

# TAIWAN WIND POWER INVESTMENT INTERNATIONAL CONFERENCE AND EXHIBITION 2016

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THEO WESTGEEST  
BOSKALIS ENERGY

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TAIPEI

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AUGUST 2016

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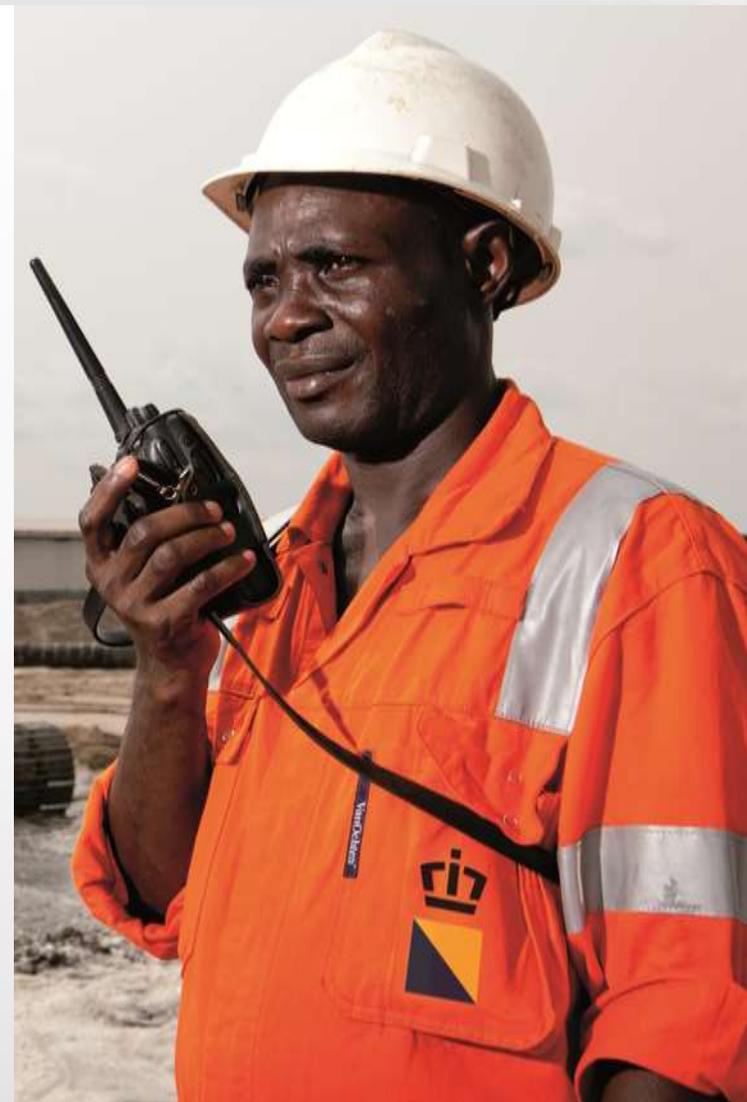


# BOSKALIS COMPANY OVERVIEW



# COMPANY OVERVIEW

- Leading global dredging & maritime expert
  - With 11,000 employees and 1,000 vessels
  - Active in 75 countries across 6 continents
  - Customers in Energy, Ports and Infra
  - Headquarters in Papendrecht, The Netherlands
- 
- Revenue 2015:       EUR   3.2   bIn
  - Net profit 2015:     EUR   440   mIn
  - EBITDA 2015:        EUR   885   mIn
  - Order book EY15:    EUR   2.5   bIn
  - Listed in AEX Euronext



# GLOBAL PRESENCE



ACTIVE IN 75 COUNTRIES  
AND 6 CONTINENTS

- Offices
- Projects and operations

# BOSKALIS OVERVIEW

## SEGMENT

## ACTIVITIES

## KEY BRANDS

## MARKETS (PRIMARILY) SERVED

## DREDGING & INLAND INFRA

- Construction and maintenance of ports
- Land reclamation
- Coastal defense
- Earthmoving in conjunction with civil infra and construction
- Soil remediation and soil improvement



- Energy
- Ports
- Infra

## OFFSHORE ENERGY

- Marine Contracting T&I
- Transport & Marine Services
- Subsea Contracting & Services
- Marine Contracting & Services
- Logistical Management



- Energy

## TOWAGE

- Terminal Services
- Harbour Towage



Joint venture with Kotug pending



- Energy
- Ports

## SALVAGE

- Salvage



- Ports (ship owners and insurance companies)

# OFFSHORE ENERGY ORGANIZATION



# OFFSHORE ENGINEERING



# OUR ASSETS

## OUR PEOPLE



# OFFSHORE ENERGY FLEET



## 23 x Heavy Transport Vessels

(DWT up to 117,000T)  
Vanguard, Blue/White/Black Marlin, Mighty Servant 1&3, Transshelf, 6 T-, 4 F- & 4 S-class vessels, Super Servant 3 and HSY 278



## 3 x Multi Purpose / cable lay vessels

Ndurance (Cable lay vessel)  
Ndeavor (Cable lay vessel)  
Stemat Spirit (Cable lay vessel)



