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# Capital Markets Day 2018

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# Agenda

| Time | Agenda | | Speaker | Page |
|---|---|---|---|---|
| **09:00-09:05** | Welcome | | | |
| **09:05-10:10** | Update on Strategy & Capital Allocation | | Henrik Poulsen | 5 |
| **10:10-10:35** | US Acquisition – Deepwater Wind | | Thomas Brostrøm & Jeff Grybowski | 29 |
| **10:35-11:00** | US Acquisition – Lincoln Clean Energy | | Ole Kjems Sørensen & Declan Flanagan | 41 |
| **11:10-15:00** | **Breakout sessions - 40 minutes each, with a 10-minute break in between** | | | |
| | Global Offshore Wind Markets | Breakout room | Martin Neubert & Thyge Boserup | 57 |
| | Offshore : EPC Excellence | Breakout room | Anders Lindberg | 75 |
| **12:40-13:30** | **Lunch** | | | |
| | Offshore : O&M Excellence | Breakout room | Mark Porter | 93 |
| | Customer Solutions | Breakout room | Morten Hultberg Buchgreitz | 107 |
| **15:10-16:00** | Financials | | Marianne Wiinholt | 123 |
| **16:00-16:30** | Wrap-up and final Q&A | | Henrik Poulsen and the Executive Committee | 145 |

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# Update on Strategy & Capital Allocation

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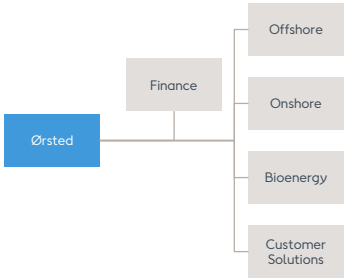
Capital Markets Day
28 November 2018




## Henrik Poulsen

## CEO and President

Born: 1967

Education: M.Sc., Finance and Accounting, Aarhus School of Business, Denmark, 1994

| | |
|---|---|
| **2012 –** | **Ørsted A/S**<br>CEO and President |
| **2008 – 2012** | **TDC A/S**<br>CEO and President |
| **2006 – 2008** | **KKR Capstone, London**<br>Operating Partner |
| **1999 – 2006** | **LEGO**<br>Executive Vice President, Markets and Products (2005-06)<br>Regional Managing Director, Europe and Asia (2004-05)<br>Senior Vice President, Global Innovation and Marketing (2002-03)<br>Senior Vice President, Global Segment 8+ (2000-02)<br>Vice President, Business Development (1999-2000) |
| **1996 – 1999** | **McKinsey & Co**<br>Senior Engagement Manager |


Love your home

# Let’s create a world that runs entirely on green energy

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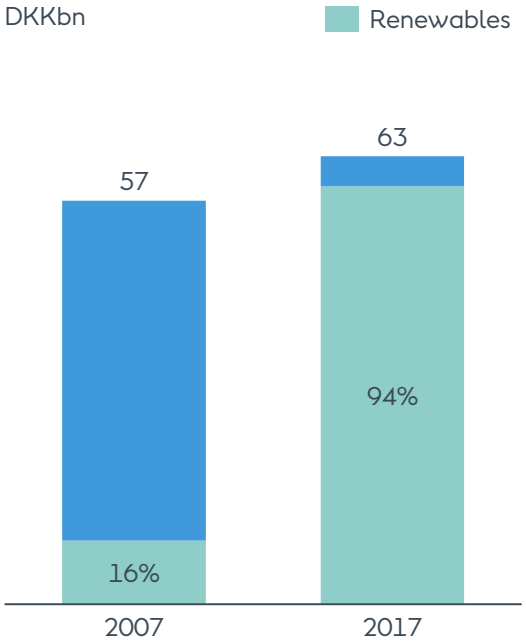
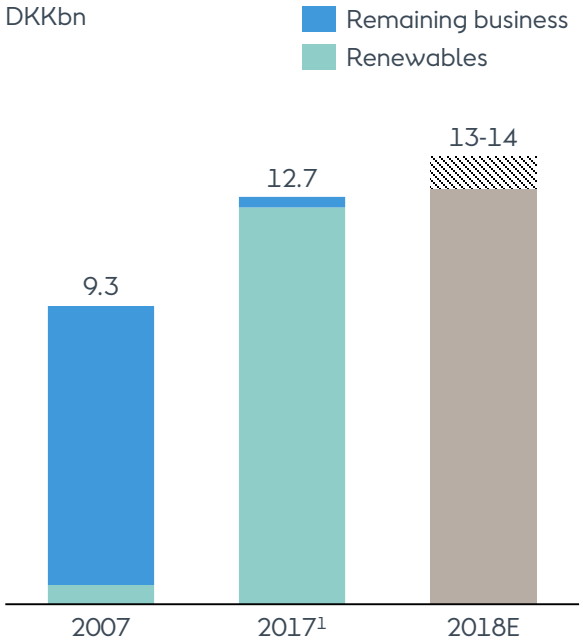
# We have transformed Ørsted to a green energy company

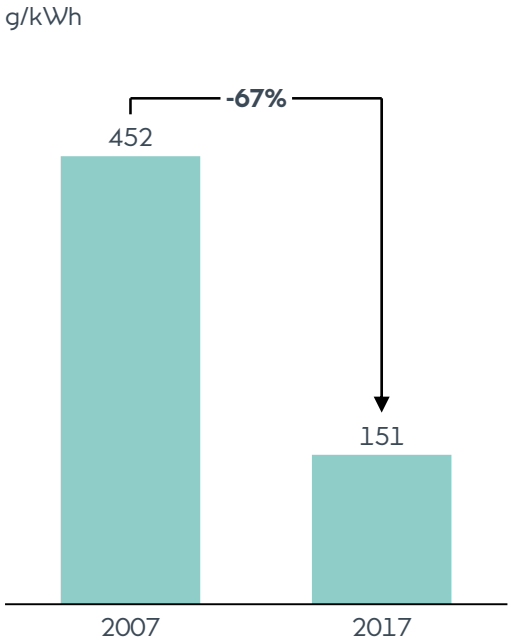
## Capital employed




## Operating profit (EBITDA)




## CO2-emissions






1. Excludes Distribution and B2C businesses, currently being divested and EBITDA contribution from new partnerships

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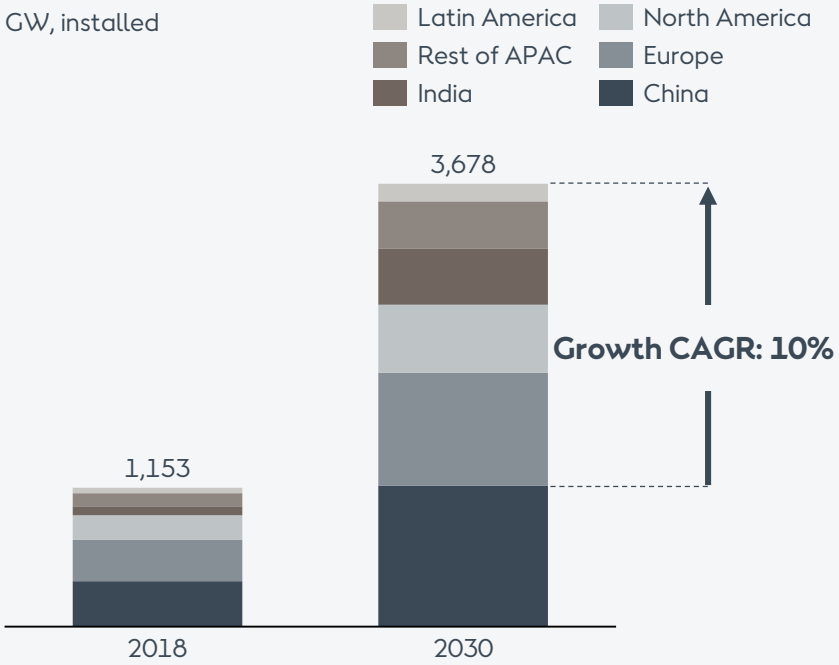
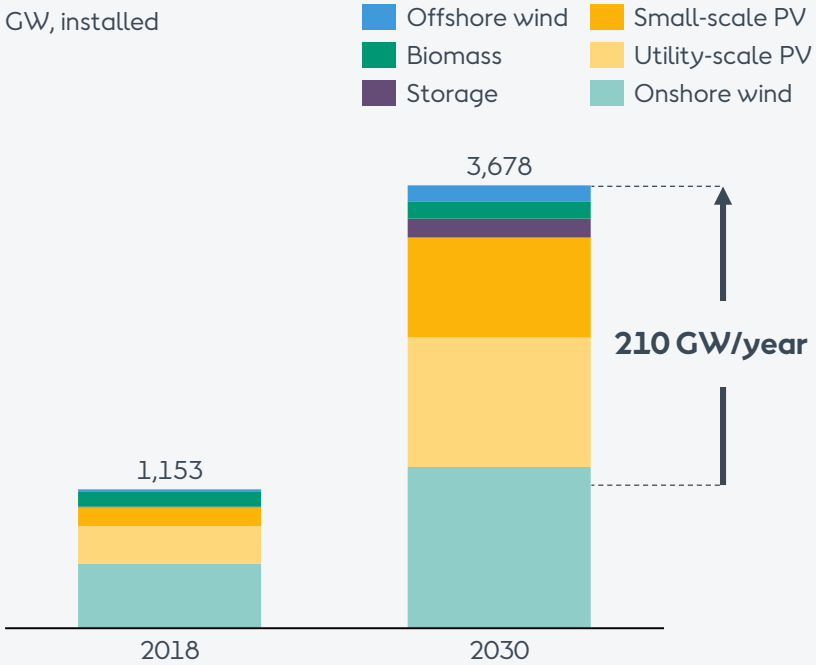
# Vision opens up a massive market opportunity in renewable energy

## Global renewable capacity by geography




## Global renewables capacity by technology






Source: BNEF New Energy Outlook 2018, BNEF 1H 2018 offshore wind market outlook (for offshore wind capacity). US includes the latest BNEF US offshore wind forecast from September 2018 as well as Middle East and Africa
Note: Excludes 'Other' (solar thermal and geothermal) accounting for less than 2%

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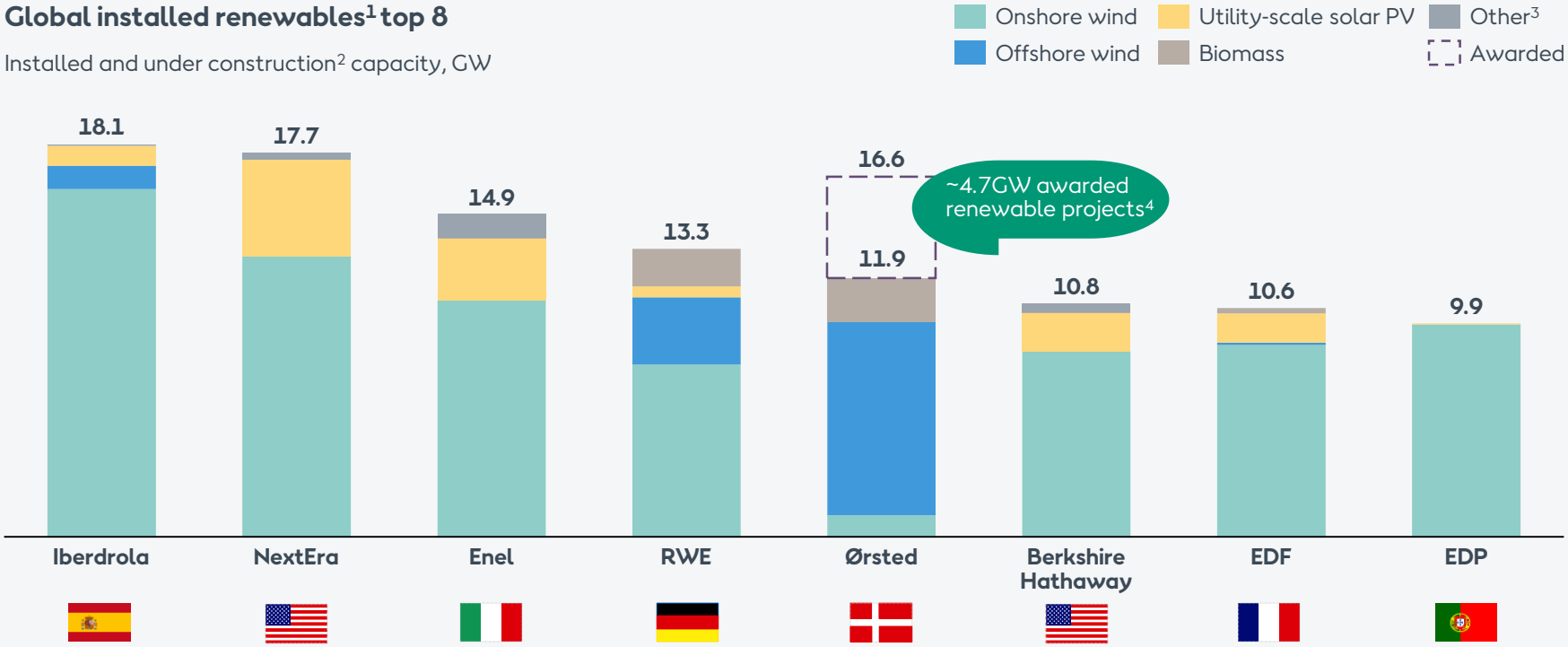
# Ørsted is strongly positioned to tap into long-term growth

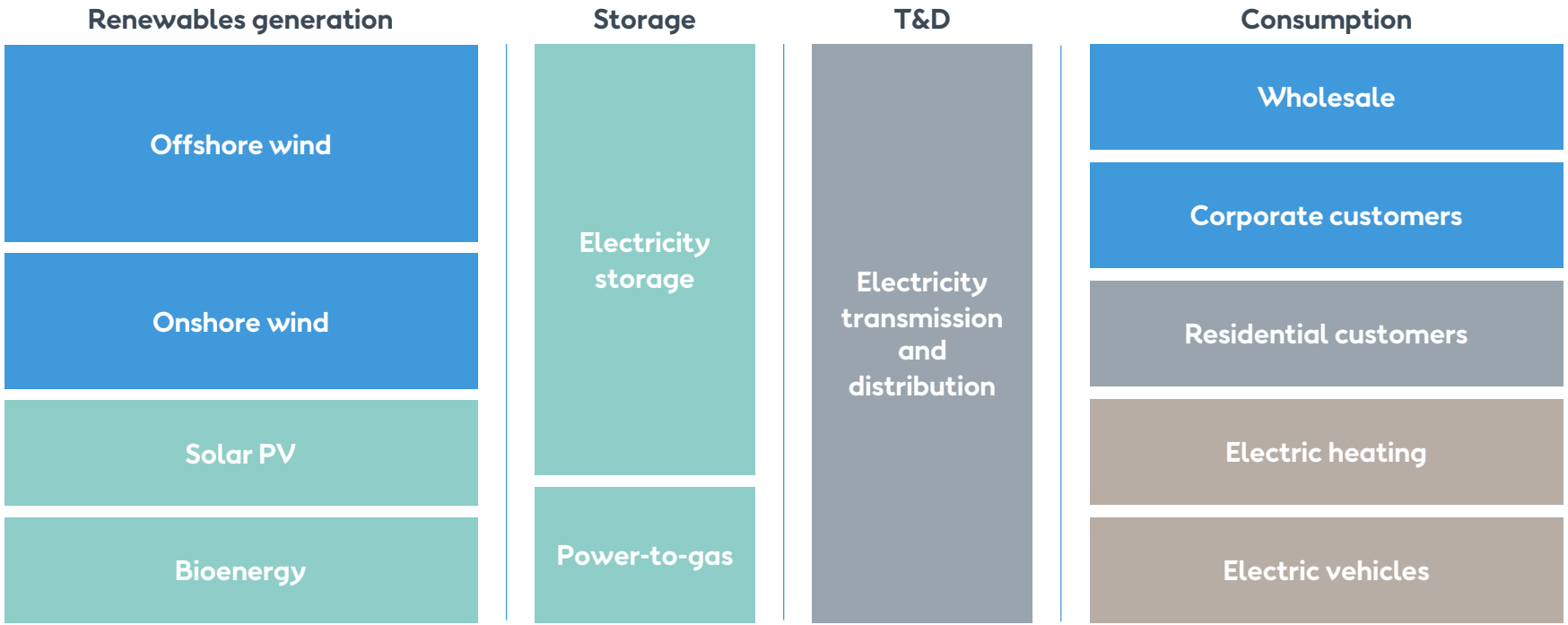
## Global installed renewables[1] top 8

Installed and under construction[2] capacity, GW




Note: Excludes Chinese players. Ørsted capacity based on constructed capacity; Source: BNEF Energy Asset Database as of November 20, 2018.
1. Includes onshore wind, offshore wind, solar PV, solar CSP, biomass, geothermal and marine generation
2. Includes projects defined as 'Under construction' and 'Finance secured'. Capacity allocation based on the ownership stake that the organisation holds (where ownership stakes are not disclosed, credit is pro-rated equally amongst all owners); 3. Includes geothermal and wave energy; 4. Includes offshore wind projects Changhua 1&2a, Changhua 2b&4, German Cluster 1, Gode Wind 3&4, Skipjack, Southfork, Revolution Wind, and onshore wind projects Sage Draw, Plum Creek, and solar PV project Permian Solar

