Document 2

Leading the energy transformation

4th Discussion Round, Studying Energy Situation

Matthias Bausenwein
General Manager for Ørsted Asia Pacific
Chairman Ørsted Taiwan

Tokyo, 8th of Dec 2017

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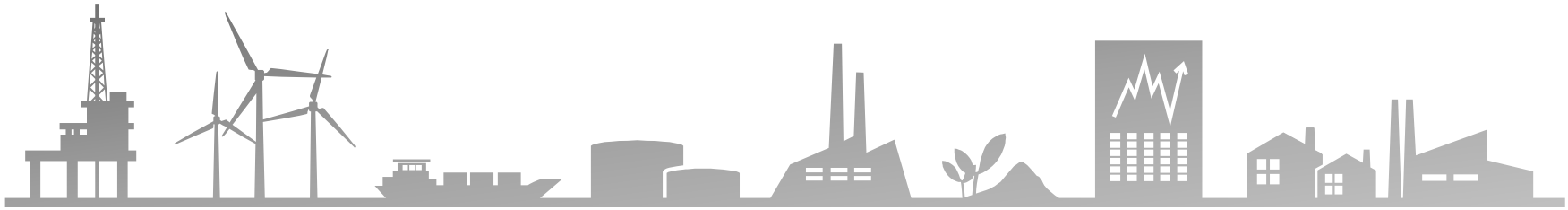
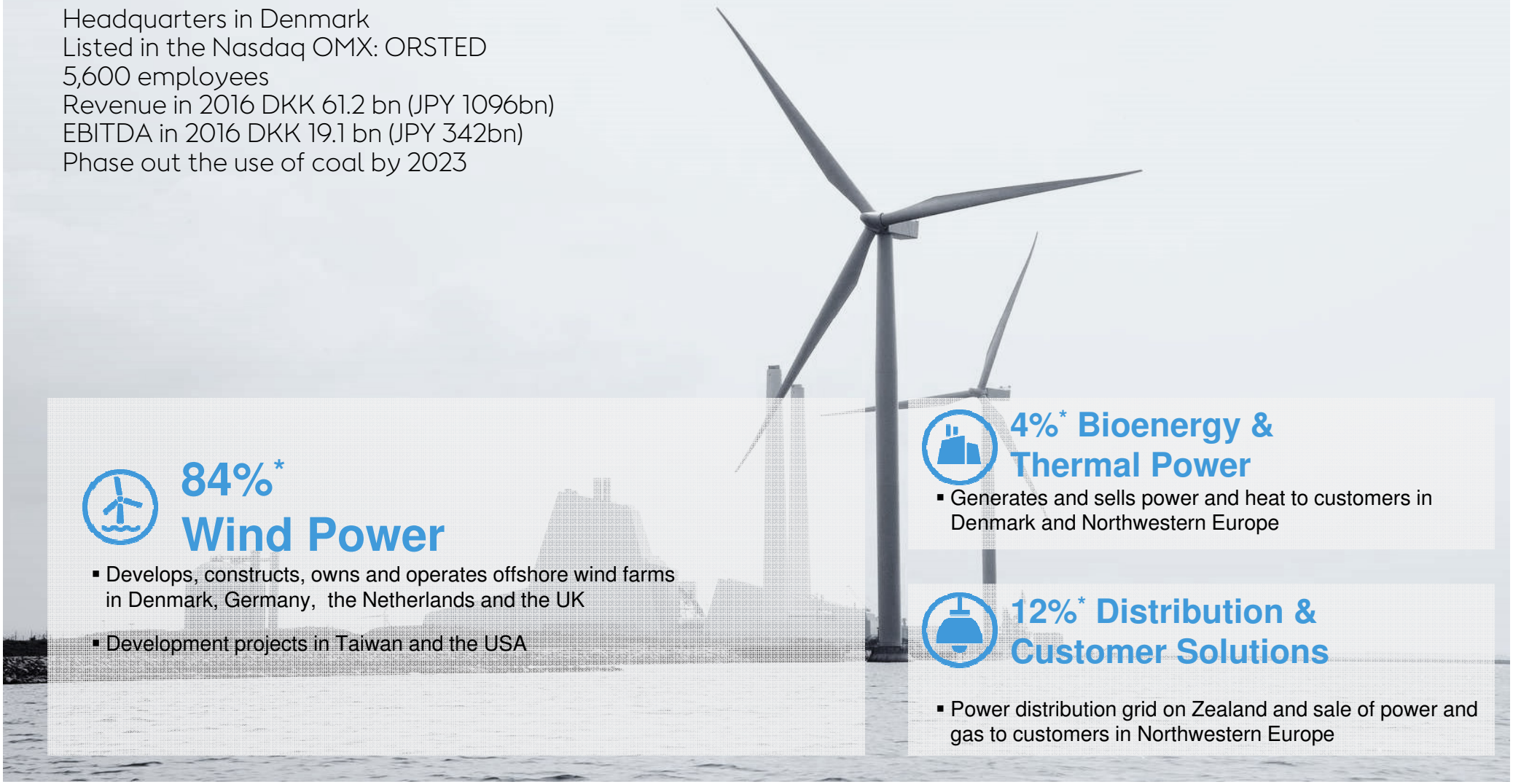



DONG Energy
is becoming
Ørsted
Create a world that runs entirely on green energy
Profound strategic transformation
from black to green energy
and recent divestment of the upstream oil and gas

Ørsted at a glance

Headquarters in Denmark
Listed in the Nasdaq OMX: ORSTED
5,600 employees
Revenue in 2016 DKK 61.2 bn (JPY 1096bn)
EBITDA in 2016 DKK 19.1 bn (JPY 342bn)
Phase out the use of coal by 2023



84%* 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

12%* Distribution & Customer Solutions

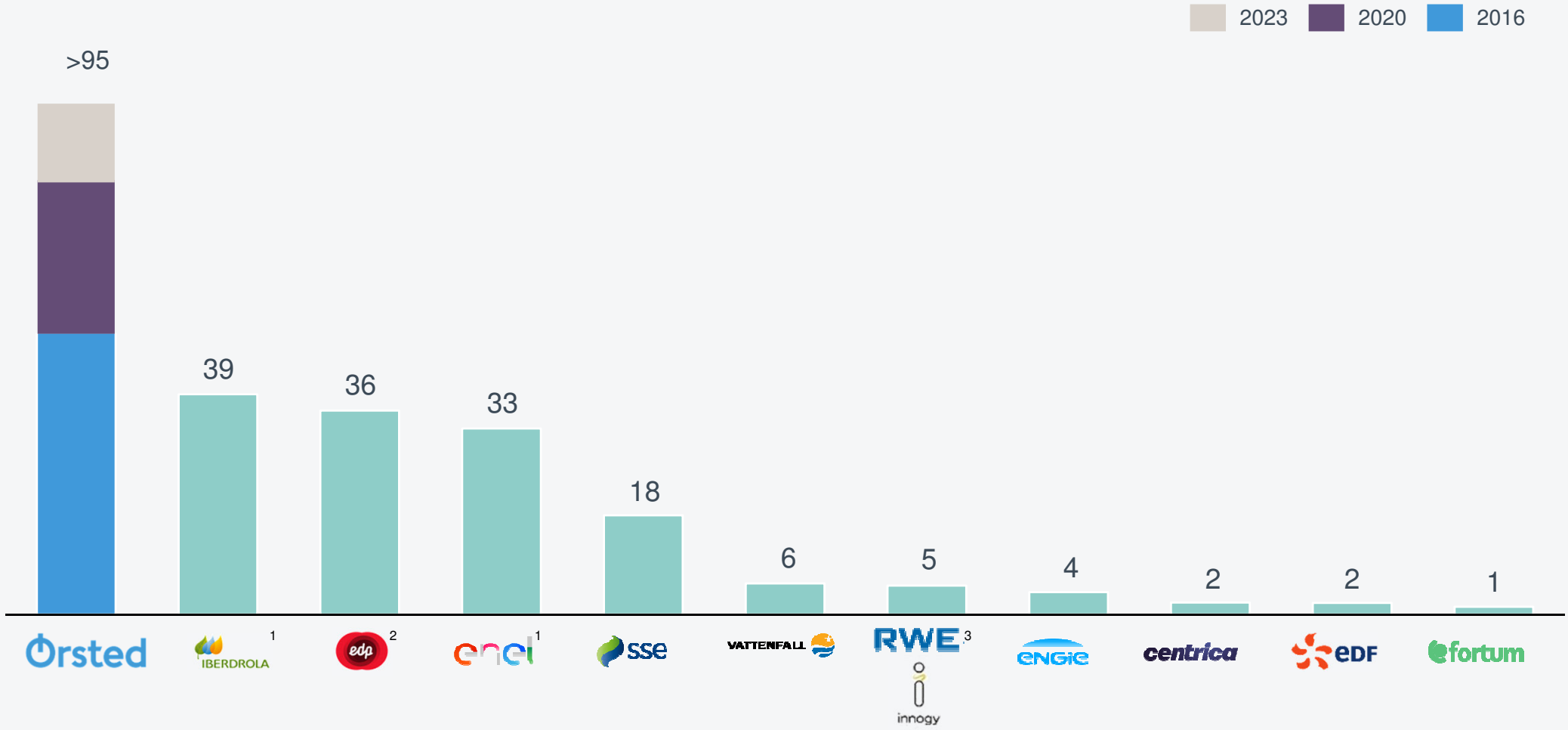
- Power distribution grid on Zealand and sale of power and gas to customers in Northwestern Europe

* Share of the Ørsted Group's capital employed

Ørsted

Greenest European energy company compared with our peers

2016 %-share of power generation from new renewables: Offshore wind, onshore wind, solar PV and bioenergy



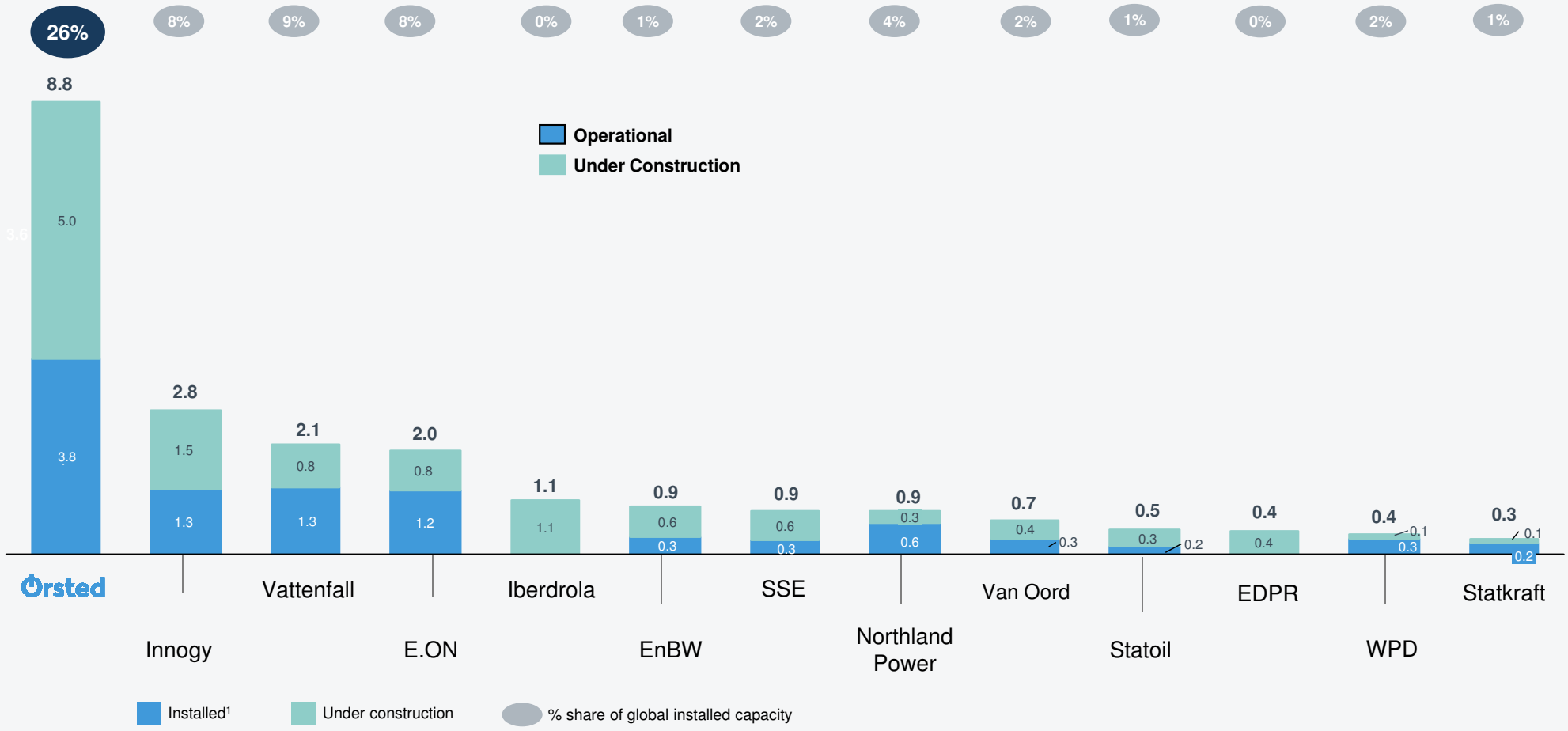
Source: Annual reports, corporate websites
Note: Not all peers disclosed detailed generation breakdown in 2016. These include E.On, Statkraft, Uniper
1. Includes hydro due to lack of disclosure granularity 2. EDPR majority owner is EDP with 82% so this is treated as a combined group. 3. RWE spun off renewables, grids and retail operations into separate company innogy in 2016, but RWE remains a majority owner with 75%. Percentage is calculated for the combined group

We are the Global Leader in Offshore Wind, with more than 25 years of experience

Largest offshore wind player globally today

Global offshore wind capacity

GW



Source: Bloomberg New Energy Finance, September 2017, Orsted analysis

1. If a project is executed on behalf of a lead developer managing the construction, then 100% of capacity is allocated to the lead developer. If construction is executed by an integrated joint venture, capacity is allocated in proportion to the JV share

Ørsted

We are not just a developer, but an integrated Energy Company

Strong integrated end-to-end business model

Develop → Build → Operate → Own

25+ years in offshore wind sector

Always built on time, on budget!

Long-term commitment, entering a market to stay

Proven track record in developing local, long-term partnerships

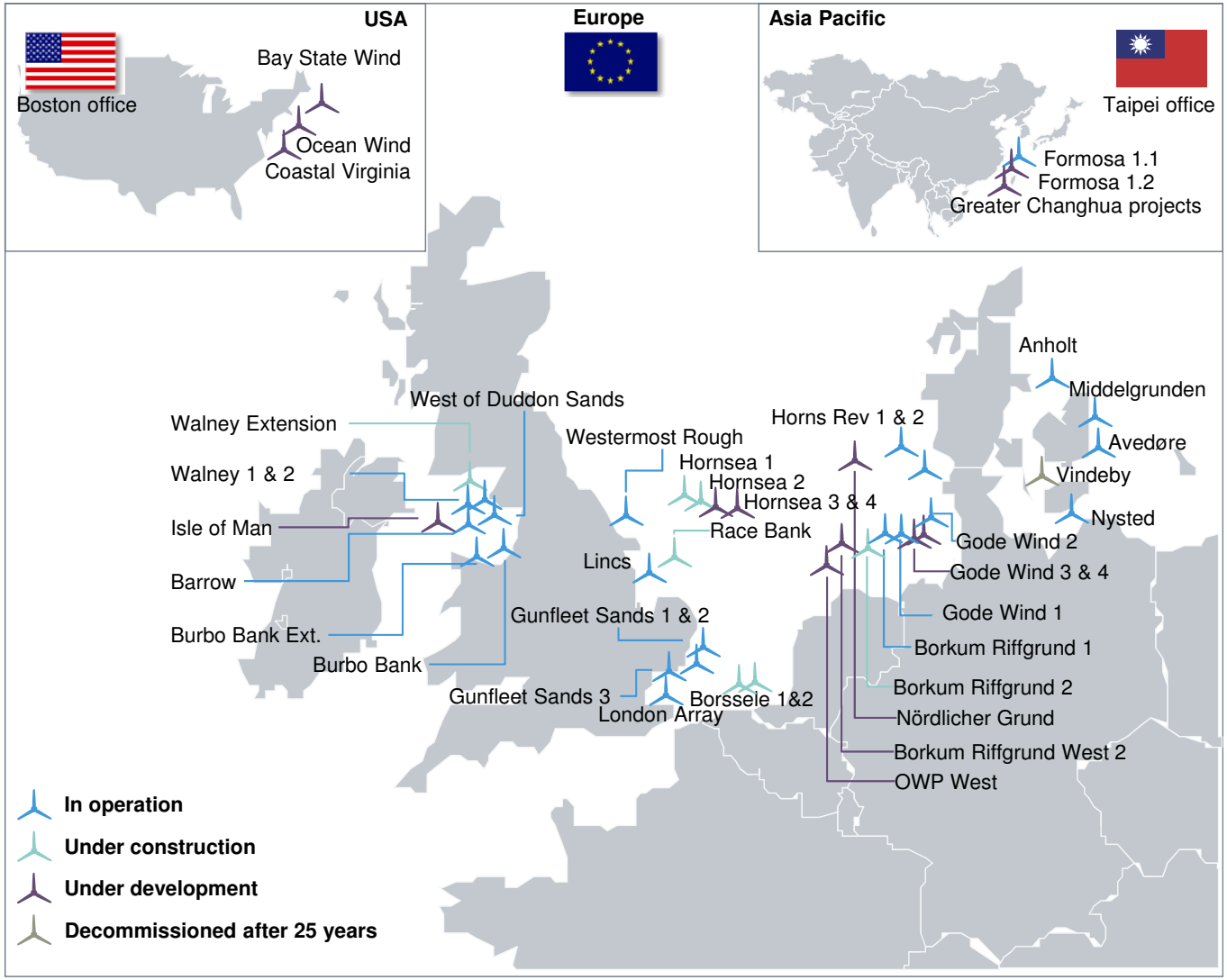
A trusted partner & advisor

We have partnered up with

Ørsted

Ørsted Wind Power overview – internationalization

Global footprint



Unparalleled experience and track record

1991 — 25+ years of experience and track record in the offshore wind sector — 2017

22 offshore wind farms in operation

7 offshore wind farms under construction

3.8 GW Constructed capacity

2,000 Dedicated employees

5.0 GW under construction

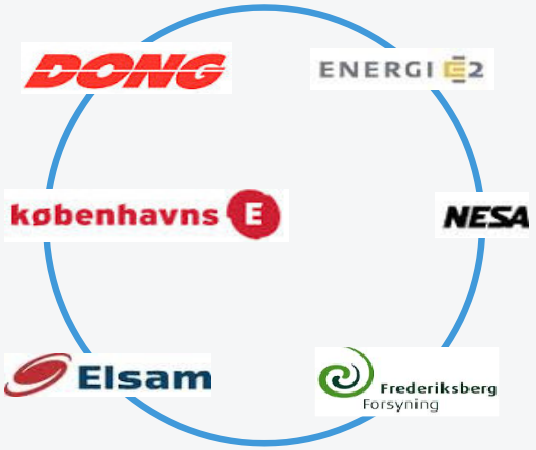
7.7 million Europeans with clean electricity