## 2 x DP Fallpipe vessels

Rockpiper (24,000T cargo capacity)  
Seahorse (18,000T cargo capacity)



## 3 x Dive Support Vessels

(AIR, SAT systems installed)  
Constructor (SAT dive)  
SMIT Komodo, EDT Protea (AIR dive)



## 5 x Offshore support Vessels

(DP2, ROV support, AH)  
Union Manta, SMIT Kamara, SMIT Nicobar, Union Sovereign, SMIT Orca



## 22 x Ocean towage / AH tugs

(AHT 28T – 205T BP)  
Some anchor handling tugs: Union Princess, SMIT Angola, SMIT Sentosa  
Ocean towage tugs: Fairmount Sherpa, Glacier, Summit, Expedition, Alpine



## 6 x Sheerlegs

(lifting capacity up to 5,000T)  
Taklift 4, Taklift 6 and Taklift 7  
Asian Hercules, Asian Hercules II and Asian Hercules III



## 13 x Barges and FSP's

(DWT up to 25,000T)  
Giants (25,000T)  
SMIT barges (4,500T – 14,000T)  
Floating super pallets (5,000T)

# OFFSHORE SERVICES PORTFOLIO

## OFFSHORE ENERGY DIVISION

Transport & Logistics	Offshore Installation	Subsea Infra	IRM	Decom
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Marine transport & services and logistical management

Installation of offshore structures, mooring & hook-up

Seabed intervention, rock installation, cable laying, landfall construction.

Subsea inspection, repair & maintenance and dry docking

De-construction & disposal of offshore structures

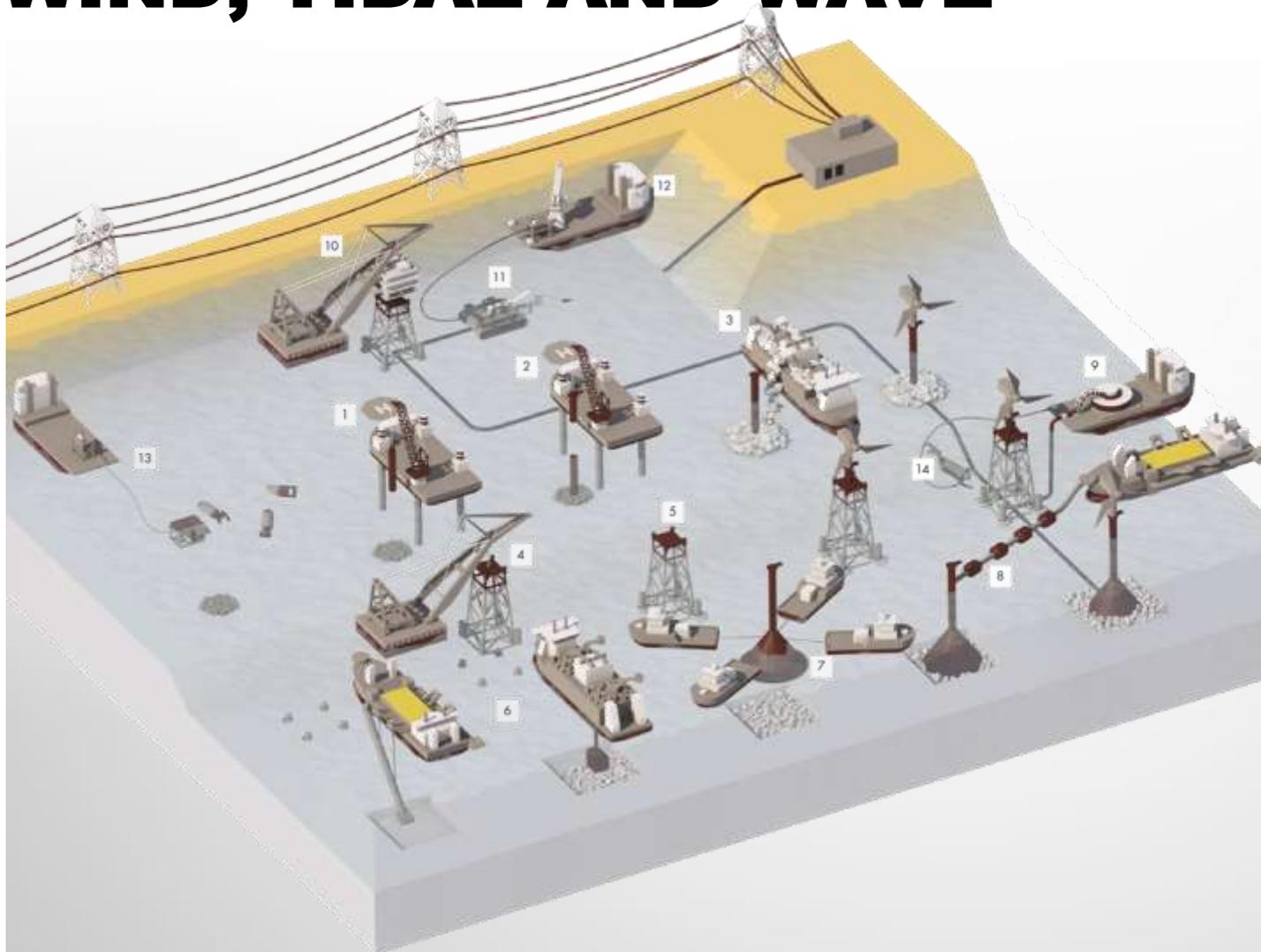
MARKETS/CLIENTS	O&G Exploration	Rigs, drillships
	O&G Production	Fixed & floating structures
	O&G Refining & Processing	LNG trains, petrochemical facilities
	Renewables	Offshore wind farms
	Port & Marine	Bridges, tunnels, cranes, vessels & barges



