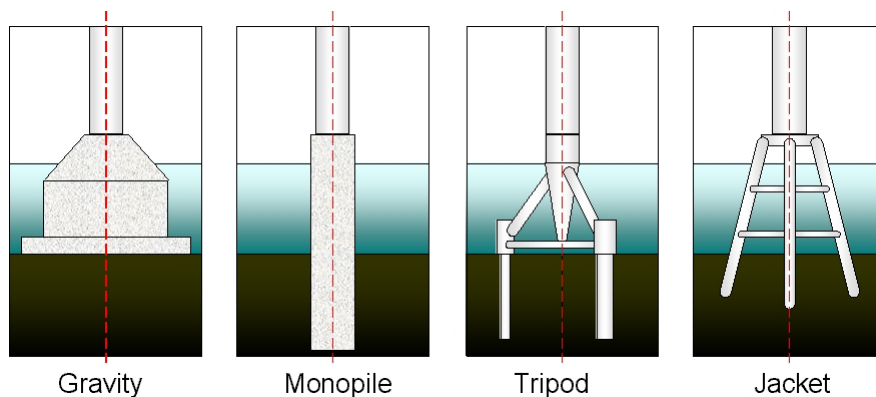
WT Shares (%) / Marktanteile WEA [%]



### Offshore-WT / Offshore-WEA

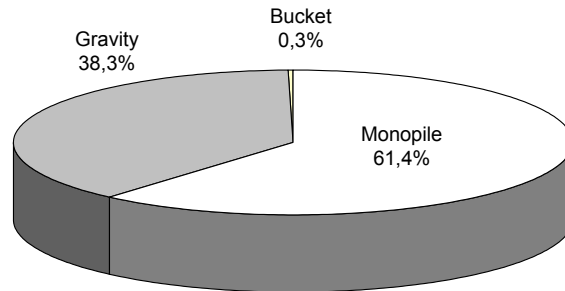
Manufacturer	Type	MW	Year	Site
Pfleiderer	Multibrid 5000	5.00	2003	Bremerhaven (D)
REpower	5 M	5.00	2004	Brunsbüttel (D)
Nordex	5 MW	5.00	n. a.	n.a.
Enercon	E 112	4.50	2003	Wilhelmshaven (D)
NEG Micon	NM 4.20	4.20	2003	Roskilde (DK)
GE Wind	3.6 offshore	3.60	2002	Albacete (E)
Vestas	V 90	3.00	2002	Hoevsoere (DK)
NEG Micon	NM 92	2.75	2002	Wieringermeer (NL)
Nordex	N 90	2.30	2003	Frederikshavn (DK)
Bonus	2.3 MW / 82	2.30	2002	Frederikshavn (DK)
REpower	MM 82	2.00	2003	Grevenbroich (D)
Vestas	V 80	2.00	2002	Horns Rev (DK)
Bonus	2.0 MW / 76	2.00	2001	Middelgrunden (DK)
Zephyros	Z72	2.00	2002	Rotterdam (NL)

### Foundations / Fundamente



**Shares Foundations / Anteile Fundamente**

**End of 2003  
296 WT**



**Innovations**

***Innovationen***

**Combination with ...**

***Kombination mit ...***

Ocean Power  
Oil & Gas Exploration

*Meerereskraft  
Öl- und Gasplattformen*

**Production of ...**

***Produktion von ...***

Potable water  
Hydrogen

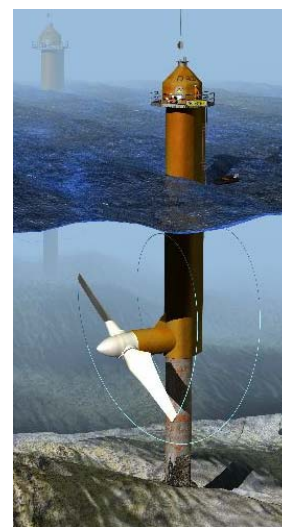
*Trinkwasser  
Wasserstoff*

**Integration by ...**

***Integration durch ...***

Prognosis  
Load management

*Prognosetools  
Lastmanagement*



## Logistics

**Increasing demands**

**Logistic-costs up to 20%  
of total investment**

**Ports as logistics-bases**

**Areas of logistics**

- Production of components
- Assembly of OWT
- Installation at Sea
- O&M at Sea

## Logistik

**Steigende Anforderungen**

**Logistik Kosten bis zu 20%  
der Gesamt-Investitionskosten**

**Häfen als Logistik-Stützpunkte**

**Logistik-Bereiche**

- Produktion Komponenten
- Endmontage Offshore-WEA
- Errichtung auf See
- Betrieb & Wartung auf See