3.5 GW World's leading operator

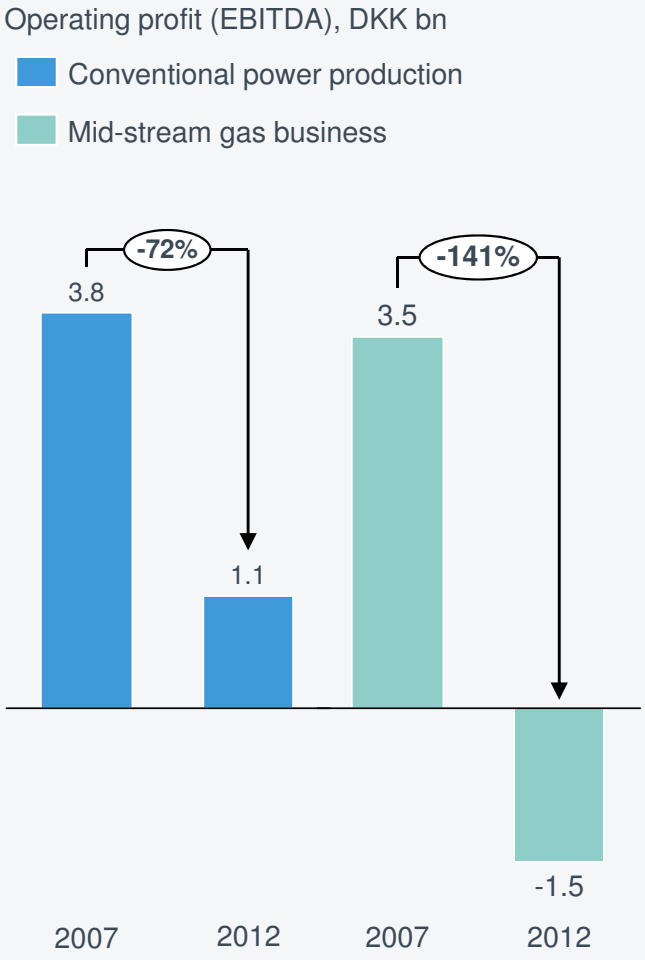
16 Partnerships

Ørsted's transition – faced strategic challenges from the outset in early 2000s

DONG Energy established through merger in 2006



Legacy business eroding



Invested broadly to identify new growth

- Onshore wind
- Offshore wind
- Hydro
- Conventional Power Plants
- Waste Fired Power Plants
- Virtual Power Plants
- Distribution Grids
- Electric Vehicles
- Gas Storage
- LNG
- Oil & Gas

Ørsted

Ten major levers pulled to transform the company

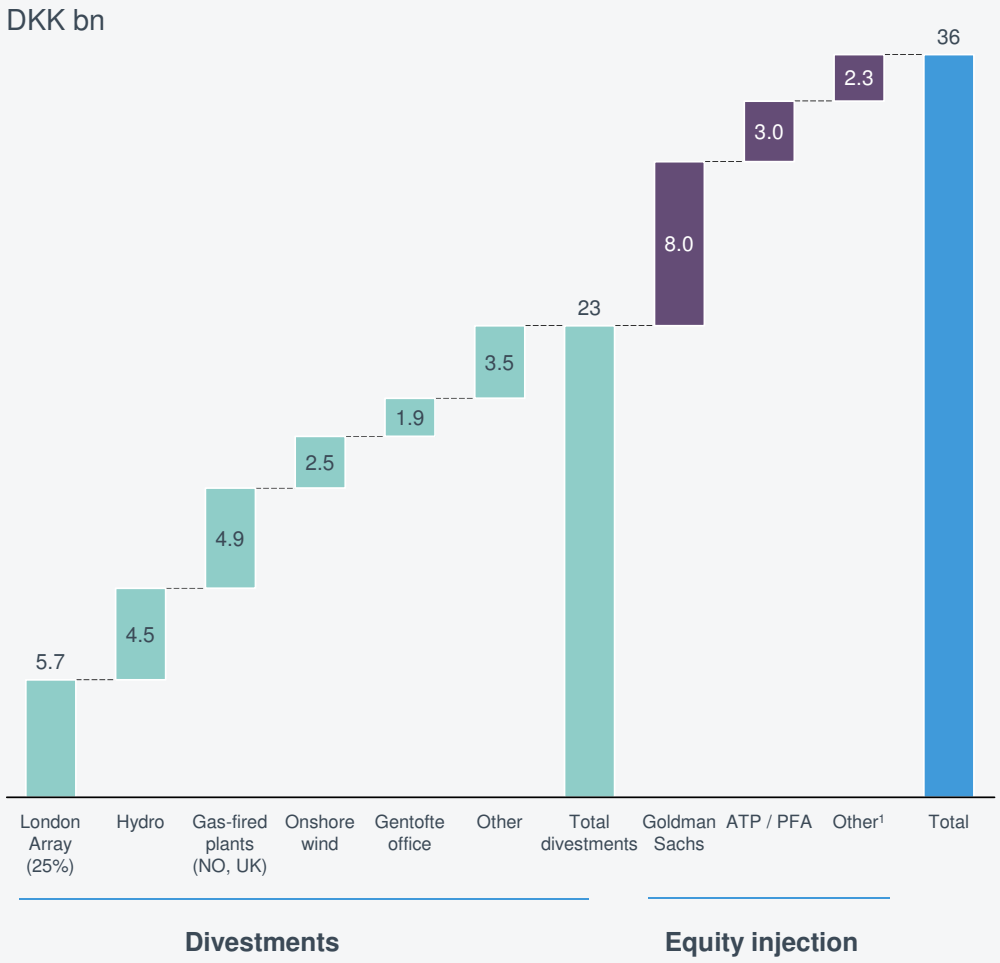
- Divested non-core assets of DKK 17 bn.[1]
- Invested DKK 81 bn. to expand offshore wind to 3.8GW today with secured pipeline to reach 8.8GW by 2022
- Farmed down 12 wind farms to recycle DKK 65 bn. of capital
- Reduced offshore wind cost-of-electricity by 50%
- Converted 5 of 7 heat and power plants to biomass to secure profitability and announced "coal-free by 2023"
- Turned around loss-making long-term gas contract portfolio, gaining DKK 6.4 bn. from compensation payments
- Initiated strategic shift in retail business from commodity sales to integrated, green energy solutions
- Lowered net interest-bearing debt and stabilized credit ratings
- Restructured and divested legacy, upstream Oil & Gas division
- Changed the company name and visual identity to reflect new green platform

1. Includes onshore wind, hydro power plant, gas-fired power plants (UK, NO), GTF office, Danish gas storage, and 'other'

Financial action plan to support continued strategic transformation

1	Re-focus portfolio	12 → 4 business areas ✓
2	Divestments	DKK 23 bn (JPY 412 bn) ✓
3	Cost reductions	DKK 1.2 bn (JPY 21 bn) ✓
4	Equity injection	DKK 13 bn (JPY 233 bn) ✓

Cash generated from mid-2013 to end-2014



1. Seas NVE, Syd Energi, Insero, Nyfors, and employees

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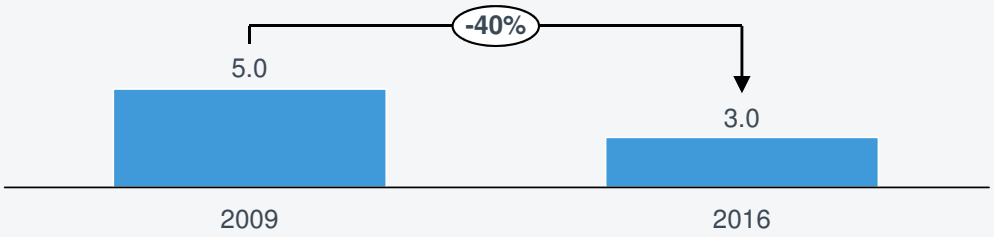
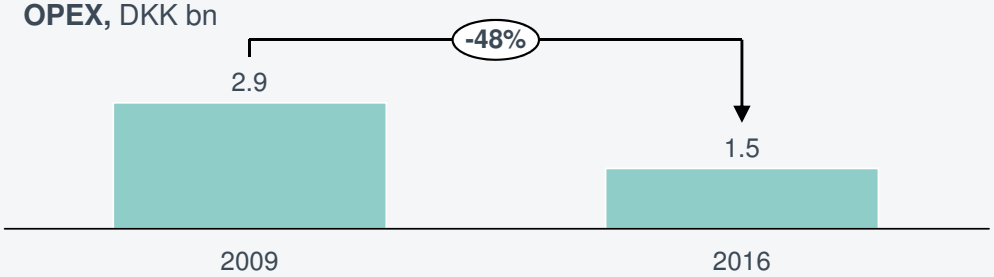
Transformation of conventional power business

Transformation of Danish power plant business

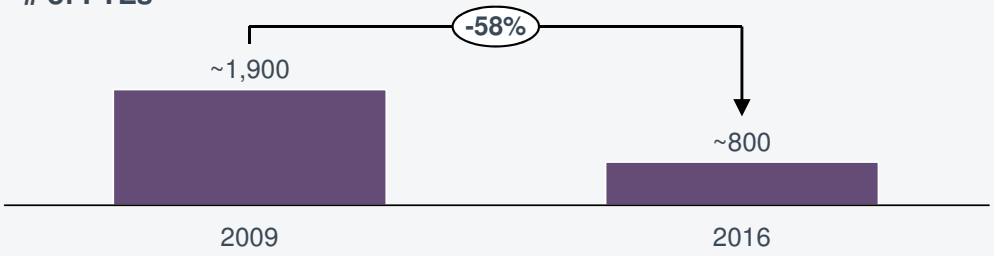
Danish portfolio of central plants, GWe



OPEX, DKK bn

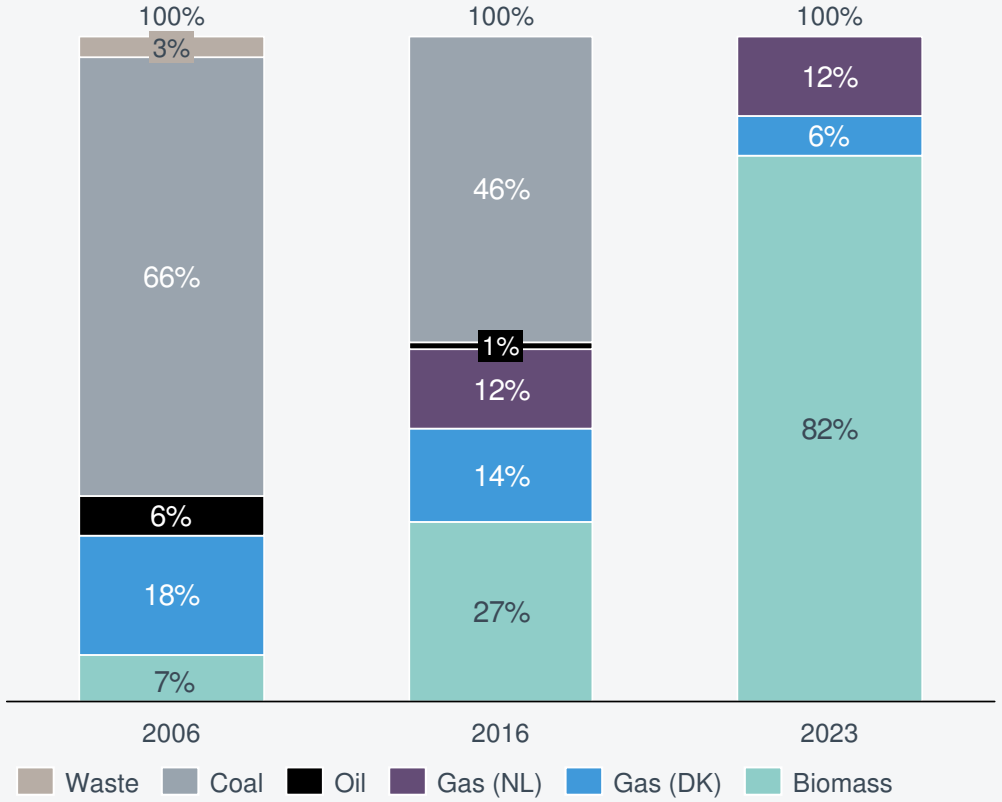


# of FTEs[1]



Biomass conversions well underway – coal will be fully phased out by 2023

Ørsted fuel composition, %[2]

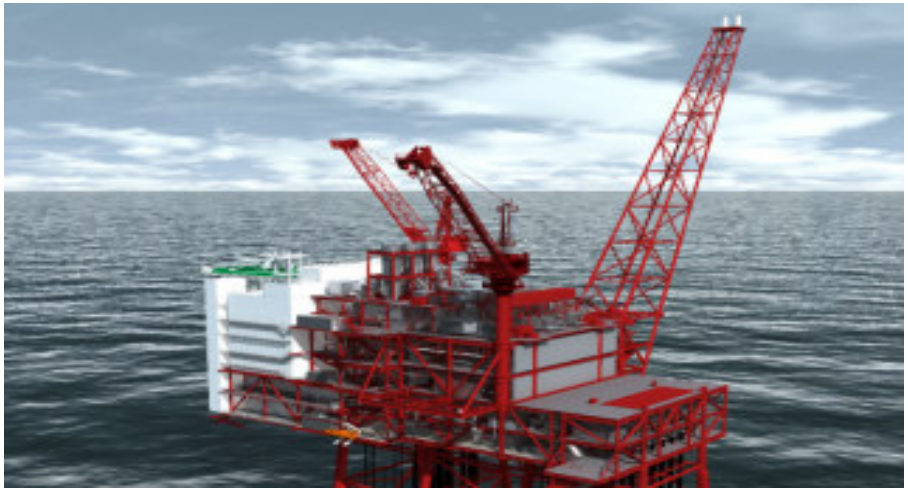


1. Adjusted for divested activities
2. Ability to use coal retained in case of force majeure

Divestment of Ørsted's Oil & Gas business to INEOS in 2017

History:

- ✓ Comprehensive portfolio restructuring focusing on risk-profile and cash flow
- ✓ Significant reduction in exploration efforts
- ✓ Reduced investments
- ✓ Divestments of ownership shares in fields
- ✓ Contain risk of Hejre field
- ✓ Significant reduction of cost base and organisation

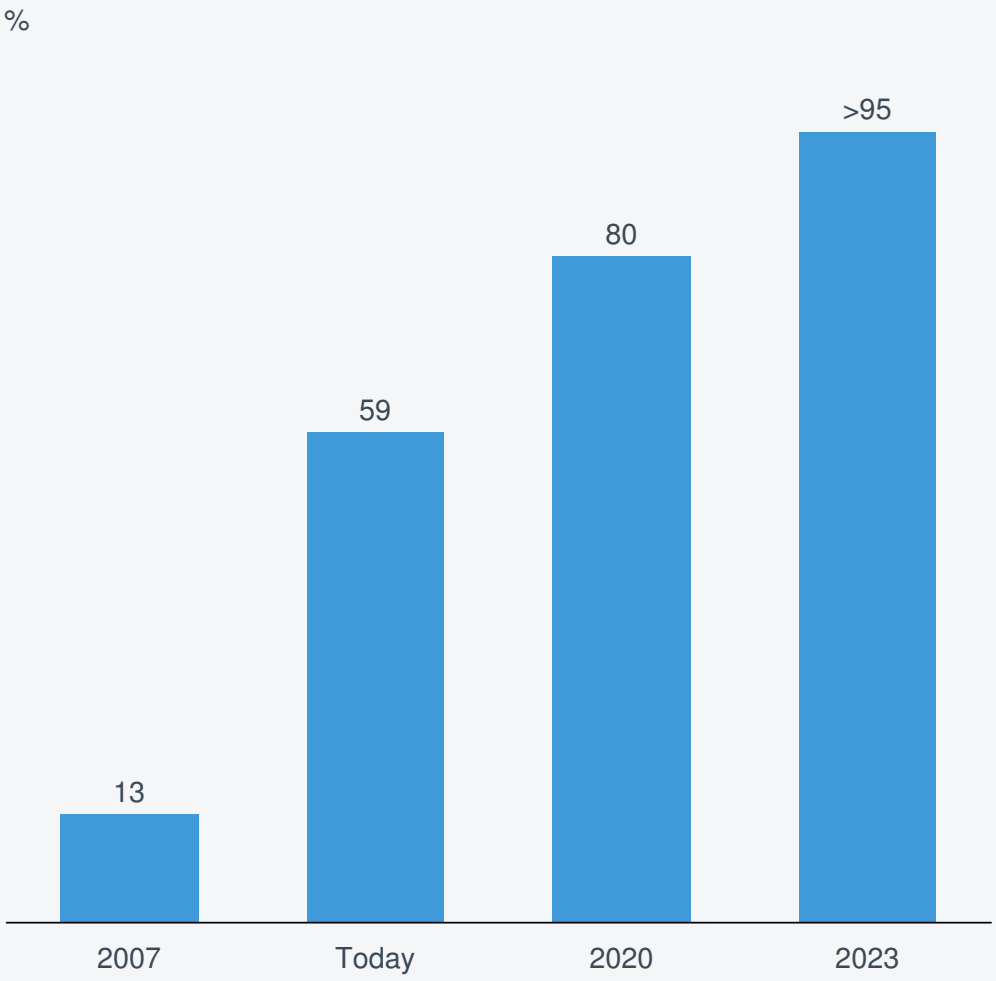


Ørsted → INEOS

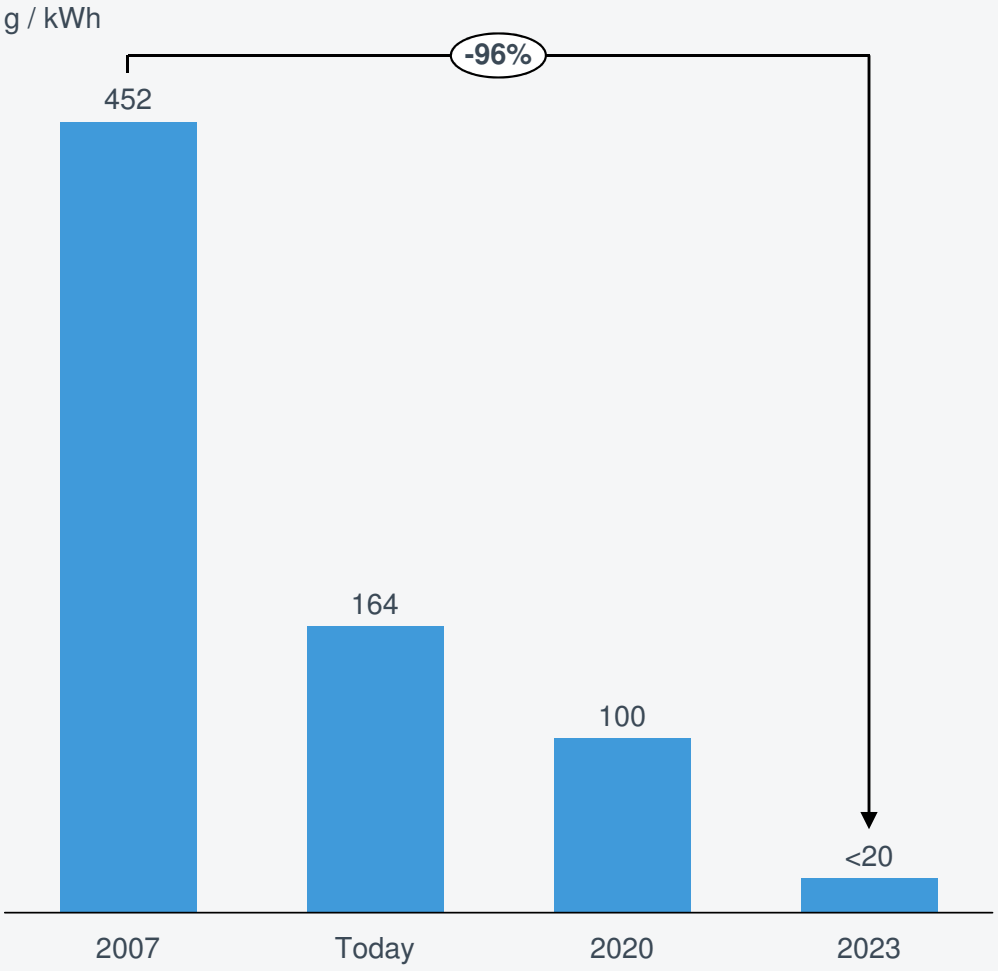
- ✓ Good and fair price : DKK 7.0 bn (JPY125.2 bn)[1]
- ✓ Sell the business as a whole
- ✓ Good strategic and cultural match – good future home for the O&G business
- ✓ Significant step to complete strategic transformation of Ørsted

