

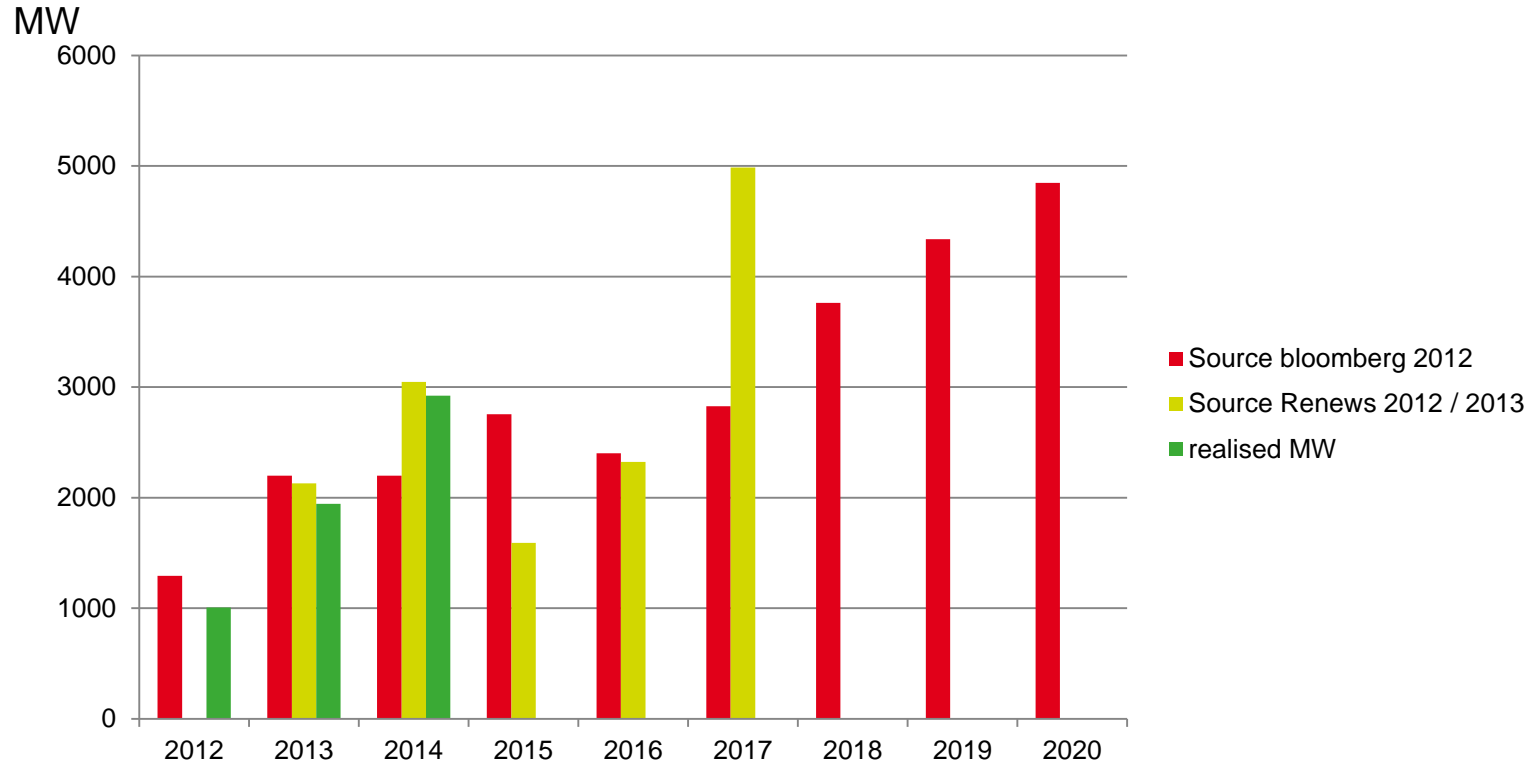


Offshore Substations

Gent – 08 May 2015

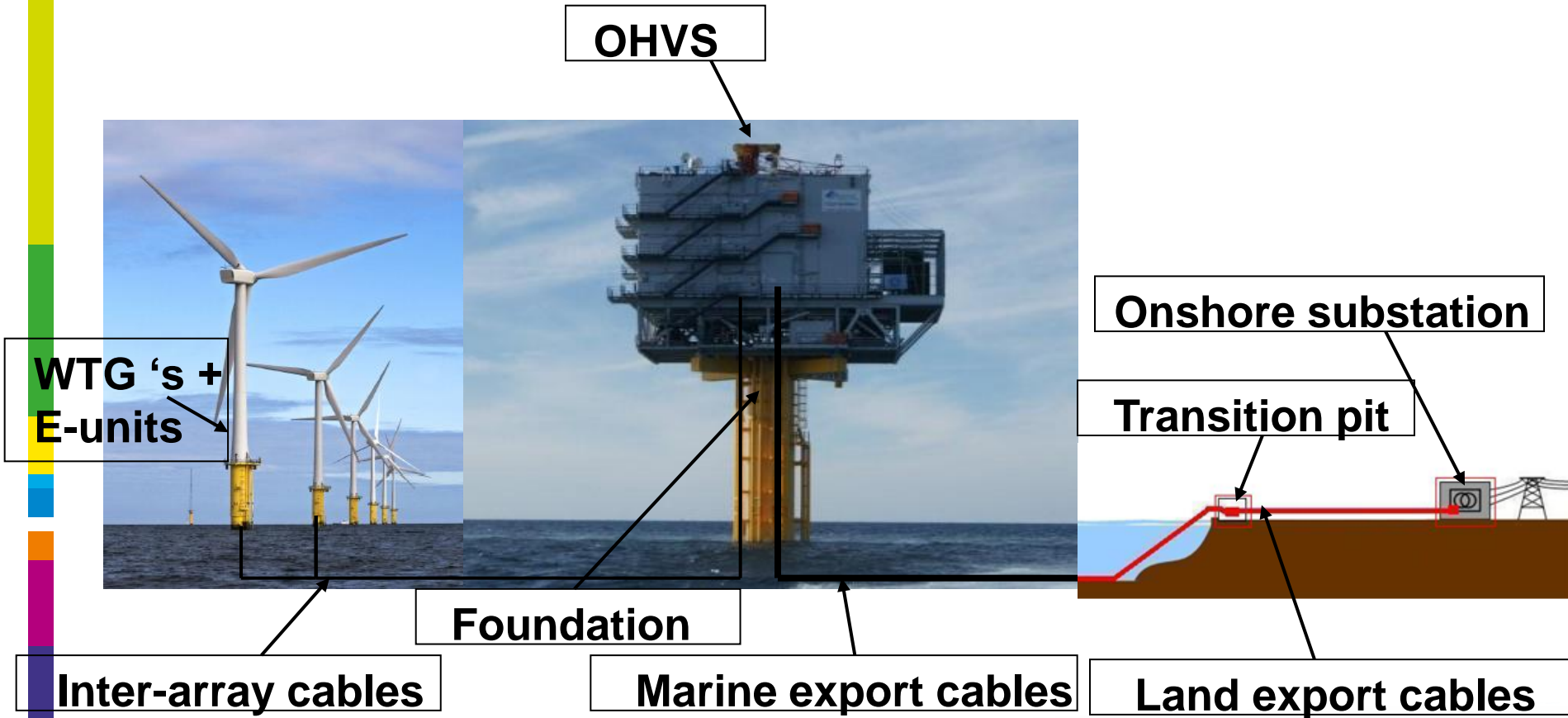
COFELY FABRICOM
GDF SUEZ

Europe : Realised Windfarms and Forecasts



