

BORSSELE 1+2 OFFSHORE WIND FARM

25 October 2017

Borssele 01+02 
Offshore Wind Farm

DONG
energy

Agenda

- DONG Energy en windenergie op zee
- Introduction to the Borssele 1+2 project
- Borssele 1+2 procurement set-up
- Wrap-up and Q & A

Jasper Vis, NL Country Manager

Claus Bøjle Møller, Senior Programme Director

Beate Beck, Senior Contract Manager



DONG ENERGY EN WINDENERGIE OP ZEE

Jasper Vis
NL Country Manager

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DONG Energy at a glance

- Headquarters in Denmark
- 6,200 employees (including Oil & Gas)
- Revenue in 2016 DKK 61.2 bn
- EBITDA in 2016 DKK 19.1 bn
- Phase out the use of coal by 2023



80%* Wind Power

- Develops, constructs, owns and operates offshore wind farms in Denmark, Germany, the Netherlands and the UK.
- Development projects in Taiwan and the USA



4%* Bioenergy & Thermal Power

- Generates and sells power and heat to customers in Denmark and Northwestern Europe



4%* Oil & Gas ** (discontinued operations)

- Produces oil and gas from fields in Denmark, Norway and the UK



12%* Distribution & Customer Solutions

- Power distribution grid on Zealand and sale of power and gas to customers in Northwestern Europe

* Share of the DONG Energy Group's capital employed

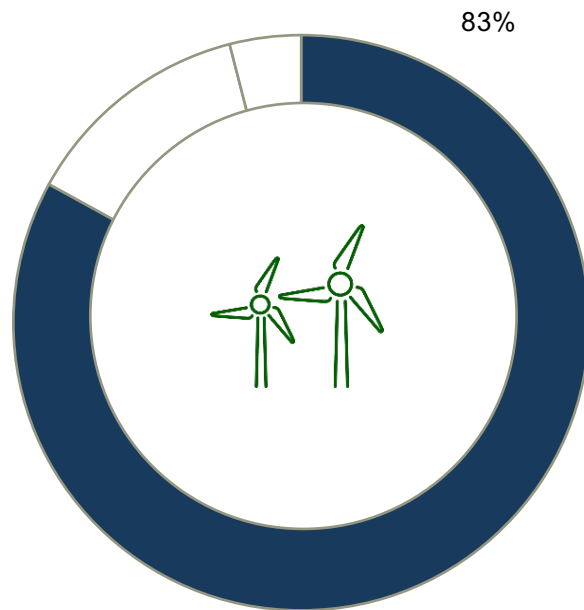
** On 24 May 2017 DONG Energy entered into an agreement to divest its upstream oil and gas business to INEOS with expected closing in Q3 2017. This corresponds to the entire share capital of DONG Energy E&P A/S for an unconditional payment of USD 1,050 million (DKK 7 billion) on cash and debt free basis. DONG Energy will retain all cash flows until 30 June 2017.

Investment strategy drives growth and returns

■ Gross investment per business unit 2016

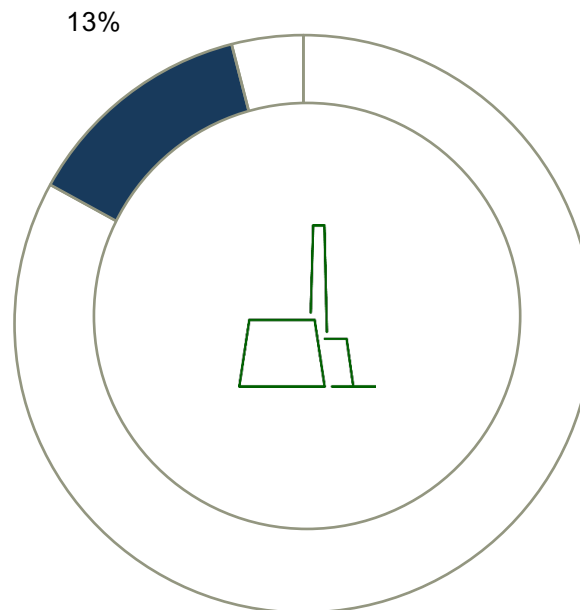
Wind Power

Fuel global market leadership and profitable growth – ambition of 11-12 GW capacity by end of 2025