Transformation of the company from black to green energy well under way - Key milestone 2023

Share of green power



CO2-emissions



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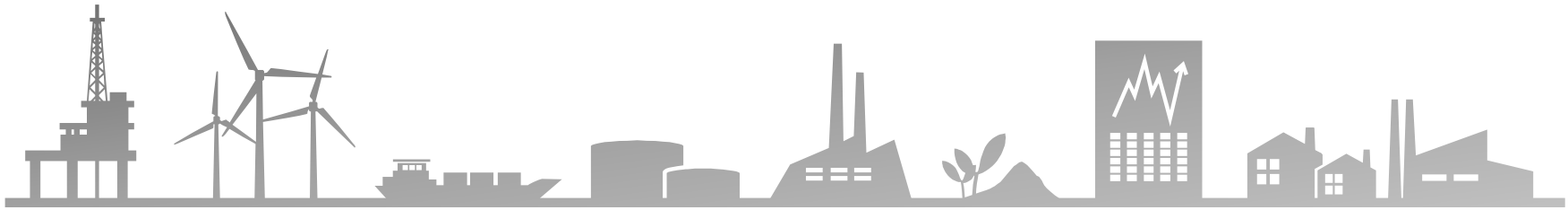
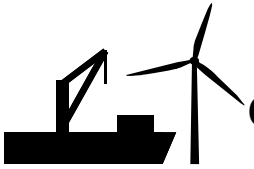


Clear and stable regulatory frameworks needed for offshore wind in Japan

Project Development and preparation



Construction

Operational Phase

7- 10 years

Building permit

Grid capacity allocation

Final investment decision

1 - 2 years

Grid connection

20-25 years

Investment

Revenue

Key takeaways:

Offshore wind development is a long term process, clear targets, a long term stable regulatory framework (e.g. FIT, relaxation of EIA, regulation for use of general sea areas) are needed

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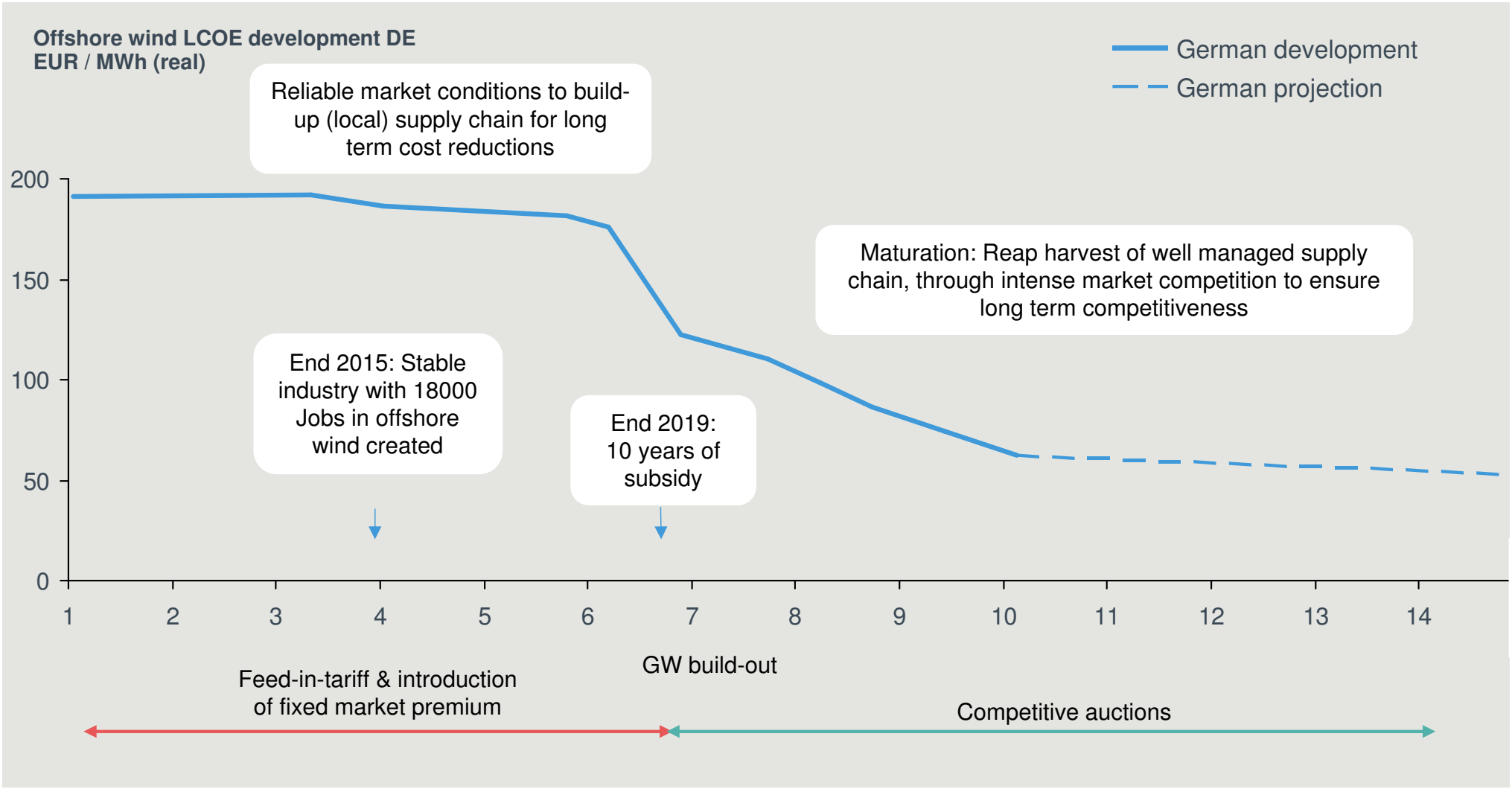
Long term cost reduction can be achieved via stable remuneration in establishment phase (German FiT: 10 years)



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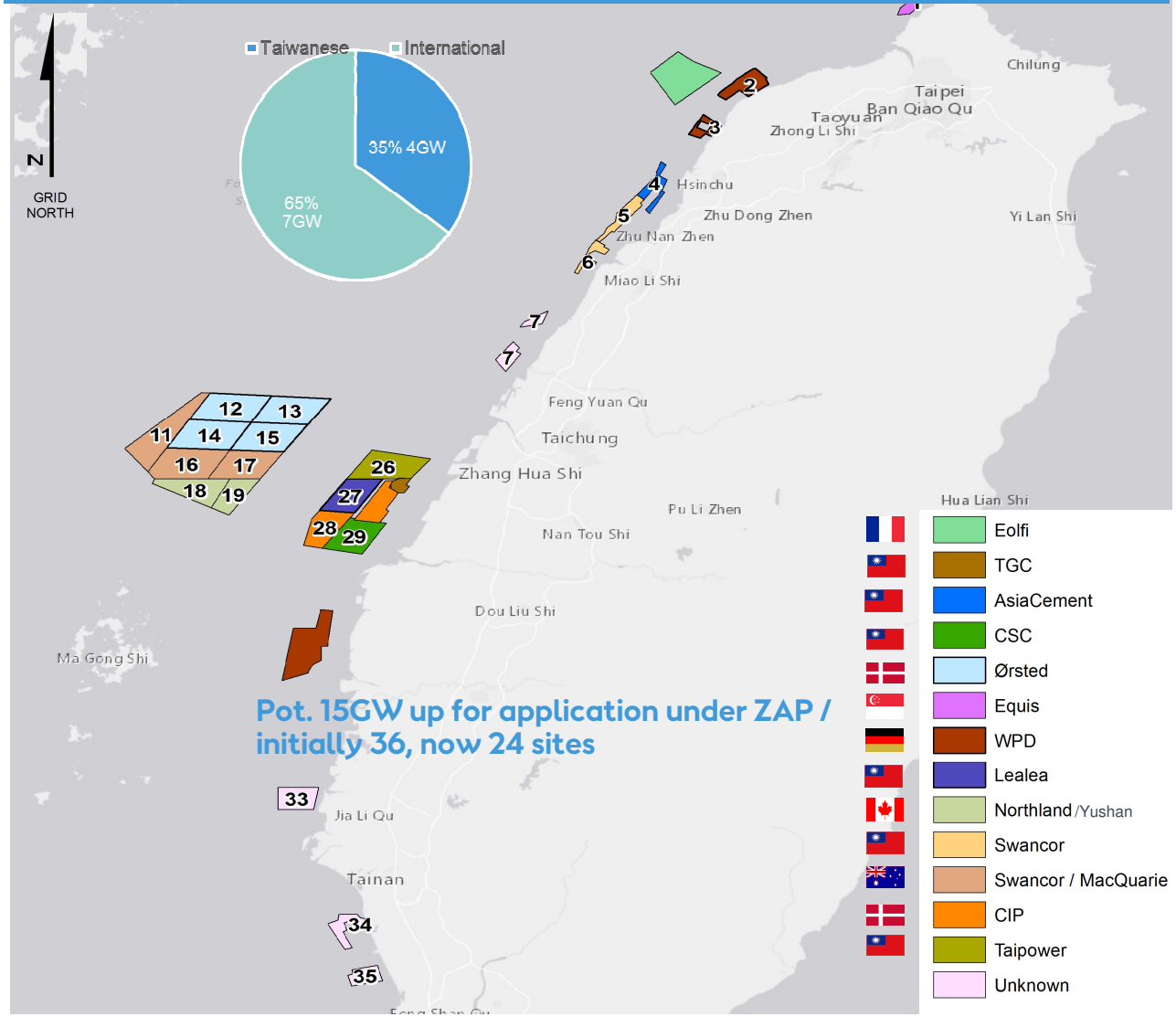
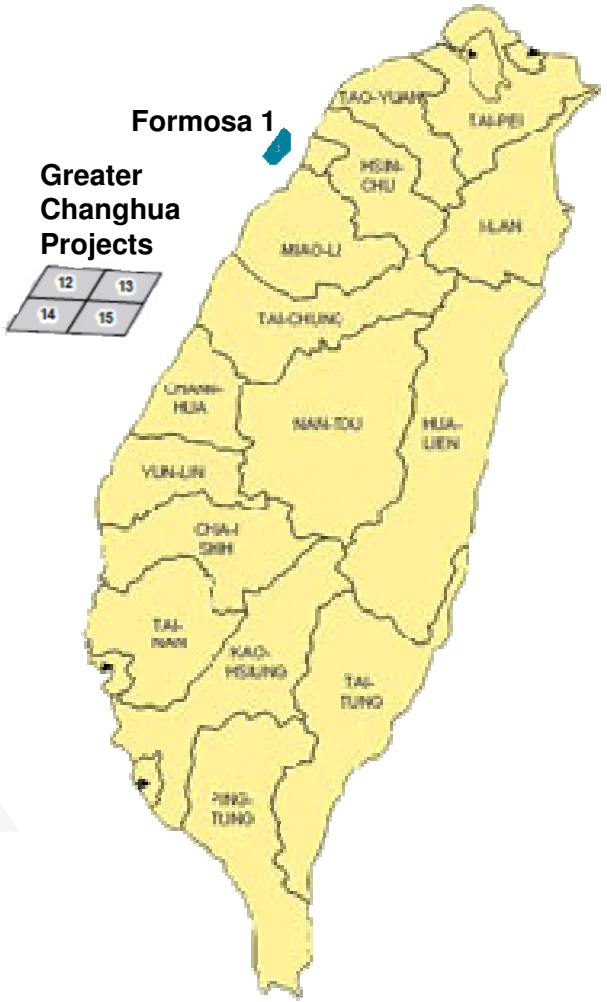
Taiwan case: Zonal application program (ZAP) as game changer leading to 11GW under development (Local/Foreigners)

Zonal Application Program Overview



Ørsted is engaged in 5 projects in Taiwan



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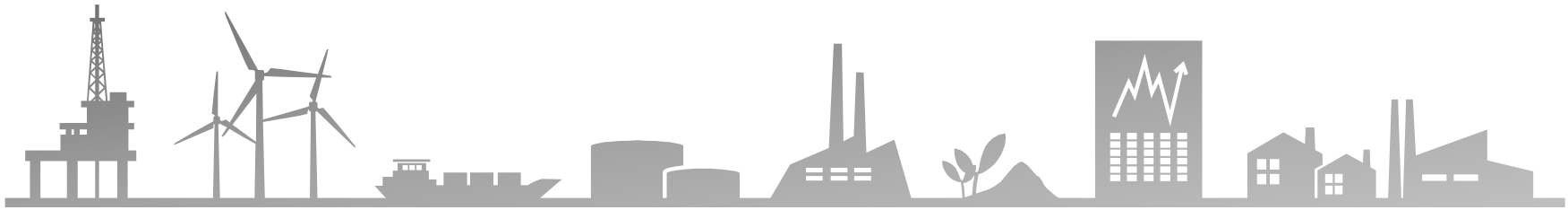
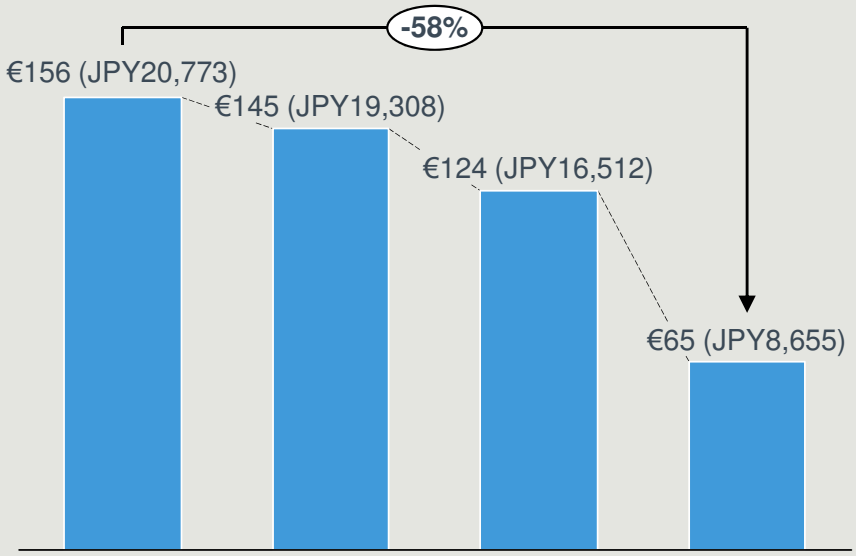


The offshore wind industry has cut the cost in half across the North Sea

United Kingdom

Levelised cost of electricity, for society, incl. transmission costs

EUR/MWh[1], 2016-prices, bid announcement year.

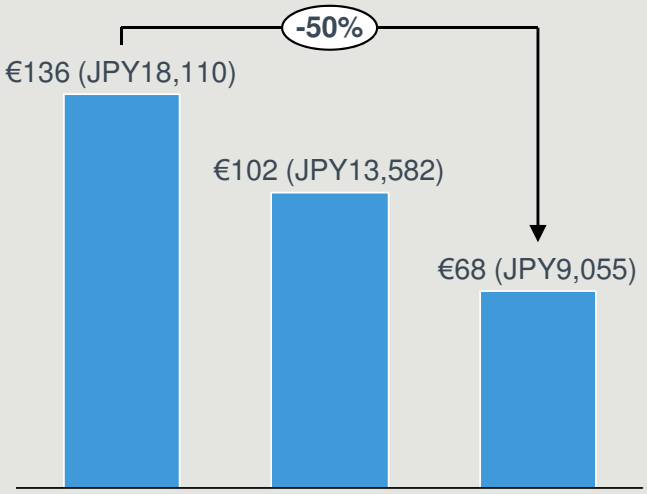


	Walney Ext.	Race Bank	East Anglia	Hornsea II
Year of subsidy agreement	2014	2015	2015	2017
Expected COD	2017	2017	2020	2022

Denmark

Levelised cost of electricity, for society, incl. transmission costs

EUR/MWh[1], 2016-prices, bid announcement year.



	Anholt	Horns Rev III	Kriegers Flak
Year of subsidy agreement	2010	2015	2016
Expected COD	2013	2019	2021

Sources: DECC

1. Levelised revenue (price) of electricity over the lifetime of the project used as proxy for the levelised cost to society. It consists of a subsidy element for the first years and a market income for the whole lifetime. Discount rate of 3.5% used to reflect society's discount rate. Market income based on country specific public wholesale market price projections at the time of contracting where available.