# Ørsted's strategic playing field



# Portfolio changes support main focus on renewables generation

## Entering Ørsted portfolio

### Lincoln Clean Energy

– Transaction closed

### Deepwater Wind

– Transaction closed

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Offshore

Onshore

Bioenergy

Customer Solutions

## Exiting Ørsted portfolio

### Distribution and B2C Customer businesses

– Transaction expected signed in H1 2019

### Oil and gas pipeline infrastructure

– Transactions expected signed in 2019



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# Strategic growth platform

| | Europe | Americas | Asia | Estimated CAPEX allocation 2019-2025 |
|---|---|---|---|---|
| **Offshore**<br>– Wind<br>– Transmission<br>– Storage | **Global leader in offshore wind**<br>– Strategic core<br>– Growth and value creation<br>– Scale<br>– Keep pioneering and innovating | | | 75-85% |
| **Onshore**<br>– Wind<br>– Solar PV<br>– Storage | ? | **Leading US renewable company**<br>– Strategic diversification<br>– Scale<br>– Technology integration<br>– New value-creating growth platform | | 15-20% |
| **Bioenergy**<br>– Biomass<br>– Renescience<br>– Biogas | – Explore growth and value creation potential of Bioenergy | | | 0-5% |
| **Customer Solutions** | – Route-to-market for Ørsted product portfolio<br>– Risk management<br>– Incremental value creation | | | |



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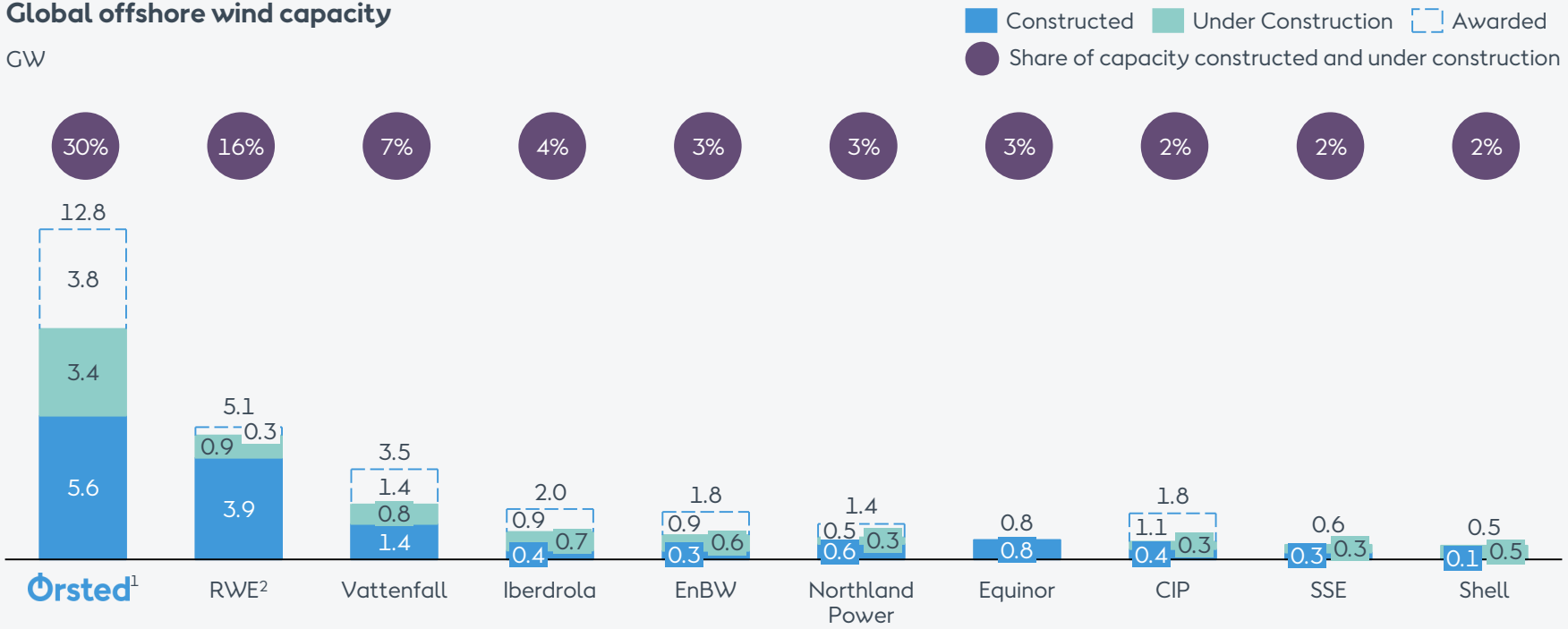
# Ørsted remains uniquely positioned in offshore wind

## Global offshore wind capacity

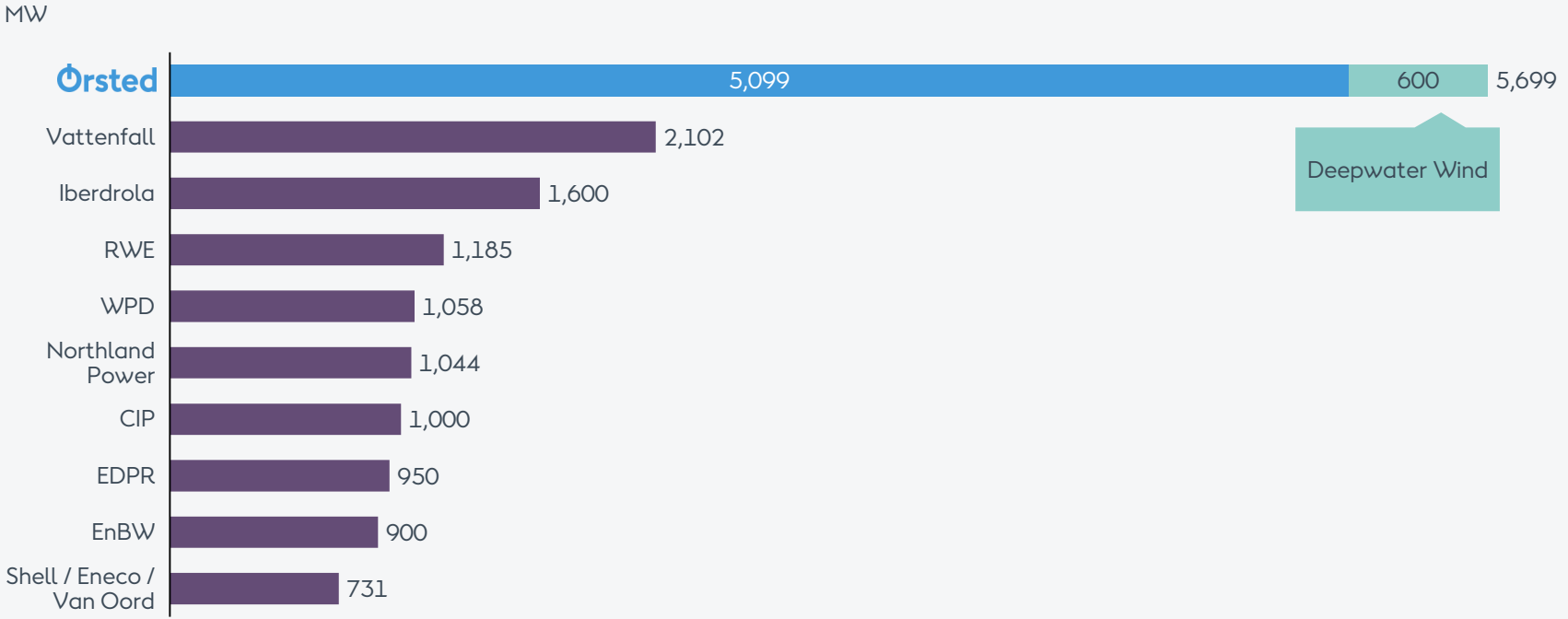
GW




Note: Awarded includes project capacity secured through auctions and beauty contests since 2015, where FID has not yet been taken
1. Includes Deepwater Wind
2. RWE capacity based on combined Innogy and E.ON offshore wind portfolio

# Ørsted's competitive position in offshore wind has proven its resilience

**Offshore wind capacity secured in competitive processes since 2015**



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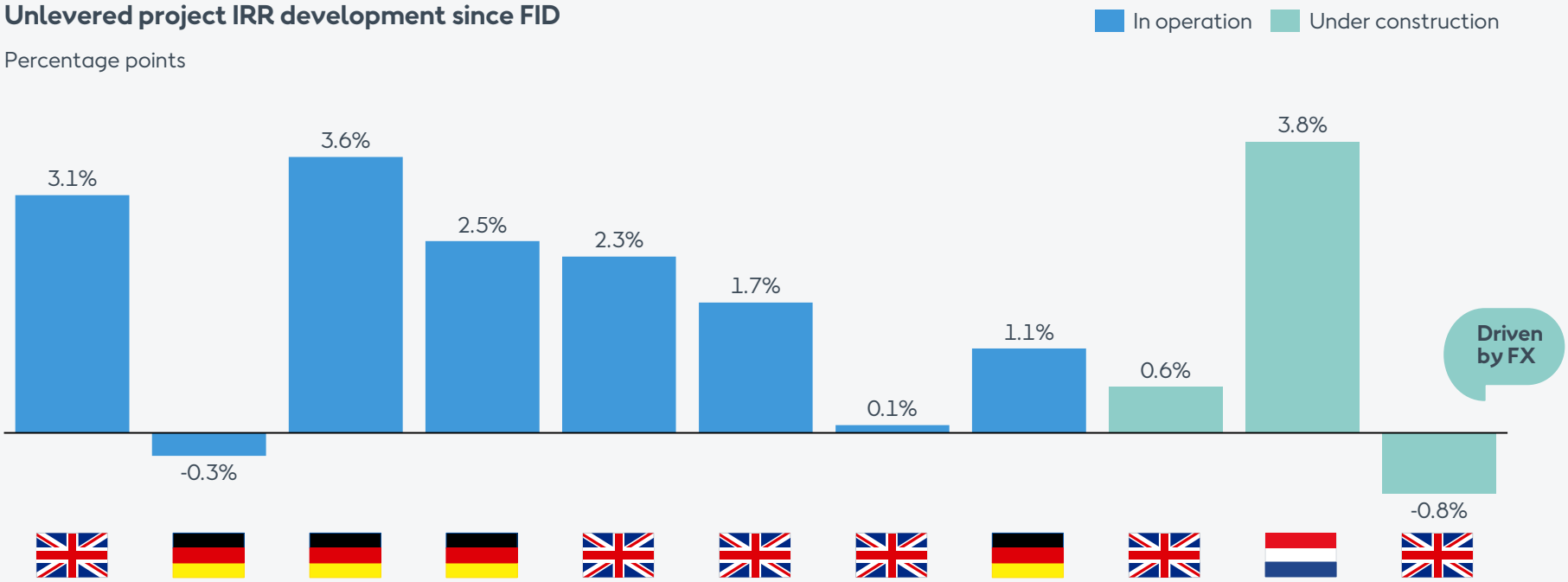
# Strong execution track-record in offshore wind

## Unlevered project IRR development since FID

Percentage points

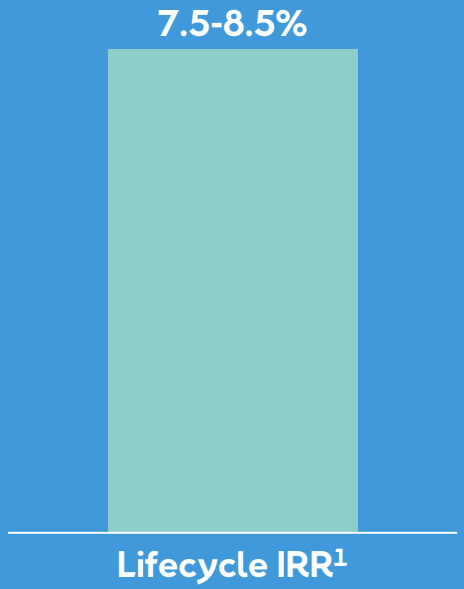


# Significant value creation from offshore wind projects secured in competitive processes

## Wind farms secured in competitive processes

- Borssele 1&2
- Hornsea 2
- German Cluster 1
- Gode Wind 3&4
- Greater Changhua 1&2a
- Greater Changhua 2b&4
- Revolution Wind

## Average unlevered lifecycle IRR on wind farms secured in competitive processes




Lifecycle IRR includes:

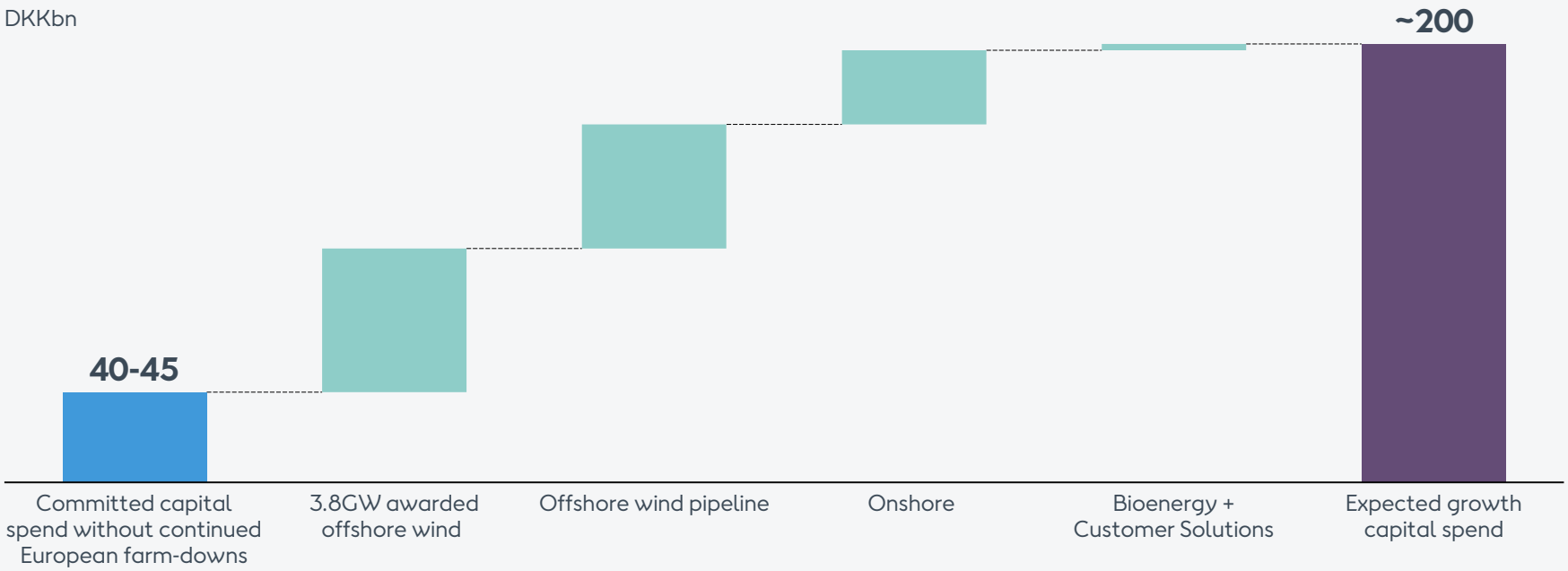
- All development expenses
- Fully allocated overhead
- Deepwater purchase price allocated to projects



1. Based on capacity weighted average, current currency and market price assumptions, and on-time, on-budget construction