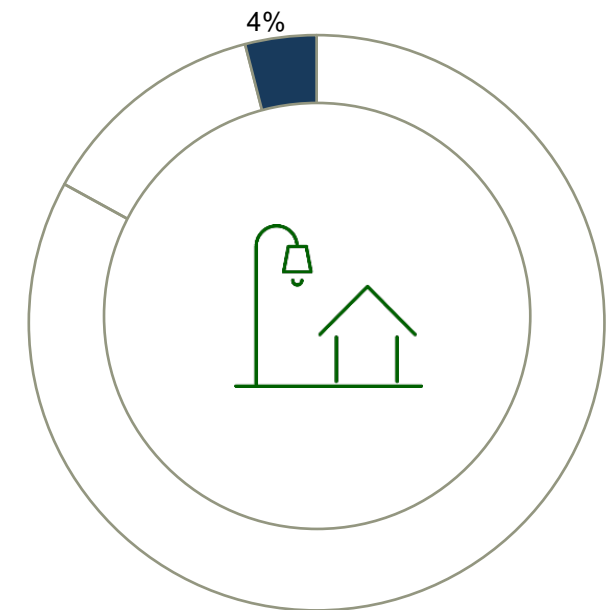
Bioenergy & Thermal Power

Biomass conversions well under way to support zero coal from 2023



Distribution & Customer Solutions

Transform utility to a smart, green and growing business



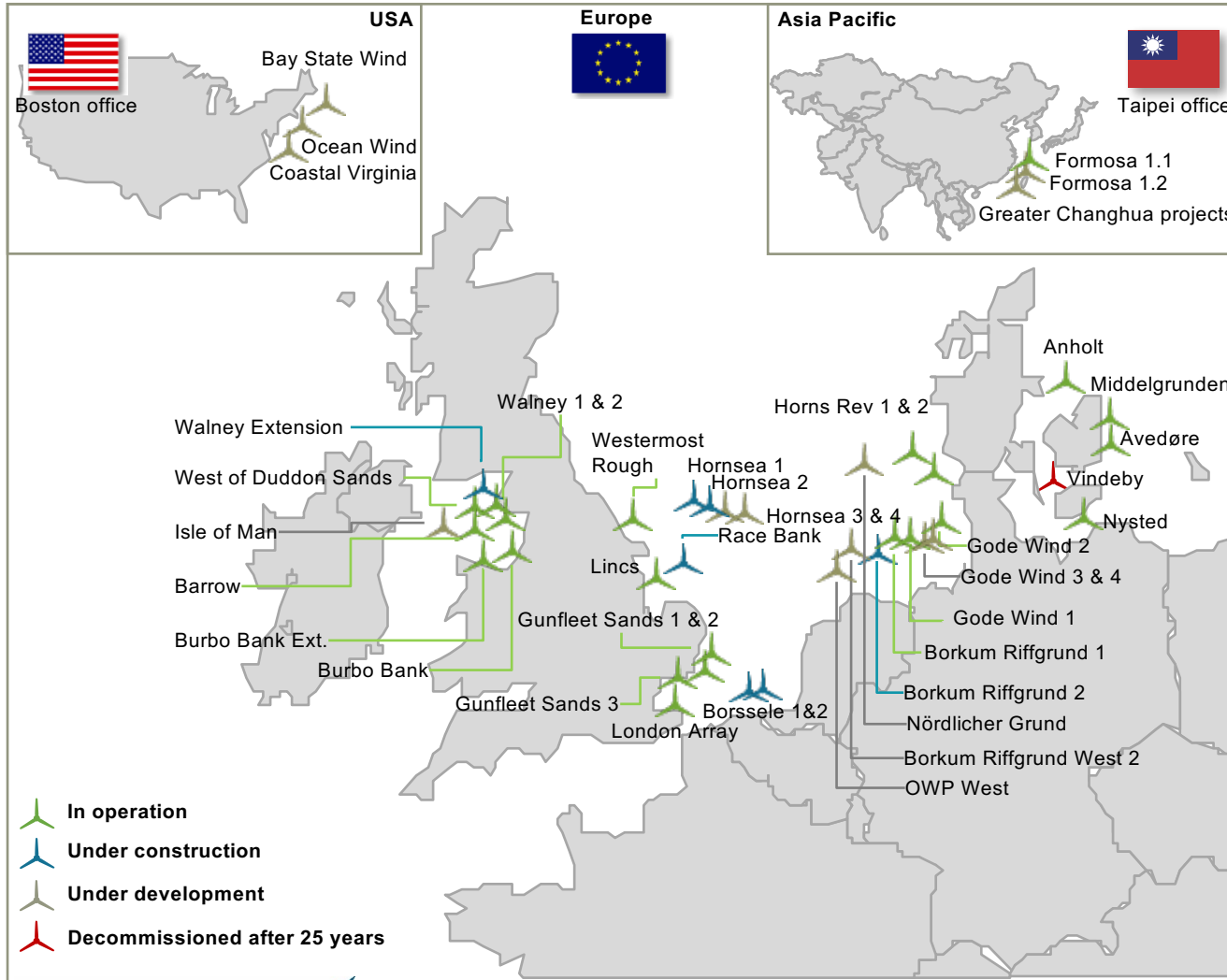
Gross investment guidance 2017: DKK 18-20 bn

DONG Energy becomes Ørsted

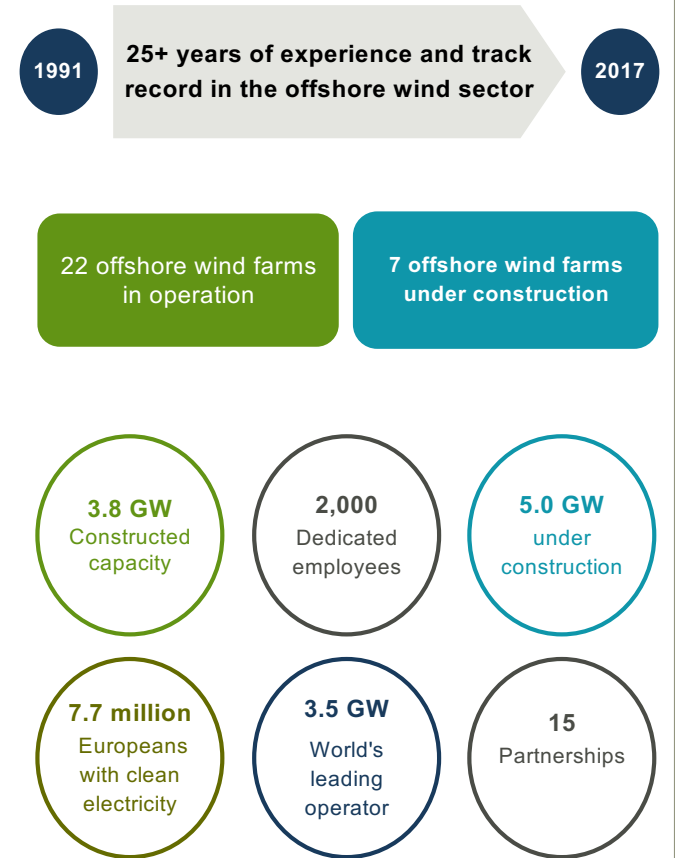
Ørsted

DONG Energy Wind Power overview

DONG Energy Wind Power geographical footprint



Unparalleled experience and track record



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Offshore Wind Farm

At the forefront of making the industry cost competitive

Multiple levers to drive down cost in offshore wind

1

Scale

- Turbines and rotor size
- Sites
- Vessel size
- Cable capacity



2

Innovation

- Foundation design (e.g. monopiles)
- Electrical



3

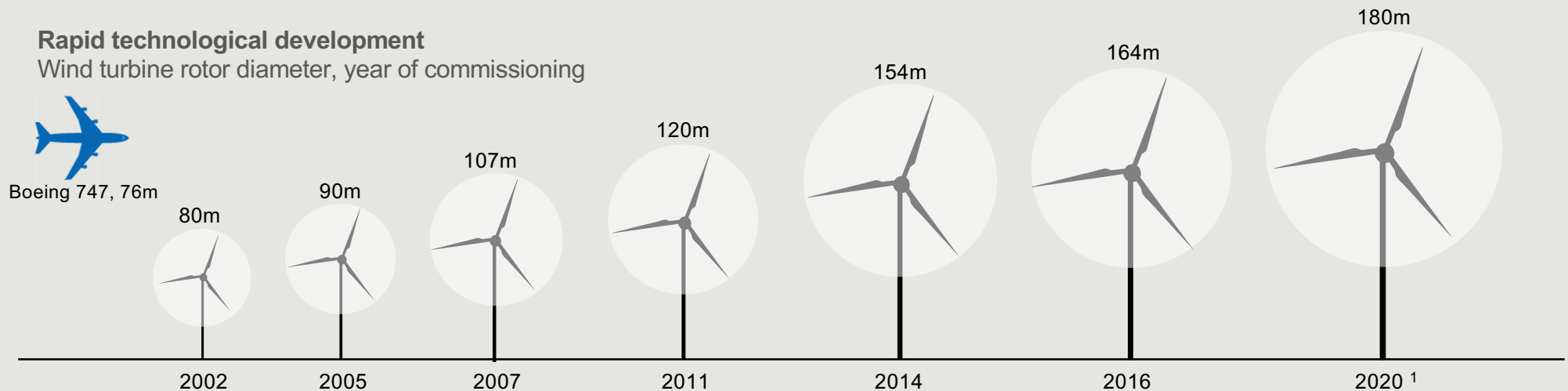
Industrialisation

- Transition from single supply to multiple global suppliers



Rapid technological development

Wind turbine rotor diameter, year of commissioning



1. Currently there are no turbines available on the market with a rotor diameter of 180m, however some suppliers have announced that they expect to bring such a turbine to market in 2020.