Offshore Wind Presentation

Offshore Wind Farm





OFFSHORE WIND : THE MOVIE

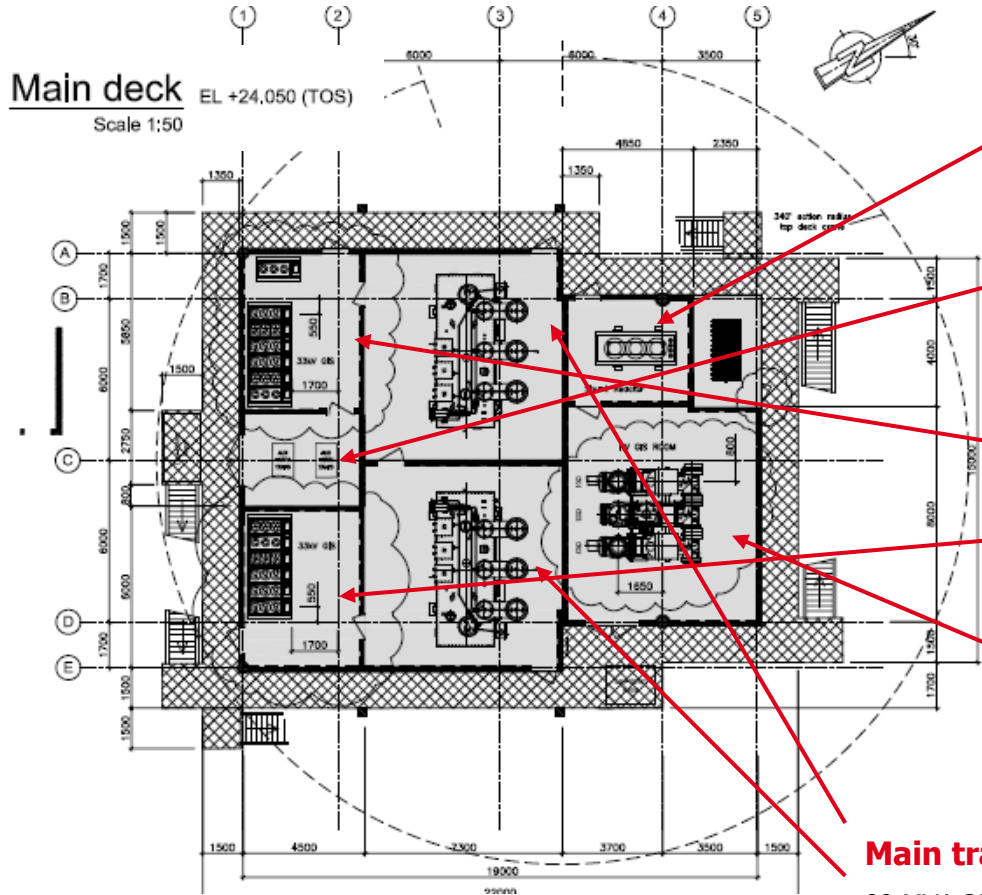
Cofely Offshore Wind_Movie 2015_UK SST.mp4

