

## **Powered by know-how**

Providing vessels to meet the needs of industry

Ole Jacob Wang Nielsen Regional Manager, UK & Ireland



41

11

#### **A2SEA Overview**



SEA ENERGY 2002



**SEA POWER** 2002



WIND 2011



- Started 1<sup>st</sup> July 2000
- 100% dedicated offshore wind
- 4 (5) vessels, 260 employees, >120 mio Euro turnover
- Located in Denmark (HQ), Germany and UK
- Installed >750 turbines, >340 foundations



**SEA JACK** 2007



SEA WORKER 2008



SEA INSTALLER 2012



SEA SERVER 2013?



Crew boats HR2/Walney 1



## **Project portfolio**

Robin Rigg

Walney 1 Ormonde

Burbo Bank
Arklow Bank

Horns Rev 2 Horns Rev 1

**Sheringham Shoal** 

(2011)

Sprogø

Lillgrund

Frederikshavn

Rødsand 2 
Baltic 1
Nysted

Greater Gabbard Prinses Amalia Gunfleet Sands Egmond an Zee Kentish Flats London Array (F: 2011) Thanet

Scoby Sands

Since 2002:
▶ 750 turbines
▶ 340 foundations





# SEA POWER SEA ENERGY

- Self propelled
- Leg suspended crane vessels
- Semi jack-ups
- Converted in 2001/02
- Installation of turbines, met masts
- Service
  - Change of main components







# SEA POWER SEA ENERGY

- 32 m legs, water depth: 4.5-24 m
- Feeder vessel
- 2-3 turbines of
   2.3MW 3.0MW size
- 1 turbine of 3.6MW size







#### **Today's Offshore Turbines**



powered by knowhow



#### **Offshore Turbines**

	2-3 MW		4-5-6-7MW		10MW	
Vestas	2.0	3.0			7.0	
Siemens	2.3	3.6			6.0	
REpower				5.0	6.0	
AREVA Wind				5.0		
Gamesa			4.5	5.0	7.0	2
GE			4.0			-
BARD				5.0	6.5	
Nordex			4.0+		6.0	
2B				5.0		
XEMC Darwind				5.0		



7



powered by knowhow

#### **The Challenge – Nacelle Weights**



powered by knowhow

#### **The Challenge – Rotor Diameters**



#### **New Vessels for Offshore Wind**















MPI Adventurer

#### **New Vessels for Offshore Wind**













# **New builds**

#### **SEA INSTALLER**

- Ordered Mid-2010 Cosco Shipyard
- Year of delivery 2012
- Self-propelled jack-up vessel
- Crane: 800 t
- 6.5-45 m of water depth (depending on tide, penetration)
- 10 x Vestas 3.0MW
   8 x Siemens 3.6MW
   5 x REpower/Siemens 6MW
- Self-propelled, DP2 Speed: 12 knots
- Charterers' Accommodation: 35 single cabins







#### **Foundations**





#### **The Challenge**



- Maximum weight 5.000t
- Maximum footprint of 35m x 35m
- Maximum monopile length 90m
- Maximum foundation height 60m



#### **Installation of Gravity Foundations**

Nysted

Lillgrund

**Thornton Bank** 

Rødsand II

Sprogø

Approx. 225 installed end of 2010







## Installation of Monopile Foundations

Horns Rev I &II Kentish Flats Scroby Sands Prinses Amalia (Q7) Egmond an Zee Burbo Bank



**Barrow Robin Rigg** Lynn Inner Dowsing **Rhyl Flats Gunfleet Sands** Thanet Arklow North Hoyle Greater Gabbard Blight Bank Baltic 1 Walney 1 London Array Lincs Sherringham Shoal

Total approx. 1100 installed mid 2011







#### Jackets, Tripod, Tripile



Alpha Ventus 6 tripods

Bard Offshore 1 Approx. 30 tripiles per June 2011





Alpha Ventus 6 jackets Ormonde 30 jackets





## **New Concepts**













#### **Keystone / Twisted Jacket**



#### Structure

- Twisted jacket uses less steel vs conventional jackets
- Elegant transition piece
  - Uses innovative composite materials
- Proven in Hurricane Katrina
- Suitable for 30-60m