DONG Energy has worked intensively with Dutch offshore companies



The Operations & Maintenance (O&M) base for an offshore wind farm is crucial during the whole operational lifetime (>25 years)

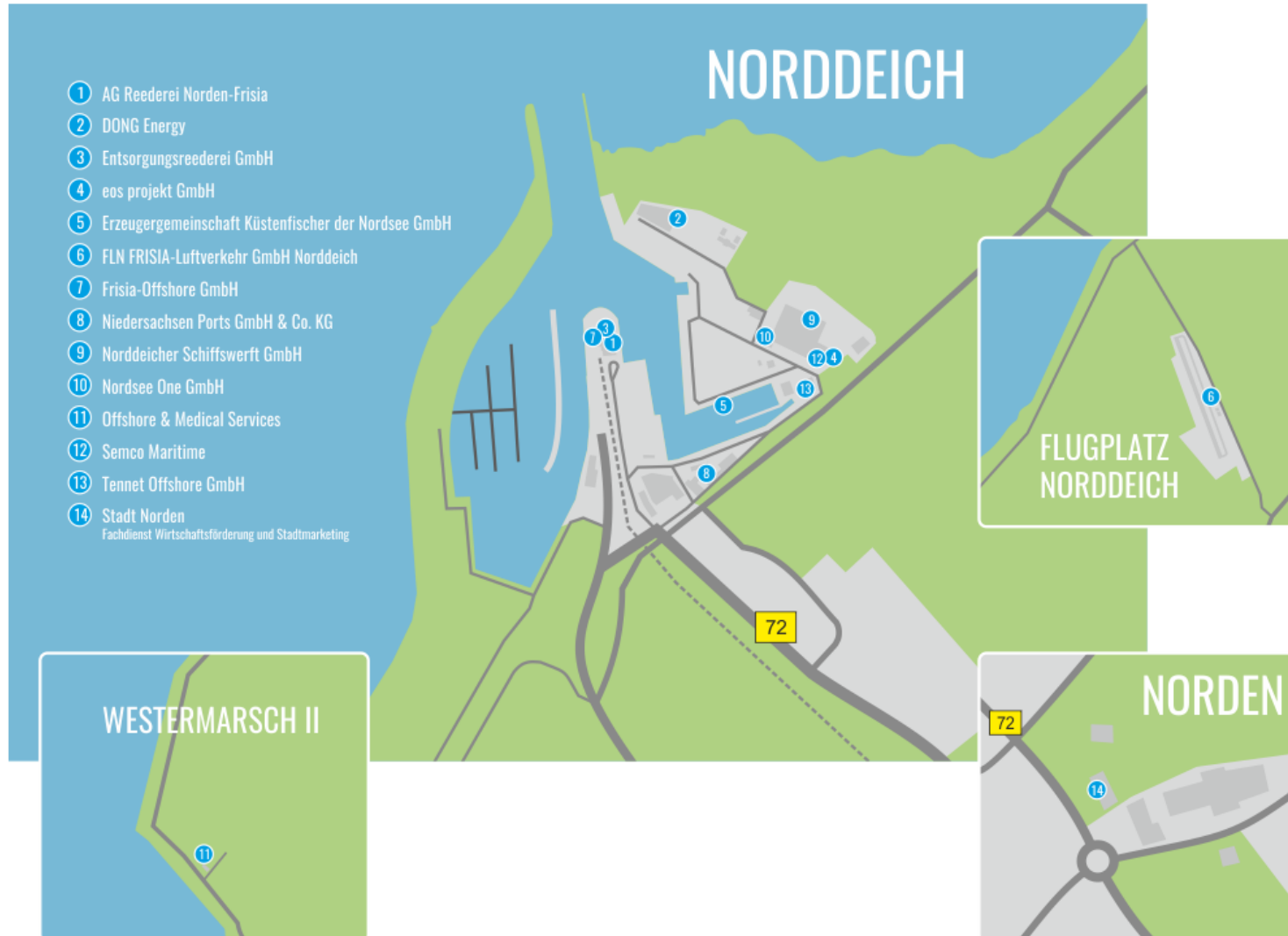


Erforderliche Persönliche Schutzausrüstung (PSA) / Personal Protective Equipment (PPE) requirements		
Parkplatz / Parking lot ACHTUNG Fahrzeuge / BEWARE of vehicles Absturzgefahr ins Wasser / Danger of falling in water	DONG-Kennwege u. Bauwerksbereiche / Quay & Site Area Warnkleidung / High Visibility Clothing Sicherheitsstiefel / Safety Boots Rettungsweste / Lifejacket Im Bereich 2, in zur Kalkante / Area closer than 2, in to edge	Schiff / Vessel Rettungsweste mit Notfunkboje / Lifejacket with PLB (Personal Location Beacon) Fußschutz / Protective boots Tätigkeitsbezogene Arbeitskleidung / Job Specific Working clothes Schutzhelm mit Kinnband / Safety Helmet with Chin Strap bei Erfordernis an Bord oder wegen Helldunst / If required by vessel or during operation andere PSA falls erforderlich / other PPE if required
		Überstieg Schiff – Bauwerk / Schiff – Schiff / Transfer ship – structure / ship – ship Rettungsweste mit Notfunkboje / Lifejacket with PLB (Personal Location Beacon) Überlebensanzug / Survival Suit für Wasserung, < 10 °C oder bei Dunkelheit / If sea temp < 10 °C or during darkness Sicherheitsstiefel, schuhbar / Ankle High Safety Boots, lightened Schutzhelm mit Kinnband / Safety Helmet with Chin Strap Auffanggurt / Harness andere PSA falls erforderlich / other PPE if required
In Notfällen / In case of emergency 112	Notruf / Emergency call 112	Betreiber / Operating company DONG Energy Renewables Germany GmbH (+49173 635 6257)




Photos: Norddeich (Germany)

O&M base for offshore wind can be a starting point for a network of offshore wind companies, example from Norddeich (DE)





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INTRODUCTION TO THE BORSSELE 1+2 PROJECT

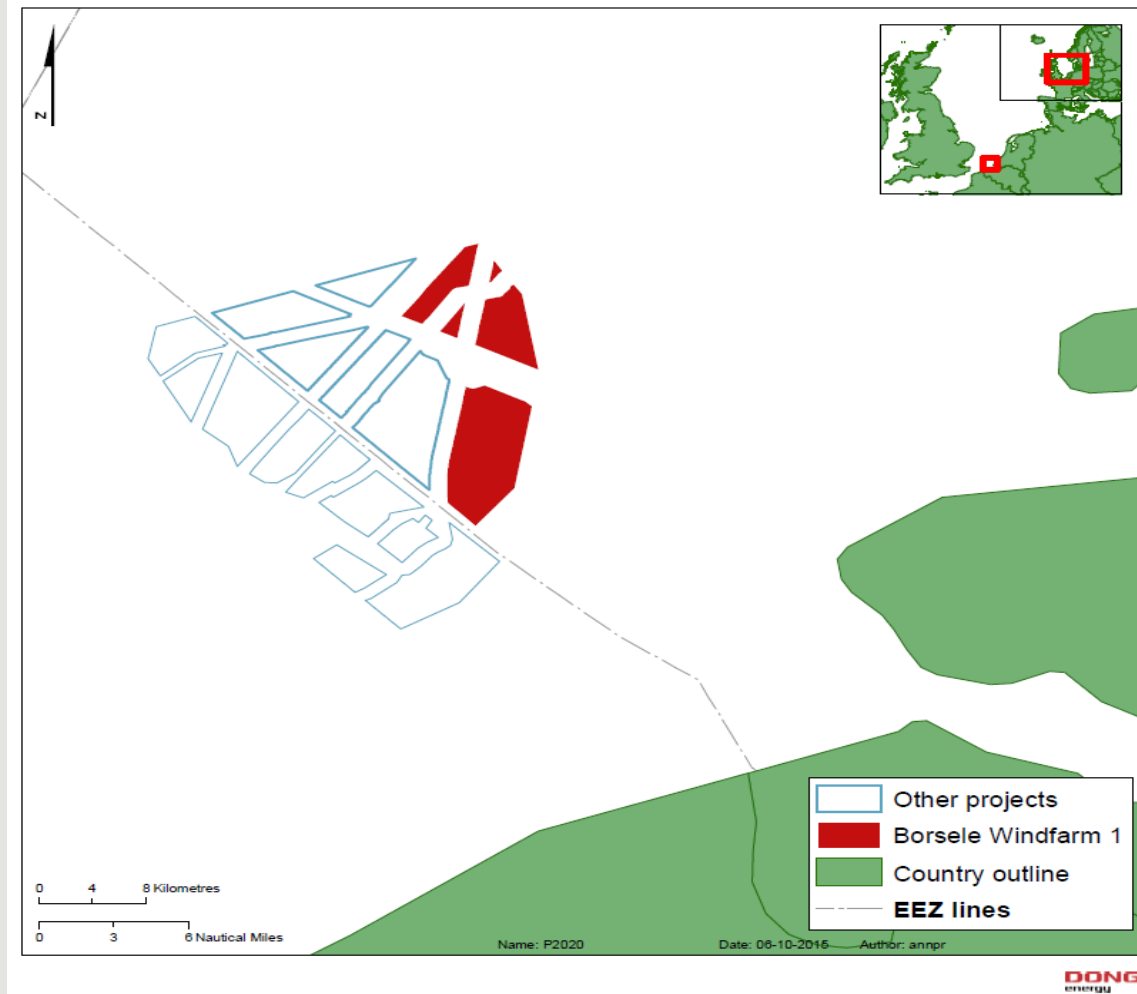
Claus Bøjle Møller
Senior Programme Director