12.05.15

Projects



Offshore Substation overview



Main deck
EL +24,050 (TOS)
Scale 1:50

Shunt reactor

33 kV 21,8 MVar

Aux/earth transformers

33/0,4 KV 400 kVA
max fault current 1000 A

33 kV switchgears

SIEMENS type 8DA 10

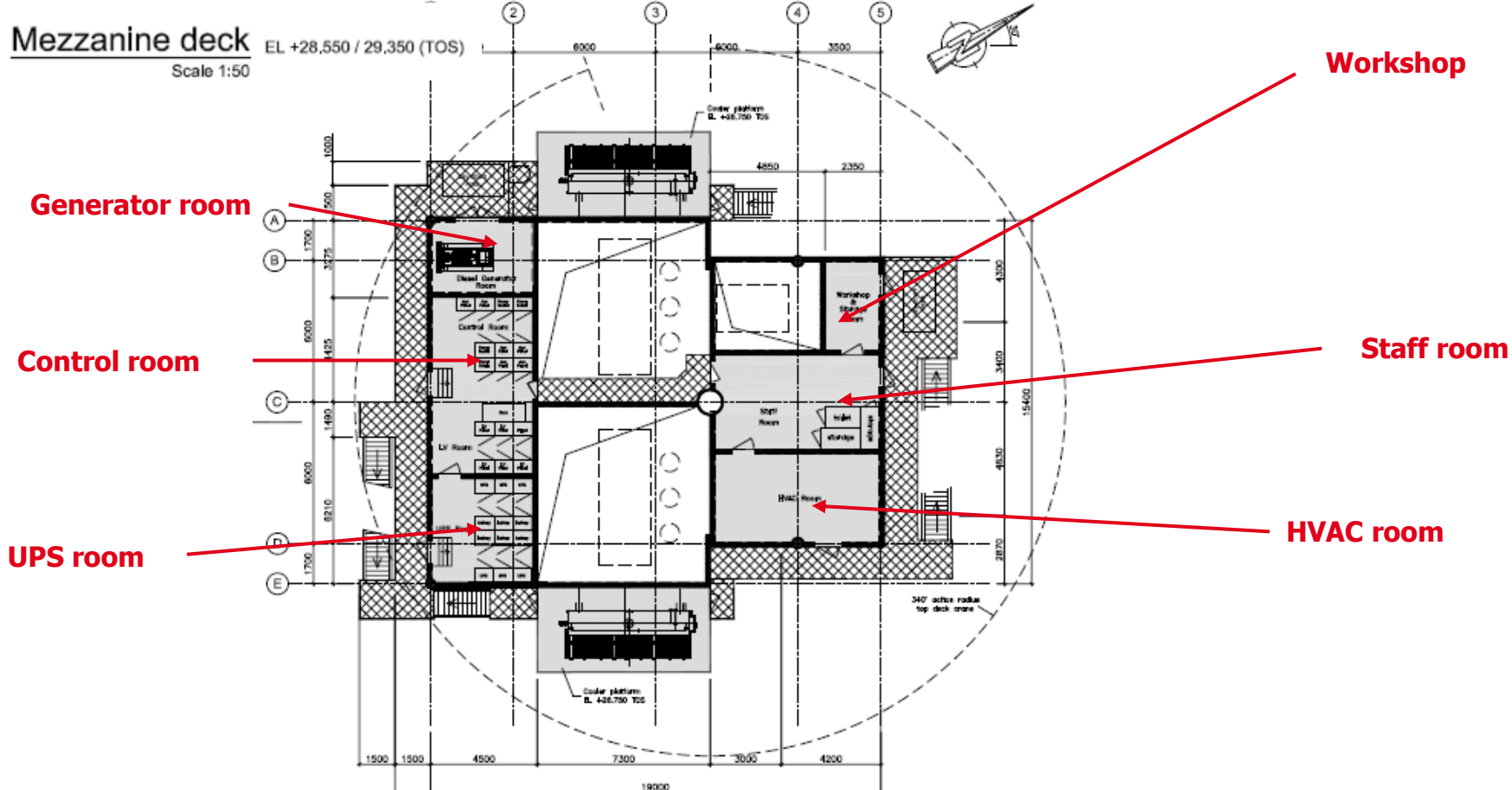
HV GIS

ABB Type ELK-04

Main transformers

80 MVA 33/150 kV ONAN

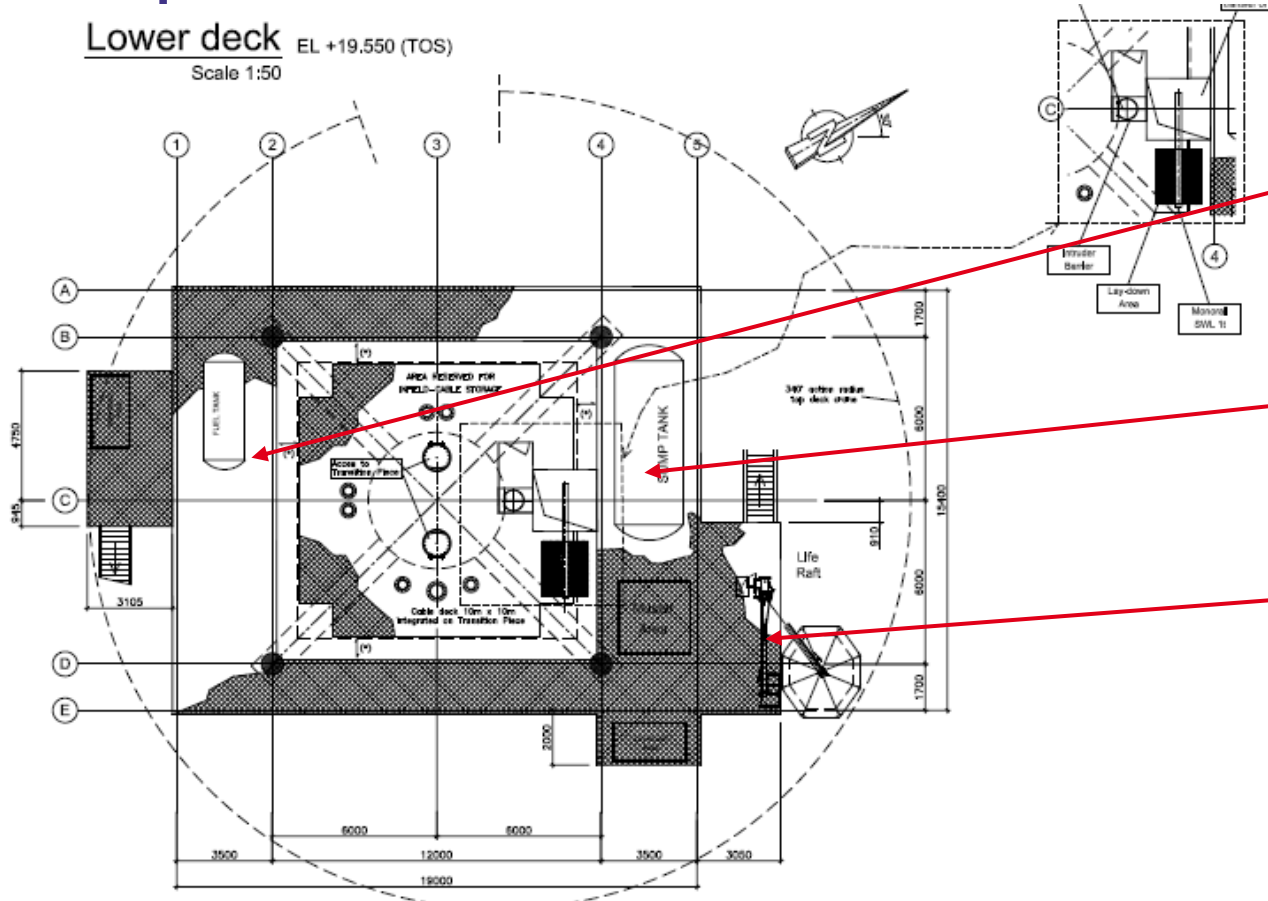
Scope information – Offshore Substation



Scope information – Offshore Substation

Lower deck EL +19.550 (TOS)