# Green growth investments towards 2025

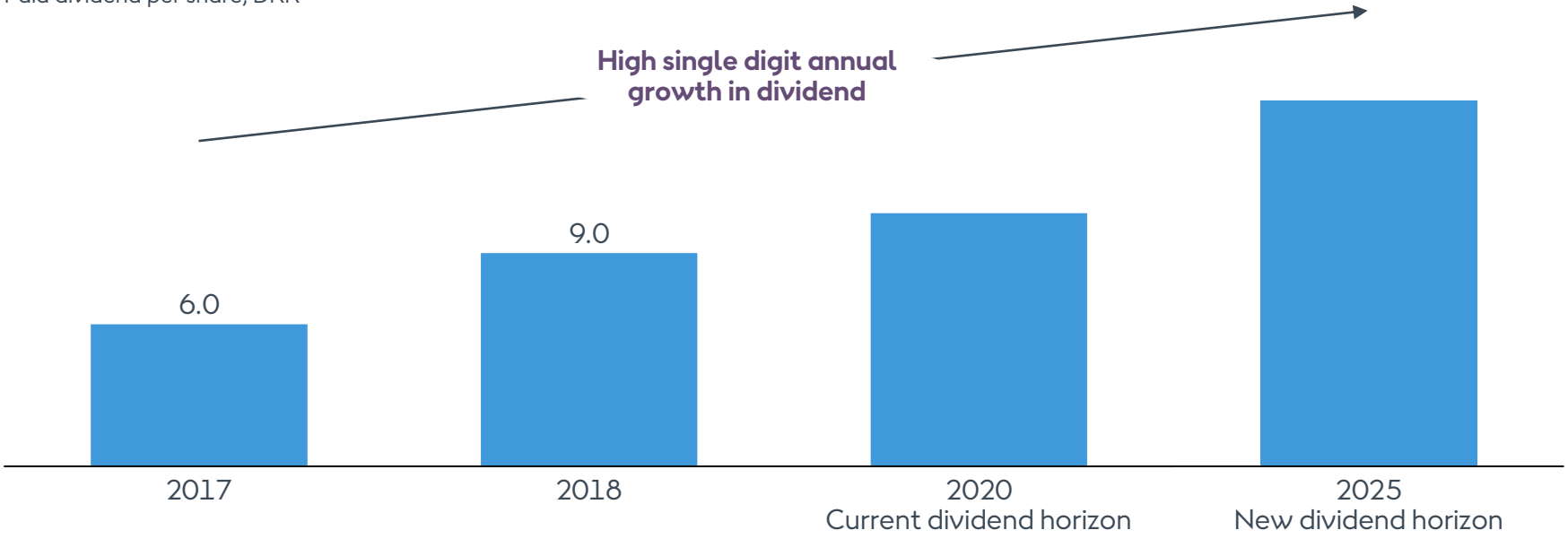
**Estimated gross investments, 2019-2025**



# We extend our commitment to shareholder remuneration

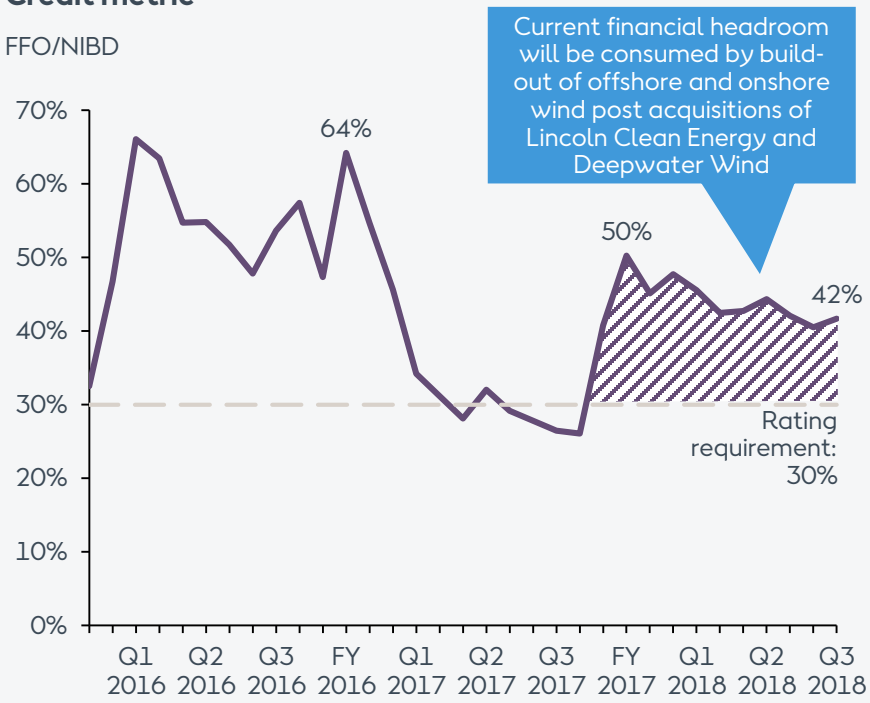
**Dividend policy**

Paid dividend per share, DKK

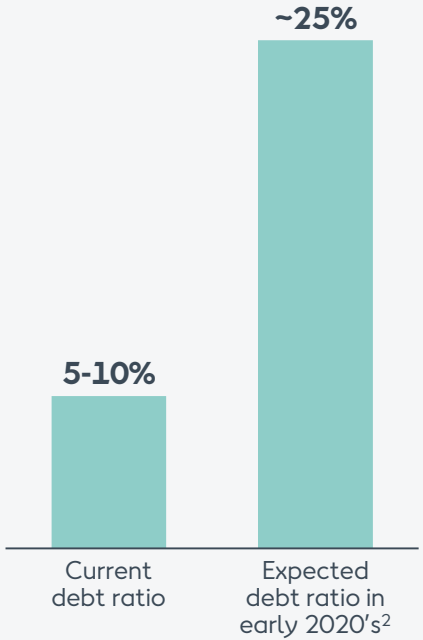


# Current financial headroom will be utilized to fuel green growth

## Credit metric




## Debt ratio[1] based on market values




## Capital allocation priorities:

- Maintain existing credit rating of BBB+/Baa1
- Honour extended dividend commitment
- Invest in value-creating green growth
- Return potential capital surplus to shareholders

1. Net debt (incl. hybrid capital) to enterprise value
2. Based on most constraining rating agency credit metric



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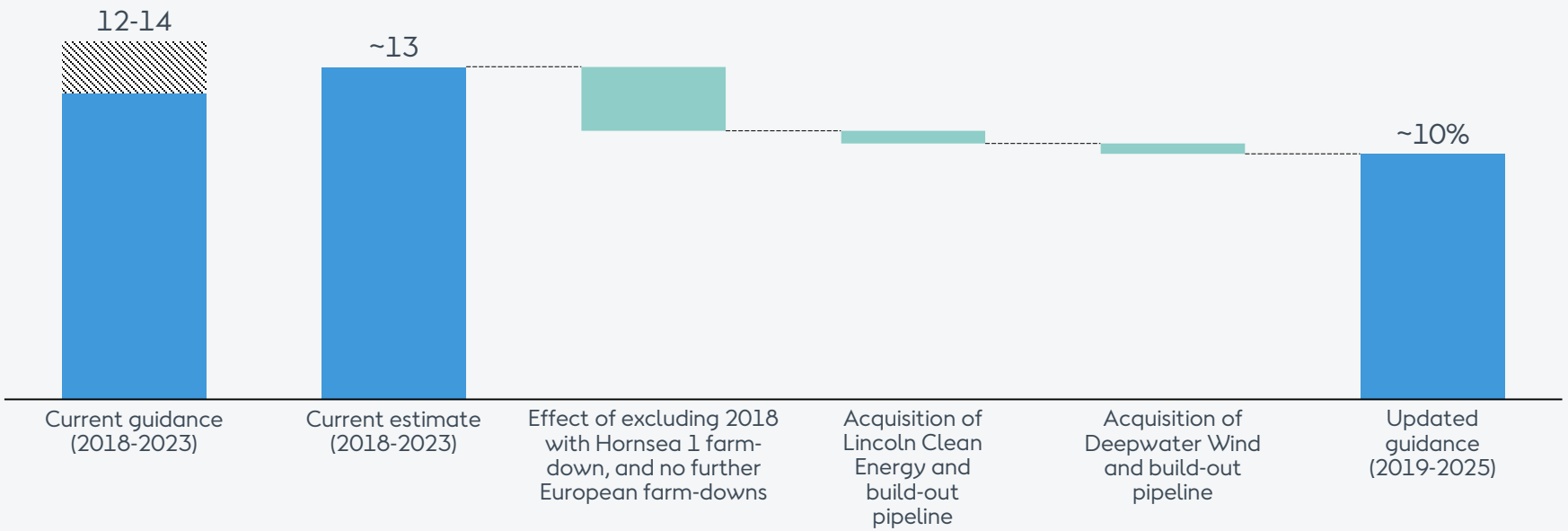
# Expected average return on capital employed of ~10% towards 2025

**ROCE**

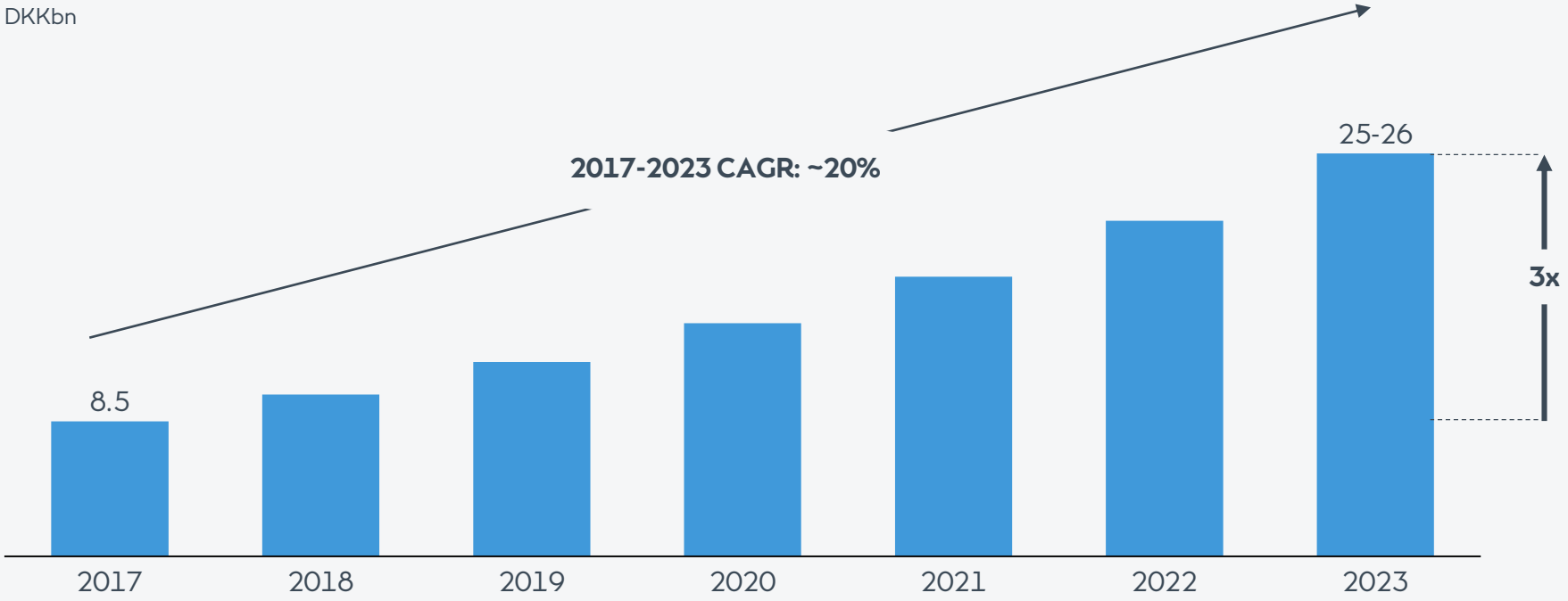
%



# Profit from operating wind farms expected to grow by an average ~20% towards 2023

**EBITDA from wind farms (offshore + onshore) in operation**

DKKbn




Note: Assumes no European farm-downs post Hornsea 1 and COD of Borssele 1&2 in Q4 2020/Q1 2021 and of Hornsea 2 in 2022.
Assumes farm-down of Changhua 1&2a. Assumes today's currency and market prices, and on-time, on-budget construction 2017-2023 based on linear 20% CAGR projection as an illustrative growth pattern. Will in reality not be linear.



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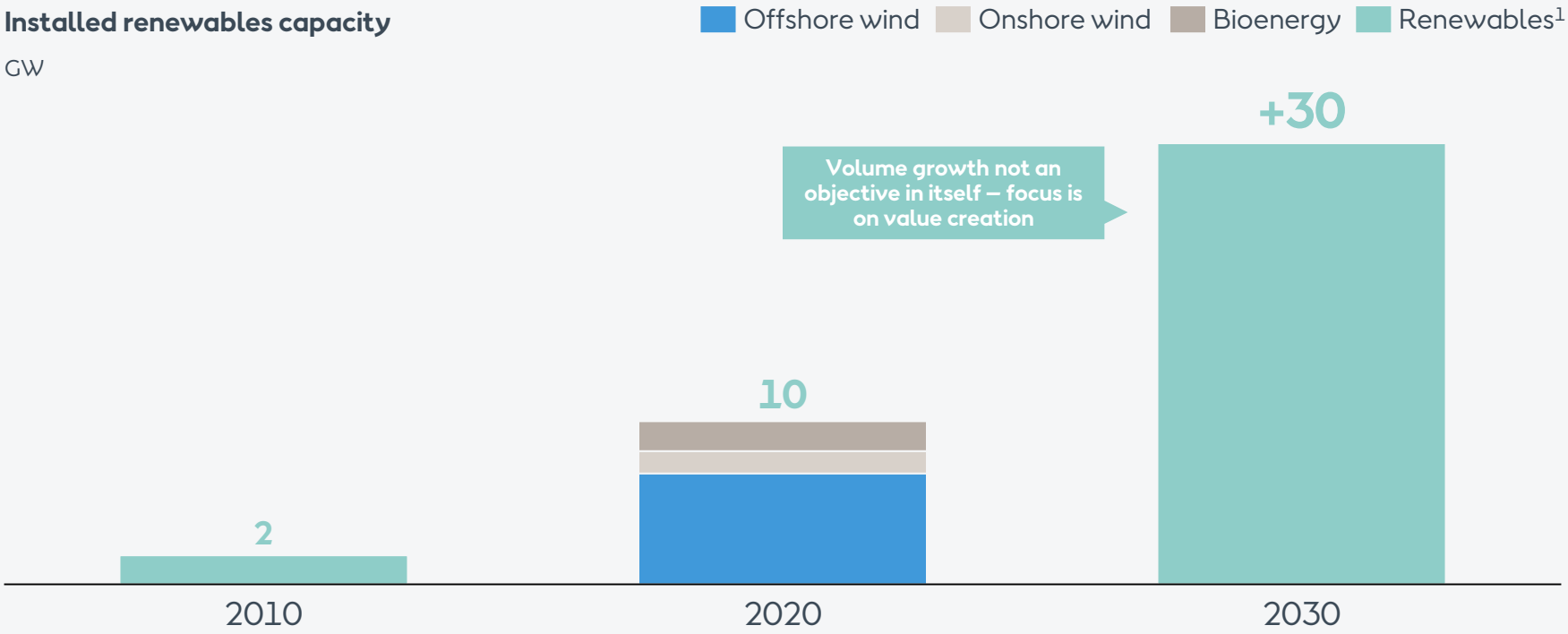
# Green growth ambition for 2030

**Installed renewables capacity**

GW






Note: 2020 includes Borssele 1&2 capacity, COD expected in Q4 2020/Q1 2021
1. Includes onshore wind, offshore wind, solar PV, storage and biomass