# RENEWABLE ENERGY



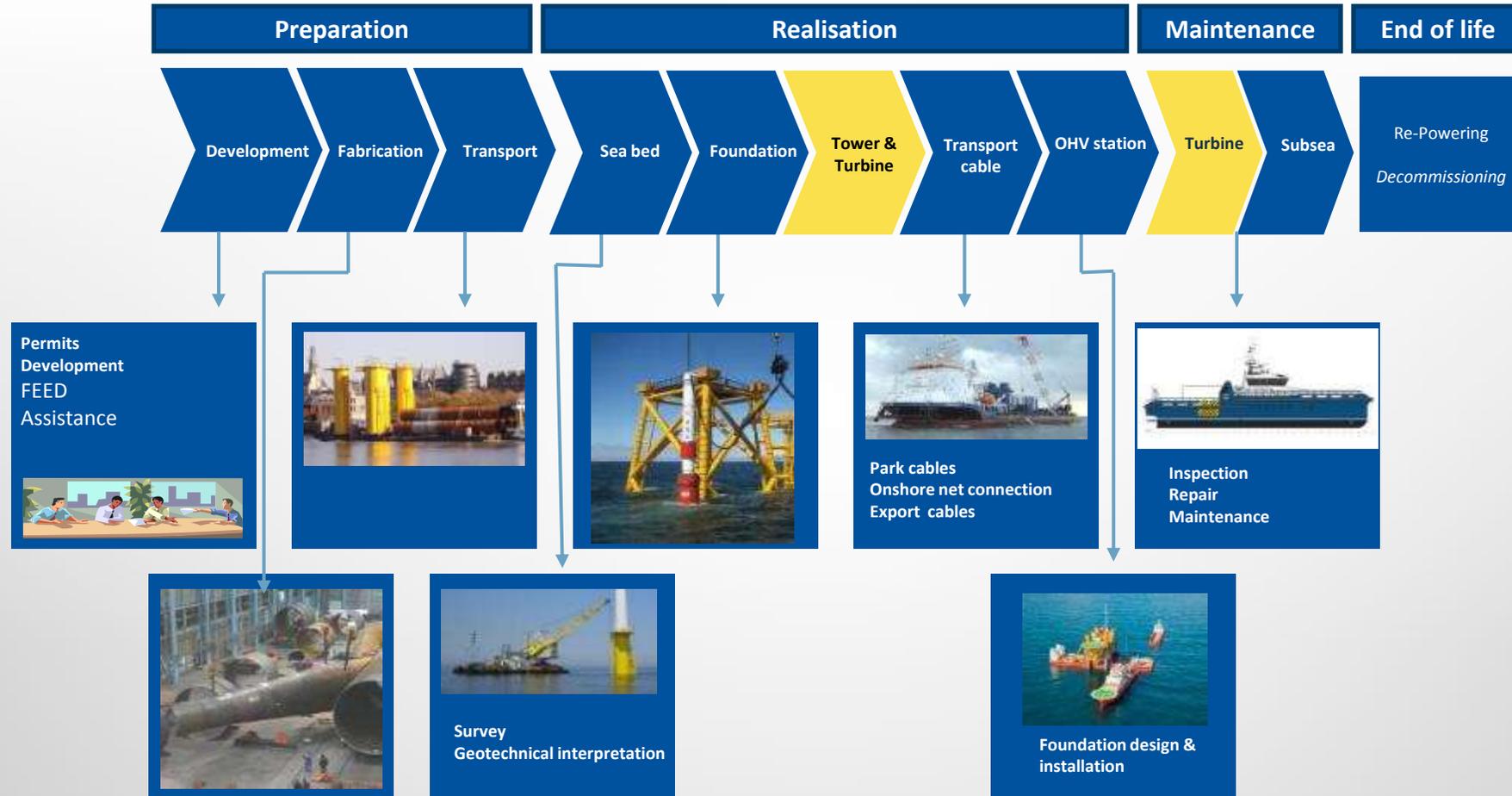
# RENEWABLE ENERGY: WIND, TIDAL AND WAVE



## OUR SOLUTIONS

1. Monopile installation on prepared location
2. Transition Piece installation
3. Scour protection installation
4. Jacket installation on prepared location
5. Scour mattress installation
6. Gravel bed installation
7. Concrete gravity base foundation installation
8. Installation of permanent ballast
9. Subsea cabling installation
10. Offshore High Voltage Station installation
11. Post burial of subsea cabling
12. Shore connection and landfall construction
13. Unexploded ordnance survey and removal
14. Subsea IRM through air or saturation diving or with Remote Operated Vehicle