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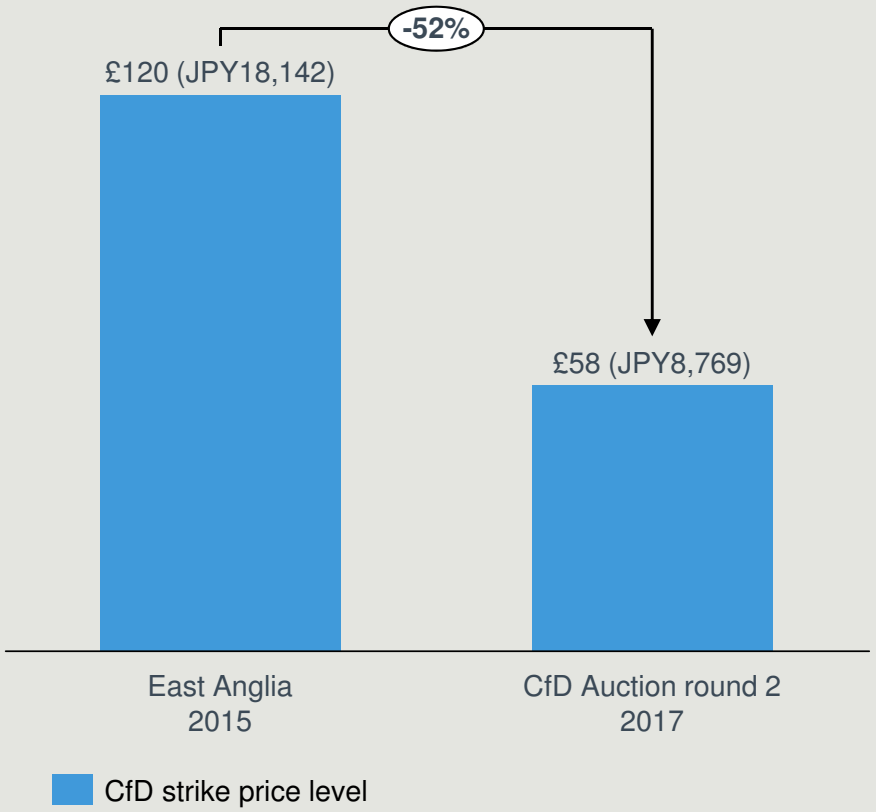
UK offshore wind shows rapidly declining costs, with latest round Orsted winning Hornsea project II at JPY 8769 / MWh

UK offshore wind CfD strike price levels

£/MWh, 2012 prices, bid announcement year



Main factors for reduced costs in UK from 2015-2017:

Scale - Orsted's pipeline of construction projects across the UK creates economies of scale

- With 1,386MW, Hornsea Project Two has the scale required to secure low costs per MW of construction, and low costs per MWh during a lifetime of operations and maintenance
- Larger turbines than previous UK parks expected

Maturing industry and technology - Innovation of offshore wind turbines, new installation equipment and methods, continuous improvements of foundation design, improved cables with higher capacity, and a growing and competitive supply chain

Risk reduction - Orsted already has several years of experience from developing Hornsea Project One in the North Sea, which reduces construction and operation risk of Hornsea Project Two

Synergies - Operations and maintenance on both Hornsea projects will be conducted from Orsted's new hub in Grimsby

Source: DECC & BEIS

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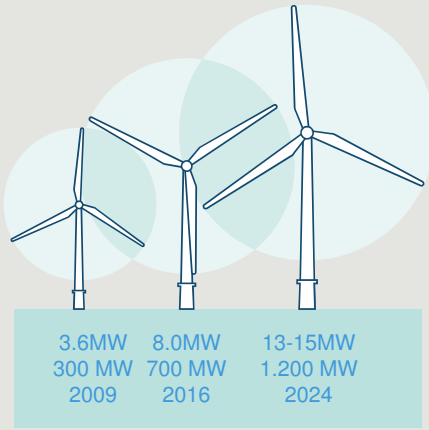
Scale is key to reduce costs – both in terms of markets and through technology

Scale

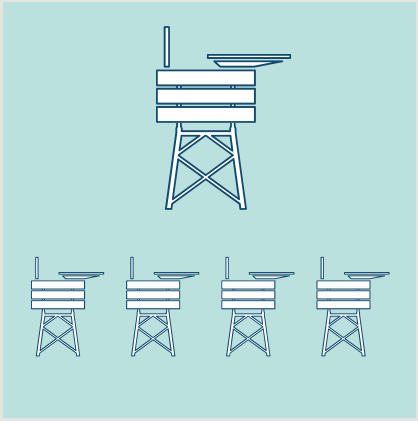


Increased size of windfarms and turbines

Innovation

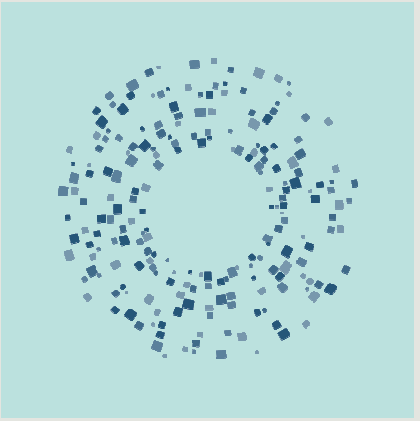
Driving innovative solutions

Industrialisation



Standardisation and procurement for multiple projects

Digitalisation



Fully capturing new technological opportunities

Ørsted

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

✓

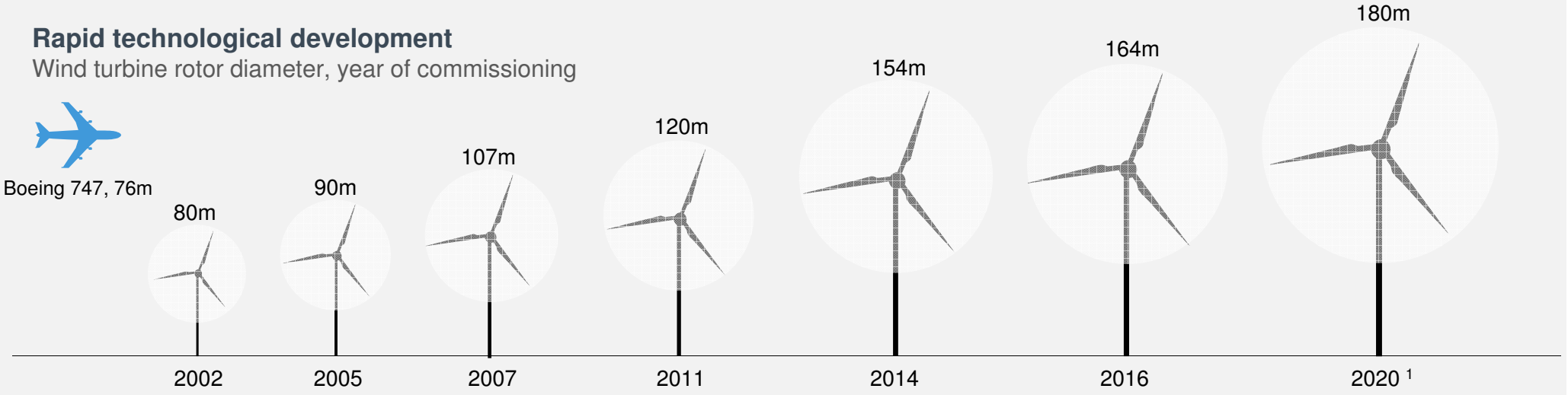
3 Industrialisation

- 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.

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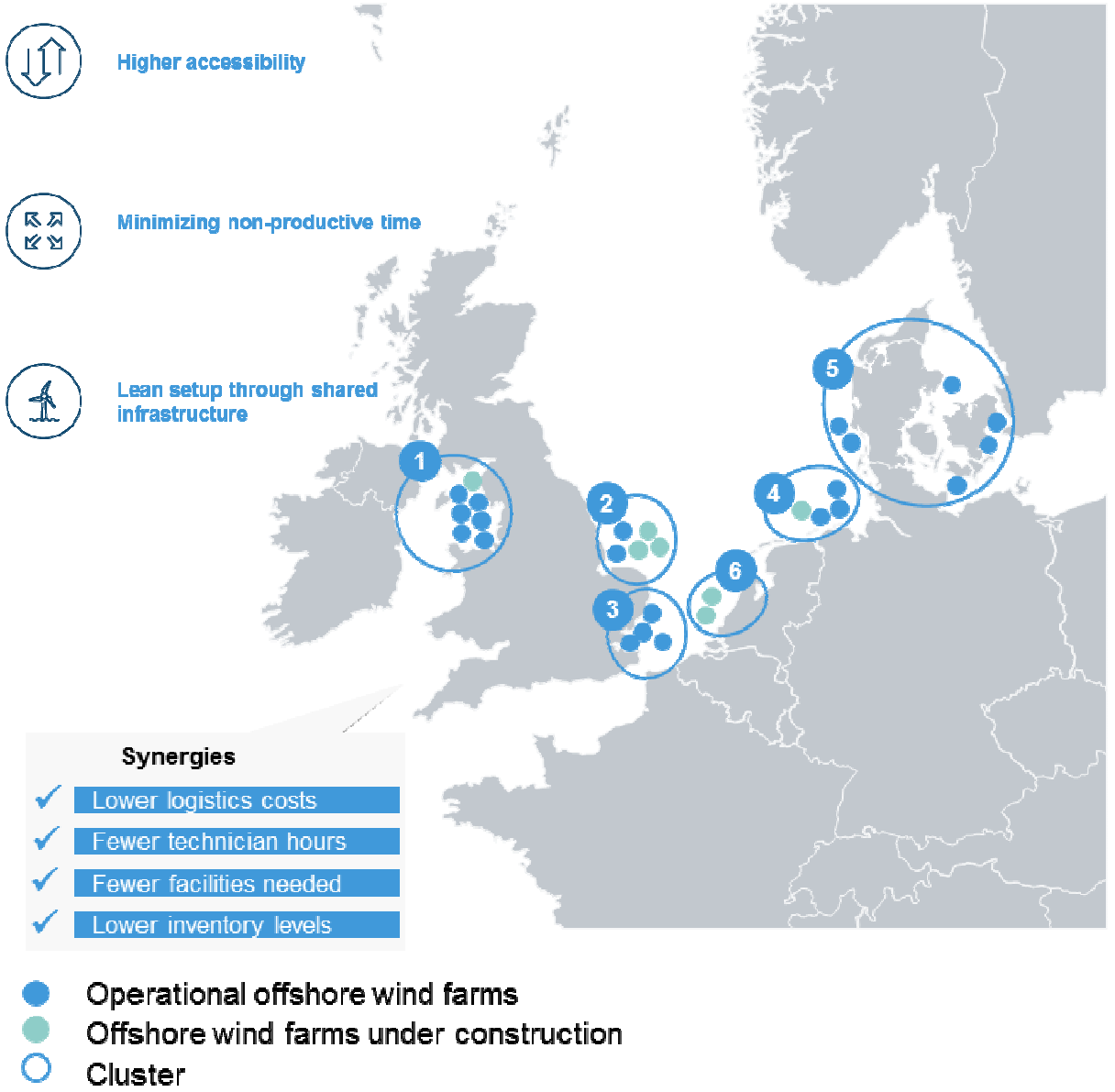
Ørsted's scale enables cluster synergies

1. **UK West coast (East Irish Sea):** Barrow, Burbo Bank, Burbo Bank Extension, West of Duddon Sands, Walney 1, Walney 2, Walney Extension
2. **East UK North:** Westermost Rough, Lincs, Race Bank, Hornsea 1, Hornsea 2
3. **East UK South:** London Array, Gunfleet Sands 1, Gunfleet Sands 2, Gunfleet Sands 3
4. **Germany:** Borkum Riffgrund 1, Borkum Riffgrund 2, Gode Wind 1, Gode Wind 2
5. **Danish waters:** Middelgrunden, Nysted, Horns Rev 2, Anholt
6. **Dutch waters:** Borssele 1 & 2



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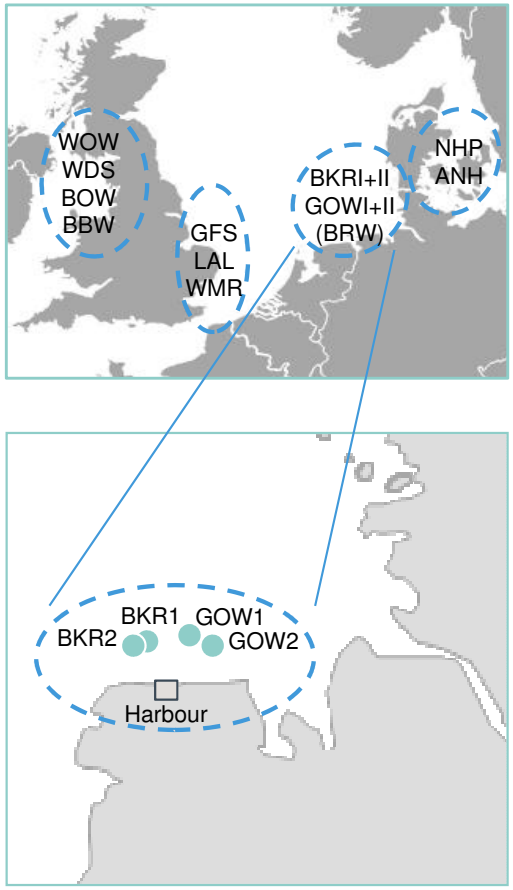
Building of operations of individual wind farms into operation of one cluster brings several O&M cost reduction potentials

Cluster areas



Cluster potentials

Description

Logistics

- Share crew logistics across sites
- Reduce standby capacity for unscheduled service

Technicians

- Share technicians across sites
- Reduce standby capacity for unscheduled service

Facilities

- Share on-site facilities* between asset projects operating at same harbour
- Reduce site administration

Inventories

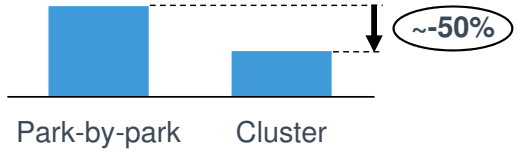
- Share spare part stock across asset projects
- Reduce capital cost due to reduced stock

Potential savings

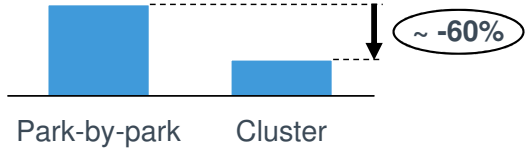
CTV

technicians (total avg. lifetime)

facilities



gearboxes on stock**



* Facilities potentially to be enlarged
** Same service level assumed
Source: Orsted, MD&AM BD analysis

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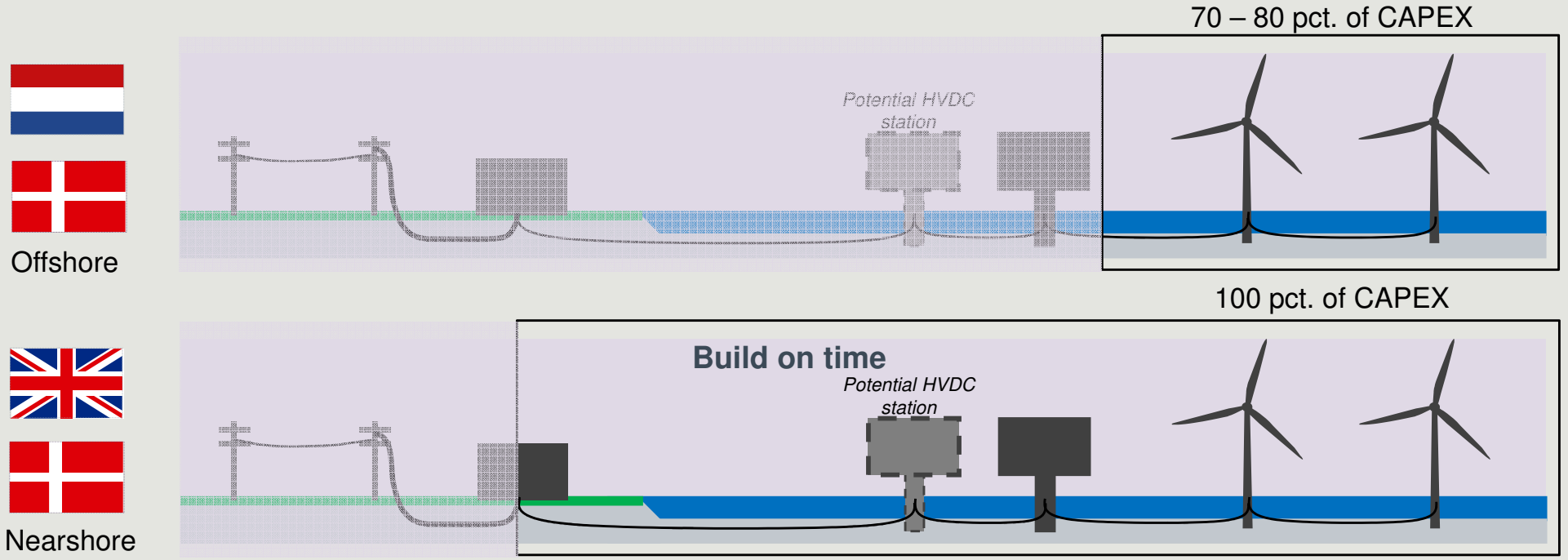
Highest possible cost reduction & build-on-time achieved when full value chain competes and has efficiency pressure



Socioeconomic rationale for Japanese offshore wind developers to build, own and operate transmission assets

- Incentivises cost efficiency of transmission deployment and completion on time and budget; it furthermore promotes competent operation and ownership of transmission assets as wind farm developer shoulder risk of grid outage
- Including transmission asset in OSW business case also incentivises selection of socioeconomic rational sites, ensuring competitive pressure on transmission design

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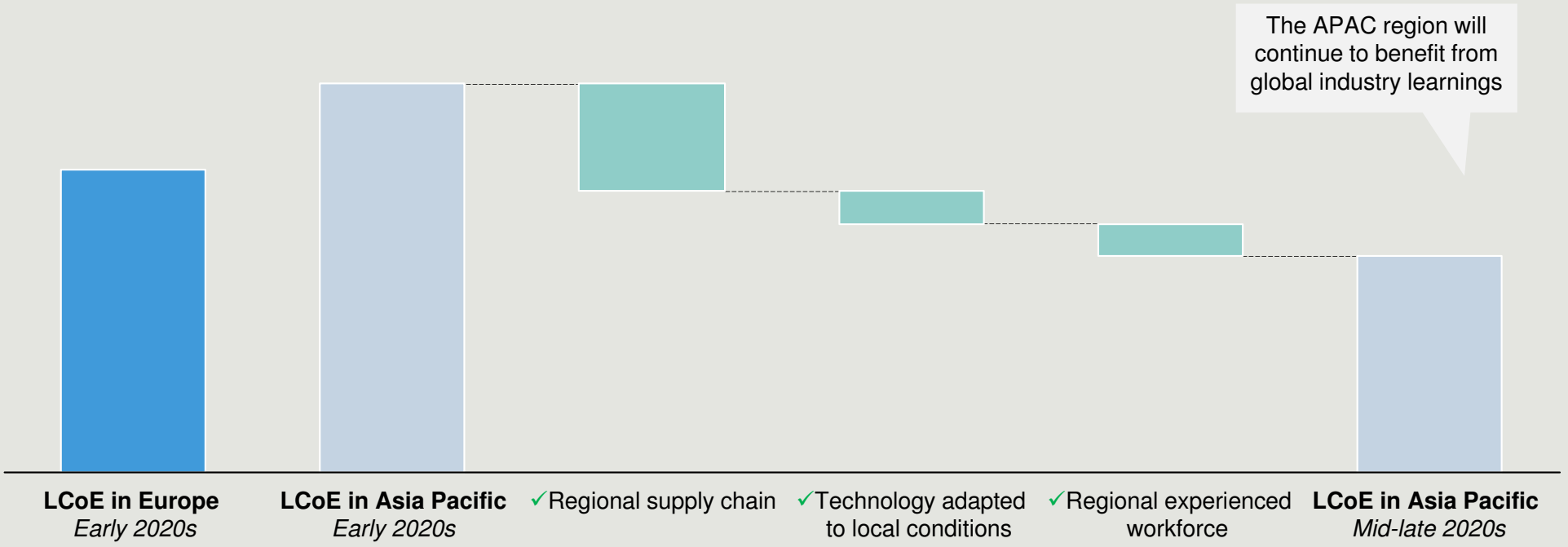
Japan will benefit from the European industry's maturation but will not be fully converged on cost from the outset

Key levers to bring down cost of offshore wind in Asia Pacific to European levels (illustrative)



- **Initial Japanese projects are likely to cost more than European projects as the industry and supply chain needs to develop in the region**
- **The speed of convergence will depend on stability of the regulatory framework and volume ambition**

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Q&A

※オーステッドより日本語訳の提供あり

資料2

Leading the energy transformation
エネルギーの変革を先導

4th Discussion Round, Studying Energy Situation
第4回エネルギー情勢懇談会

Matthias Bausenwein
General Manager for Ørsted Asia Pacific
Chairman Ørsted Taiwan
マティアス・バウゼンバイン
オーステッド社アジア太平洋局長
オーステッド台湾会長