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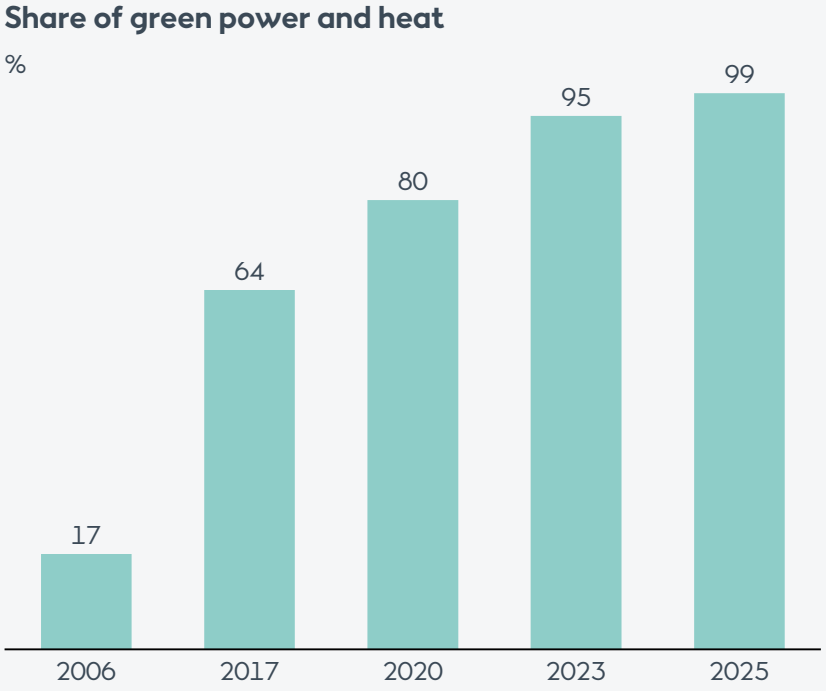
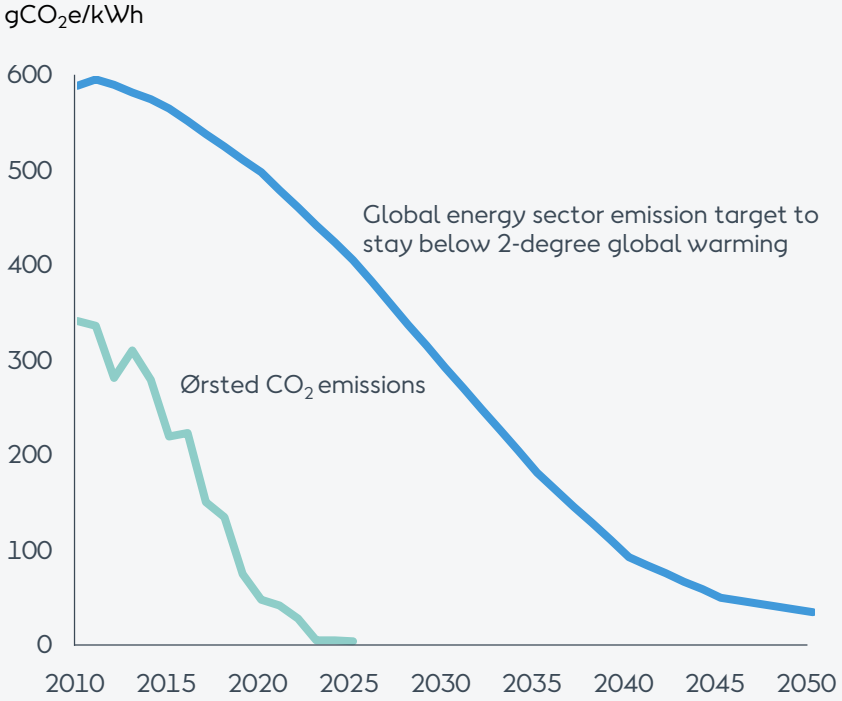
# Green share of power generation ~99% in 2025, approximating zero emissions



# New strategic estimates towards 2025

| Metric | Strategic estimates |
|---|---|
| Total CAPEX spend, 2019-2025 | DKK 200bn |
| CAPEX allocation split, 2019-2025 | |
| – Offshore | 75-85% |
| – Onshore | 15-20% |
| – Bioenergy + Customer Solutions | 0-5% |
| Average ROCE, 2019-2025 | ~10% |
| Average yearly growth in EBITDA from wind farms (offshore + onshore) in operation, 2017-2023 | ~20% |
| Share of contracted and regulated EBITDA, avg. 2019-2025 | ~90% |
| Green share of generation, 2025 | 99% |



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Purpose-driven, global, green energy leader delivering market leading returns through scale, innovation, superior execution, and financial discipline

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# 2019 key milestones

| | |
|---|---|
| **Offshore** | – Commissioning of Hornsea 1<br>– FID on Changhua 1&2a in Taiwan<br>– Outcome of NJ, NY, RI and MA solicitations<br>– Full consent for Hornsea 3 project<br>– Successful integration of Deepwater Wind |
| **Onshore** | – Successful integration of Lincoln Clean Energy<br>– Commissioning of Lockett (184MW)<br>– FID on Sage Draw (300MW) and Plum Creek (230MW)<br>– First utility scale storage solution in operation (UK)<br>– Solar PV project (Permian) |
| **Bioenergy** | – Completion of Renescience plant in Northwich<br>– Biomass-conversion of Asnæs plant<br>– FID on two new biogas plants |
| **Customer Solutions** | – Divestment of Distribution and B2C businesses<br>– First corporate offshore PPAs signed<br>– Signing of oil and gas pipeline divestments |



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# Deepwater Wind

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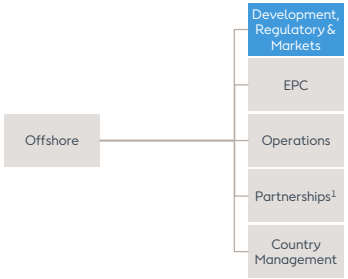
Capital Markets Day
28 November 2018




## Thomas Brostrøm

## President, Ørsted North America. CEO, Ørsted US Offshore

Born: 1979

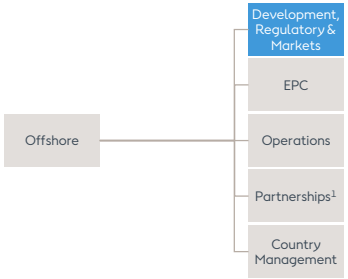
Education: M.Sc. in Finance and International Business

| | |
|---|---|
| **2015 –** | **Ørsted A/S**<br>President & CEO, Ørsted North America |
| **2014 – 2015** | **Ørsted A/S**<br>Director, Markets and Pipeline |
| **2012 – 2014** | **Ørsted A/S**<br>Senior Manager, Head of Project Development UK |
| **2009 – 2012** | **Ørsted A/S**<br>Various senior positions, Head of Renewables Strategy and Performance, Business Developer and M&A |
| **2007 – 2009** | **Straumur Investment Bank**<br>Associate |
| **2005 – 2007** | **COWI and Bank Invest / NorthCap Partners** |

Board member American Wind Energy Association (2017 – Now)
Former Board Member RenewableUK (2013 – 2015)



1. Partnerships & Structured Solutions, Revenue and Asset Management




## Jeffrey Grybowski

## Co-CEO, Ørsted US Offshore

Born: 1971

Education: J.D. in Law

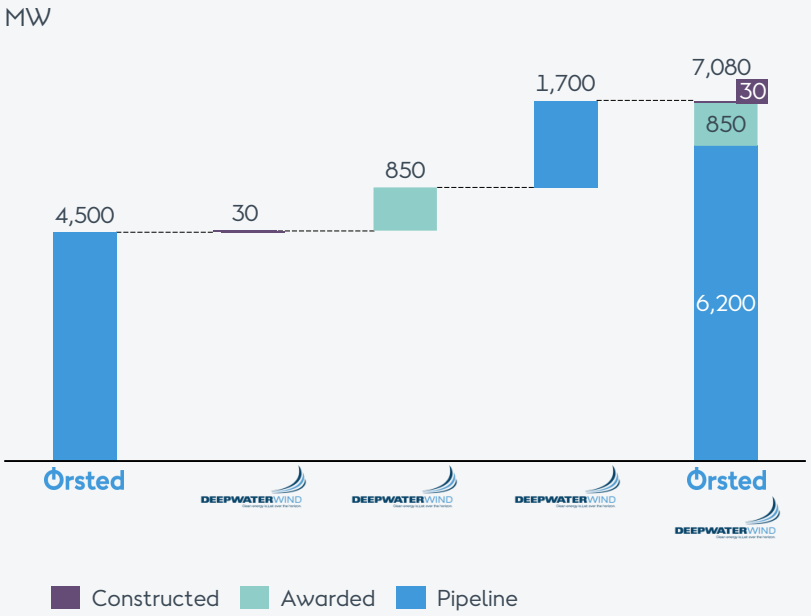
| | |
|---|---|
| **2018 –** | **Ørsted A/S**<br>Co-CEO, Ørsted North America |
| **2012 – 2018** | **Deepwater Wind**<br>CEO |
| **2010 – 2012** | **Deepwater Wind**<br>Chief Administrative Officer and Senior Vice President, Strategy and External Affairs |
| **2007 – 2010** | **Hinckley, Allen & Snyder LLP**<br>Partner |
| **2003 – 2007** | **Office of the Governor, State of Rhode Island**<br>Chief of Staff |
| **2001 – 2003** | **Hinckley, Allen & Snyder LLP**<br>Associate |
| **1998 – 2001** | **Sullivan & Cromwell LLP and the United states District Court for the District of Rhode Island** |



1. Partnerships & Structured Solutions, Revenue and Asset Management

# The integration of Deepwater Wind creates the leading US offshore wind platform

## Net capacity of US projects




### Portfolio

– One 30MW project in operation, three projects with 850MW PPA's secured and 1,700MW net development pipeline

### Pioneer

– Permitting and operational experience from first US offshore wind farm

– Secured best lease areas along Eastern seaboard with proximity to shore and grid connection

### Organisation

– Strong complementary fit merging leading local development skills with Ørsted's global execution capabilities



Source: Bloomberg New Energy Finance (BNEF), Bureau of Ocean Energy Management (BOEM)

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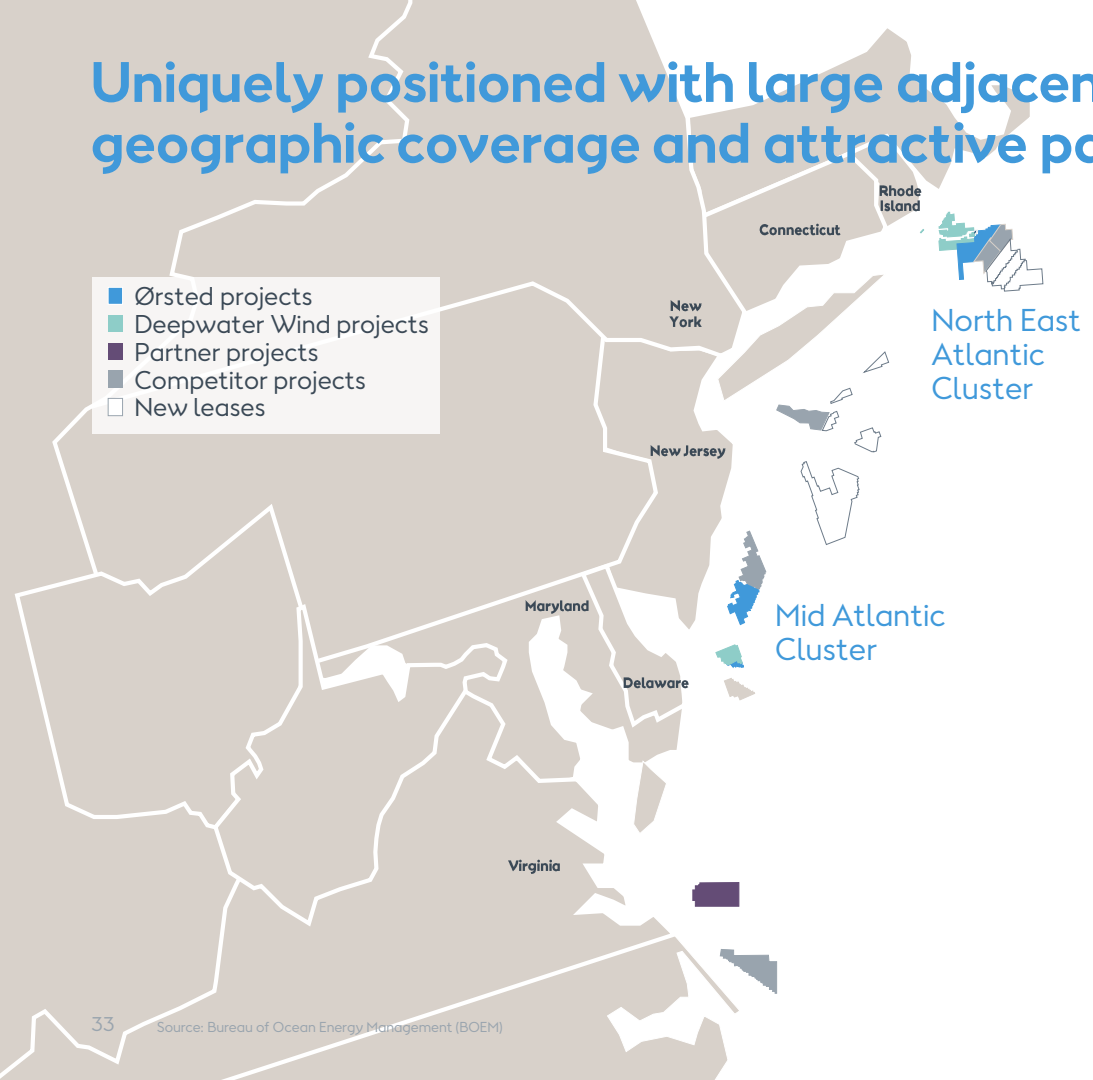
# Uniquely positioned with large adjacent projects, comprehensive geographic coverage and attractive partners




**Scale**
Large scale cluster projects in the North East (MA, CT, RI, NY) and Mid Atlantic (NJ, DE, MD)

**Site proximity**
Adjacent sites allow for significant synergy potential

**Geographic coverage**
Most comprehensive geographic coverage with opportunity to bid into all states from MA to VA

**Attractive partners**
JV's with leading utilities in New England (Eversource) and New Jersey (PSEG) bring strong, local transmission know-how



Source: Bureau of Ocean Energy Management (BOEM)

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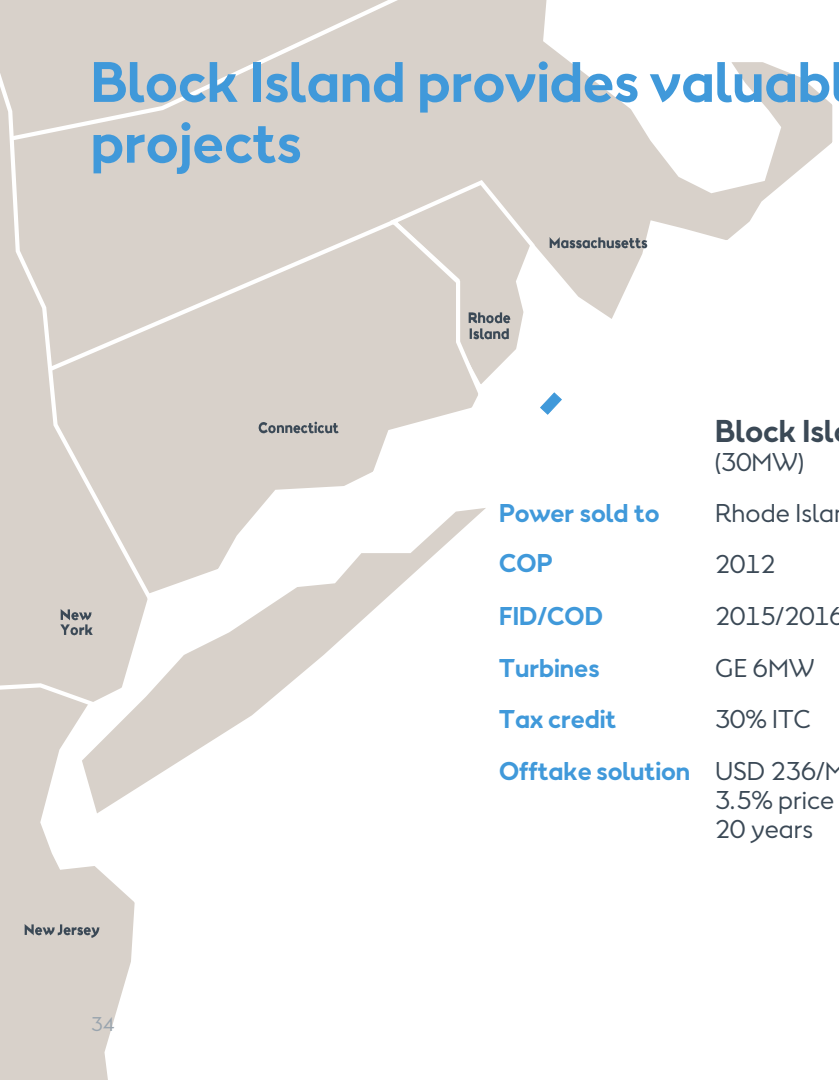
# Block Island provides valuable experience for next rounds of projects




**Block Island**
(30MW)

| | |
|---|---|
| **Power sold to** | Rhode Island |
| **COP** | 2012 |
| **FID/COD** | 2015/2016 |
| **Turbines** | GE 6MW |
| **Tax credit** | 30% ITC |
| **Offtake solution** | USD 236/MWh<br>3.5% price escalator<br>20 years |

**Tax credit**
First offshore wind project to obtain tax credit

**Federal permitting**
First offshore wind project to go through federal permitting. Significant stakeholder engagement and local knowledge required