#### Installation

- Faster installation time
  - Fewer installation manoeuvres
  - No driving template required
- Improved utilisation of deck space increases transportation efficiency





## Is feeding of foundations offshore an option?



## The big question

- Feeding in 2-2.5m significant wave height needed
- Feeding foundations
   30 x 30m, 1000t, 75m high
- Feeding turbines
   80m towers, 300t nacelles, 60m blades, rotor?

2 stable platforms? - Floating?





#### Is floating installation an option?



## **First installations done**

- Greater Gabbard
- Sheringham Shoal
- Ormonde
- Alpha Ventus
- Thornton Bank / Rødsand II / Nysted

- Piles / TP's
- Piles / TP's
- Jackets
- Jackets
- Gravity foundations





22

#### **Floating Vessel Types**















- sector for piling operations
- Floating heavy lift cranes & shear leg cranes

# Semi-sub installation of jackets







#### The future for foundation installation?







## New Business within A2SEA: Jacket Installation Vessel

Use of a large size Aframax DP shuttle tanker and convert it to a Jacket Installation Vessel (JIV). Why?

- Reduced cost
  - Conversion of existing tonnage
  - Minimize the installation time per jacket
  - Reduce tug requirement
- Increase flexibility
  - Robust to tidal variations
  - Not dependent on soil conditions on the seabed
  - Various size and types of jackets

#### Increase capacity

- Use of large vessel (246 m long, 42m wide, 6500m2 deck space)
- Dynamic positioned
- Weather robust
- Space and capacity in top class





powered by knowhow



26

# Jacket Installation Vessel

#### FEED Phase ongoing

- 12 Months development programme into yard ready conversion. Finished Q1 2012
- Wind tunnel test and extensive lifting analysis planned during the summer
- Vessel (Navion Savonita converted) available to market Q1 2014

#### Signed MOU with TEEKAY

- TK will own the vessel and provide basic crew
- A2SEA provide deck crew + operational/project management for offshore wind
- MOU negotiations with contractor ongoing
  - Well known contractor is advicing in FEED phase





## **Jacket Installation Vessel**







# **Jacket Installation Vessel**

#### **Design Criteria**

- Hs = 3 m
- Current = 2 knots
- Wind = 25 knots
- Heading < 45 degrees

#### Round 3 Data (Dogger Bank)

- Hs mean < 2,2 m
- Current 10 year

max 1,25 - 1,9 knots

Wind mean < 22 knots</li>







29

# **Operation & Maintenance**





# Service

A2SEA supports both park owners and turbine manufacturers in offshore wind operation and maintenance by providing the following services:

- Crane vessels for major component exchange
- Accommodation vessels and jack-ups
- Crew boat operation and management
- Subsea inspection and maintenance







# **Crew boats**

# Crew boat operation and management

- Crewing
- Technical management
- Newbuilding
  - Project management







# Service

# Crane vessel for major component change

- Gearbox change
- Blade change
- Transformer and generator change
- Platform repair







# **MV WIND**

# Chartered service jack-up for maintenance work

- Self propelled DP jack-up, built 1996/2010
- 55.8 m legs, water depth: 4 35 m
- Liebherr Crane LTR 11200 superstructure on fixed pedestal
- Crane capacity: 30 tons @ 30 m radius @ 100 m height
- Accommodation: 23 single cabins







# **New builds**

#### **SEA SERVER**

- Concept design
- Self-propelled, self-elevating unit
- GTK1100 telescopic crane, 95 t
- 60 m legs, 6-45 m of water depth (depending on tide, penetration)
- Wave limit jacking: Hs 1.5-2.0 m
- Speed: 6 knots















# Thank you for listening

VATTENFALL S