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Borssele 1+2 – The first large scale Dutch tender project

And also DONG Energy's entry into the Dutch offshore wind market



Borssele 1+2 project summary

Project Specific Characteristics		Key data and location	
Location	<ul style="list-style-type: none"> Borssele site 1 & 2 (BSW01+02), Zeeland, South West of The Netherlands Two adjacent 380MW sites 	Capacity	752 MW
		Size of the site	112 km ²
Subsidy	<ul style="list-style-type: none"> CFD: 72.7 EUR/MWh (nom.) w. floor price of 29 EUR/MWh Duration: 15 years fixed + 1 year extension 	Turbine type	Siemens – Gamesa 8MW
		Number of turbines	94
Modules	<ul style="list-style-type: none"> Monopiles Array cable voltage 66kV On/offshore substation and export cable build by TenneT BSW01 and BSW02 connecting to the same offshore substation with a capacity of 700MW 	Water depth	39.7 m to 14.0 m
		Distance to shore (shortest)	22 km
		Wind resource (at hub height)	9.5 m/s
		Length of offshore cable route	TenneT scope
		Length of onshore cable route	TenneT scope
Key Project dates	<ul style="list-style-type: none"> Project award: 5 July 2016 Substation energized: August 2019 Construction: 2020 First power deadline 5 July 2021 (5 years after award) 	O&M harbour	Vlissingen*
		Construction harbour	TBC
Borssele map		Offshore substation	TenneT scope: 700 MW
		Onshore substation	TenneT scope
		DONG Energy Ownership	100%
		Subsidy regime	CFD: 72.7 EUR/MWh

*Subject to final agreement

Project Timeline for Borssele 1+2

We are in the design and procurement phase towards offshore construction in 2020

DONG Energy is awarded the Borssele 1 & 2 projects

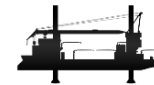
Letter of Intent signed with Zeeland Seaports