Scale 1:50



Diesel fuel tank

Double walled – incl. leak detection / 14 d

Sump tank / Oil water separator

Loss of diesel / oil – 110% transformer oil content

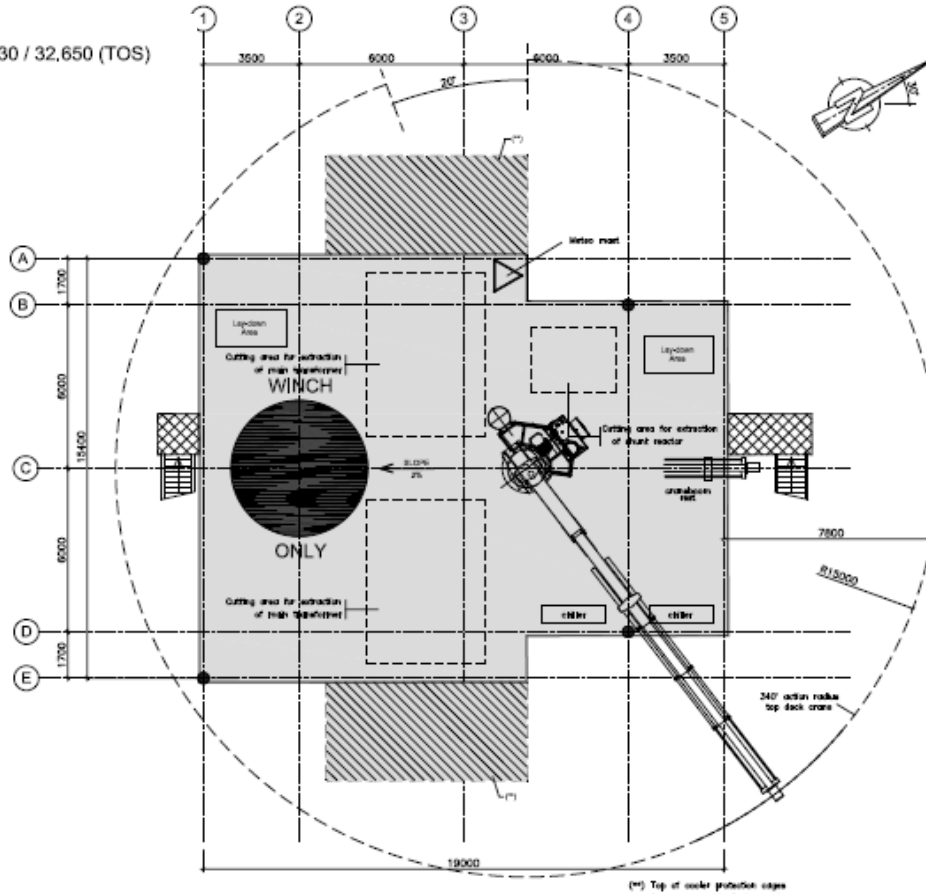
Life raft

Liferaft davit

Scope information – Offshore Substation

Top deck EL +33.030 / 32.650 (TOS)

Scale 1:50



Belwind I

Belwind I Offshore Wind Farm (Belgium)

- Fabricom and Hydro Soil Services (DEME Group), partners in the Temporary Trade Association 'THV Seawind OHVS', are responsible for the following scope within **Phase I** (165 MW, 55 turbines):
 - Overall project management
 - Design & Fabrication of an Offshore High Voltage Station (OHVS)
 - Installation of OHVS at sea
 - Supply of onshore 'booster' station and connection to HV grid
 - Installation of 'booster' and control room
 - Supply and installation of 150 kV onshore cable
 - execution of Horizontal Directional Drilling (HDD)
 - A part of THV Seawind OHVS - SM BOSS offers a unique technology to transform and transport electricity to shore (solution patent pending together with CG Holdings / Tractebel)



Owner

Belwind NV (Colruyt, SHV,
Meewind, PMV, Rabo Project Equity)

Location

Bligh Bank, Belgium
Fabrication: Hoboken, Belgium

Total manhours

85,000 (Fabricom)

Client

Van Oord

Start date

August 2009

Engineering

12.05.15
Fabricom

Completion date

September 2010

Belwind I

- Construction
- Load out
- Transport
- Offshore Installation



London Array Limited

London Array Offshore Wind Farm (UK)

- Design, procurement, fabrication and installation of two offshore substation structures (Package 4) for the Phase I of the London Array Project, the world's largest offshore wind farm
- The project is executed as a JV 'Future Energy' together with Lemants (Smulders) and GeoSea (DEME) with Fabricom in the lead
- The scope includes
 - Overall project management
 - Design of monopiles
 - Design, fabrication and transportation of transition pieces
 - Design, fabrication, transportation and installation of two offshore HV substations
- Phase I of this €2.2 billion project - 630 MW, 175 turbines (Siemens, 175 SWT 3.6)