**Local supply chain**
First offshore wind project to utilise the local supply chain



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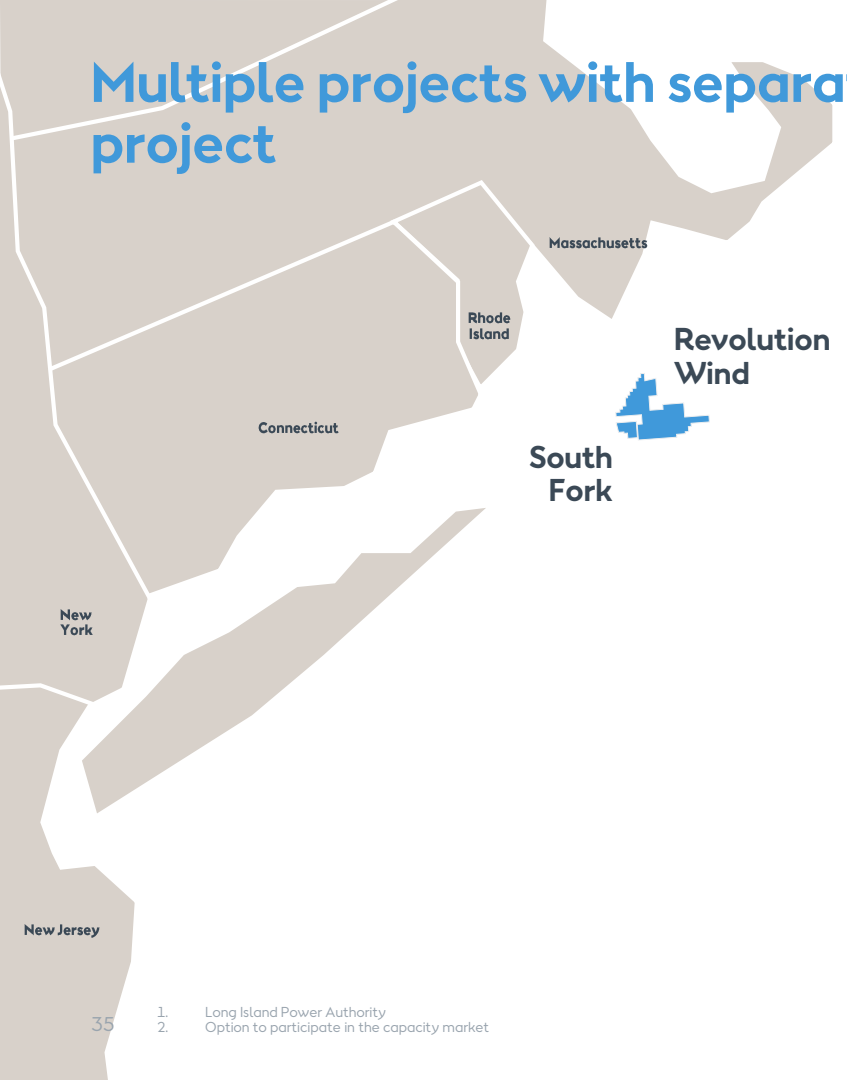
# Multiple projects with separate PPA's constructed as one 730MW project




| | South Fork (90 + 40MW) | Revolution Wind (200MW) | Revolution Wind (400MW) |
|---|---|---|---|
| **Power sold to** | New York | Connecticut | Rhode Island |
| **COP** | 2019/2020 | 2020/2021 | 2020/2021 |
| **FID/COD** | ~2020/2022 | ~2021/2023 | ~2021/2023 |
| **Turbines** | To be decided | To be decided | To be decided |
| **Tax credit** | Tax credit qualifying equipment secured | | |
| **Offtake solution** | 90 + 40MW approved by LIPA[1] | Fully negotiated subject to regulatory approval[2] | Under negotiation[2] |

1. Long Island Power Authority
2. Option to participate in the capacity market

# Well positioned for further development in Mid Atlantic


| | Coastal Virginia[1] (12MW) | Skipjack (120MW) |
|---|---|---|
| Power sold to | Virginia | Maryland |
| COP | Approval of amendment pending | 2020 |
| FID/COD | N/A / 2020 | ~Post COP-award/2022 |
| Turbines | SGRE 6MW | To be decided |
| Tax credit | N/A | To be decided |
| Offtake solution | N/A | 20-year OREC, USD 171/MWh, 1% price escalator per year |



1. Ørsted only providing EPC services for Coastal Virginia (owned by Dominion Energy)

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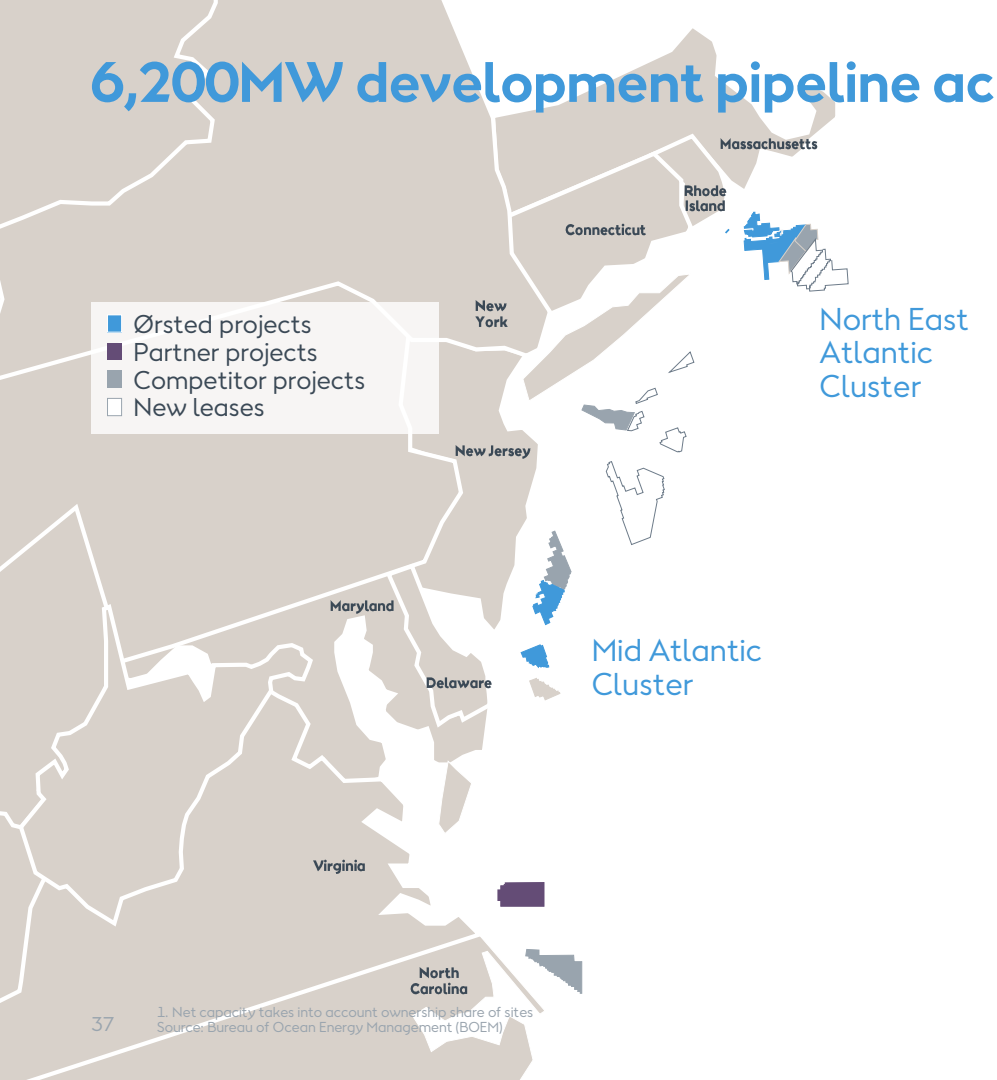
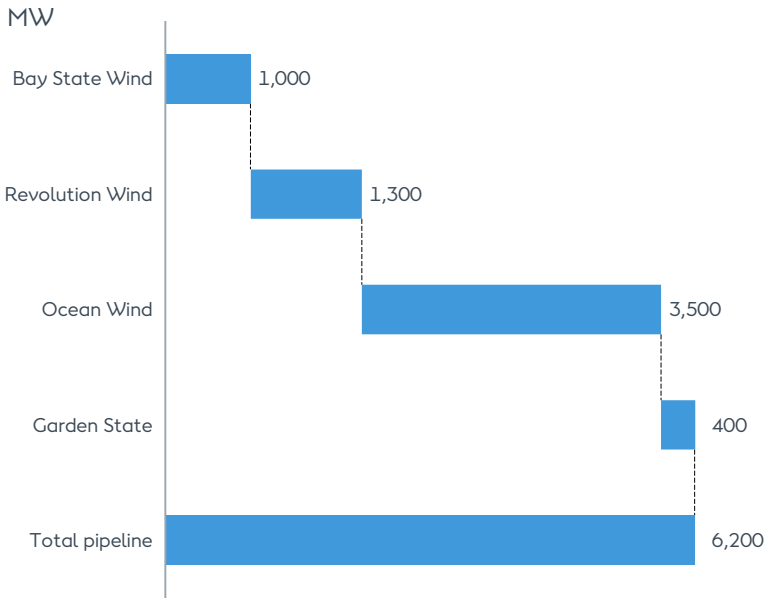
# 6,200MW development pipeline across the east coast




## Net project pipeline[1]




1. Net capacity takes into account ownership share of sites
Source: Bureau of Ocean Energy Management (BOEM)

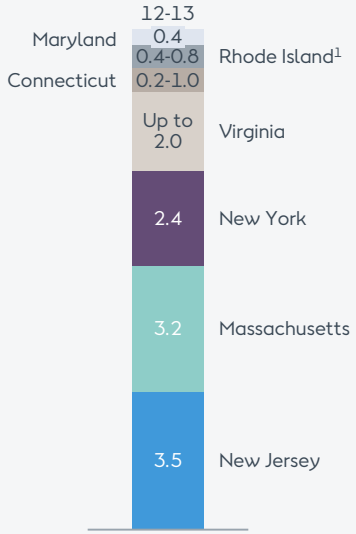


Ørsted

# Significant political ambitions and upcoming opportunities

## State targets

GW




## Upcoming opportunities

**Sep 2018[2]**
Connecticut zero-carbon solicitation ~800MW

Ørsted opportunity:
Constitution Wind[3]
Revolution Wind

**Dec 2018**
New Jersey 1st
300-1,100MW

Ørsted opportunity:
Ocean Wind
Garden State

**H1 2019**
Massachusetts 2nd offshore wind RFP
800MW

Ørsted opportunity:
Bay State Wind
Revolution Wind

**H2 2020**
New Jersey 2nd
1,200MW

Ørsted opportunity:
Ocean Wind
Garden State

**H1 2021**
Massachusetts 3rd offshore wind RFP
800MW

Ørsted opportunity:
Bay State Wind
Revolution Wind

**Oct 2018[2]**
Rhode Island zero-carbon RFP
200-400MW

Ørsted opportunity:
Revolution Wind

**Feb 2019**
New York 1st
800-1,200MW

Ørsted opportunity:
Bay State Wind
Revolution Wind

**H2 2020**
New York 2nd
800-1,200MW

Ørsted opportunity:
Bay State Wind
Revolution Wind

**H2 2022**
New Jersey 3rd
1,200MW

Ørsted opportunity:
Ocean Wind
Garden State

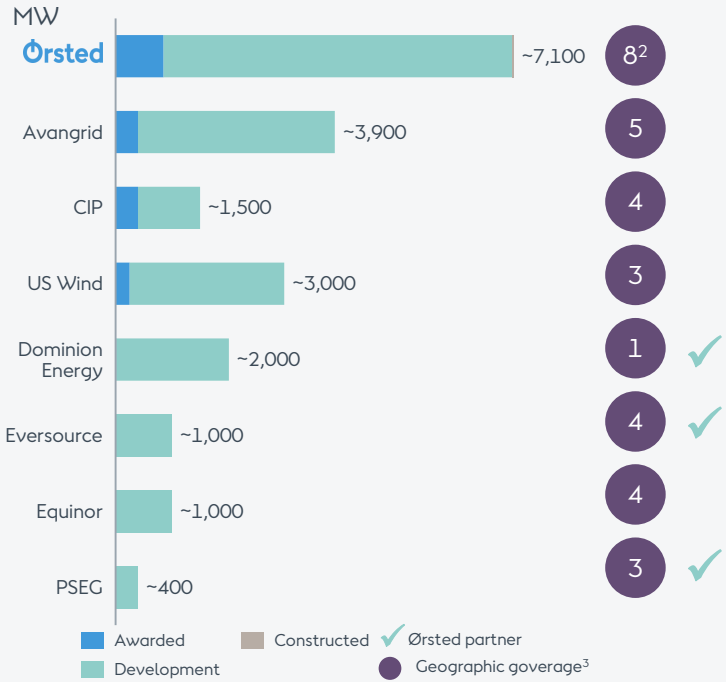
1. No official offshore wind target, but capacity already awarded or planned as auctions
2. Auction result pending
3. Part of Bay State Wind lease
Source: Source: Bloomberg New Energy Finance (BNEF), US National Renewable Energy Laboratory (NREL)



Ørsted

# Largest project pipeline, widest geographic reach and strong partnerships

## Net capacity by developer[1]




### First mover

Ørsted in a front-runner position by moving early into the US

### Attractive partners

Selecting strong local partners provides robustness and complementary fit in new markets

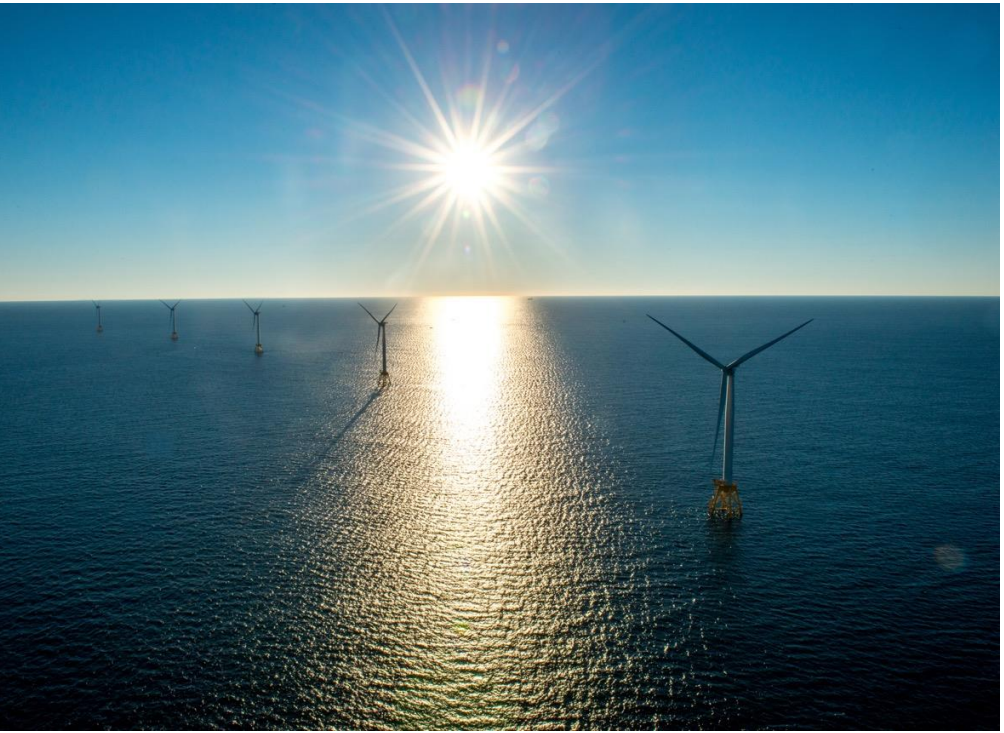
### Superior lease areas

Ørsted lease areas are superior to upcoming new leases: less conflicted areas, close to established markets and located in relatively shallow waters

1. Net capacity takes into account ownership share of sites
2. Includes Ørsted's opportunity to access Virginia from strategic partnership with Dominion Energy
3. Geographic coverage is defined by the number of States which the developer has access to via its leases

Source: Bloomberg New Energy Finance (BNEF), US National Renewable Energy Laboratory (NREL)

# The leading offshore wind developer in the US



Combined portfolio of Ørsted and Deepwater Wind creates the largest project pipeline in the US