Connection agreement signed with TenneT

Completion of design

Offshore construction begins



Borssele offshore wind farm handed over to O&M



2016

2017

2018

2019

2020

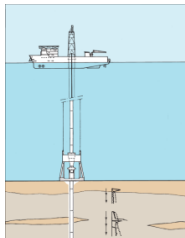
2021

Turbine supply agreement signed with **SIEMENS Gamesa** RENEWABLE ENERGY



Procurement of main contracts

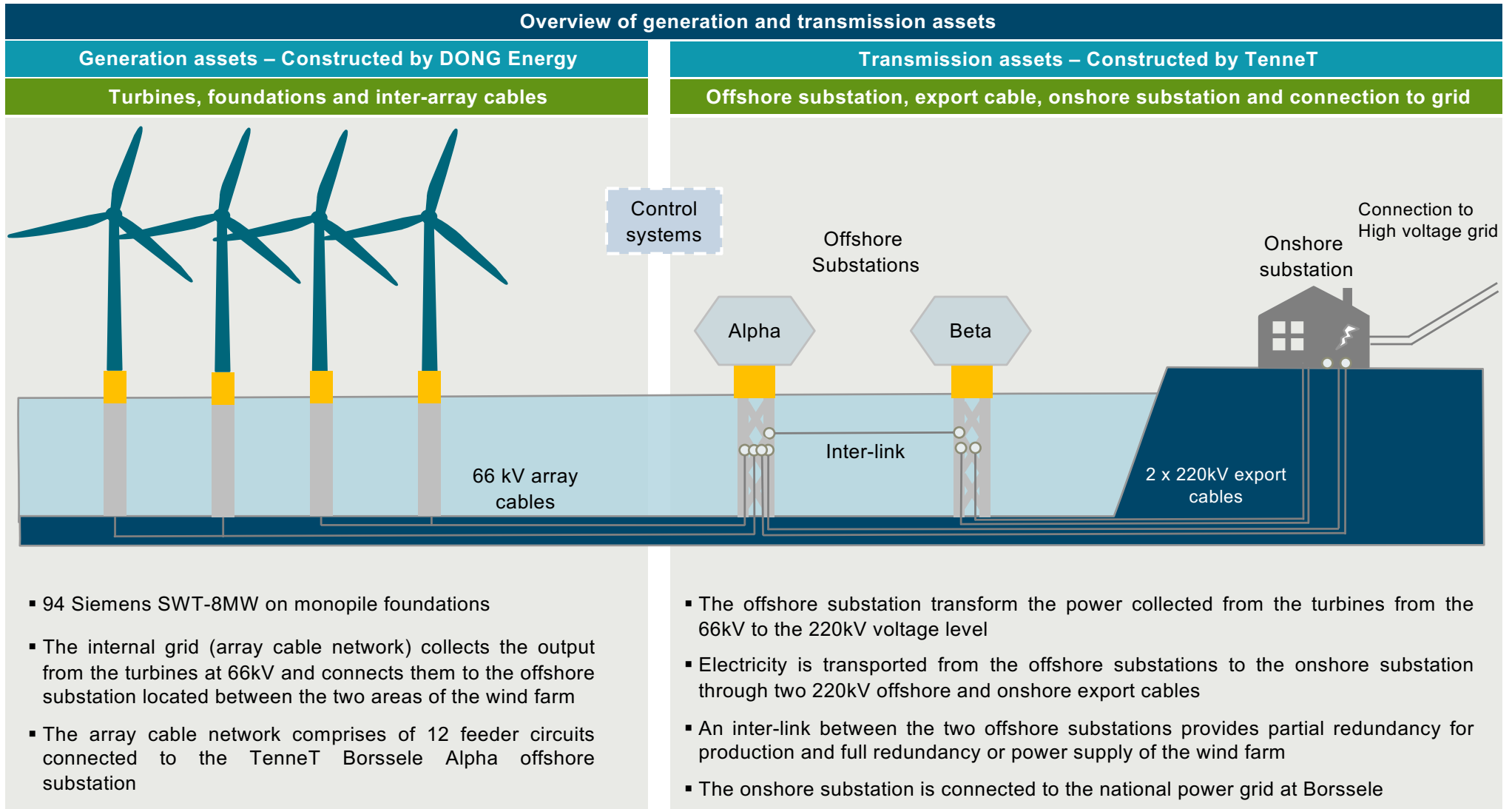
First power is generated



Seabed investigations for design

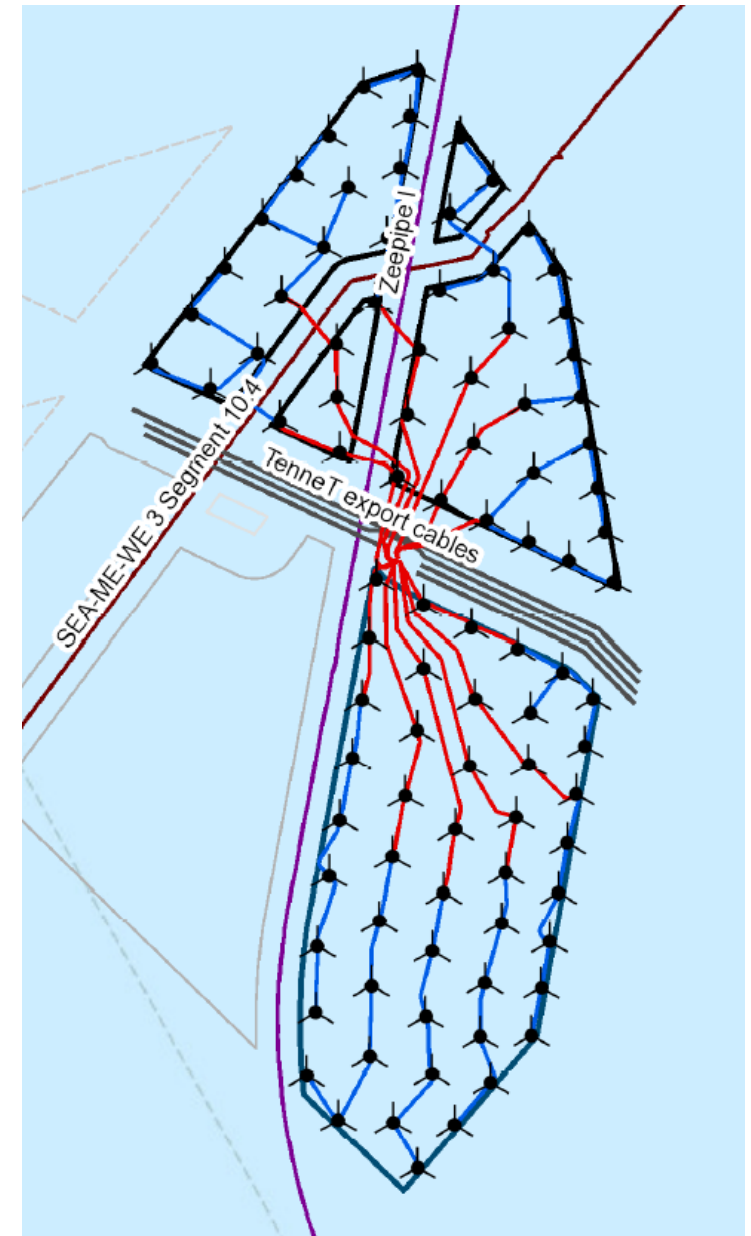
The full power plant

Important interface and cooperation with TenneT to get green energy ashore



Wind farm overview

- 12 Feeder circuits of 66 kV array cables
- Large number of cable and pipeline crossings
- Proximity to
 - TenneT platforms and cables
 - Borssele 3+4 project



Preliminary layout

94 structures

Nacelle/turbine



Rotor/blades



Transition Piece
Including boat
landing for
service vessels



Tower



Monopile
foundation
Hammered
into the seabed



Water surface

Seabed

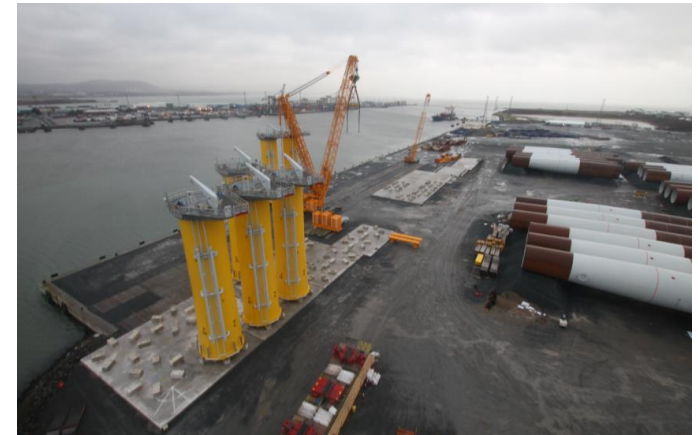
Construction activities

We have a plan – detailed concept is not locked yet

- Transport, storage and installation of components
- Crew logistics
- Onshore services
- Let's have a look at an animation...






Borssele 01+02
Offshore Wind Farm






Expected Operations Set-up for Borssele 1 + 2

Conceptual overview based on similar project

FACILITIES

-  Hangar and helipad at airfield
-  Office and warehouse at harbour
-  Jetty / pontoon for loading crew transfer vessels with people, tools and spare parts

LOGISTICS

-  2 - 3 Crew Transfer Vessels
-  1 Helicopter
-  30 - 40 Deliveries / week

OFFSHORE SITE

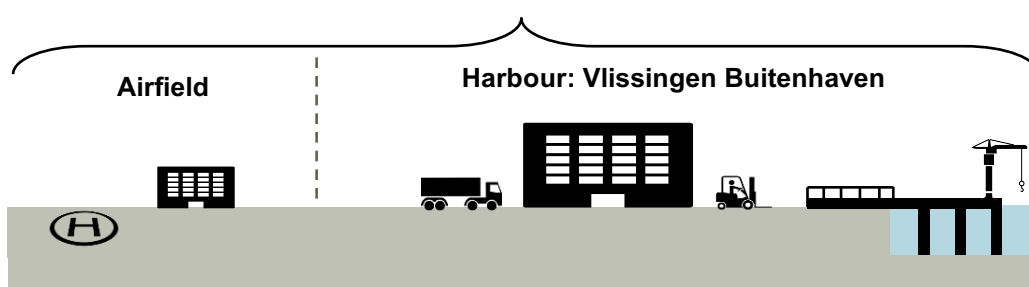


- 94 x SWT-8.0
- 752 MW park capacity
- WTGs installed 2020
- Operations start 2020

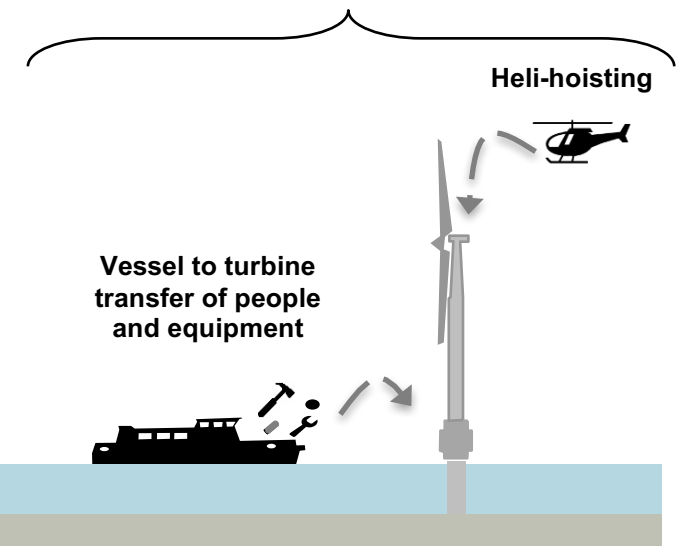
STAFF

-  35 - 40 Technicians
-  15 - 20 Vessel crew
-  10 - 20 Site office staff
-  4 Helicopter crew