Ørsted

Tokyo, 8th of Dec 2017
2017年12月8日東京

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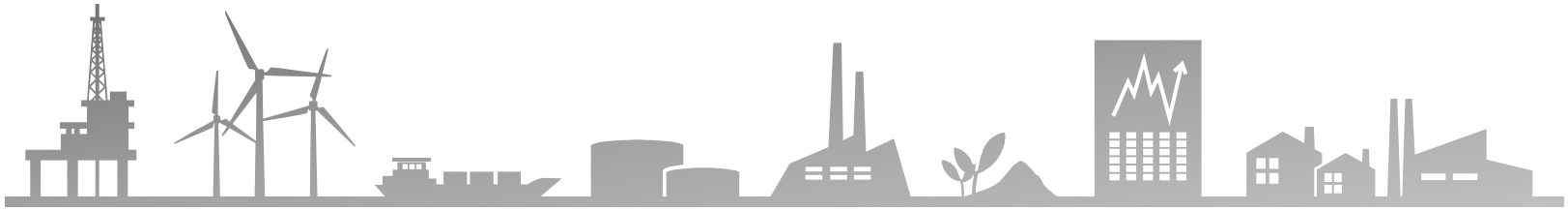


DONG Energy (ドンエナジー) は Ørsted に生まれ変わりました

Create a world that runs entirely on green energy

完全にグリーン・エネルギーで動く世界の創造を目指す

Profound strategic transformation from black to green energy and recent divestment of the upstream oil and gas

化石からグリーンへ、深遠な戦略的変革、及び石油・ガス事業の売却

Ørsted at a glance ・ 会社概要

Headquarters in Denmark
Listed in the Nasdaq OMX: ORSTED
5,600 employees
Revenue in 2016 DKK 61.2 bn (JPY 1096bn)
EBITDA in 2016 DKK 19.1 bn (JPY 342bn)
Phase out the use of coal by 2023

本社所在地：デンマーク
ナスダックOMXに上場：ORSTED
従業員数：5,600名
営業収益（2016年度）：612億DKK（1.096兆円）
EBITDA（2016年度）：191億DKK（3,420億円）
2023までに、完全に石炭の利用から撤退の目指す

84%* Wind Power 風力発電

- Develops, constructs, owns and operates offshore wind farms in Denmark, Germany, the Netherlands and the UK
  デンマーク、ドイツ、オランダ、イギリスにおいて洋上ウィンドファームの開発・建設・運転
- Development projects in Taiwan and the USA
  台湾、米国においてプロジェクト開発

4%* Bioenergy & Thermal Power バイオマス・エネルギー・火力発電

- Generates and sells power and heat to customers in Denmark and Northwestern Europe
  電力・熱の生産、及びデンマークと北西欧のお客様に電力と熱を販売

12%* Distribution & Customer Solutions 送配・カスタマーソリューションズ

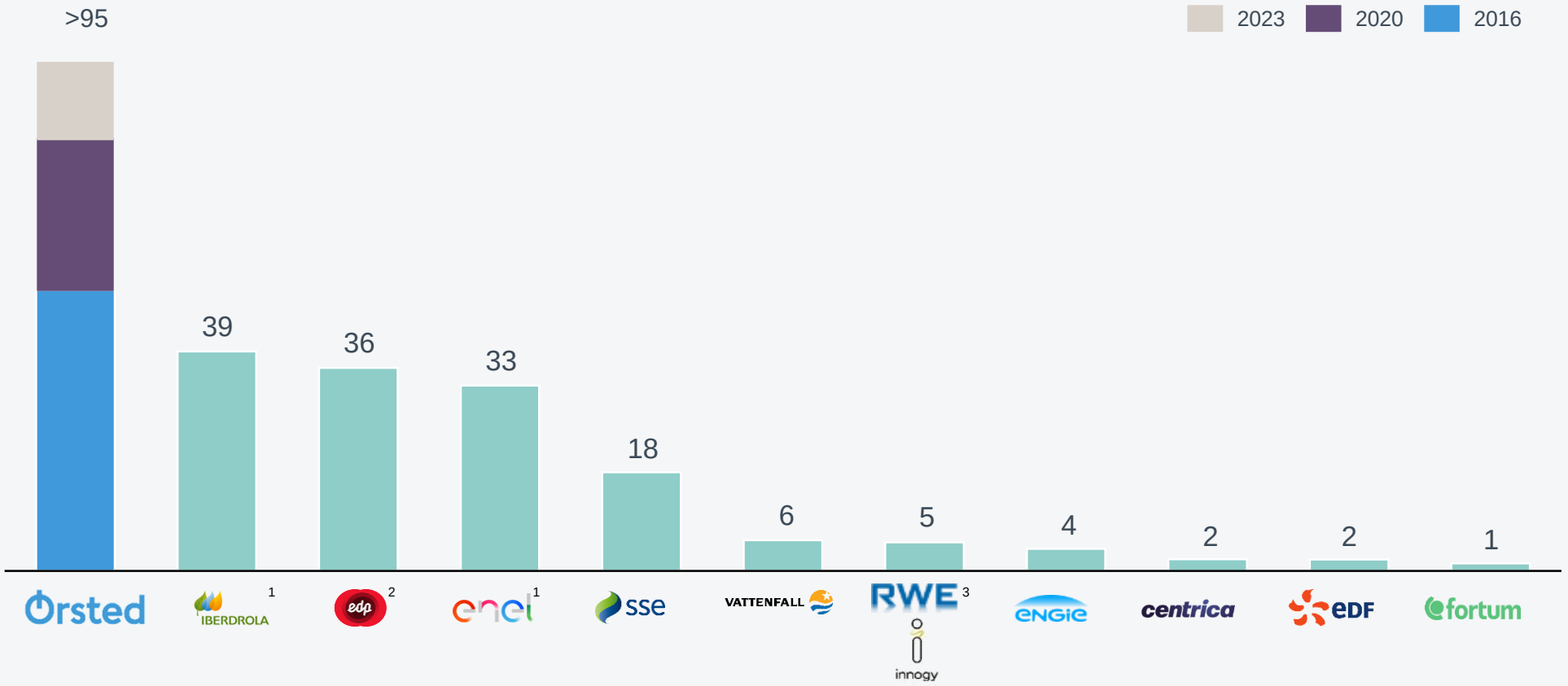
- Power distribution grid on Zealand and sale of power and gas to customers in Northwestern Europe
  デンマーク・シェラン島の配電網、及び北西欧のお客様に電力及びガスの販売

* Share of the Ørsted Group's capital employed

Ørsted

Greenest European energy company compared with our peers
欧州のエネルギー事業者の中で最もグリーンな企業

2016 %-share of power generation from new renewables: Offshore wind, onshore wind, solar PV and bioenergy
総発電量における新エネルギーの割合（2016年）：洋上風力、陸上風力、太陽光、バイオマス・エネルギー



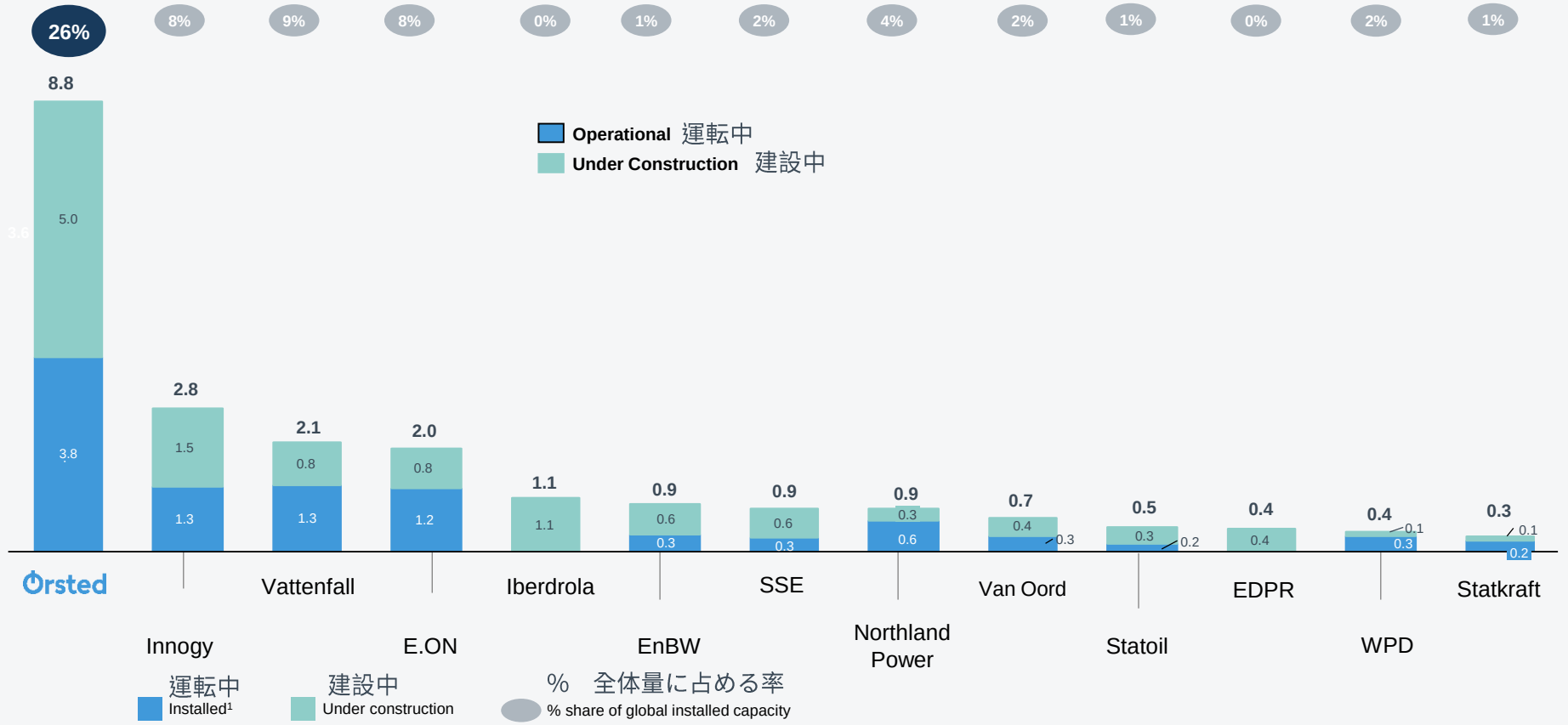
Source: Annual reports, corporate websites
Note: Not all peers disclosed detailed generation breakdown in 2016. These include E.On, Statkraft, Uniper
1. Includes hydro due to lack of disclosure granularity 2. EDPR majority owner is EDP with 82% so this is treated as a combined group. 3. RWE spun off renewables, grids and retail operations into separate company innogy in 2016, but RWE remains a majority owner with 75%. Percentage is calculated for the combined group

We are the Global Leader in Offshore Wind, with more than 25 years of experience / 25年以上の事業経験のおかげで、洋上風力発電のグローバル・リーダー

Largest offshore wind player globally today / 世界の大手洋上風力発電会社

Global offshore wind capacity / 洋上風力発電量

GW



Source: Bloomberg New Energy Finance, September 2017, Orsted analysis

1. If a project is executed on behalf of a lead developer managing the construction, then 100% of capacity is allocated to the lead developer. If construction is executed by an integrated joint venture, capacity is allocated in proportion to the JV share

Ørsted

We are not just a developer, but an integrated Energy Company
プロジェクト開発を行うディベロッパーだけでなく、総合エネルギー企業として営業

Strong integrated end-to-end business model
強力に統合された徹底したビジネスモデル

25+ years in offshore wind sector
25年以上の洋上風力発電の経験

Always built on time, on budget!
常に建設期間・予算厳守

Long-term commitment, entering a market to stay
長期的なコミットメント、長期的な視野を持って各市場に関与

Proven track record in developing local, long-term partnerships
地域の企業と長期的なパートナーシップの構築の実績

A trusted partner & advisor
信頼できるパートナとアドバイザー

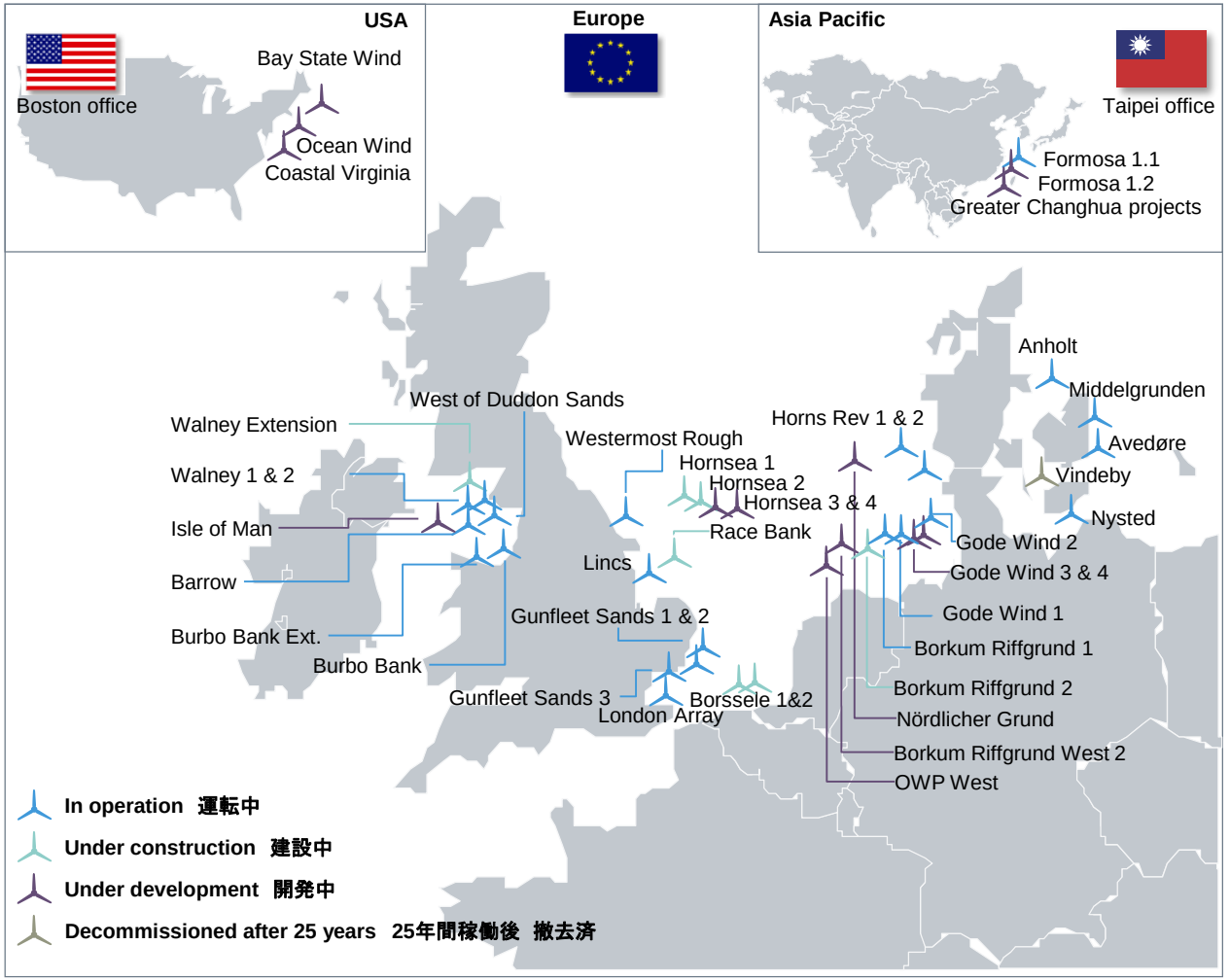
We have partnered up with
提携パートナー

SSE
IBERDROLA RENEWABLES
e.on
Masdar
VATTENFALL
PGGM
Caisse de dépôt et placement du Québec
pka
LEGO
Green Investment Group
PFA
PensionDanmark
GLOBAL INFRASTRUCTURE PARTNERS
STADTWERKE LÜBECK
LÆRERNES pension
Industriens Pension
talanx.
Insurance. Investments.
LÆGERNES PENSIONSKASSE
Marubeni
William Demant
Sumitomo Corporation
MACQUARIE

Ørsted

Ørsted Wind Power overview – internationalization
オーステッド・ウィンドパワー概要　－　国際化

Global footprint　国際的存在感



Unparalleled experience and track record

比類のない経験と実績

1991 — 25+ years of experience and track record in the offshore wind sector
25年以上の洋上風力発電の経験 — 2017

22 offshore wind farms in operation
運転中 洋上ウィンドファーム

7 offshore wind farms under construction
建設中 ウィンドファーム

3.8 GW Constructed capacity
建設済み 発電量

2,000 Dedicated employees
従業員数

5.0 GW under construction
建設中 発電量

7.7 million Europeans with clean electricity
欧州において770万人のお客様

3.5 GW World's leading operator
世界第一のオペレーター

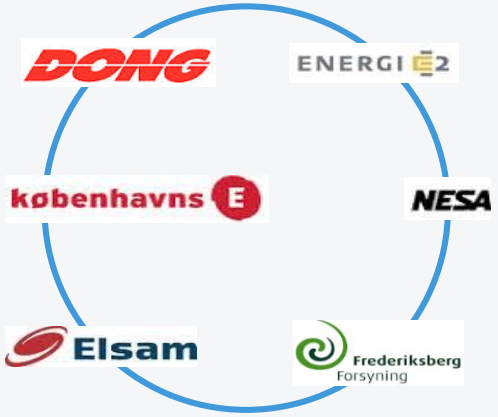
16 Partnerships
パートナーシップ

Ørsted

Ørsted's transition – faced strategic challenges from the outset in early 2000s / オーステッドの変革-2000年代初頭から複数の課題に直面

DONG Energy established through merger in 2006

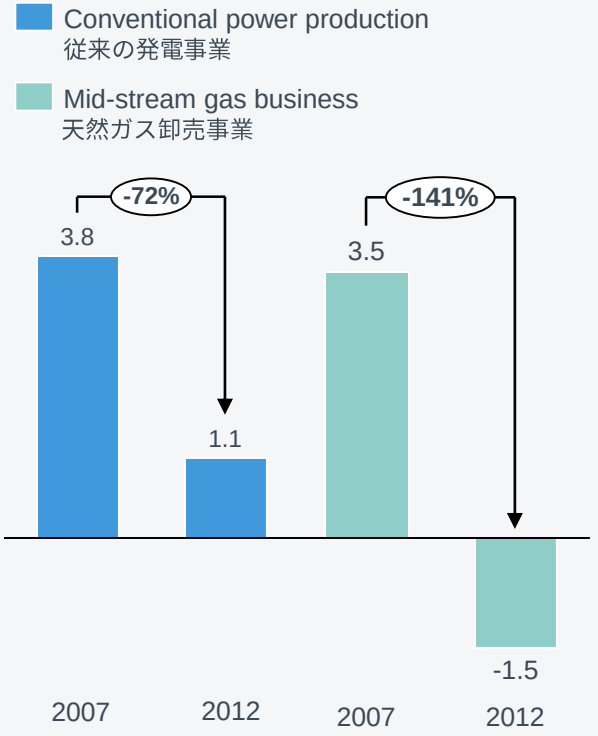
2006年合併を経てドンエナジーが設立



Legacy business eroding

従来の事業の停滞

Operating profit (EBITDA), DKK bn
営業利益（EBITDA)、10億DKK



Invested broadly to identify new growth

成長事業を識別するために幅広い投資

- **Onshore wind** 陸上風力発電
- **Offshore wind** 洋上風力発電
- **Hydro** 水力発電
- **Conventional Power Plants** 従来の発電
- **Waste Fired Power Plants** 廃棄物発電所
- **Virtual Power Plants** 仮想発電所
- **Distribution Grids** 配電網
- **Electric Vehicles** 電気自動車
- **Gas Storage** ガス貯蔵
- **LNG** 天然ガス
- **Oil & Gas** 石油・ガス