# WIND FARM SUPPLY CHAIN



# ACTIVITIES

Scour protection installation



Transport



Mobilisation



Logistics



Installation



Secondary works



# EQUIPMENT

## RENEWABLE FLEET



# TOTAL BALANCE-OF-PLANT SOLUTION



# TOTAL BALANCE-OF-PLANT SOLUTION

## Equipment development



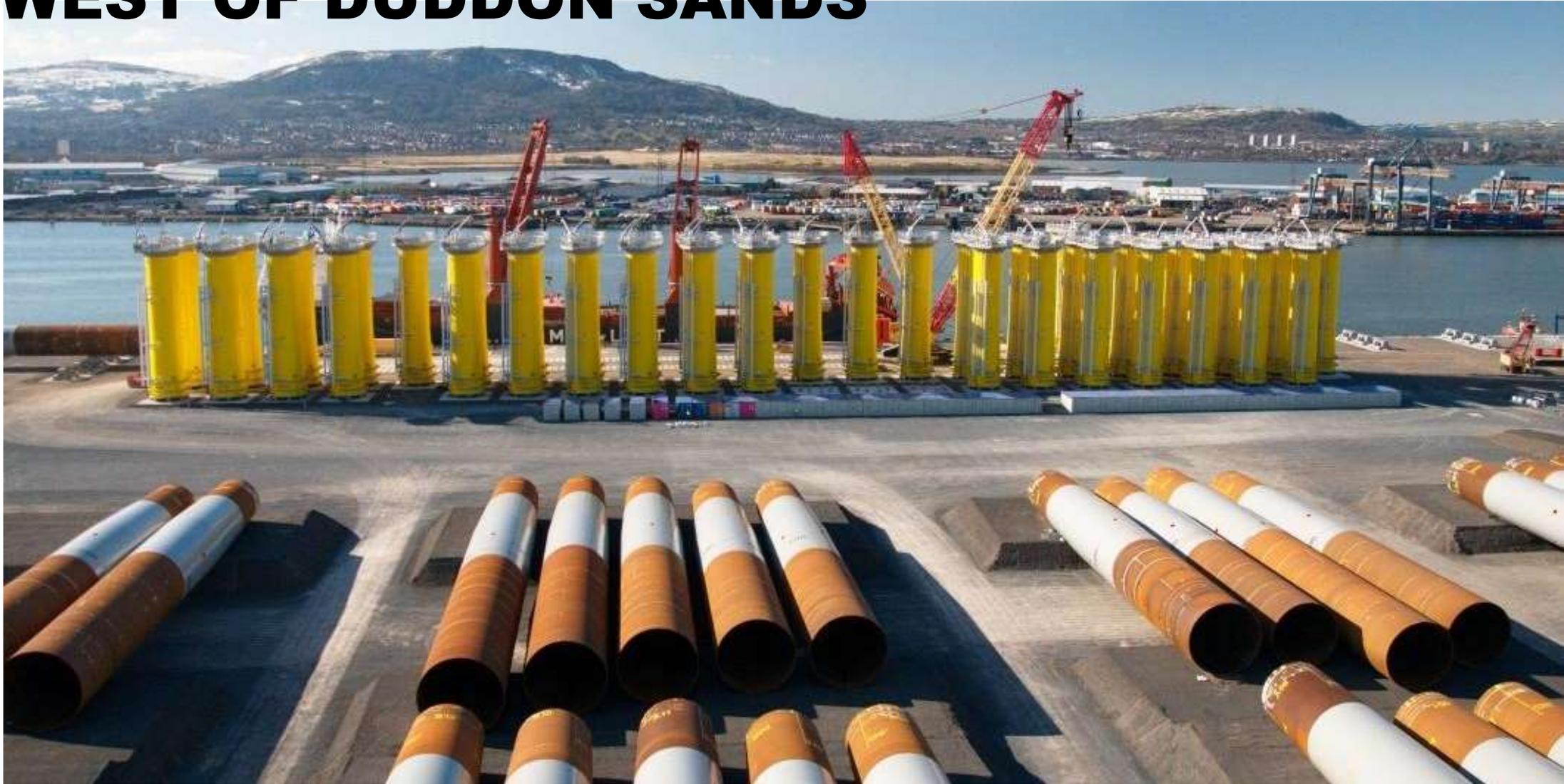
# WEST OF DUDDON SANDS PROJECT

## Facts

- Location: Irish Sea,
  - Client: DONG Energy/ Scottish Power Renewables
  - Capacity: 389 MW
  - Period: 2012 – 2014
  - Scope:
    - Transport and installation of 108 wind turbine foundations and 108 transition pieces
    - Scour protection of the foundation
    - 6 different project locations in 4 countries
- Key assets involved :
    - Seagoing tugs
    - Barges
    - Fallpipe vessel
    - Jack up vessels (supplied by the client)
    - IHC S-2000 Hydro hammer