O&M Facilities



Offshore Operations



Example – O&M Facility in Liverpool



Example – O&M Facility in Norddeich



Erforderliche Persönliche Schutzausrüstung (PSA) / Personal Protective Equipment (PPE) requirements

Parkplatz / Parking lot	DONG-Kennwege u. Passierbereich / Quay & Site Area	Schiff / Vessel	Überstieg Schiff – Bauwerk / Schiff – Schiff / Transfer ship – structure / ship – ship
<p>ACHTUNG Fahrzeuge / BEWARE of vehicles</p>	<p>Warnkleidung / High Visibility Clothing</p>	<p>Rettungsweste mit Notfunkboje / Lifejacket with PLB (Personal Location Beacon)</p>	<p>Überlebensanzug / Survival Suit Bei Wasserung, < 10 °C oder bei Dunkelheit / If fall temp < 10 °C or during darkness</p>
<p>Absturzgefahr ins Wasser / Danger of falling in water</p>	<p>Sicherheitsstiefel / Safety Boots</p>	<p>Fußschutz / Protective boots</p>	<p>Sicherheitsstiefel, schrubbar / Ankle High Safety Boots, lighened</p>
	<p>Schutzhelm mit Kinnband / Safety Helmet with Chin Strap Bei Erfordernis an Bord oder wegen Helldunkel! / If required by vessel or during operation</p>	<p>Tätigkeitsbezogene Arbeitskleidung / Job Specific Working clothes</p>	<p>Schutzhelm mit Kinnband / Safety Helmet with Chin Strap</p>
	<p>Rettungsweste / Lifejacket Im Bereich 2, in zur Kalkante / Area closer than 2, in to edge</p>	<p>andere PSA falls erforderlich / other PPE if required</p>	<p>Auffanggurt / Harness</p>
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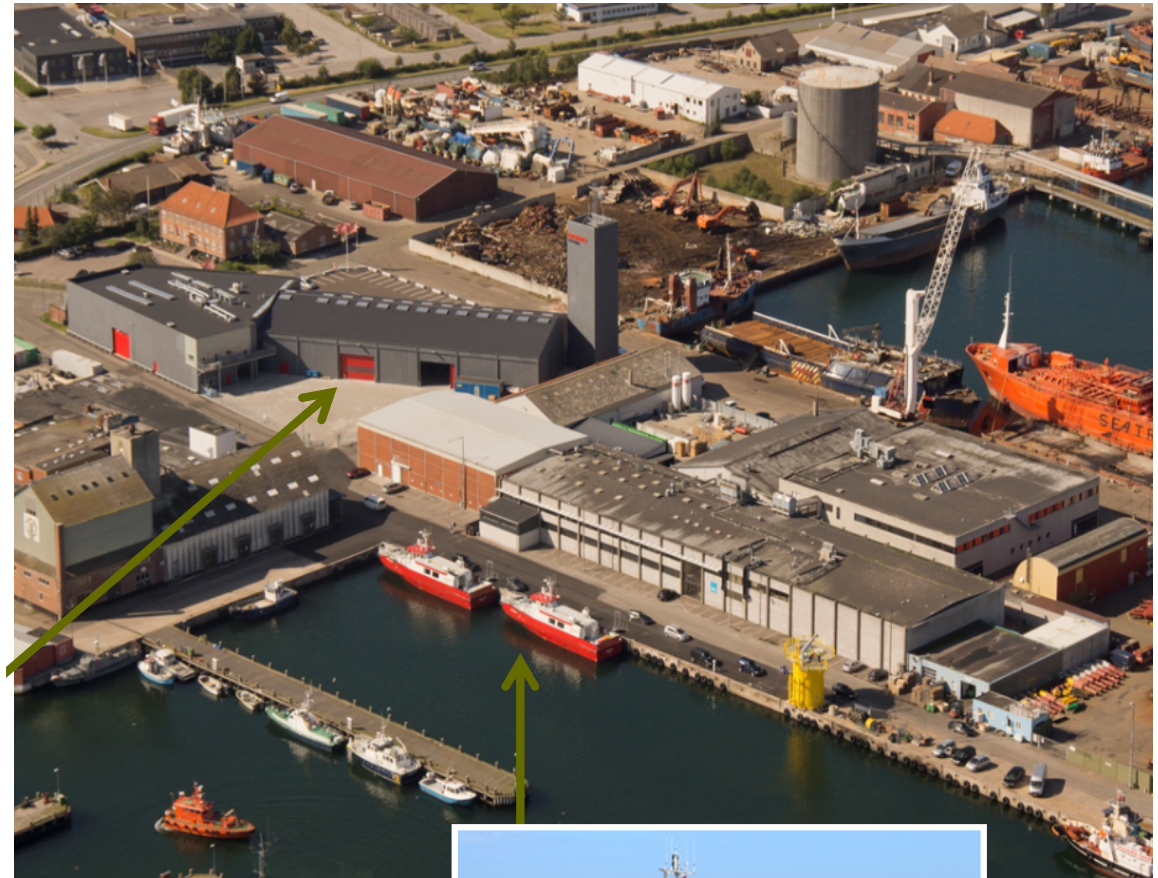
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Photos: Norddeich (Germany)

Example – O&M Facility in Grenaa

- Base during construction and operation
- Rebuild existing buildings to provide office and storage facilities for O&M activities
- Workforce of approx. 70 people
- 3 service vessels based in Grenaa