Ørsted

Ten major levers pulled to transform the company
当社の変革に貢献した10の方策

Divested non-core assets of DKK 17 bn.[1]
総計170億DKK(3,000億円)の中核部分以外の資産を売却

Invested DKK 81 bn. to expand offshore wind to 3.8GW today with secured pipeline to reach 8.8GW by 2022
洋上風力事業を現状の規模（3.8GWの設置容量/2022年までに8.8GWを達するためのプロジェクトパイプラインを確保）に拡大するために810億DKK（1.5兆円）を投資

Farmed down 12 wind farms to recycle DKK 65 bn. of capital
650億DKKの資本を得るために12のウィンドファームの所有権を譲渡

Reduced offshore wind cost-of-electricity by 50%
洋上風力発電コストを50%低減

Converted 5 of 7 heat and power plants to biomass to secure profitability and announced "coal-free by 2023"
収益性を確保するために7つの熱電併給プラントのうち5つをバイオマスに転換し、"2023年には石炭フリー"を公表

Turned around loss-making long-term gas contract portfolio, gaining DKK 6.4 bn. from compensation payments
赤字体質であった長期ガス契約を改変、64億DKK補償金の支払いをうける

Initiated strategic shift in retail business from commodity sales to integrated, green energy solutions
商品販売から「統合的グリーン・エネルギー・ソリューションズ」の提供に小売事業の戦略の方針転換を開始

Lowered net interest-bearing debt and stabilized credit ratings
ネット（純）有利子負債を低減、及び信用格付けを安定させた

Restructured and divested legacy, upstream Oil & Gas division
伝統的な事業の一角であった上流 (アップ・ストリーム、探鉱・開発，採掘など)石油・ガス部門を再編及び売却

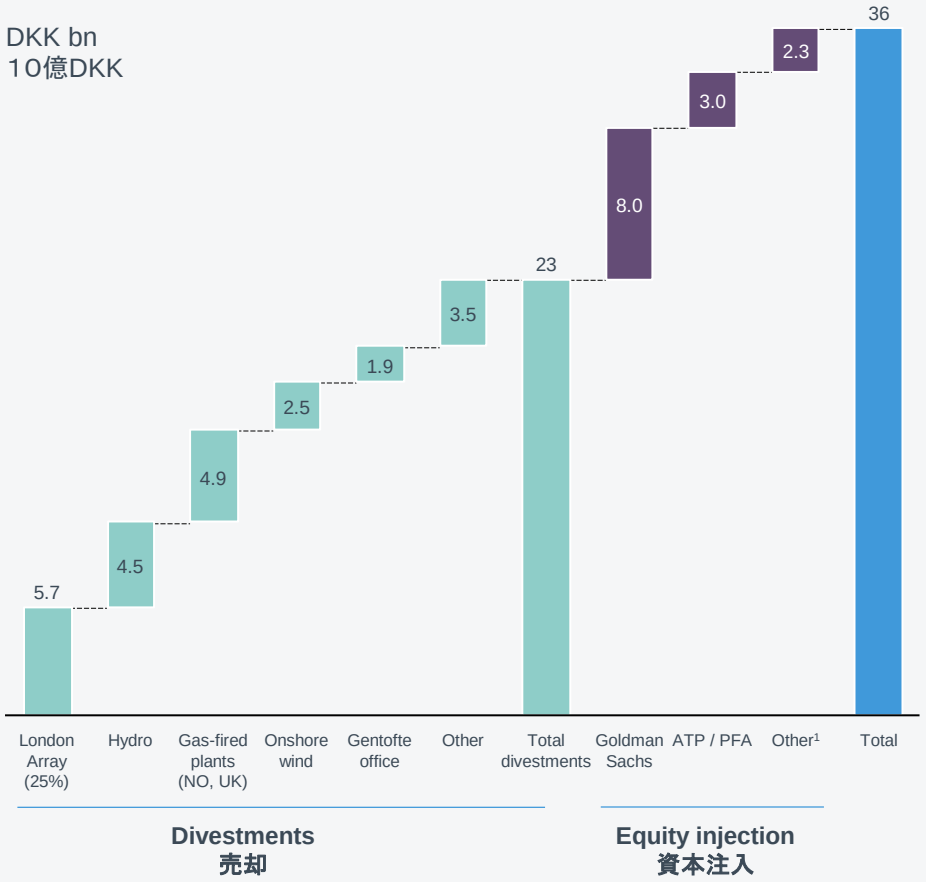
Changed the company name and visual identity to reflect new green platform
新たなグリーン戦略を反映すべく会社名を変更

1. Includes onshore wind, hydro power plant, gas-fired power plants (UK, NO), GTF office, Danish gas storage, and 'other'

Financial action plan to support continued strategic transformation
戦略的変革を実行するための財務行動計画

1	**Re-focus portfolio** **主力事業の見直し**	**12 → 4 business areas** **事業分野** ✓
2	**Divestments** **売却**	**DKK 23 bn (JPY 412 bn)** **230億DKK（4,120億円）** ✓
3	**Cost reductions** **コスト削減**	**DKK 1.2 bn (JPY 21 bn)** **12億DKK(210億円）** ✓
4	**Equity injection** **資本投入**	**DKK 13 bn (JPY 233 bn)** 130億DKK（2,330億円） ✓

Cash generated from mid-2013 to end-2014
2013年半ば~2014年半ばに実現した現金化

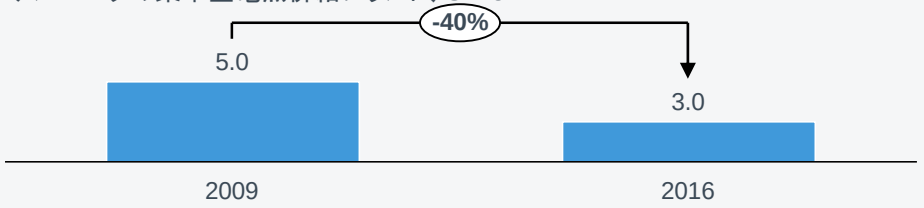


1. Seas NVE, Syd Energi, Insero, Nyfors, and employees

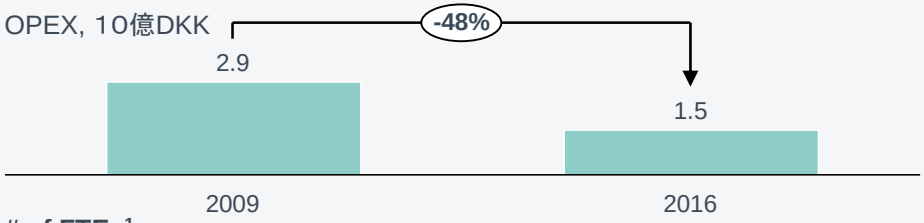
Transformation of conventional power business
従来型電力発電事業の変革

Transformation of Danish power plant business
デンマークの電熱併給事業の変革

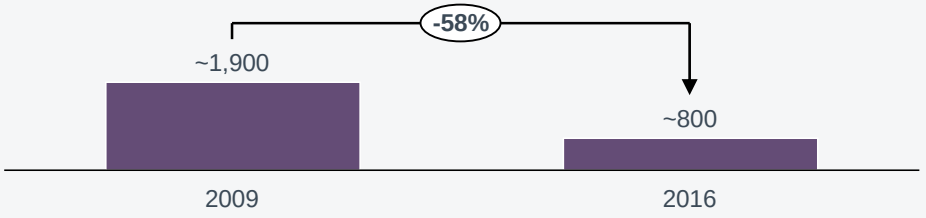
Danish portfolio of central plants, GWe
デンマークの集中型電熱併給プラント、GWe



OPEX, DKK bn
OPEX, 10億DKK

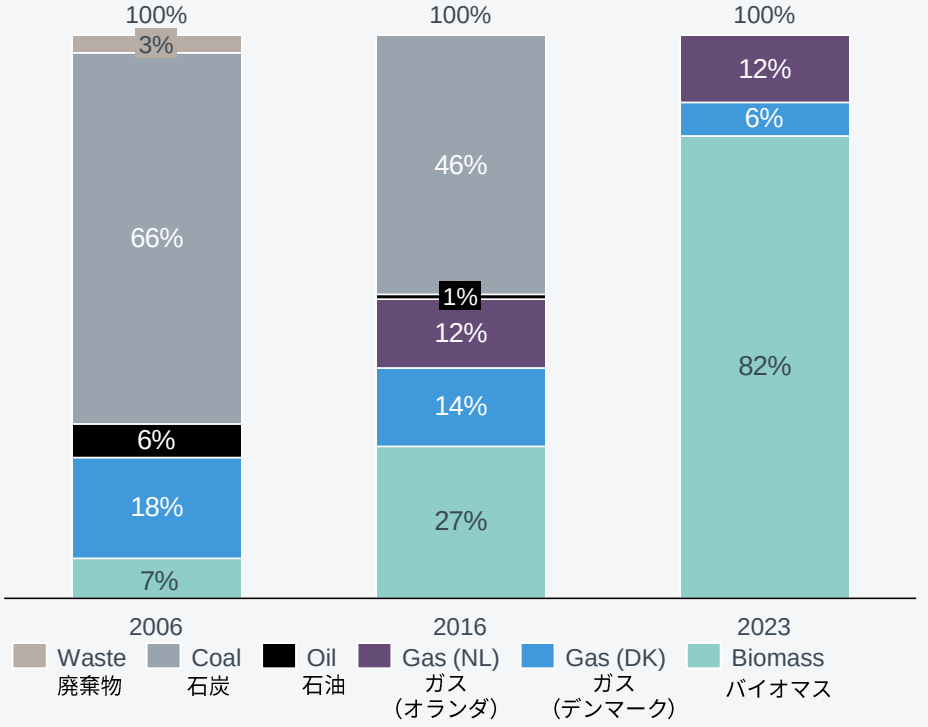


# of FTEs[1]
フルタイム当量



Biomass conversions well underway – coal will be fully phased out by 2023 バイオマスへの転換が進行中、2023年までには完全に石炭の利用から撤退

Ørsted fuel composition, %[2]
オーステッドの燃料消費量、%



1. Adjusted for divested activities
2. Ability to use coal retained in case of force majeure

Divestment of Ørsted's Oil & Gas business to INEOS in 2017
2017年に石油・ガス事業をINEOSに売却

History:
歴史：

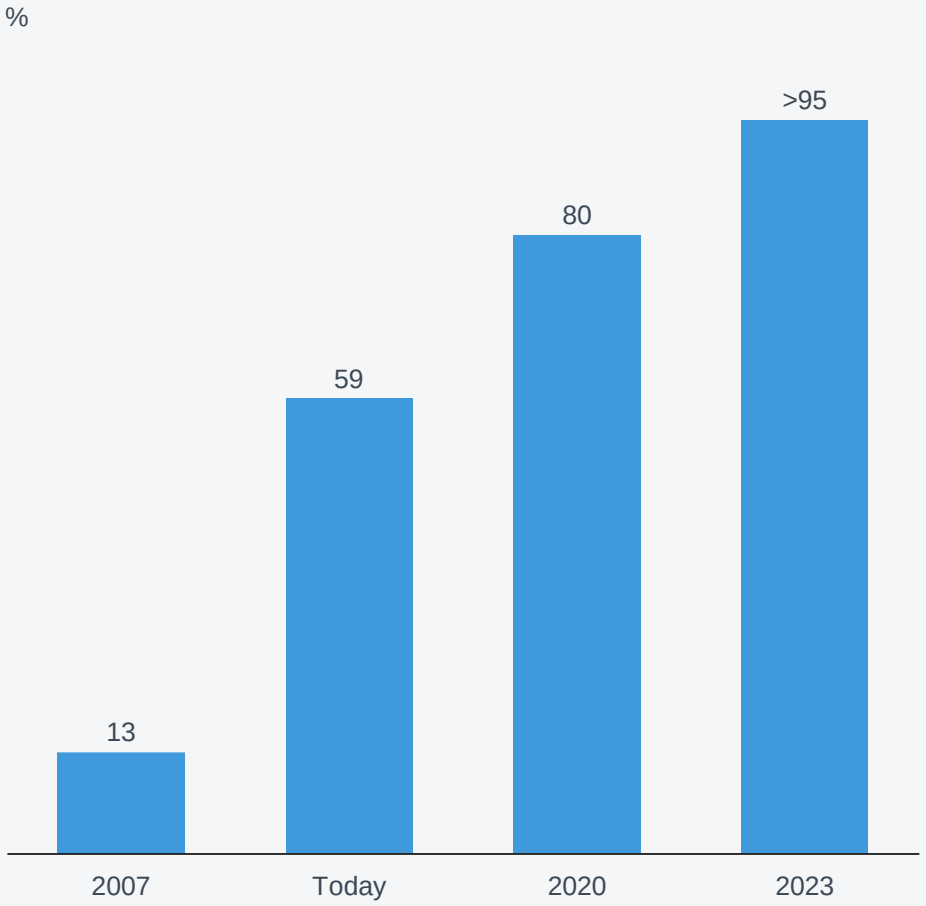
- ✓ Comprehensive portfolio restructuring focusing on risk-profile and cash flow リスク・プロファイルとキャッシュ・フローに焦点を当てた包括的なポートフォリオ再編
- ✓ Significant reduction in exploration efforts
  探査事業を大幅に削減
- ✓ Reduced investments 投資を削減
- ✓ Divestments of ownership shares in fields
  油田の所有権を売却
- ✓ Contain risk of Hejre field
  ヘルイェ油田のリスクコントロール
- ✓ Significant reduction of cost base and organisation
  コスト・ベースと組織を大幅に削減

Ørsted → INEOS

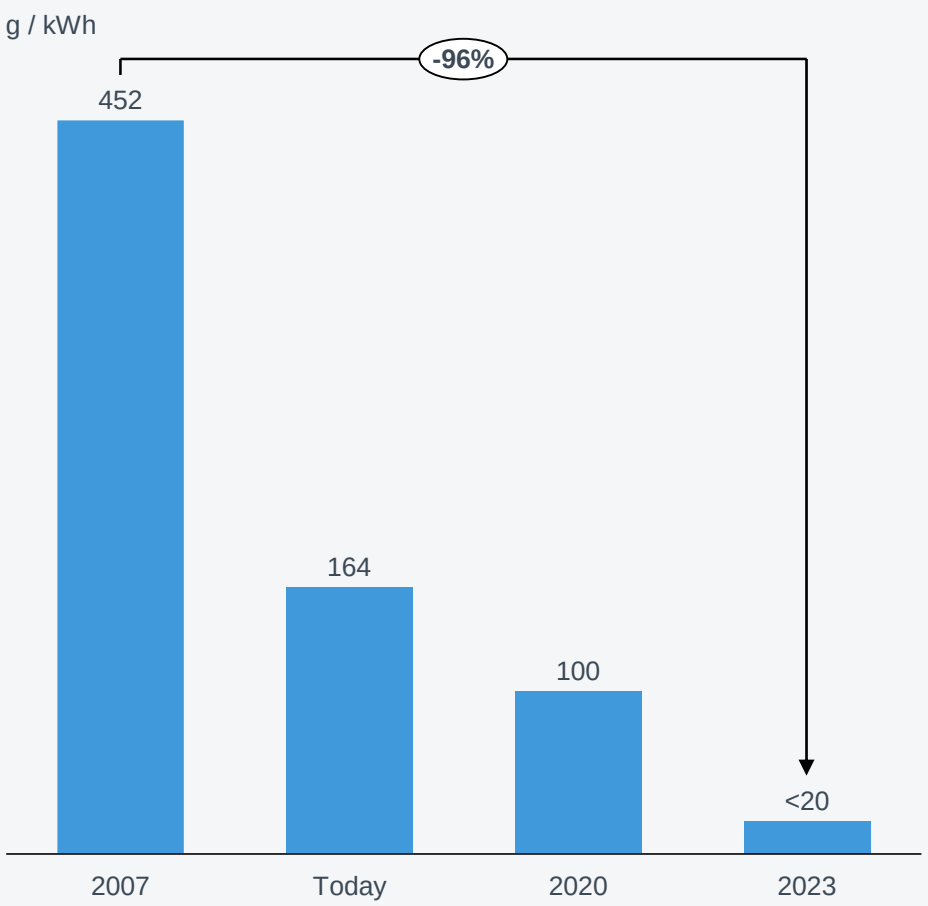
- ✓ Good and fair price : DKK 7.0 bn (JPY125.2 bn)[1]
  適切な売却価格　1252億円
- ✓ Sell the business as a whole 事業を一括して売却
- ✓ Good strategic and cultural match – good future home for the O&G business 戦略と企業文化の一致 – 最適な石油と天然ガス事業の譲渡先
- ✓ Significant step to complete strategic transformation of Ørsted オーステッドの戦略的変革に向けて重要な一歩

Transformation of the company from black to green energy well under way - Key milestone 2023
化石から緑のエネルギーを扱う企業への変革

Share of green power グリーン・エネルギーの比率



CO_2-emissions CO_2排出量



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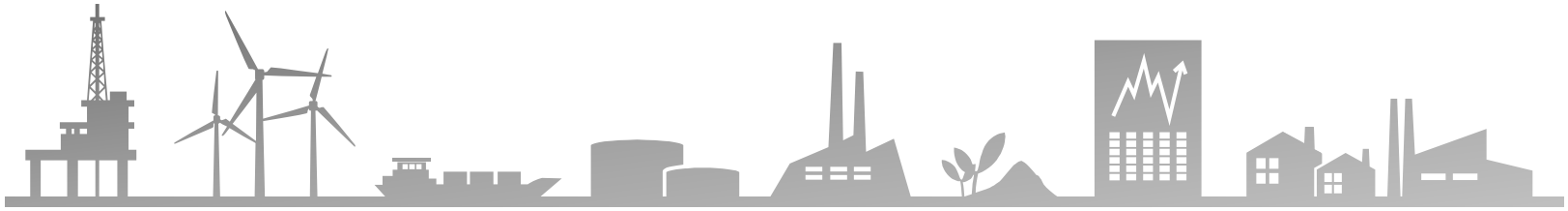
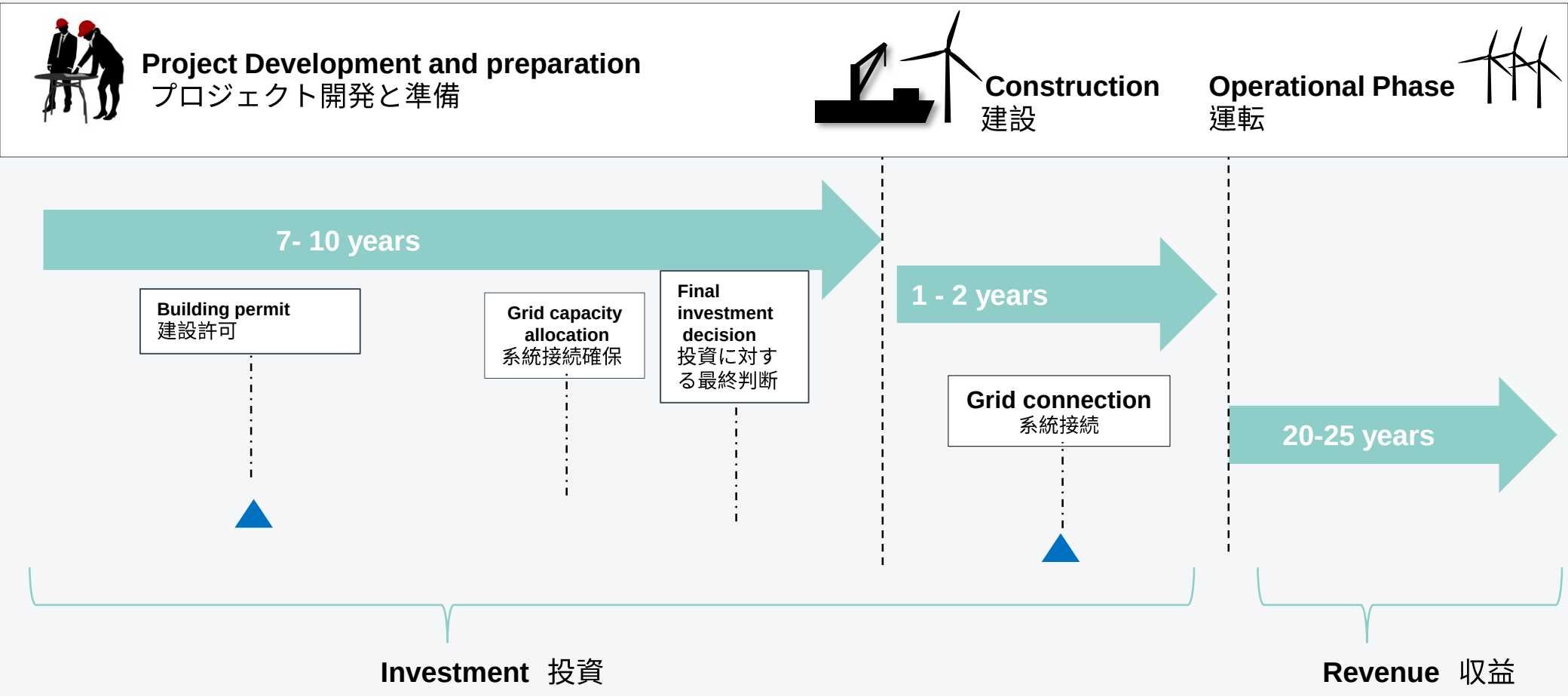