# WEST OF DUDDON SANDS



# INNOVATIONS



# TRANSPORT AND INSTALLATION



# TRANSITION PIECE GROUTING



# WIKINGER

## FACTS

- Location: Baltic Sea, 34 km northeast of the island Rügen, Germany
- Client: Iberdrola Renewables Offshore Deutschland GmbH
- Capacity: 350 MW
- Scope: Transport and installation of 70 (four-legged) jacket foundations and 1 substation (6 piles),
- 6 different project locations in 4 countries
- Main installation vessels:
  - Boskalis Giant 7 with Liebherr 600 T installation crane
  - Boskalis Taklift 4 sheerleg



# WIKINGER



# WIKINGER



# INNOVATIONS



# TRANSPORT AND INSTALLATION



# VEJA MATE

## FACTS

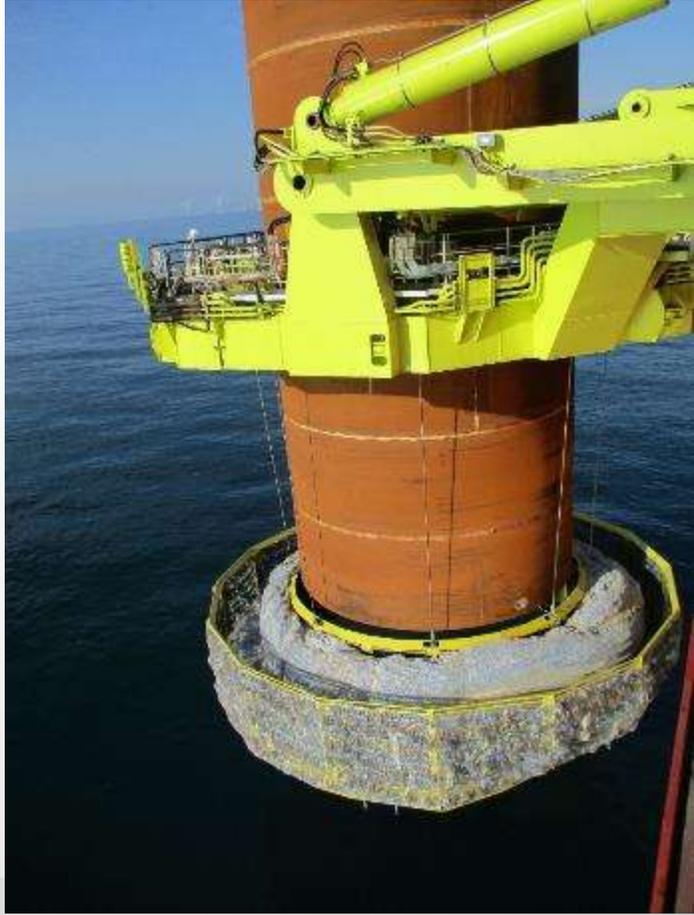
- Location: North Sea, 80 km from the German coast
- Client: Veja Mate Offshore Project GmbH
- Capacity: 402 MW
- Scope: Engineering, Fabrication, Transport and Installation of 67 XXL monopiles and 67 transition piles, including the installation of the scour protection of the foundations.
- 5 different project locations in 4 countries
- Main installation vessels:
  - SeaJacks Scylla
  - SeaJacks Zaratan
- Monopiles are driven with the IHC S-4000 Hydro hammer



# VEJA MATE



# INNOVATIONS



# XXL MONOPILES

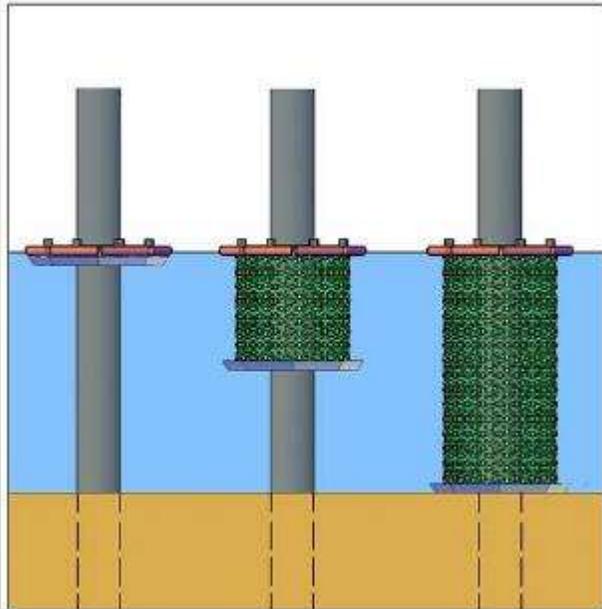
MAX 84.8 M, 1304 T - MIN. 76.2 M, 1157 T

DIAMETER 7.8 M



# INSTALLATION – NOISE MITIGATION

HYDRO SOUND DAMPER (HSD)