Anholt Offshore Wind Farm

Was probably Denmark's largest construction site at the time



Investment: 1,3 bEUR

Area, app.: 20 x 5 km

Persons: 3.000 offshore

Man-year: 1.000 offshore

Vessels: 105

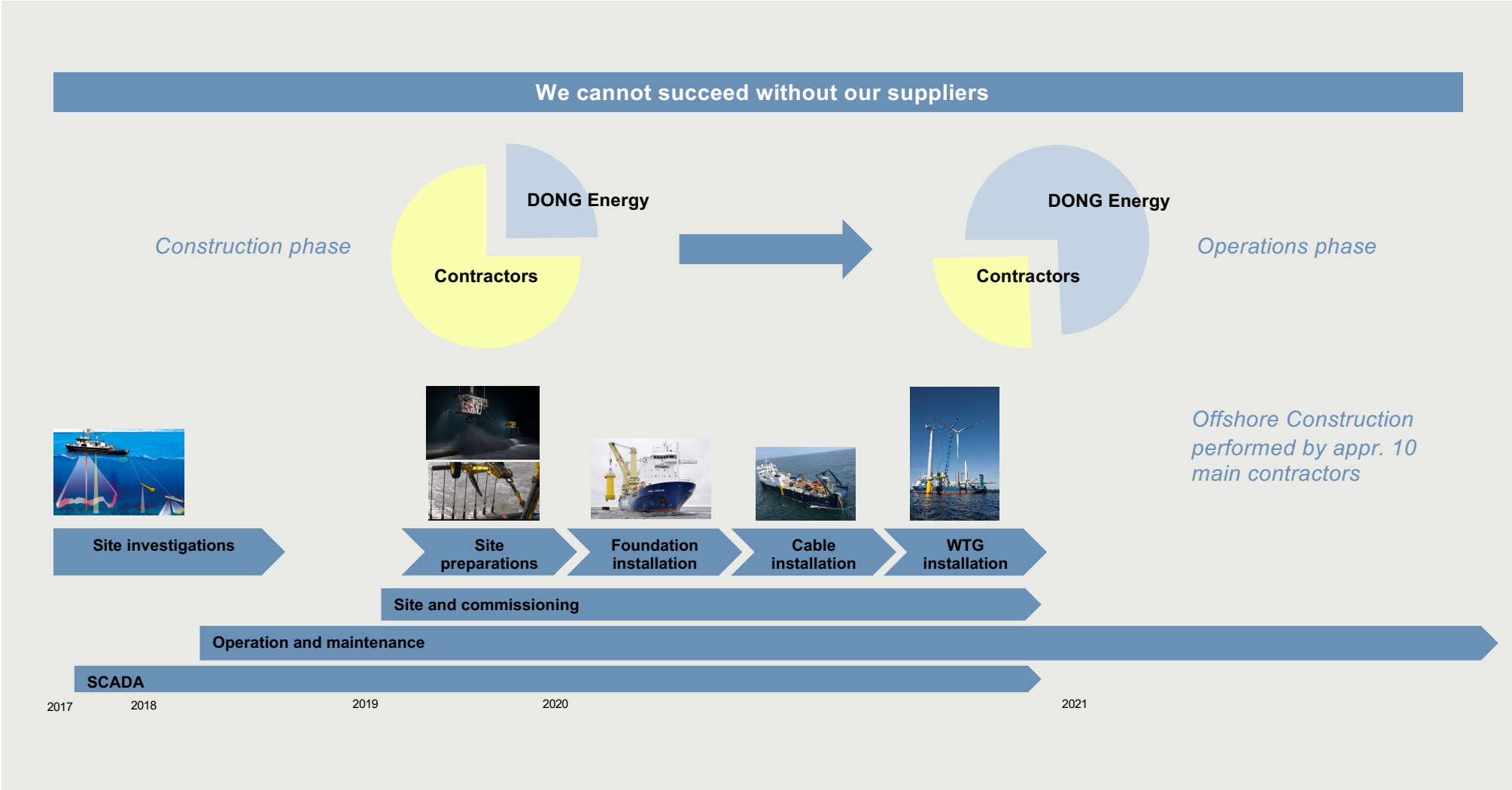
HOW TO DO BUSINESS WITH DONG ENERGY

Beate Beck
Senior Contract Manager

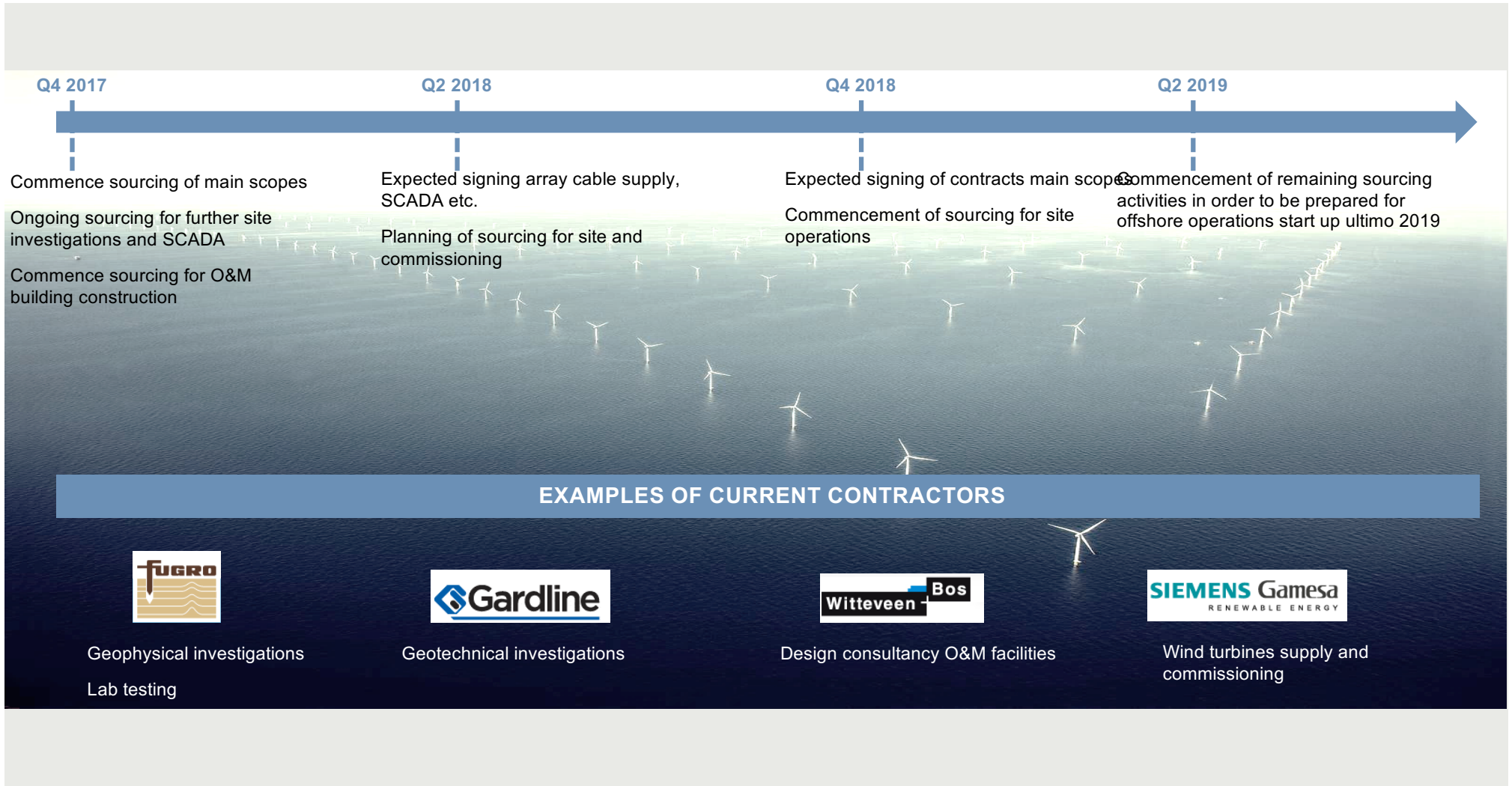
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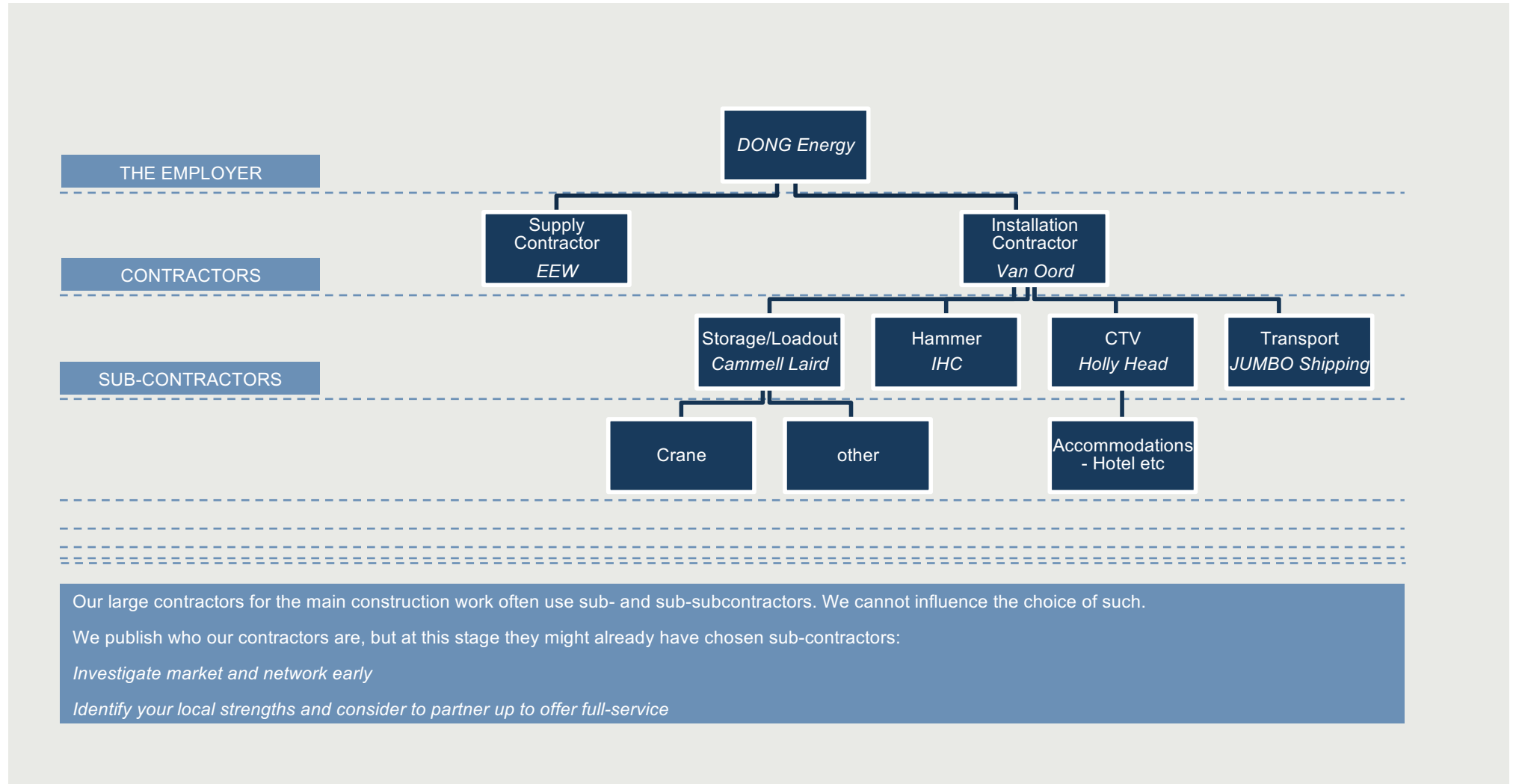
DONG Energy and our suppliers