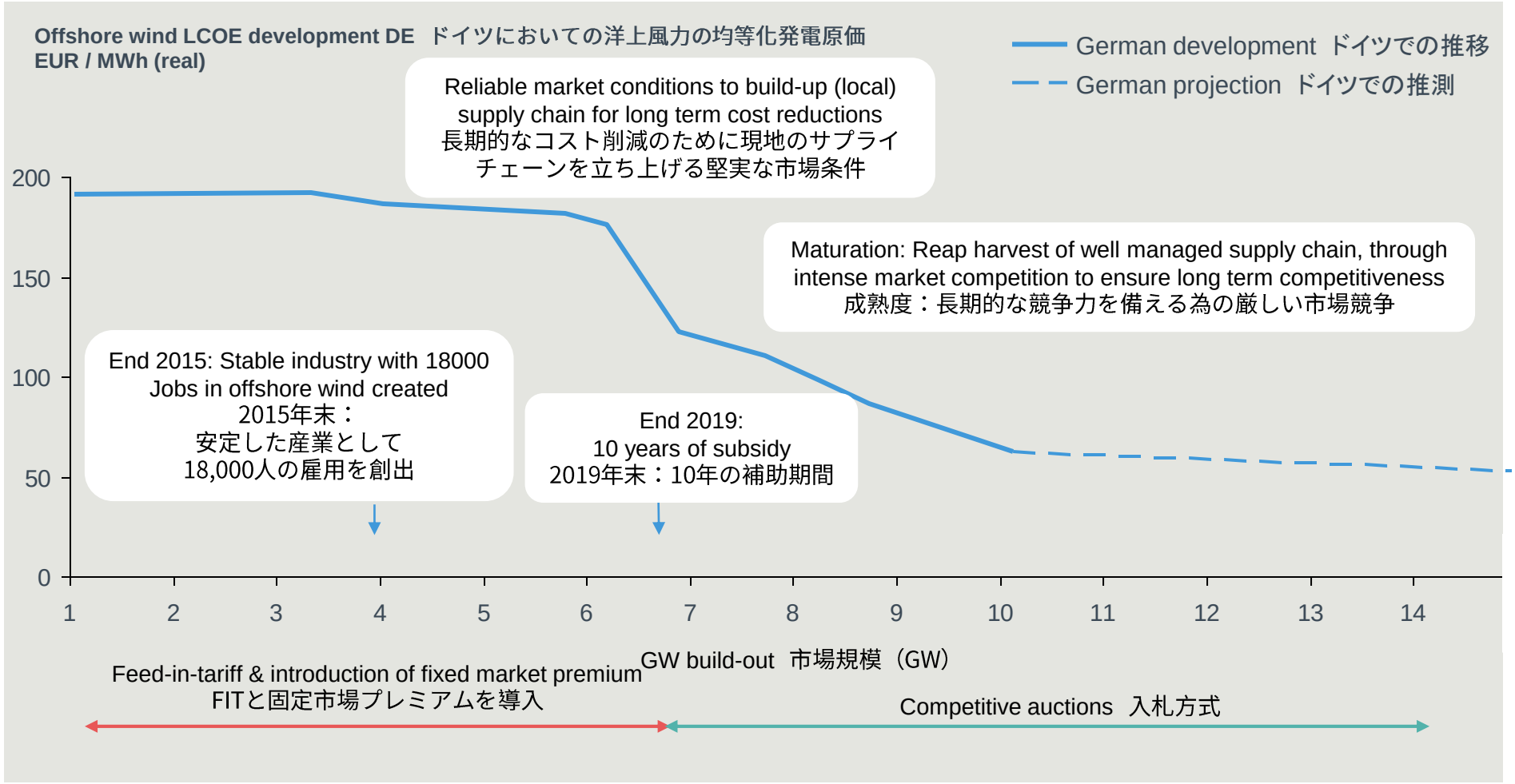
Clear and stable regulatory frameworks needed for offshore wind in Japan
今後日本の洋上風力に必要条件―透明性と継続性が高い法制度



Key takeaways 重要な観点:

Offshore wind development is a long term process, clear targets, a long term stable regulatory framework (e.g. FIT, relaxation of EIA, regulation for use of general sea areas) are needed
洋上風力案件の開発は長期に渡るプロセスであって、明確な目標値、長期的安定した法制度（FIT、EIAの緩和、一般海域利用に関する規制など）が必要

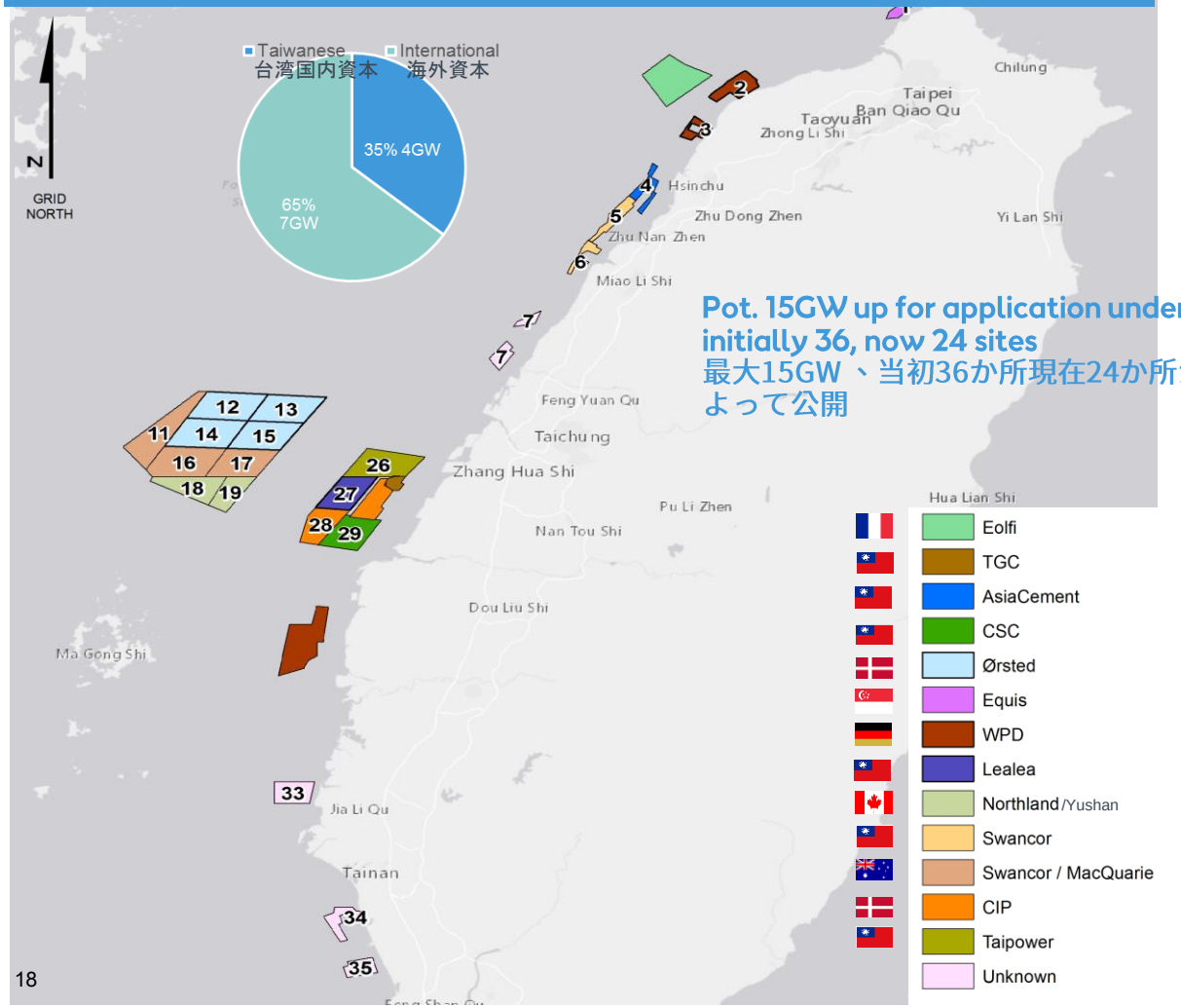
Long term cost reduction can be achieved via stable remuneration in establishment phase (German FiT: 10 years)
市場形成段階の安定した補助制度が長期的なコスト削減を実現



Taiwan case: Zonal application program (ZAP) as game changer leading to 11GW under development (Local/Foreigners)

台湾の事例：ゾーン別アプリケーションプログラム(ZAP) がもたらす大変革
１１GWの国内外企業による開発

Zonal Application Program Overview　ZAPの概要

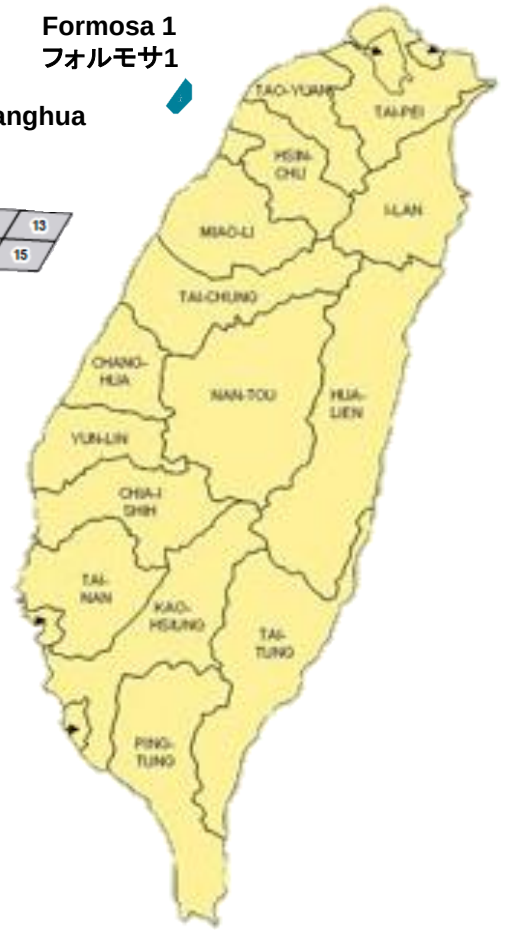


Pot. 15GW up for application under ZAP / initially 36, now 24 sites
最大15GW 、当初36か所現在24か所がZAPによって公開

Ørsted is engaged in 5 projects in Taiwan
オーステッドが台湾で関わる５つの案件

Formosa 1
フォルモサ1

Greater Changhua Projects
彰化広域



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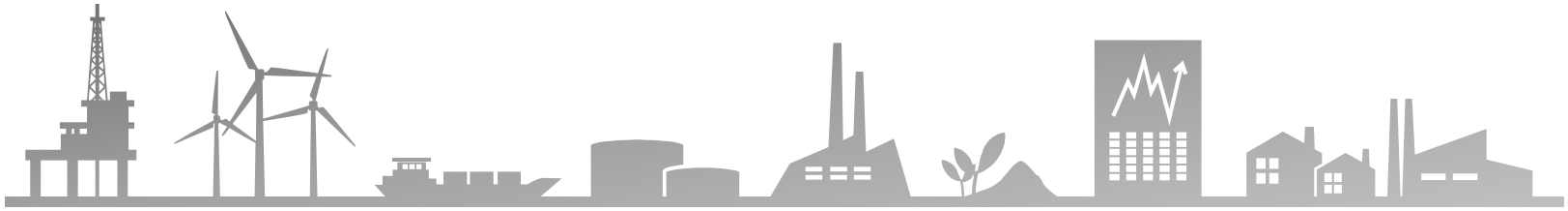


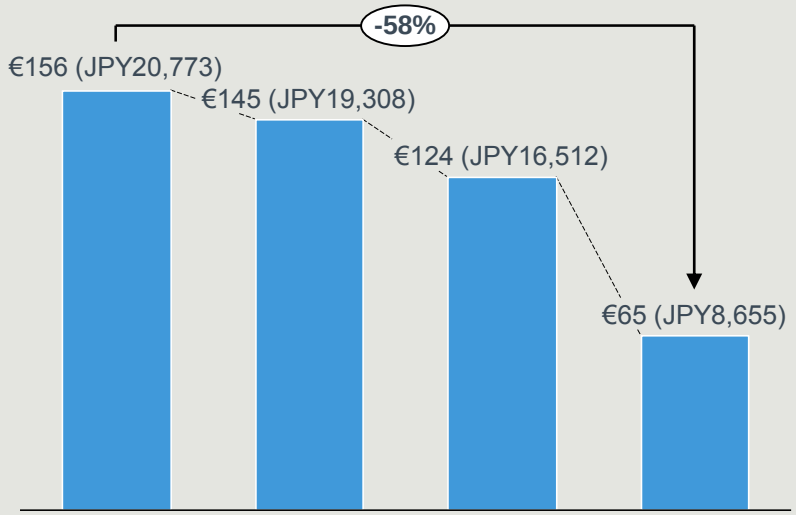
The offshore wind industry has cut the cost in half across the North Sea　北海のプロジェクトにおいてのコスト半減

United Kingdom イギリス

Levelised cost of electricity, for society, incl. transmission costs 均等化発電原価(含む送電コスト)

EUR/MWh[1], 2016-prices, bid announcement year

EUR/MWh[1], 2016年価格, 公募公開年



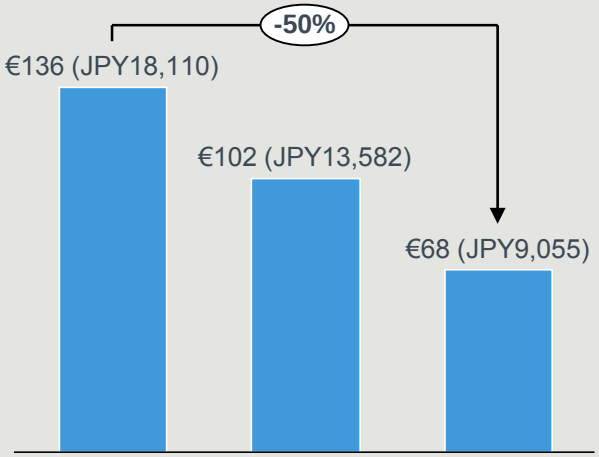
	Walney Ext.	Race Bank	East Anglia	Hornsea II
Year of subsidy agreement 補助額決定年	2014	2015	2015	2017
Expected COD 商業運転開始（予定）	2017	2017	2020	2022

Denmark デンマーク

Levelised cost of electricity, for society, incl. transmission costs 均等化発電原価(含む送電コスト)

EUR/MWh[1], 2016-prices, bid announcement year

EUR/MWh[1], 2016年価格, 公募公開年



	Anholt	Horns Rev III	Kriegers Flak
Year of subsidy agreement 補助額決定年	2010	2015	2016
Expected COD 商業運転開始（予定）	2013	2019	2021

Sources: DECC

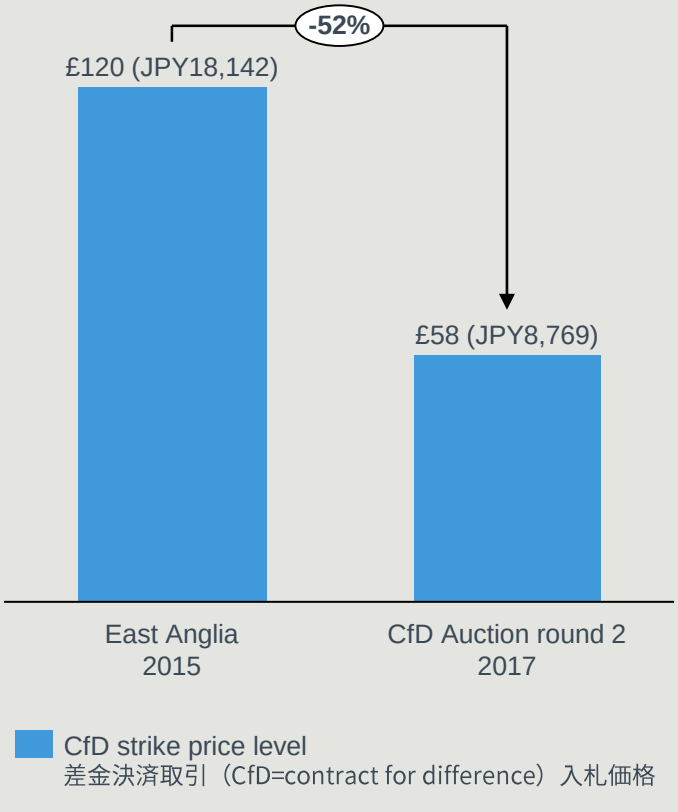
1. Levelised revenue (price) of electricity over the lifetime of the project used as proxy for the levelised cost to society. It consists of a subsidy element for the first years and a market income for the whole lifetime. Discount rate of 3.5% used to reflect society's discount rate. Market income based on country specific public wholesale market price projections at the time of contracting where available.