Owner

London Array Ltd
(JV E.ON, DONG Energy, Masdar)

Location

Project destination: Thames Estuary, UK
Fabrication: Hoboken, Belgium

Total manhours

100,000 (JV)

Client

London Array Ltd

Start date

October 2009

Engineer

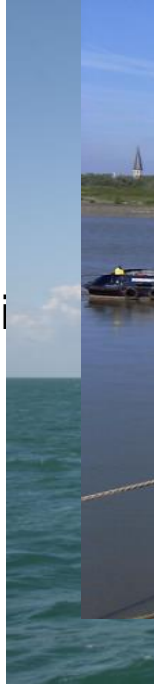
Garrad Hassan / Fabricom

Completion date

September 2011

Project : London Array

- Construction
- Load out
- Transport
- Offshore Installation



London Array - VGB Quality Award 2012

VGB members represent ~520.000 MW installed power capacity

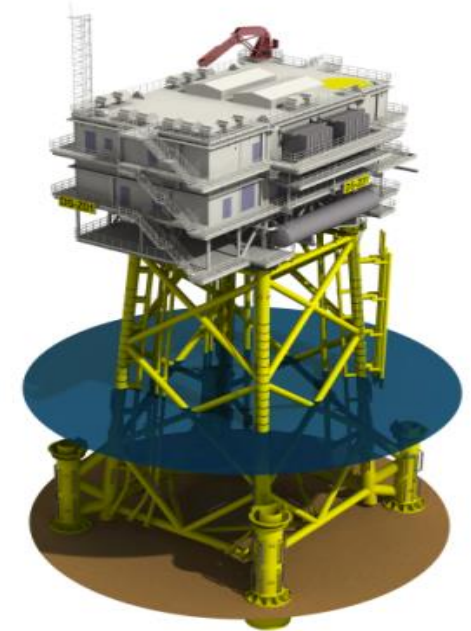


West of Duddon Sands

West of Duddon Sands Offshore Wind Farm (UK)

■ Fabricom scope:

- Complete fabrication, delivery and commissioning on site of:
- 1 Topside Module
- 1600 T
- W x L x H: 15 x 28.5 x 14
(excl. cantilevered walkway areas and other minor items.)
- 1 Jacket Substructure
- 1300 T



Owner

Scottish Renewables (WODS) Ltd
Dong Energy WODS (UK) Ltd.

Client

Scottish Renewables (WODS) Ltd.
Dong Energy WODS (UK) Ltd.

Engineering

Employee of agent of Employer

Location

West coast of England
Fabrication: Hoboken, Belgium

Start date

January 2012

Completion date

August 2013

Total manhours

103,000 (Fabricom)

West of Duddon Sands

- Construction
- Jacket
- Move out
- Load out



Amrumbank West (Germany)

- Fabricom, CG Holdings, Lemants and GeoSea, partners in the Temporary Trade Association are responsible for the following scope:
 - Engineering, Topside & Foundation
 - Fabrication of the jacket foundation
 - Fabrication of an Electrical Offshore Substation (EOS)
 - Transport of jacket & Topside
 - Installation of jacket & EOS at sea
 - Commissioning
 - Electrical installation in- and outside 80 Transition Pieces for 80 windmills



Owner

E.on

Client

E.on Climate & Renewables

Engineering

Fabricom & Partners
12.05.15

Location

Amrumbank West, Germany, North Sea, 38km north Helgoland
Fabrication: Hoboken, Belgium

Start date

June 2011 (early works), Mid 2013 (Construction)