Attractive PPA's secured with further opportunities for optimisation

Strong organisation with complementary skills

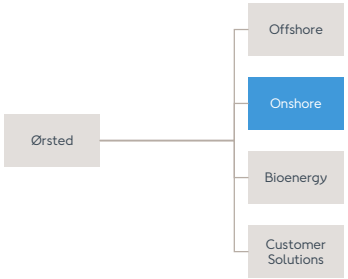


Ørsted

# Lincoln Clean Energy

Ørsted

Capital Markets Day
28 November 2018



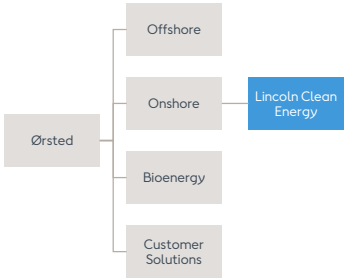

## Ole Kjems Sørensen

## Executive Vice President, Onshore and M&A

Born: 1972

Education: Master of Law, Aarhus University

| | |
|---|---|
| **2018 –** | **Ørsted A/S**<br>EVP Onshore and M&A |
| **2016 – 2018** | **Ørsted A/S**<br>Senior Vice President, Head of Partnerships, M&A & Asset Management in Wind Power |
| **2014 – 2016** | **Ørsted A/S**<br>Vice President, Head of Commercial Transactions & Market Development in Wind Power |
| **2012 – 2014** | **Ørsted A/S**<br>Vice President, Head of Partnerships and M&A in Wind Power |
| **2011 – 2012** | **Ørsted A/S**<br>Senior Director, Head of Wind Power M&A |
| **2006 – 2011** | **Ørsted A/S**<br>Senior Manager, Group M&A |
| **2004 – 2006** | **ATP**<br>Private Equity Partners, Vice President |
| **1999 – 2004** | **Gorrissen Federspiel**<br>Lawyer |




## Declan Flanagan

## CEO, Lincoln Clean Energy

Born: 1974

Education: B.Sc., National University of Ireland, M.Sc., University of Ulster and MBA, Kellogg School of Management, Northwestern University

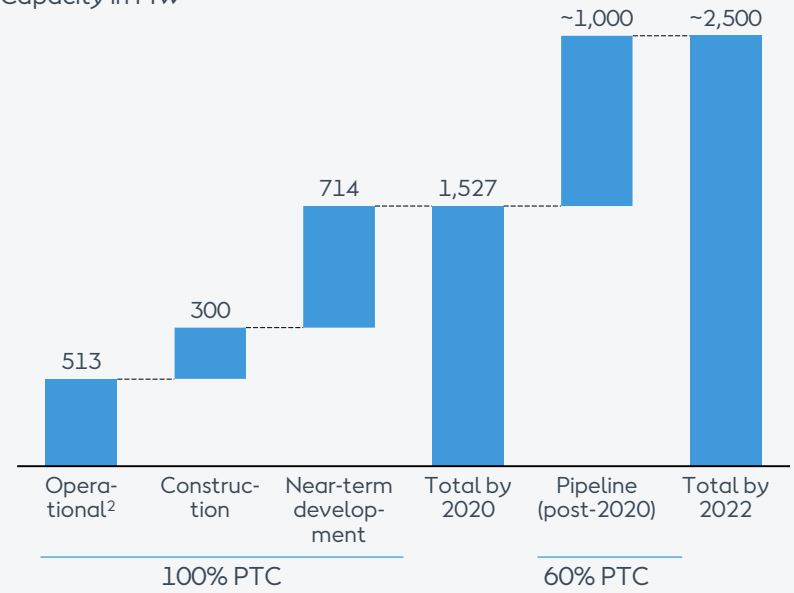
| | |
|---|---|
| **2009 –** | **Lincoln Clean Energy**<br>Founder and CEO |
| **2007 – 2009** | **E.ON Climate & Renewables North America Inc.**<br>CEO & Board member of Global Renewables Business |
| **2003 – 2007** | **Airtricity North America**<br>CEO |
| **2000 – 2003** | **Airtricity Holdings**<br>Regulation & Trading Manager |

Former member of the boards of both the American Wind Energy Association and the Solar Industry Association

# Lincoln Clean Energy at time of aquisition

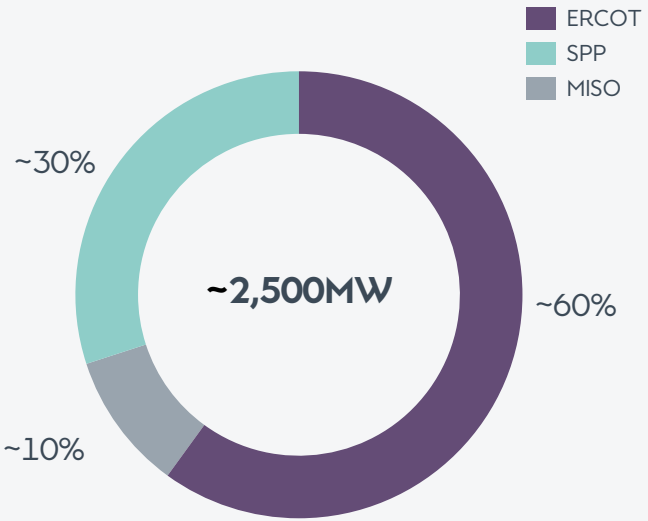
## Portfolio Overview[1]

Capacity in MW




## Geographic footprint

% split by MW[3]

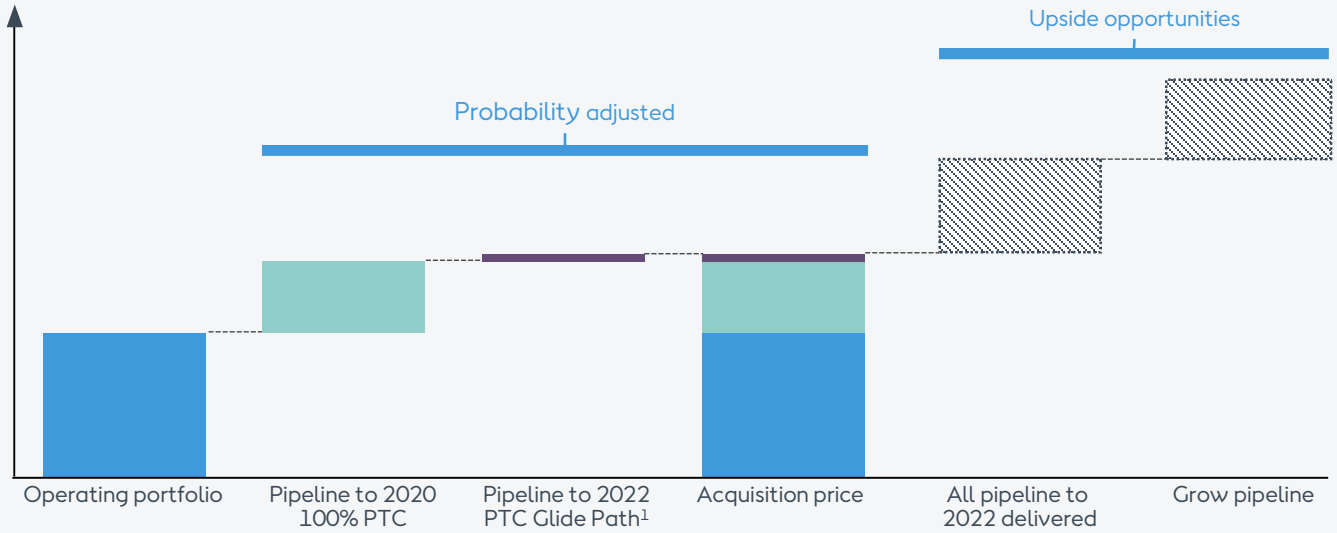



1. Potential future capacity based on LCE's existing project pipeline at time of the acquisition
2. Operational portfolio includes 10MW of Solar PV
3. Including pipeline post-2020

# Acquisition price based on prudent assumptions, expect to achieve high single digit IRR

## Purchase price breakdown

Illustrative






1. PTC Glide Path: projects eligible to Production Tax Credits (PTCs) at less than 100%

# Operating portfolio 813MW

| | Amazon Windfarm Texas (Dermott) (253MW) | Willow Springs Wind (250MW) | Tahoka Wind (300MW) |
|---|---|---|---|
| **ISO** | ERCOT | ERCOT | ERCOT |
| **COD** | 2017 | 2017 | **2018** |
| **Turbines** | 110 GE / 2.3MW | 100 GE / 2.5MW | 120 GE / 2.5MW |
| **Tax Equity** | 50% GE EFS[1]<br>50% BAML[2] | 50% BHE[3]<br>50% BAML[2] | 100% BHE[3] |
| **Offtake solution** | PPA with Amazon and Iron Mountain<br>15 years | 193MW (77%) Hedge with BAML[2]<br>13 years | 231MW (77%) Hedge with BAML[2]<br>13 years |

813MW includes Oak Solar a 10MW Solar Project, commissioned 2011, no tax equity, fully merchant power. RECs until May 2020

**Bold = Development post acquisition**


1. GE EFS: GE Energy Financial Services
2. BAML: Bank of America Merrill Lynch
3. BHE: Berkshire Hathaway Energy



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# Large scale, low capex portfolio with solid offtake

## Key metrics

**~45%** Average historic load factor

**<1.5 USDm/MW** CAPEX multiples lower than BNEF 2017 benchmarks

**22 USD/MWh** Average nominal offtake pricing[1]
83% contracted[2]

## Portfolio highlights

- Large scale assets with top tier partners
- Over $1 billion in tax equity raised representing c. 80% of total capex at COD
- Tahoka was one of the largest single investor tax equity financings in US wind power at $305 million
- Amazon Windfarm Texas long term agreement was the largest volume corporate offtake in the US at time of execution



1. Weighted average including escalation for PPA lifetime
2. Weighted average annual offtake volume

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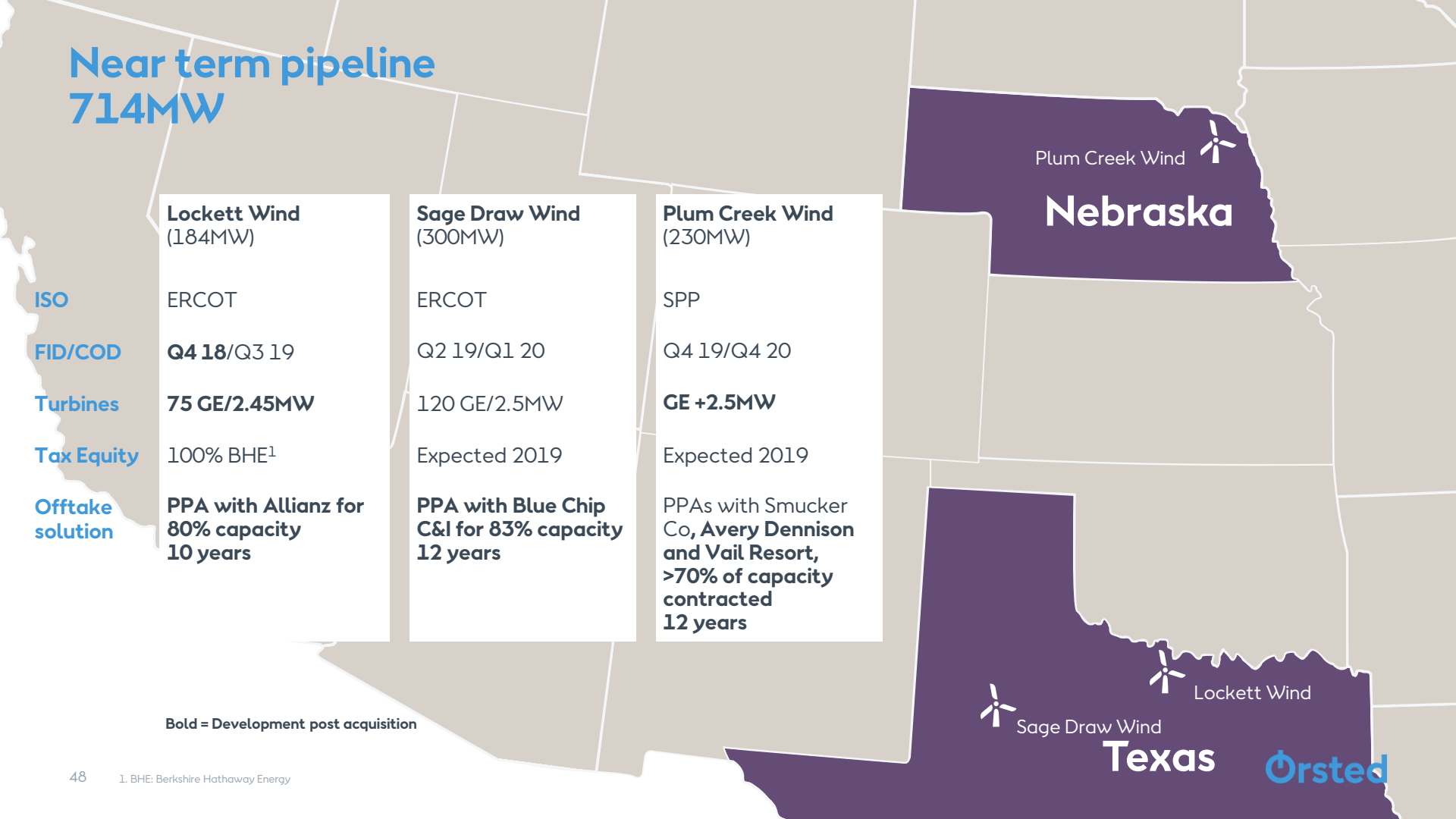
# Near term pipeline 714MW

| | Lockett Wind (184MW) | Sage Draw Wind (300MW) | Plum Creek Wind (230MW) |
|---|---|---|---|
| ISO | ERCOT | ERCOT | SPP |
| FID/COD | **Q4 18**/Q3 19 | Q2 19/Q1 20 | Q4 19/Q4 20 |
| Turbines | **75 GE/2.45MW** | 120 GE/2.5MW | **GE +2.5MW** |
| Tax Equity | 100% BHE[1] | Expected 2019 | Expected 2019 |
| Offtake solution | **PPA with Allianz for 80% capacity 10 years** | **PPA with Blue Chip C&I for 83% capacity 12 years** | PPAs with Smucker Co, **Avery Dennison and Vail Resort, >70% of capacity contracted 12 years** |

**Bold = Development post acquisition**






1. BHE: Berkshire Hathaway Energy

# Capex and load factor improvements drive lower LCOE

## Key metrics

**~47%** Expected average load factor[1]

**<1.2 $m/MW** Capex multiples lower than BNEF 2019 benchmarks

**12-15 $/MWh** Expected nominal range of offtake pricing[2]

**Turbine progression** Increase in energy capture and capex reduction compensates for lower PPA pricing

## Key developments since acquisition

All major contracts in place for near term pipeline with 80% volume contracted[3]:

- Lockett: Final Investment Decision taken
- Sage Draw: Executed PPA for 83% capacity
- Plum Creek: >70% offtake and turbine supply agreement executed

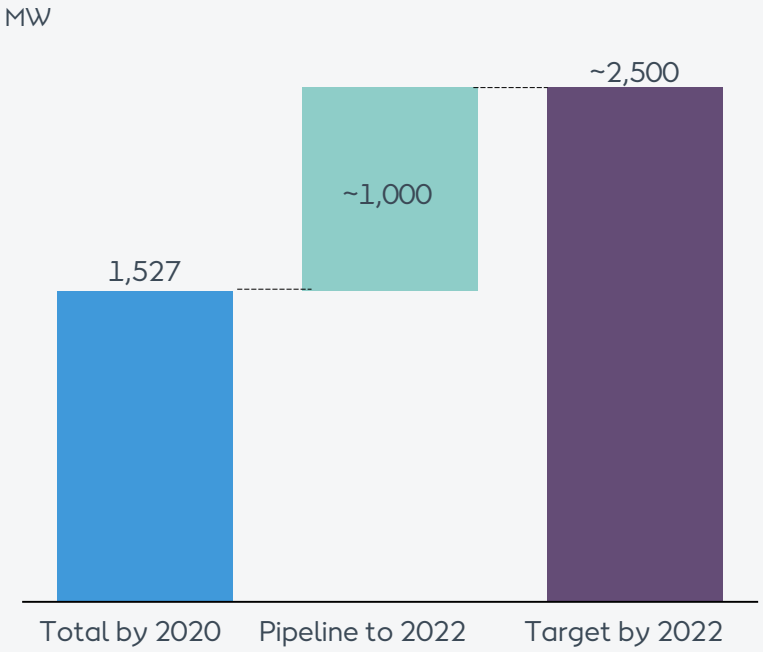
1. Weighted average expected load factor
2. Weighted average including escalation for PPA lifetime
3. Weighted average annual offtake volume. Target offtake met, may add more opportunistically



Ørsted

# Well positioned to realise an additional 1GW between 2020 and 2022

**Pipeline to 2022**




**Targeting 1GW growth to 2022 from:**

– Regionally diverse portfolio:
  - ERCOT South
  - ERCOT West
  - MISO
  - SPP

– Multi-technology projects:

**Wind**

Average size 300MW, eligible for at least 60% PTC

**Solar**

Capitalize on favorable ITC glide path and customer demand



Ørsted

# Today we are announcing 500MW of wind and solar PPAs with ExxonMobil

**Sage Draw Wind**
300MW
250MW PPA
COD Q1 2020

**Permian Solar**
350MW
250MW PPA
COD Q2 2021



The two long term PPA's executed in Texas with ExxonMobil are a case study of where onshore renewables is heading