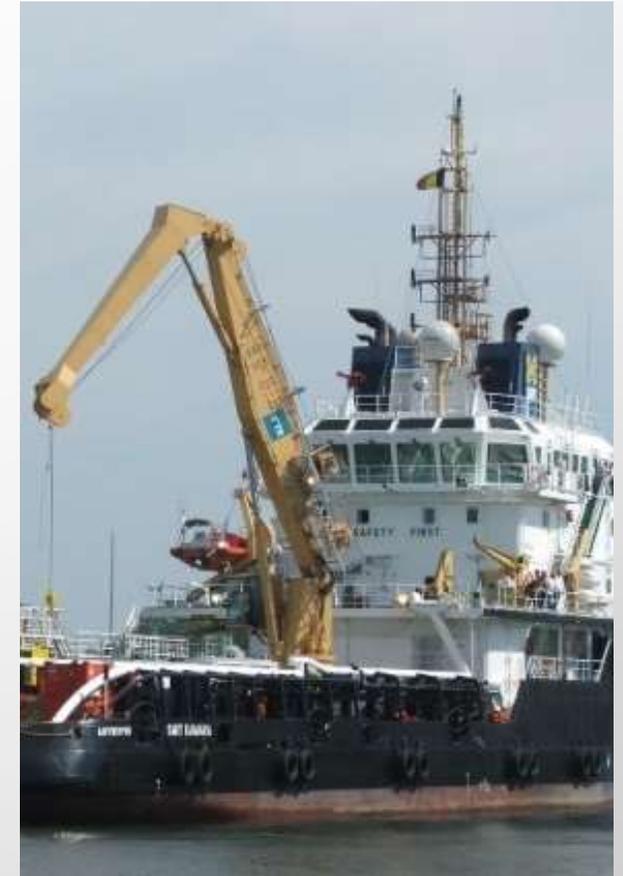
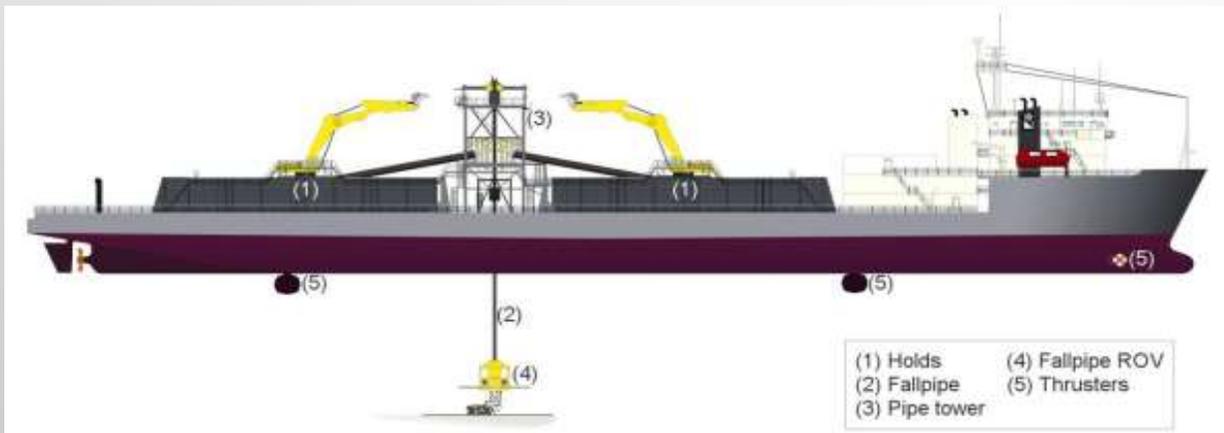


DOUBLE BIG BUBBLE CURTAIN(S) (DBBC)