DONG Energy's Contractors



DONG Energy Contractors – EXAMPLE from previous project



EXAMPLES of various previous demands

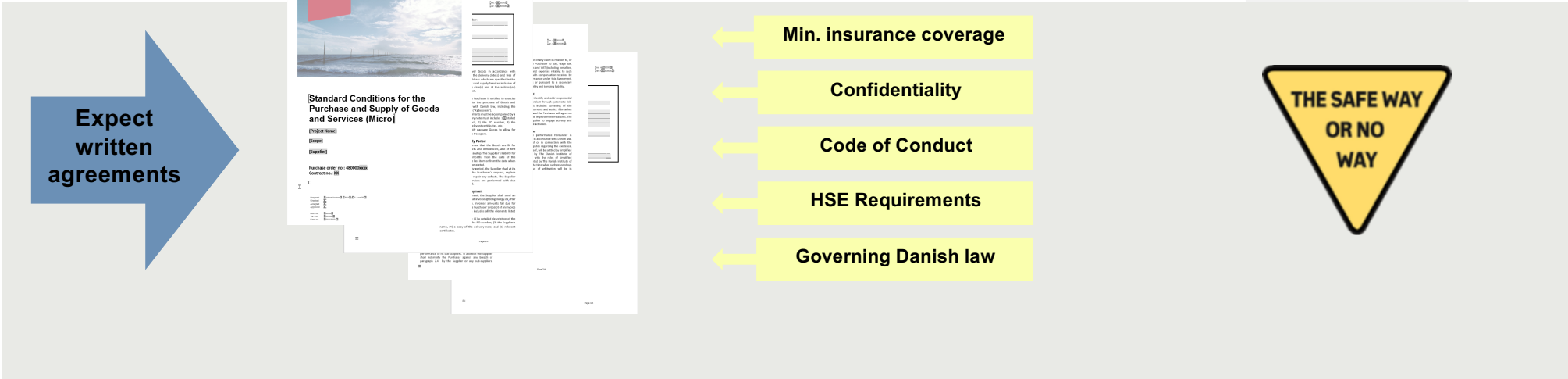
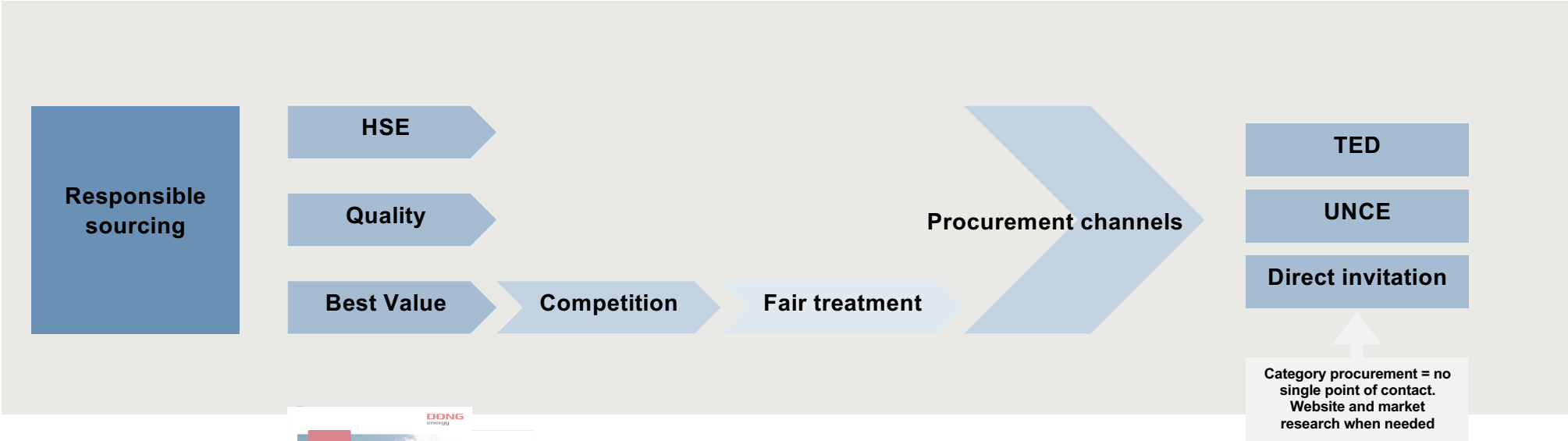
Planning for which services are required is ongoing, why the examples of supplies might not be necessary.

Consider paring up with other suppliers in order to provide full service fit for our (and potentially our contractors') requests.

O&M Facilities Site & Commissioning



Procurement principles



Wrap-up

- 
- DONG Energy is an experienced and focused offshore wind front-runner
 - Our approach is to engage locally for the benefit of our project and businesses in the area
 - We are still in the planning, design and early procurement phase
 - Follow the development of the project through our website and newsletter
 - Thanks for taking an interest in our project – we look forward to the cooperation

Q & A

- New Dutch Ørsted website online by 6 November:

orsted.nl