Ørsted

UK offshore wind shows rapidly declining costs, with latest round Orsted winning Hornsea project II at JPY 8.769 / kWh
イギリスの洋上風力でのコスト削減が急速 –
オーステッド落札した Hornsea II では8.769円/kWhを実現

UK offshore wind CfD strike price levels　イギリスにおいての洋上風力差金決済取引入札価格

£/MWh, 2012 prices, bid announcement year　£/MWh, 2012年価格, 公募公表年



Main factors for reduced costs in UK from 2015-2017
コスト削減の主要要因2015-2017

Scale - Orsted's pipeline of construction projects across the UK creates economies of scale

規模 - オーステッドのイギリスでおいての権利取得済みの案件による規模の経済

- With 1,386MW, Hornsea Project Two has the scale required to secure low costs per MW of construction, and low costs per MWh during a lifetime of operations and maintenance
- Larger turbines than previous UK parks expected

Maturing industry and technology - Innovation of offshore wind turbines, new installation equipment and methods, continuous improvements of foundation design, improved cables with higher capacity, and a growing and competitive supply chain

技術と産業としての成熟 – 洋上風力用風車の技術革新、新しい設置設備・方法、基礎部分の継続的改善、電気接続ケーブルの大容量化、サプライチェーンの競争力の向上

Risk reduction - Orsted already has several years of experience from developing Hornsea Project One in the North Sea, which reduces construction and operation risk of Hornsea Project Two

リスクの低減 –北海のHornsea Project Oneからの経験値を生かし、Hornsea Project Twoにおいての建設・運転リスクを低減

Synergies - Operations and maintenance on both Hornsea projects will be conducted from Orsted's new hub in Grimsby

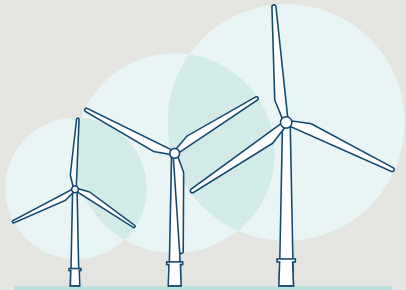
相乗効果 – オーステッドの新しい拠点となるGrimsbyからO&Mを実行

Source: DECC & BEIS

Ørsted

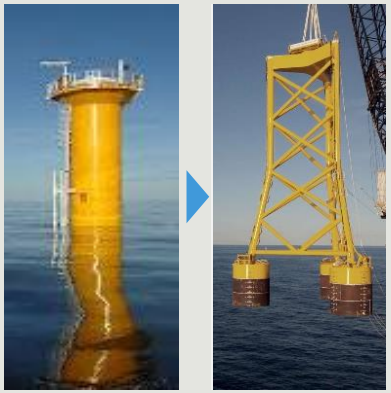
Scale is key to reduce costs – both in terms of markets and through technology　規模は市場面でも技術面でもコスト削減の鍵となる

Scale
規模



Increased size of windfarms and turbines
風車とウィンドファーム（風力発電プラント）の大型化

Innovation
イノベーション

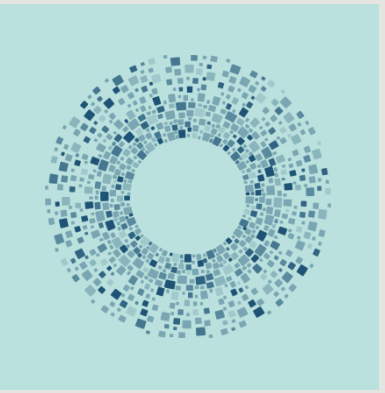


Driving innovative solutions
革新的なソリューションを駆動

Industrialisation
産業化

Standardisation and procurement for multiple projects
標準化と複数の案件に対応した調達

Digitalisation
デジタル化



Fully capturing new technological opportunities
技術革新の可能性を確実に捉える

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At the forefront of making the industry cost competitive
洋上風力のコスト競争力を高める先駆者

Multiple levers to drive down cost in offshore wind 洋上風力における様々な方策によるコストダウン

1 Scale 規模

- Turbines and rotor size 風車・ローターの規模
- Sites 立地
- Vessel size 船舶の規模
- Cable capacity ケーブルの送電容量

✓

2 Innovation イノベーション

- Foundation design (e.g. monopiles)
  基礎のデザイン（モノパイルなど）
- Electrical 電気設備

✓

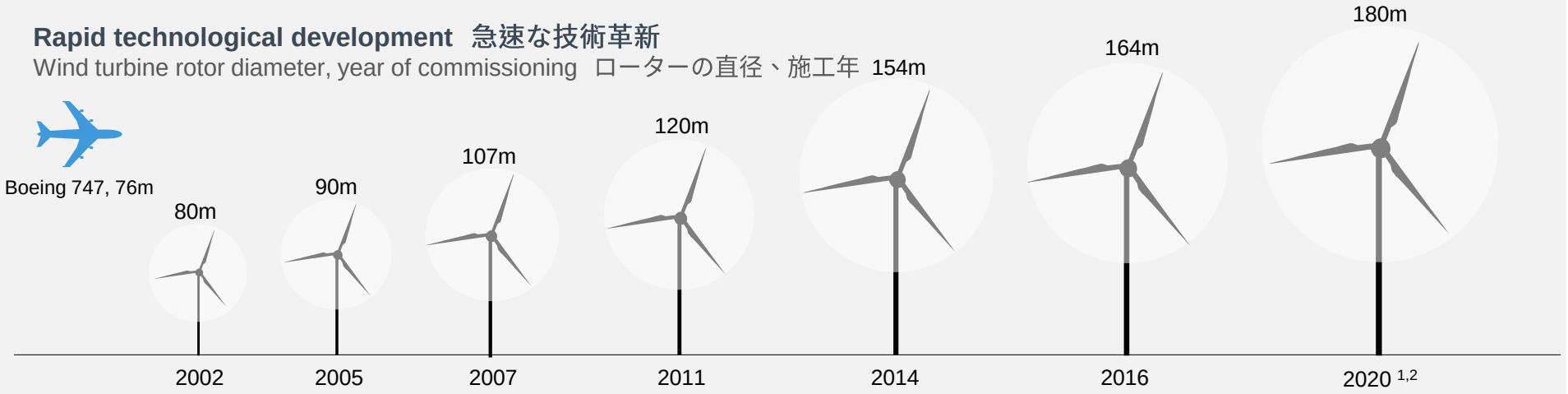
3 Industrialisation 産業化

- Transition from single supply to multiple global suppliers
  サプライヤーの多様化とグローバル化

✓

Rapid technological development 急速な技術革新

Wind turbine rotor diameter, year of commissioning ローターの直径、施工年



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.
2. 現時点では商業化されているローター直径180mの風車はありませんが、2020年までに施工可能としている風車メーカーがあります。

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Ørsted's scale enables synergies
相乗効果をもたらすオーステッドの規模

1. **UK West coast (East Irish Sea):** Barrow, Burbo Bank, Burbo Bank Extension, West of Duddon Sands, Walney 1, Walney 2, Walney Extension

   イギリス西海岸

2. **East UK North:** Westermost Rough, Lincs, Race Bank, Hornsea 1, Hornsea 2

   イギリス東海岸　北

3. **East UK South:** London Array, Gunfleet Sands 1, Gunfleet Sands 2, Gunfleet Sands 3

   イギリス東海岸　南

4. **Germany:** Borkum Riffgrund 1, Borkum Riffgrund 2, Gode Wind 1, Gode Wind 2

   ドイツ

5. **Danish waters:** Middelgrunden, Nysted, Horns Rev 2, Anholt

   デンマーク海域

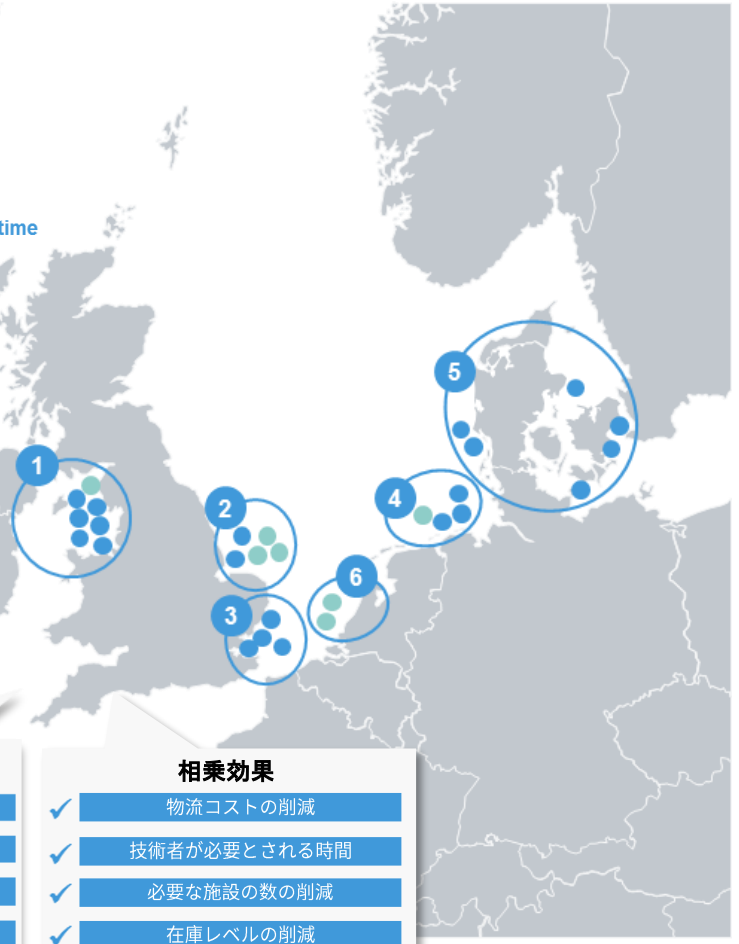
6. **Dutch waters**: Borssele 1 & 2

   オランダ海域

Higher accessibility
アクセスの向上

Minimizing non-productive time
非生産時間の低減

Lean setup through shared infrastructure
インフラの共有による効率高い設定



Synergies	相乗効果
✓ Lower logistics costs	✓ 物流コストの削減
✓ Fewer technician hours	✓ 技術者が必要とされる時間
✓ Fewer facilities needed	✓ 必要な施設の数の削減
✓ Lower inventory levels	✓ 在庫レベルの削減

- Operational offshore wind farms 運転中の洋上風力ファーム
- Offshore wind farms under construction 建設中の洋上風力ファーム
- Cluster クラスター

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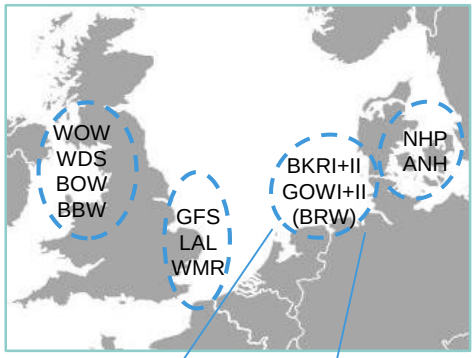
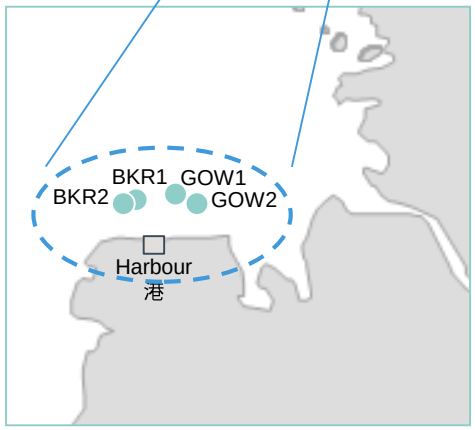
Building of operations of individual wind farms into operation of one cluster brings several O&M cost reduction potentials
個別プロジェクトとしての対応からクラスター（群れ）での対応がO&Mのコスト削減を実現

Cluster areas クラスター地域





Cluster potentials クラスターの潜在能力

Description 説明

Logistics ロジスティクス

- Share crew logistics across sites
  技術者派遣のロジを共有
- Reduce standby capacity for unscheduled service
  不定期保守の為の待機時間の削減

Technicians 技術者

- Share technicians across sites
  技術者を共有
- Reduce standby capacity for unscheduled service
  不定期保守の為の待機時間の削減

Facilities 施設

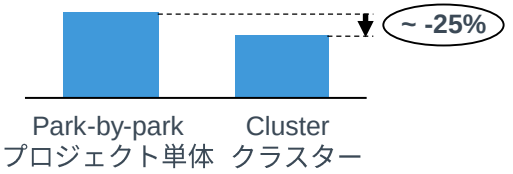
- Share on-site facilities* between asset projects operating at same harbour
  同じ港を拠点とするプロジェクト間での設備の供給
- Reduce site administration
  管理業務の削減

Inventories 在庫

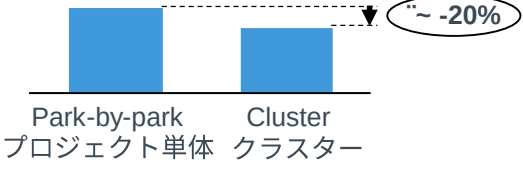
- Share spare part stock across asset projects
  プロジェクト間のスペアのストックを共有
- Reduce capital cost due to reduced stock
  在庫を少なくすることによ資本コストの削減

Potential savings 潜在的削減

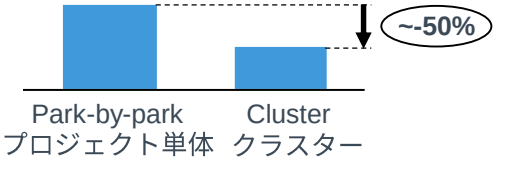
CTV アクセス船の数



technicians (total avg. lifetime)
技術者の数



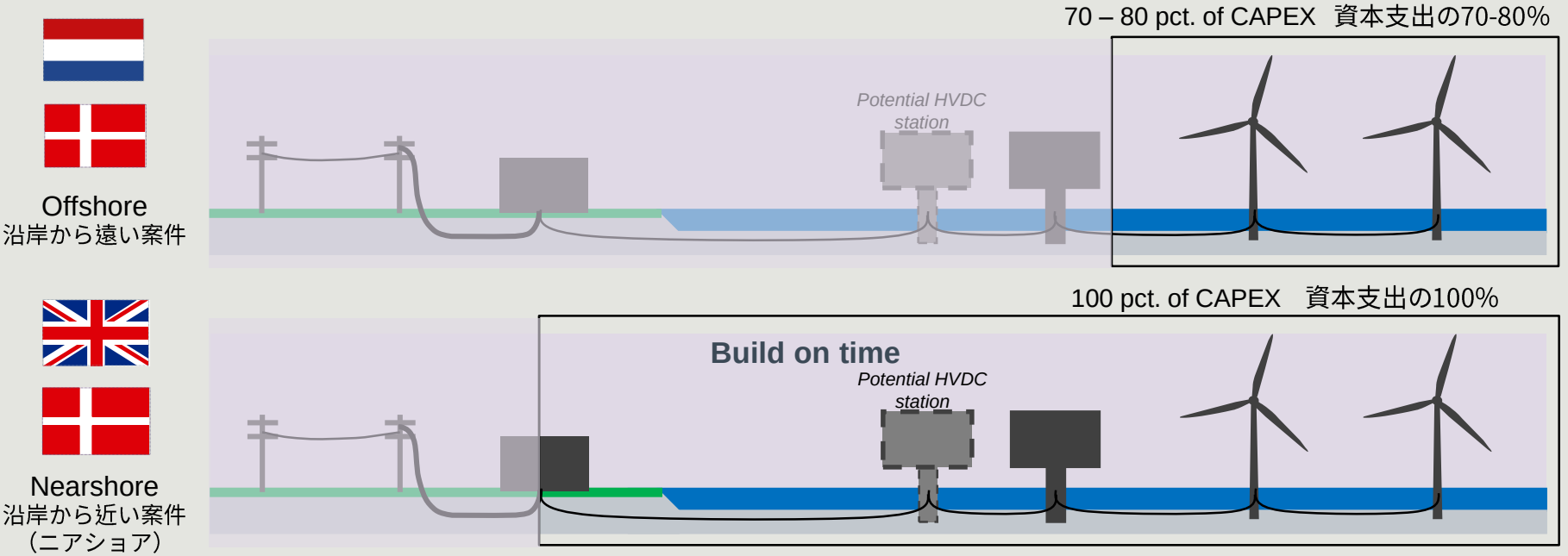
facilities 設備の数



gearboxes on stock**
ギアボックスのストック

* Facilities potentially to be enlarged 施設の拡大の可能性あり
** Same service level assumed 同等のサービスレベルを想定
Source Orsted, MD&AM BD analysis

Highest possible cost reduction & build-on-time achieved when full value chain competes and has efficiency pressure
バリューチェーン全体が競争下に置かれることにより最大限のコスト削減とオンタイムの建設が可能となる

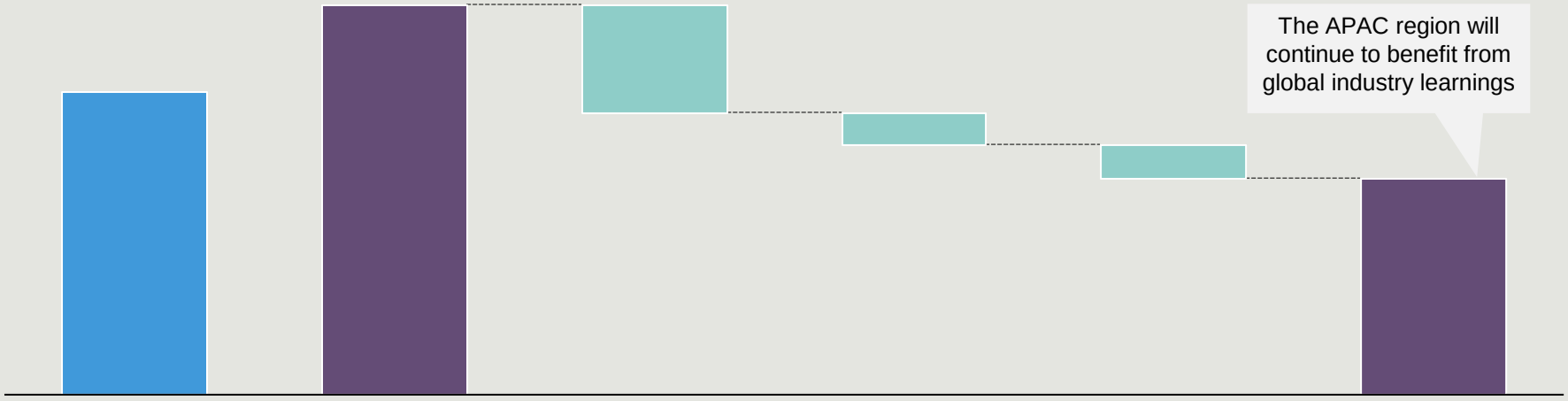


Socioeconomic rationale for Japanese offshore wind developers to build, own and operate transmission assets
陸上の変電所までの接続ケーブルを開発事業者が建設・所有・運営すべき社会経済な根拠

- Incentivises cost efficiency of transmission deployment and completion on time and budget; it furthermore promotes competent operation and ownership of transmission assets as wind farm developer shoulder risk of grid outage
  接続部分のコスト削減と施工時間短縮よりもたらすメリット、及び適切な所有・運営により電力出力のリスクを低減
- Including transmission asset in OSW business case also incentivises selection of socioeconomic rational sites, ensuring competitive pressure on transmission design
  陸上の変電所までの接続ケーブルを経済性評価に含めることにより、電気系統接続部分のデザインにおいても最適化が行われ、立地検討にも役立つ

Japan will benefit from the European industry's maturation but will not be fully converged on cost from the outset
日本は成熟したヨーロッパの洋上風力産業からの恩恵を確実に受ける 但しコストダウンの浸透には時間が必要

Key levers to bring down cost of offshore wind in Asia Pacific to European levels (illustrative)
アジア太平洋地域でのコストをヨーロッパ標準に低減する為の主要方策（概念図）



- **Initial Japanese projects are likely to cost more than European projects as the industry and supply chain needs to develop in the region**
  地域においてのサプライチェーンが構築される前の、初期段階での日本でのプロジェクトはヨーロッパの水準より高くなります
- **The speed of convergence will depend on stability of the regulatory framework and volume ambition**
  コスト削減のスピードは法規制の安定性、及び導入目標などによります

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Q&A
質疑応答