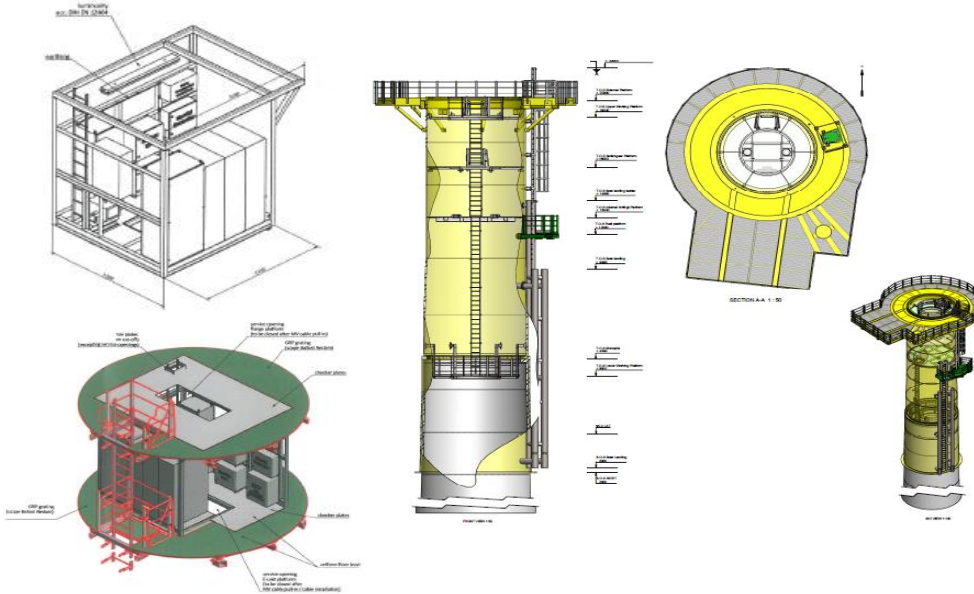
Completion date

Mid 2014

Total manhours

240,000 (Fabricom Direct + Indirect)

Eon Amrumbank / Butendiek Transition Pieces (E-Units)



- Inside TP for windturbine : LV SWG, aux systems (batteries, Lighting, cable routings, HVAC...)
- Inside TP : 33 kV SWG
- Outside TP / jacket : lighting, identification, navigation lights...

Eon Humber Gateway

Humber Gateway Offshore Substation (UK)

- Fabricom has the lead for the two Offshore Substations (JV with Iemants and CG Holdings Belgium NV)
- Scope Fabricom
 - Design
 - Supply
 - Installation
 - Commissioningof the Low Voltage equipment and systems



Owner

E.on Climate & Renewables UK
Humber

Client

CG Holdings Belgium NV

Engineering

Fabricom, CG Holdings & Iemants

Location

8 Km east off the Yorkshire Coast, near the Humber Estuary in the north-east of England. Fabrication: Hoboken, Belgium

Start date

December 2011

Completion date

January 2014

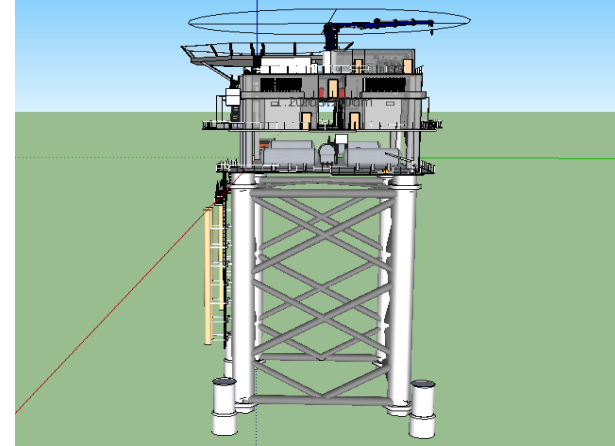
Total manhours

44,000 (Fabricom scope only)

Butendiek WPD

Butendiek Offshore Wind Farm (Germany)

- Fabricom, CG Holdings, Iemants and GeoSea, partners in the Temporary Trade Association are responsible for the following scope:
 - Engineering, grid integration (DC plug)
 - Fabrication of the jacket foundation
 - Fabrication of an Offshore High Voltage Station (OHVS)
 - Transport of jacket & Topside
 - Installation of jacket & OHVS at sea
 - Commissioning



Owner

OWP Butendiek GmbH & Co Kg

Client

OWP Butendiek

Engineering

Fabricom, CG Holdings & Iemants

12.05.15

Location

34 Km West of the Island of Sylt in the North Sea (Germany). Fabrication: Hoboken, Belgium

Start date

August 2011

Completion date

Mid 2014

Total manhours

95,000 (Fabricom)

Dong Energy

Gode Wind (01 & 02) Offshore Wind Farm (Germany)

- Cofely Fabricom and Iemants, partners in the Temporary Trade Association are responsible for the following scope:
 - Complete fabrication, delivery and commissioning on site of one offshore substation of 330 MW and its jacket for the Gode Wind 01 project
 - Complete fabrication, delivery and commissioning on site of one offshore substation of 252 MW and its jacket for the Gode Wind 02 project



Figure 3: GOW02 substation

Owner

Dong Energy

Client

Dong Energy

Engineering

Dong Energy – JV Cofely Fabricom/Iemants

Location

DolWin Cluster - German Bight - Germany
Fabrication: Hoboken, Belgium

Start date

December 2013

Completion date

July 2015

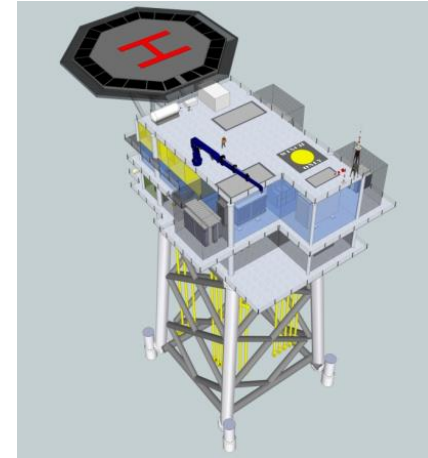
Total manhours

250,000 (Cofely Fabricom)