## Installation Ships *Montage-Schiffe*

**A2SEA** | Ocean Hanne, Ocean Ady

**Jumbo** | Jumbo Javelin, Fairpartner

**Mammoet van Oord** | Jumping Jack

**Mayflower Energy** | Resolution



**O&M / Betrieb & Wartung**



**Abeking & Rasmussen: SWATH@A&R 25m Windpark Tender**

**Economy**

**Reference Windfarm**

Number of WT: 100  
 Rated Power: 5 MW  
 Distance: min. 40 km  
 Distance: max. 40 km  
 Water Depth: min. 15 m  
 Water Depth: max. 40 m

Electricity Costs:  
**7.0 - 7.5 Eurocent/kWh**

**Source:** Study BMWI 12/2001

**Ökonomie**

**Referenz-Windpark**

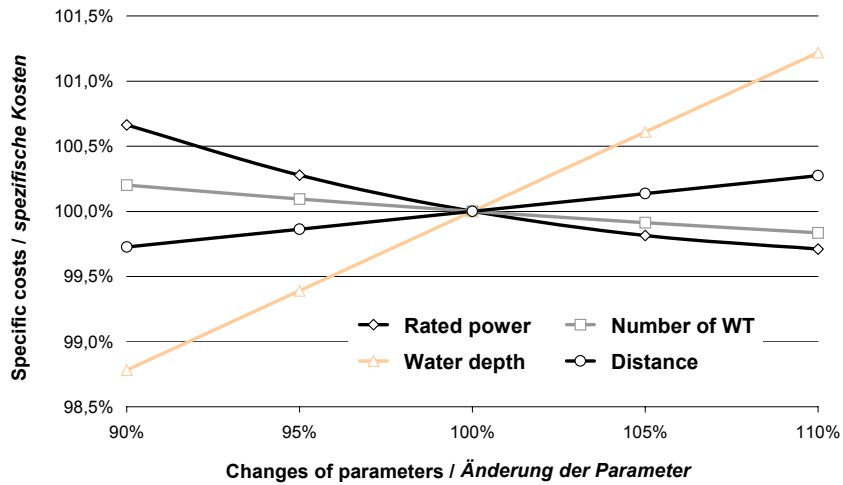
Anzahl WEA: 100  
 Nennleistung: 5 MW  
 Entfernung: min. 30 km  
 Entfernung: max. 40 km  
 Wassertiefe: min. 15 m  
 Wassertiefe: max. 40 m

Stromgestehungskosten:  
**7,0 - 7,5 Eurocent/kWh**

**Quelle:** Studie BMWI 12/2001



### Investment Costs / Investitionskosten



### Investment Costs

#### Electricity Costs

Analysis of projects  
6 - 8 Eurocent/kWh  
strong economies of scale

#### Financing

Risk allocation  
Economic viability  
Total Cost of Ownership  
Syndicating of investors

### Investitionskosten

#### Stromgestehungskosten

Projektanalysen  
6 - 8 Eurocent/kWh  
starke Skaleneffekte

#### Finanzierung

Risikoanalyse  
Wirtschaftlichkeitsbewertung  
Total Cost of Ownership  
Bildung von Konsortien

**Conclusions**

New offshore-capacity until 2006:  
approx. **3.500 MW**

OWT power range:  
**3 MW** and higher available

Offshore foundations:  
**Monopiles** favoured

Offshore logistics:  
**Optimisation, port expansion**

**Fazit**

*Offshore-Zubau bis 2006:  
rund **3.500 MW***

*WEA Leistungsklassen:  
**3 MW** und mehr verfügbar*

*Offshore-Fundamente:  
**Monopiles** bislang favorisiert*

*Offshore-Logistik:  
**Optimierung, Hafenausbau***

**... from vision to reality.**