- Multi-technology to meet corporate demand for 24hr green energy
- Development/execution efficiency in the core West Texas wind footprint
- Further synergies possible in long term operations and capex

**Potential for further additions of solar to portfolio but remain largely wind focused**

## LCE solar track record

MW

**10** — **Oak Solar**
New Jersey
- Full greenfield project
- COD 2011

**10** — **Lone Valley 1**
California
- Early stage acquisition project
- Secured PPA with SoCal Edison
- COD 2014
- Sold to EDPR

**20** — **Lone Valley 2**
California
- Expansion project
- Secured PPA with SoCal Edison
- COD 2014
- Sold to EDPR

**350** — **Permian**
Texas
- Project in development
- Secured 250MW PPA with ExxonMobil



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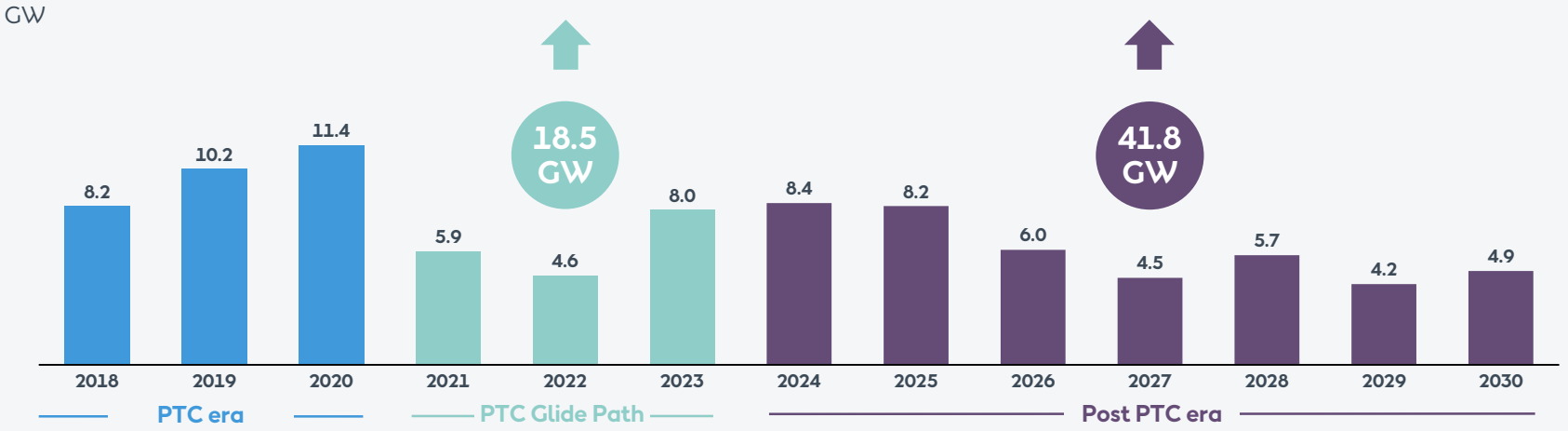
# LCE in a strong position to meet demand in the post subsidy era

## US net wind capacity additions




Unprecedented buildout

Some market recalibration

Growth driven by consumer demand and continued reduction in LCoE



Source: BNEF New Energy Outlook

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# LCE has development capabilities to be competitive in the post PTC era


**Willow Springs Wind**

- Phase 2 of a prior acquisition
- Utilised retained connection rights
- Increased interconnection agreement by 20% post acquisition
- Created a new project with a very competitive cost base

**Tahoka Wind**

- Acquired as a project directed into the transmission system via a low value connection point in SPP
- Worked with the transmission company to bring a decommissioned line back into service
- Enabled Tahoka to secure access to the higher value ERCOT market

**Amazon Windfarm Texas**

- PPA with Amazon was the largest volume corporate offtake in the US at time of execution
- Involved extensive collaboration with Amazon management
- Full greenfield project

**Lockett Wind**

- Experienced in utilizing the spectrum of offtake structures
- Recently executed a hedge with Allianz effectively reducing shape risk
- Full greenfield project

**Multi-project**

- Track record in both wind and solar leads to cross selling opportunities
- Leverage strong relationship with C&I
- Opportunity only accessible as a result of the acquisition



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# LCE and Ørsted a powerful combination to succeed in US market

## LCE

### Relationships and Market Knowledge

Successful track record in multiple US states, over 150 years of combined experience in the US market

### Tax Equity Capabilities

Close relationship with tax equity investors

### Offtake Solutions

Corporate and utility PPAs, financial hedges

## Ørsted

### Balance Sheet Strength

Credit assurance and funding availability

### Scale

Procurement and ability to deploy resources

### In-House Capabilities

Expertise in complex engineering



Ørsted

# The leading onshore wind developer in the US


Significant progress since acquisition

*Tahoka fully operational*

*Final Investment Decision taken for Lockett*

*Executed PPA on Sage Draw for 83% capacity*

*>70% offtake secured for Plum Creek*

LCE/Ørsted have the right capabilities to be competitive in the post PTC era

A regional cross-technology platform to meet future corporate demand and drive growth

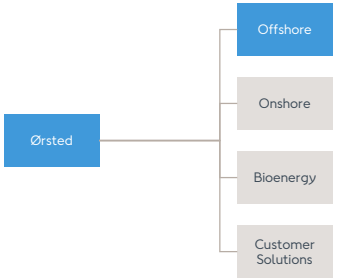


Ørsted

# Global Offshore Wind Markets

Ørsted

Capital Markets Day
28 November 2018



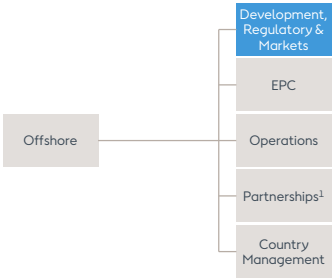

## Martin Neubert

## Executive Vice President, CEO Offshore

Born: 1973

Education: M.Sc. in Economics and Finance (FAU) & CFA

| | |
|---|---|
| **2018 –** | **Ørsted A/S**<br>Executive Vice President, CEO Offshore |
| **2016 – 2018** | **Ørsted A/S**<br>Chief Strategy Officer, Head of Strategy, Development and Regulatory, Offshore Wind |
| **2012 – 2016** | **Ørsted A/S**<br>Head of Partnerships, Offshore Wind |
| **2008 – 2012** | **Ørsted A/S**<br>Head of Group M&A, Head of Equity Partnerships |
| **2005 – 2008** | **Bain Capital**<br>Associate in Private Equity |
| **2000 – 2005** | **Arthur Andersen & EY**<br>Various positions |




## Thyge Boserup

### Senior Vice President, Head of Development, Regulatory & Markets, Offshore

Born: 1970

Education: M.Sc. in Economics

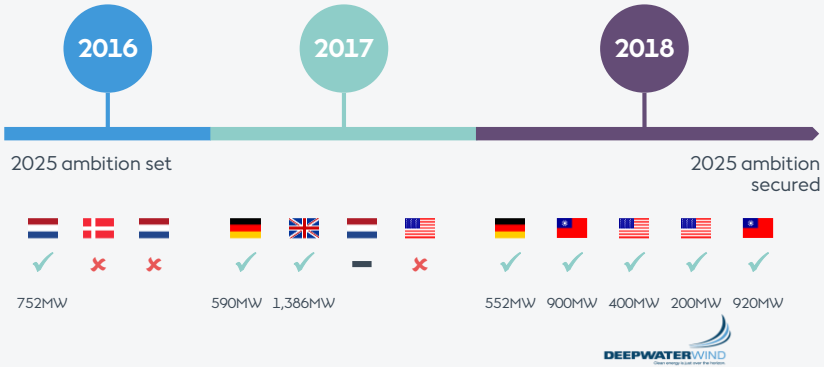
| | |
|---|---|
| **2018 –** | **Ørsted A/S**<br>Senior Vice President, Head of Development, Regulatory & Markets, Offshore |
| **2016 – 2018** | **Ørsted A/S**<br>Senior Director, Head of Market & Project Development, Offshore Wind |
| **2014 – 2015** | **TB advisory**<br>Independent advisor |
| **2008 – 2014** | **Saxo Bank A/S**<br>Executive Vice President, Chief Commercial Officer |
| **2007 – 2008** | **Danisco A/S**<br>Vice President, Head of Corporate Development |
| **2002 – 2006** | **ISS A/S**<br>Senior Vice President, Head of Corporate Affairs and Investor Relations |



1. Partnerships & Structured Solutions, Revenue and Asset Management

# Unprecedented track record in capturing valuable growth in competitive allocations

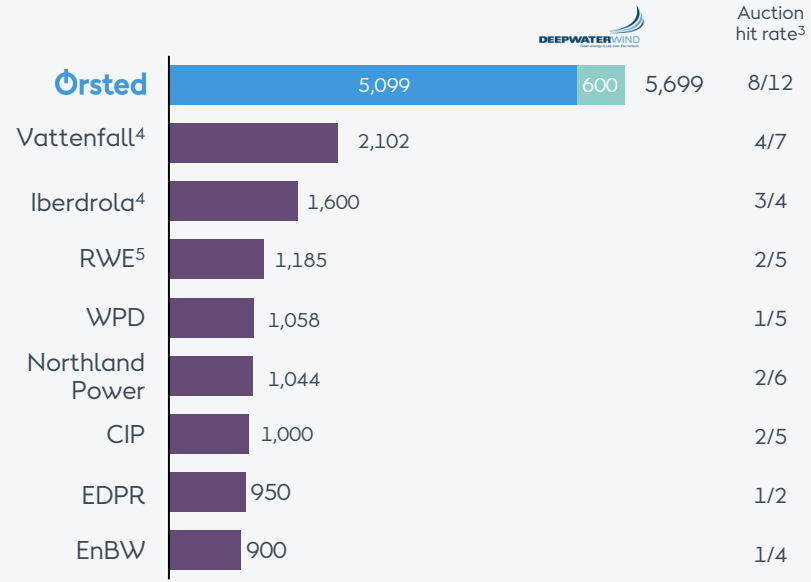
## Competitive tenders and auctions by market 2016-2018




**37%** capacity secured in the past 36 months[1]

## Net offshore wind capacity secured[2]

MW secured since 2015




1. 33% excl. Deepwater Wind
2. Net capacities are defined as the developer's ownership share of the offshore wind project
3. Auction hit rate equal to number of auctions where capacity was secured divided by number of unique auctions participated in since 2015
4. Vattenfall capacity includes Horns Rev III (407MW) secured in 2015, Iberdrola capacity includes East Anglia ONE (714MW) secured in 2015
5. RWE winning capacity calculated as Innogy and E.ON's aggregated winning capacity

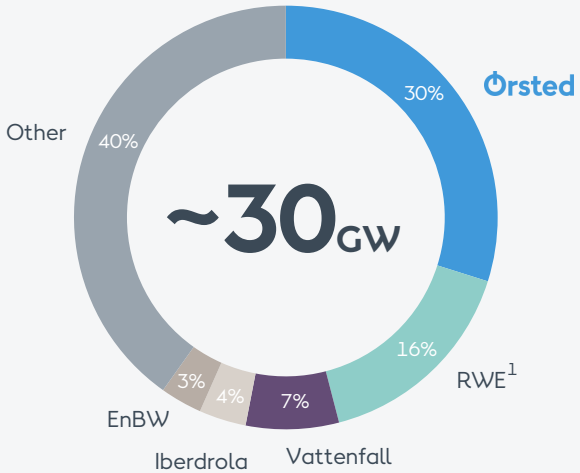


Ørsted

# Market leader with the largest asset base in operation, in construction and in development

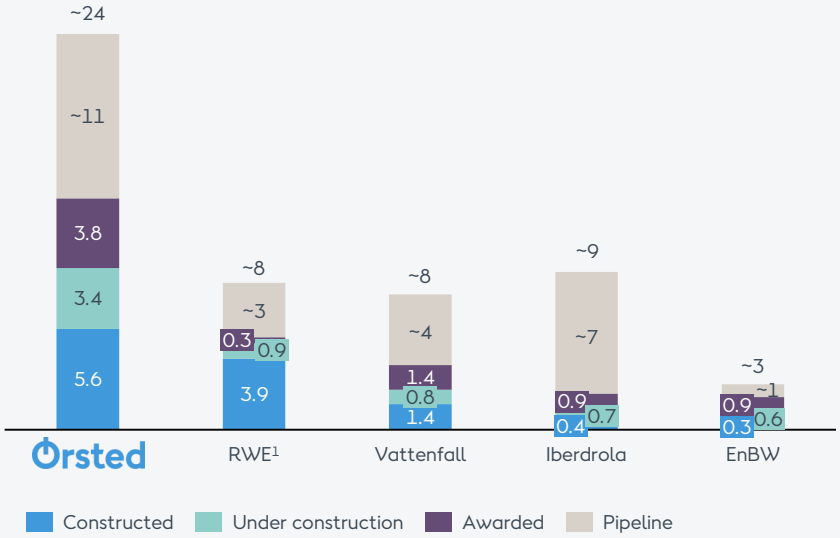
## Offshore wind competitive picture

2018 market share of global capacity constructed and under construction, %




## Global offshore wind capacity (gross)[2]

Constructed, under construction, awarded and pipeline[3], GW

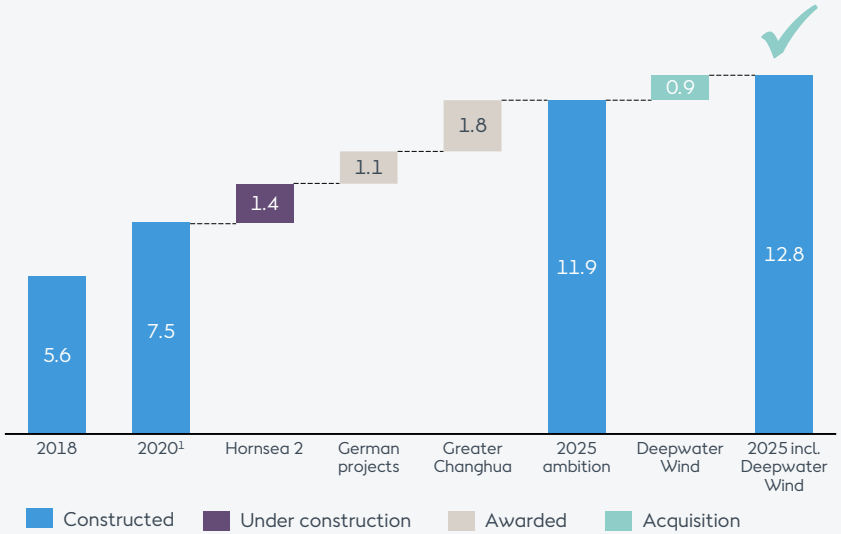



1. RWE capacity and market share calculated as Innogy and E.ON combined
2. Gross capacity implies full share of partnership projects
3. Defined as net capacity of project rights exclusively owned by developer, if ownership share is not disclosed 100% is assumed