# INSTALLATION – SCOUR PROTECTION

## FALLPIPE VESSEL



# OTHER SERVICES

## SUCTION INSTALLED WIND TURBINES



# ABERDEEN OFFSHORE WIND FARM

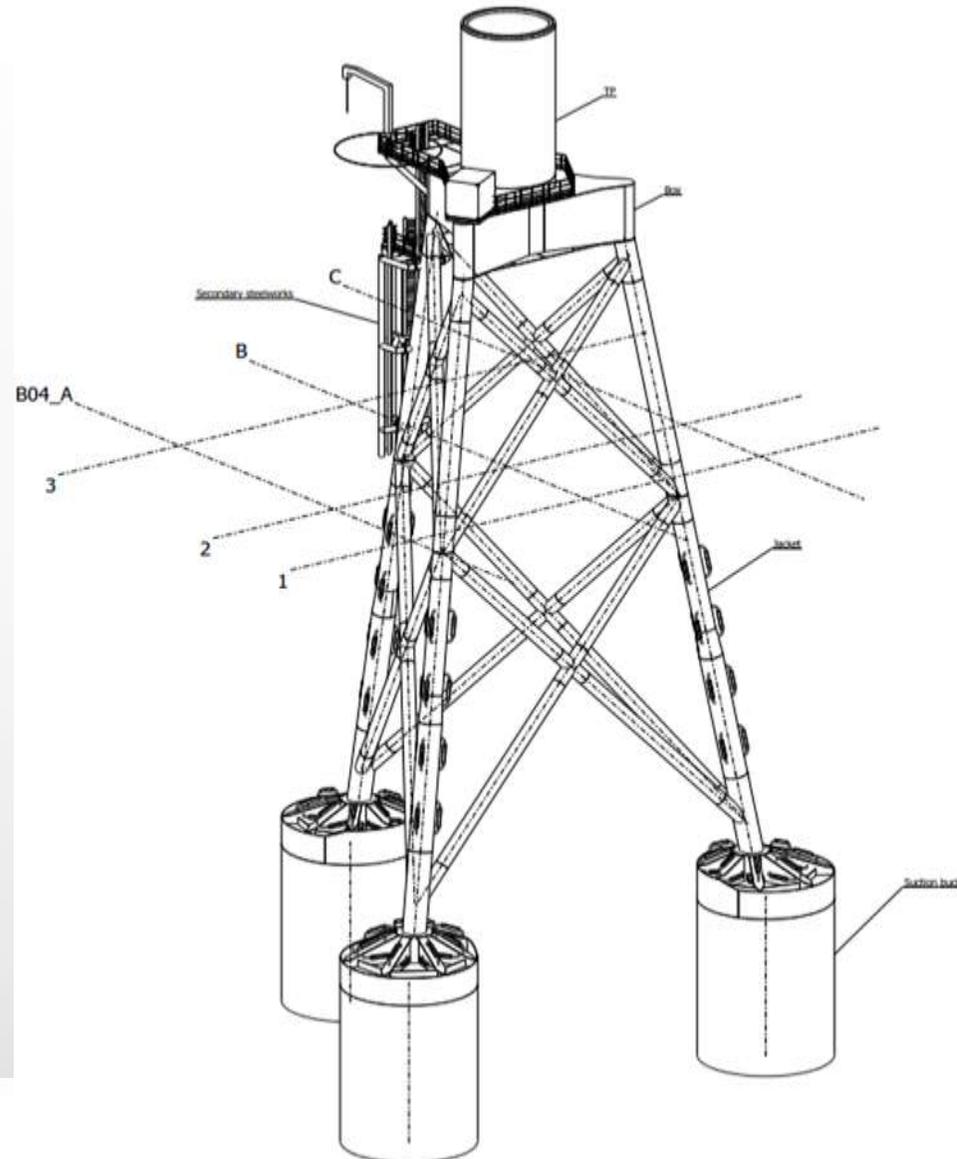
## FACTS

- Location: North Sea, 3 km from the Aberdeen
- Client: Vattenfall Windpower Ltd
- Capacity: 93 MW
- Scope: Balance of Plant, Design, Engineering, Fabrication, Transport and installation of 11 jacket foundations and 11 WTG's, including the installation 2x 66 kV export cables and 9x 66 kV inter-array cables
- 3 different project locations in 3 countries
- Main installation vessels:
  - Jack up vessel for WTG's, Shearleg Asian Hercules for jackets
  - Cable lay vessel Ndurance/Ndeavor
- In preparation, execution Q4 2017 to Q2 2018