Gemini Typhoon

Gemini Offshore Wind Farm (The Netherlands)

- Cofely Fabricom, CG Holdings and Iemants, partners in the Temporary Trade Association are responsible for the following scope:
 - Engineering Topsides & Jackets & onshore substation
 - Fabrication of the Electrical Offshore Substations & jackets
 - Fabrication of Onshore Substation
 - Transport Topsides & jackets
 - Installation Topsides & jackets sea
 - Commissioning



Owner

Consortium Northland Power, Siemens,
Van Oord, Typhoon, HVC

Client

Van Oord

Engineering

JV Cofely Fabricom/CG/Iemants

Location

North Sea, the Netherlands
Fabrication: Hoboken, Belgium

Start date

Jan 2014

Completion date

Dec 2015

Total manhours

300,000 (Cofely Fabricom)

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Luchterduinen Eneco

Luchterduinen Offshore Wind Farm (The Netherlands)

- Fabricom, CG Holdings and Iemants, partners in the Temporary Trade Association are responsible for the following scope:
 - Engineering Topside
 - Fabrication of an Electrical Offshore Substation (EOS)
 - Transport Topside
 - Installation EOS at sea
 - Commissioning



Owner

Eneco

Client

Van Oord

Engineering

Van Oord – JV Cofely Fabricom/CG/Iemants

Location

North Sea, the Netherlands
Fabrication: Hoboken, Belgium

Start date

February 2013

Completion date

August 2015

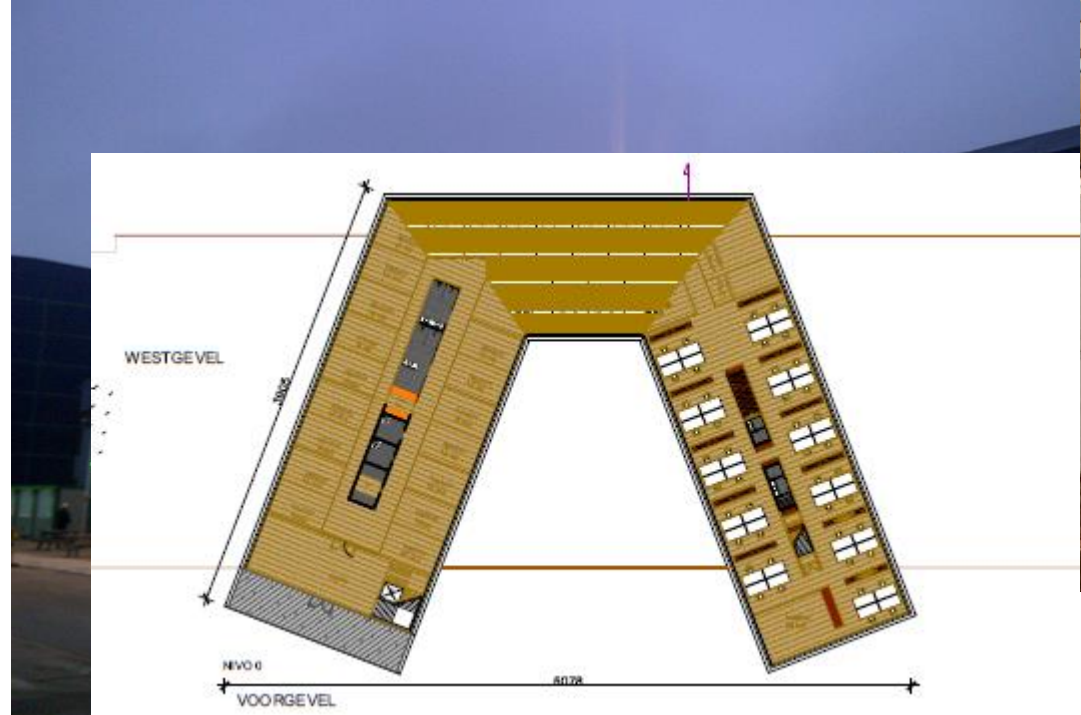
Total manhours

80,000 (Cofely Fabricom)

COFELY FABRICOM
GDF SUEZ

Yard Investments

- Increase Height of 300 Tons hall
- New Wellfare facilities
- Dumping dry dock
- Administrative building
- Extra Construction Hall





Thank you!