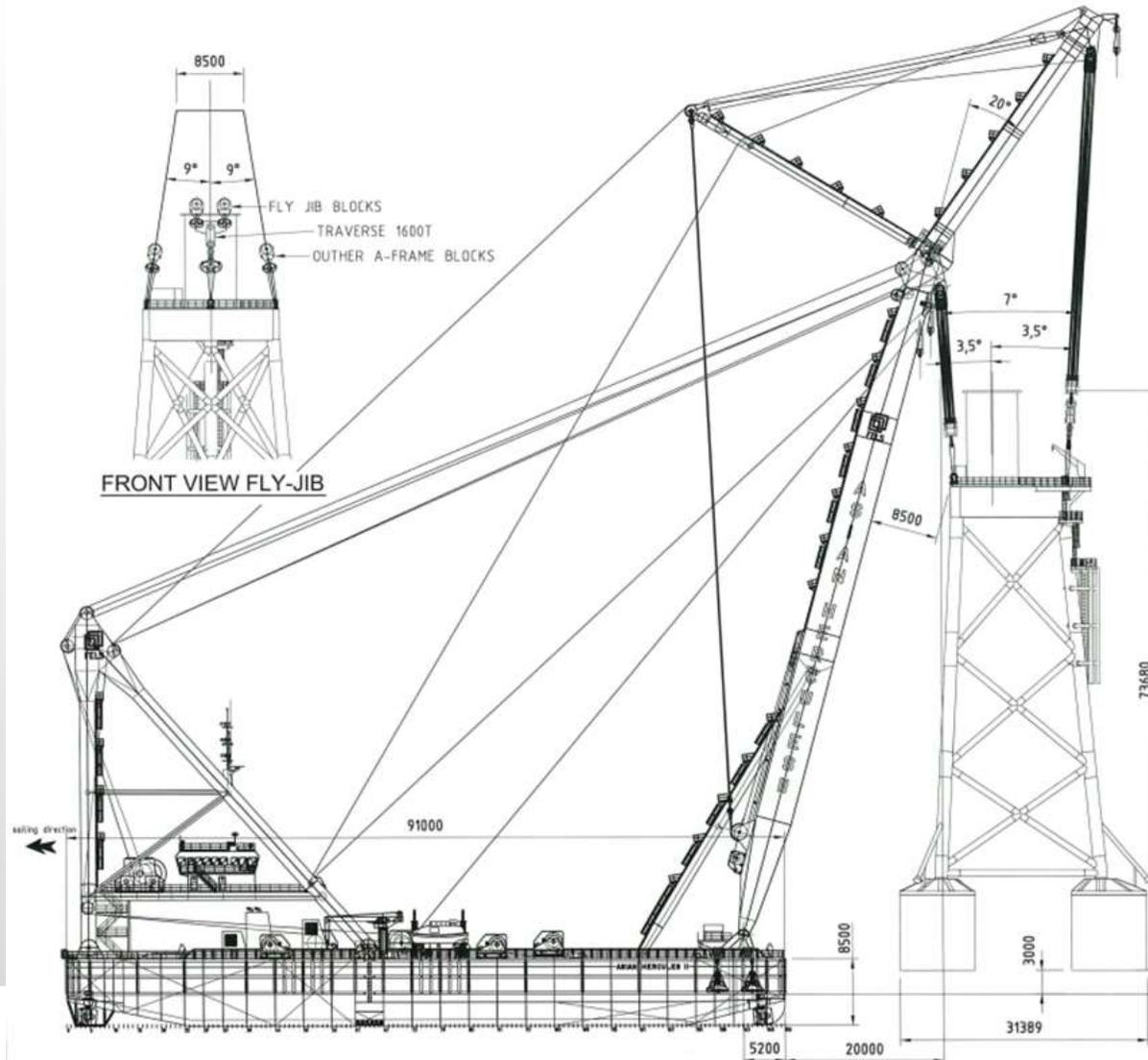


# ABERDEEN OWF

Jacket Weight  
950-1230 ton



# ABERDEEN OWF



# CONVERTER PLATFORM INSTALLATION

## DOLWIN 2 PROJECT

- Client: Tennet
- Period: 2014-2015
- Location: DolWin field in the German sector of the North Sea
- Scope:
  - Tow-out at the fabrication yard
  - Transport of the platform hull from the construction yard
  - Seabed preparations
  - Tow out, positioning and installation of the platform
  - Platform ballasting and scour protection installation



- Key assets involved :
  - Harbour tugs Smit Lamnalco
  - Dockwise Mighty Servant 1
  - AHTs (Fairmount 3x, Union Sovereign)
  - Rockpiper, Seahorse, EDT Protea





# ARRAY & EXPORT CABLING

## BORKUM WEST 2 – array cable replacement

- Client: Trianel
- Period: 2015 (< 48hrs)
- Location: German Bight
- Scope:
  - Removal of existing cable
  - Installation of spare cable including cable protection system, hang-off, termination and testing utilising in-house resources only
  - Protection of cable by trenching

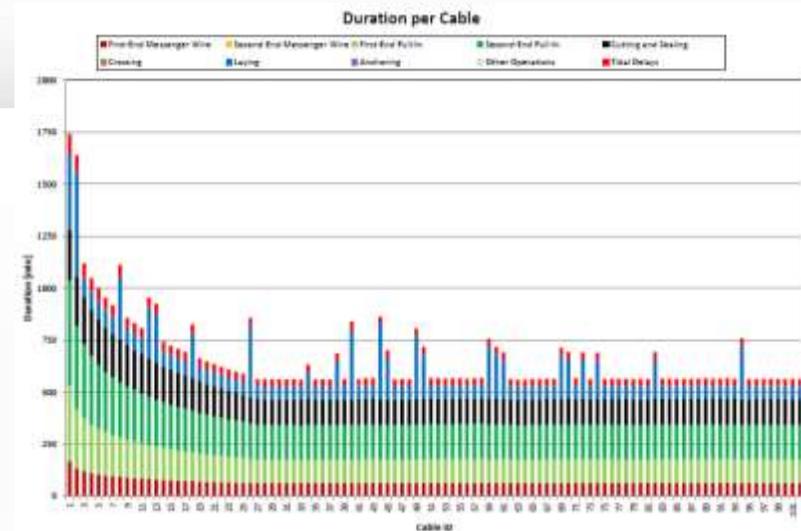


- Key assets involved :
  - Ndurance cable lay vessel
  - Grand Canyon with T1500

# CABLING

## WHY VBMS?

- Multiple vessels providing flexibility
- Proven reliability of on time delivery
- In-house resources for design & engineering
- Proven track record in supply & install EPCI
- In-house termination, testing & protection
- Dedicated repair service including storage of spare cable



## SPECIALIST SERVICES

- Interface management with foundation and WTG installation
- Burial Assessment Studies & Route Engineering
- Production estimation based on experience
- 66kV cable
- Mock-up services

# CABLE INSTALLATION VESSEL



# TRENCHFORMER – BURIAL EQUIPMENT



# TOWED VERTICAL INJECTOR – LOW TIDE



# HIGH TIDE



# NEW VESSEL CONCEPTS FOR TRANSPORT & LAYING



# SANDBANK OFFSHORE WINDFARM - CABLES



# THANK YOU; QUESTIONS?



# **NEW HORIZONS**



**HOW CAN WE CREATE  
NEW HORIZONS TOGETHER?**