# 11-12 GW ambition secured ahead of time – new ambition set towards 2025

## Ørsted Offshore capacity (gross)

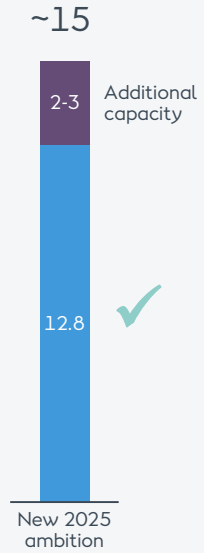
GW




## Ørsted Offshore capacity – updated ambition

GW

**+2-3 GW**

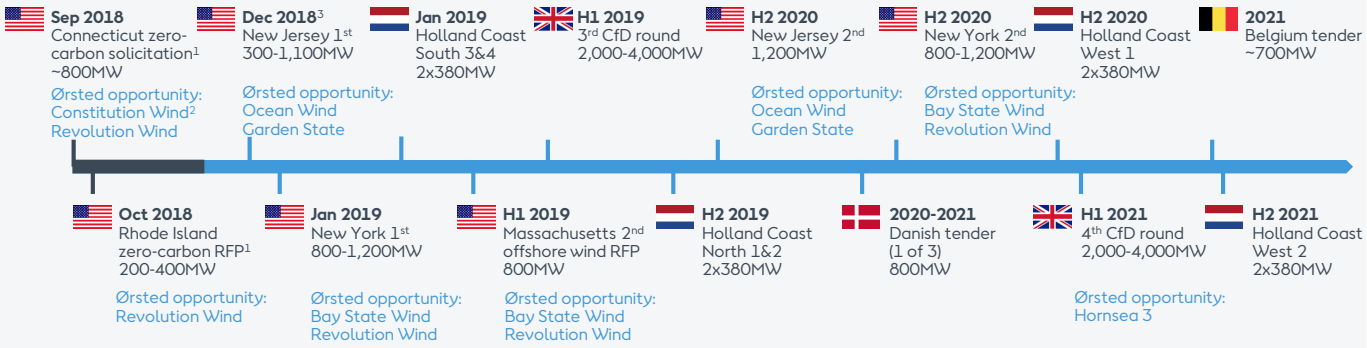




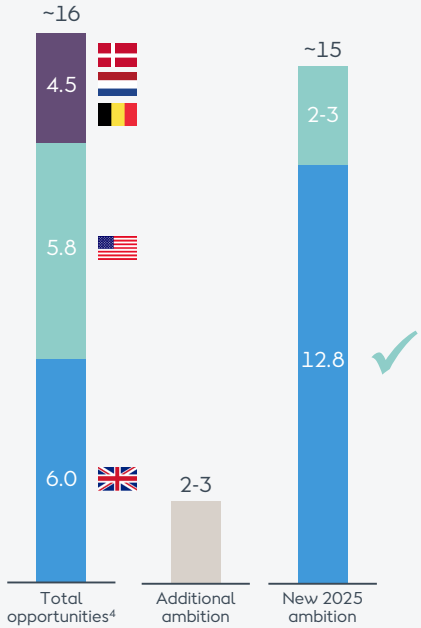

1. 2020 includes Borssele 1&2 capacity, COD expected in Q4 2020/Q1 2021

# Increased 2025 ambition on the back of a strong short-term opportunity pipeline

## Upcoming firm opportunities in regions with existing footprint for Ørsted Offshore



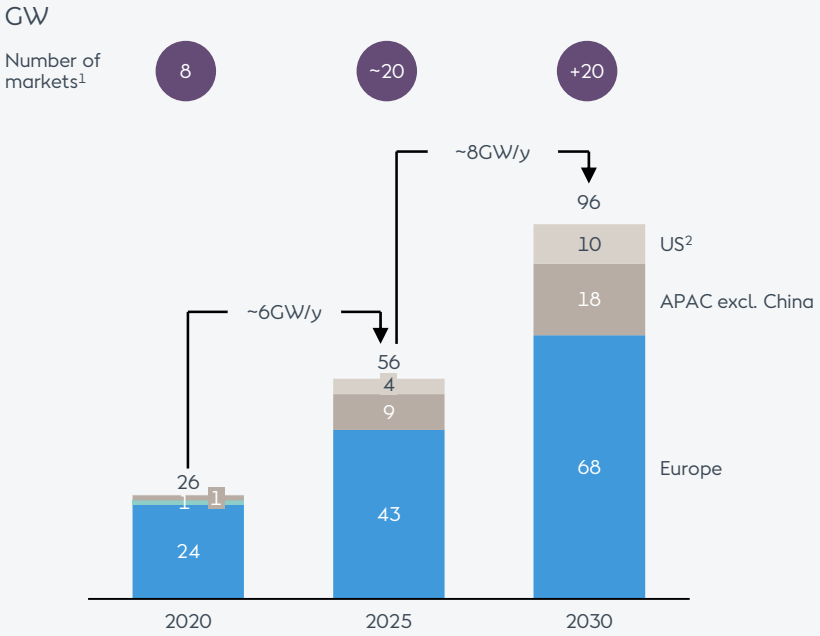

**further potential opportunities across the globe**




1. Auction result pending. 2. Part of Bay State Wind lease. 3. Bids due on 28 December in New Jersey – winners expected to be selected by July 2019
4. Total opportunities estimated as the sum of the 14 opportunities combined with the average taken of the ranges
Source: Bloomberg New Energy Finance (BNEF), Netherlands Enterprise Agency, Danish Ministry of Energy, Utilities and Climate, US National Renewable Energy Laboratory (NREL), UK Department of Energy & Climate Change, Belgium Energy Federal Public Services (FPS)

# Accelerated global growth towards 2030 – a substantial part is already backed by political commitments

## Offshore wind installed capacity forecast excl. China




## Offshore wind capacity with firm political commitment[3]

### Targets in existing footprint markets

- The UK government has a CfD roadmap with bi-yearly auctions of 2-4GW towards 2030 to reach 30GW
- Target of 15GW offshore wind by 2030
- Offshore Wind Energy Roadmap 2030 outlines 11.5GW by 2030 through 1GW per year post 2023
- MA 2027 (2035) target: 1.6 (3.2) GW. VA 2028 target: 2.0GW. NJ 2030 target: 3.5GW. NY 2030 target: 2.4GW.
- Current 2025 target of 5.5GW which has already been reached through grid allocation and price auction
- Outlined plan for three 800MW (2.4GW) offshore wind projects before 2030 by the Danish Government leading to a total of 5GW in 2030
- Authorities of Belgium have announced plans for offshore wind targets of 2.2GW by 2020 and 4GW by 2030

**~81GW**

### Targets in next horizon markets

- The Indian government has target of 5GW before 2022 and 30GW by 2030
- The South Korean government has a total wind target of 18GW by 2030 of which 13GW is allocated to offshore wind
- France has a 2023 target of 3GW installed and 6GW in the pipeline post 2023

**~46GW**

1. Number of markets with installed capacity by BNEF above 200MW with US States treated as separate markets
2. US includes the latest BNEF US offshore wind forecast from September 2018. This forecast is 3GW higher than H1 2018 Offshore Wind Outlook from July 2018
3. Firm political commitment is defined by a country's public offshore wind target by 2025/2030

Source: Bloomberg New Energy Finance (left side), Governments' official energy outlook (right side)



Ørsted

# Dedicated front end organisation managing the global development portfolio across the globe

**Develop** | Build | Operate | Own

+250 FTEs focused on market, project and business development

~11GW under development across six different markets

Global presence with three hubs: Europe, APAC and US

Annual DEVEX of DKK ~1.8bn (2019-2022)

## DEVEX breakdown


**Project management, design and procurement**

– Development and optimisation of projects through the development cycle

**Site investigations**

– Geotechnical and geophysical investigations of array area and cable route (primarily 3rd provider)
– Deployment of wind- and met ocean measurement equipment
– Technical analysis of site data, and development of geological models

**Land rights**

– Commercial agreements and acquisition of rights to onshore land for cable routes, onshore substation and harbour facilities

**Consent and permits**

– Permitting processes, including stakeholder engagement, permit applications, public hearings, and Environmental Impact Assessments (EIAs)

**Market development**

– Development of existing and new markets, including regulatory engagement and identification of new project opportunities



Ørsted

# Successful market and project development approach established to ensure value creation when entering new markets

## Market and project development approach

1. **Early stakeholder engagement**
2. **Establish local offices and secure project rights either through greenfield investments or M&A**
3. **Find local partner with complementary competencies**
4. **Ability to scale fast**

**Value creation through diligent market and project selection and development**

## Market examples

- Strong stakeholder engagement and involvement in the development and build-up of UK offshore wind market
- Early engagement with local stakeholders since 2013/2014 enabled an effective market entry in 2016

- Securing +6GW Hornsea zone has given Ørsted consistent opportunities through several bid rounds in the UK
- Acquired small German projects in close proximity to gain significant scale advantages through Borkum Cluster, Gode Wind Cluster and Cluster 1

- Partnership with leading transmission builder in New England, Eversource Energy, for the Bay State Wind project in Massachusetts
- JV with Swancor and Macquarie for the first offshore wind farm in Taiwan, Formosa 1, to access local knowledge early in the development process

- Strong track record by developing and building the largest offshore wind farms in the world[1]
- Became largest developer in Taiwan by securing capacity in both grid allocation and price auction

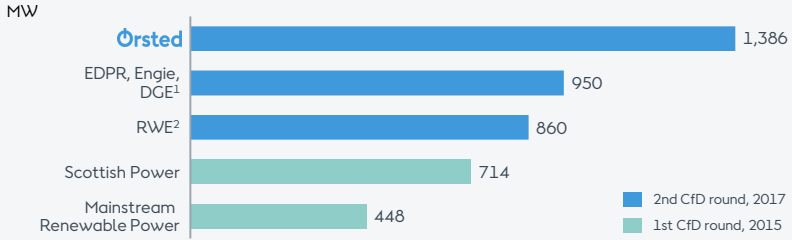
1. Horns Rev 1 (160MW, 2002), Horns Rev 2 (209MW, 2009), Walney 1&2 (367MW, 2012), London Array (630MW, 2012), Walney Extension (659MW, 2018), Hornsea 1 (1,218MW, 2021) and Hornsea 2 (1,386MW, 2022)

# Strong position in the UK with +4 GW pipeline opportunities

## Ørsted Offshore´s activities at UK East Coast


## Market update and Ørsted opportunities

### UK 1st and 2nd CfD auction outcome




### Market

- Next UK CfD auction to be initiated May 2019, subsequent auctions every two years
- Target annual build-out of 1-2GW towards 2030. Target of 30GW capacity by 2030
- The Crown Estate extension projects applications approved (3.4GW)
- Round 4 lease auctions in 2019

### Ørsted

- Hornsea 3 and 4 consent process and preparation ongoing
- Satisfied application criteria for development of Race Bank Extension (573 MW) and further expectations to participate in process for new leasing rounds, expected to be initiated in 2019

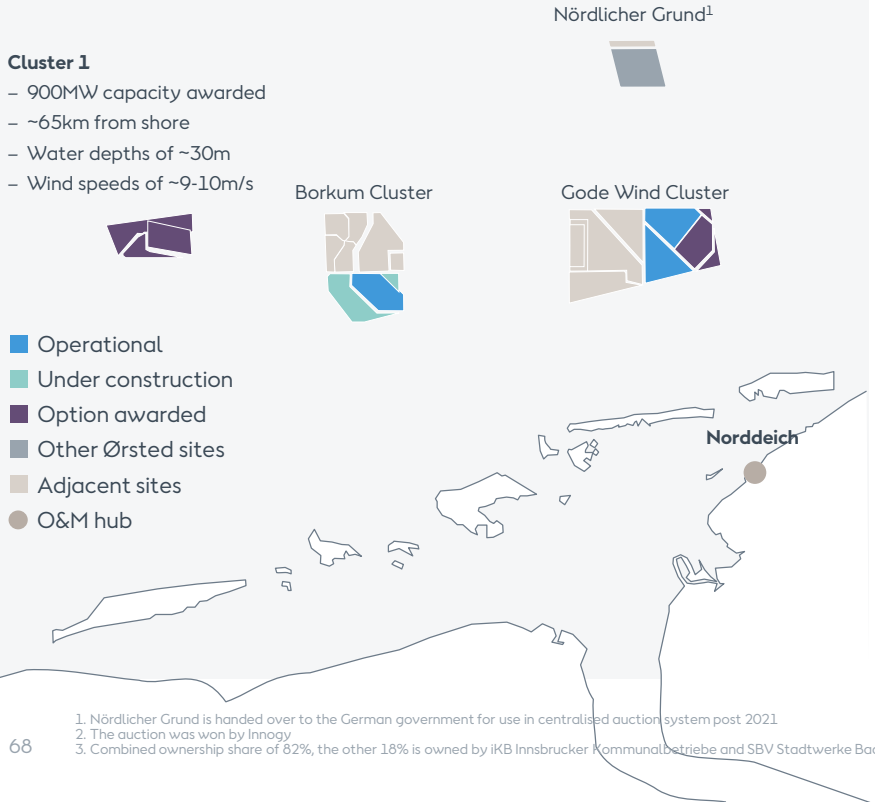


1. Diamond Generating Europe
2. The auction was won by Innogy

# Largest capacity secured in highly competitive German auctions

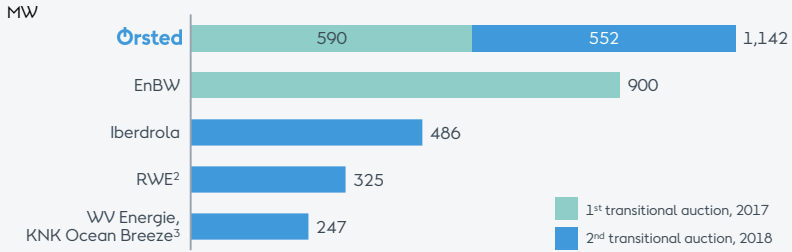
## Ørsted Offshore´s activities in Germany

**Cluster 1**
- 900MW capacity awarded
- ~65km from shore
- Water depths of ~30m
- Wind speeds of ~9-10m/s




## Market update and Ørsted opportunities

### German transitional auctions outcome




### Market

- First centralised tender expected in 2021, approximately 800MW to be built per year from 2026
- Centralised tender expected on a yearly basis towards 2030
- Target of 15GW offshore wind capacity by 2030

### Ørsted

- 1,142MW awarded to Ørsted in the two transitional auctions
- Gode Wind 3&4 cluster will have a capacity of 242MW at weighted average price of EUR 81/MWh
- Cluster 1 awarded at price of EUR 0/MWh with 900MW total capacity
- Nördlicher Grund handed back for consideration in centralised tender

1. Nördlicher Grund is handed over to the German government for use in centralised auction system post 2021
2. The auction was won by Innogy
3. Combined ownership share of 82%, the other 18% is owned by iKB Innsbrucker Kommunalbetriebe and SBV Stadtwerke Bad Vibel



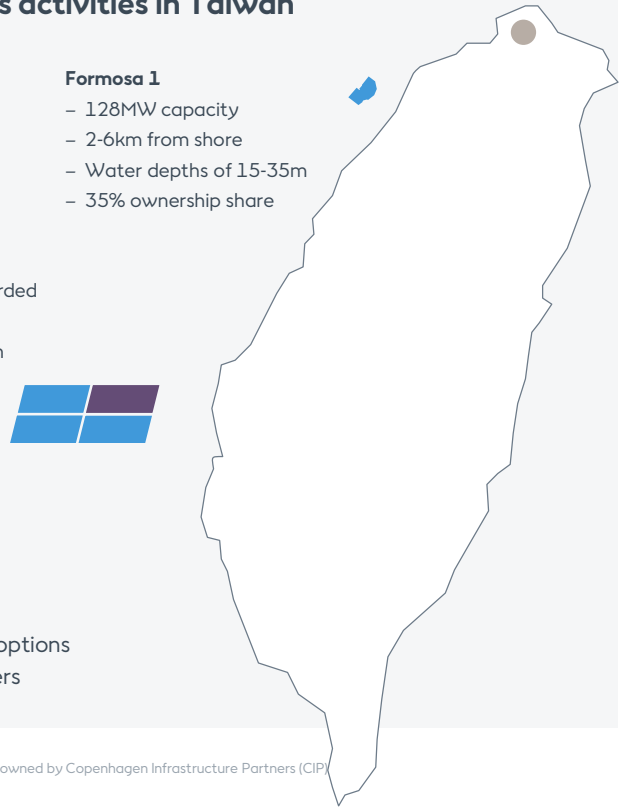
Ørsted

# Market leading position in Taiwan with 1.8GW secured capacity

## Ørsted Offshore´s activities in Taiwan

**Formosa 1**
- 128MW capacity
- 2-6km from shore
- Water depths of 15-35m
- 35% ownership share

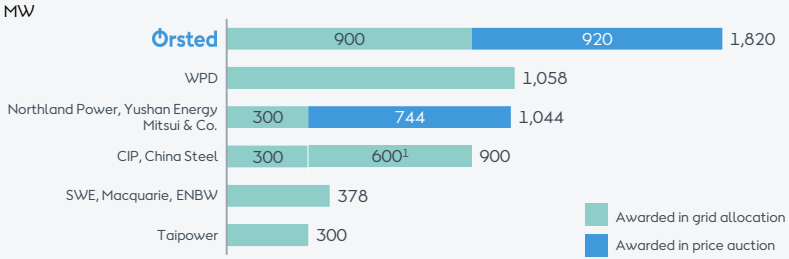
**Changhua 1 & 2 & 4**
- 1,820MW capacity awarded
- 35-60km from shore
- Water depths of 35-45m
- Wind speeds of 9-10m/s



- Awarded projects
- Exclusive pipeline options
- APAC Headquarters

## Market update and Ørsted opportunities

### Taiwan allocation and auction outcome




### Market

– Taiwan has now met its target of awarding 5.5GW of capacity to be installed by 2025

– Future auctions are being planned for projects post 2025

### Ørsted

– 900MW[2] awarded in grid allocation in April – expected to be completed in 2021 subject to FID in 2019

– 920MW[3] awarded in price-based auction in June. Expected to be completed in 2025, subject to FID in 2023. Winning bid price was TWD 2,548/MWh (~EUR 72.3/MWh)

– Greater Changhua 3 (583MW) available for future auctions

1. Capacity independently owned by Copenhagen Infrastructure Partners (CIP)
2. Changhua 1&2a
3. Changhua 2b&4

# Selected next horizon markets for offshore wind

## Japan

- 90% of energy consumption is imported
- Lack of space onshore
- Strong public pressure to phase out nuclear
- Clear political intention to increase renewables

### Timeline

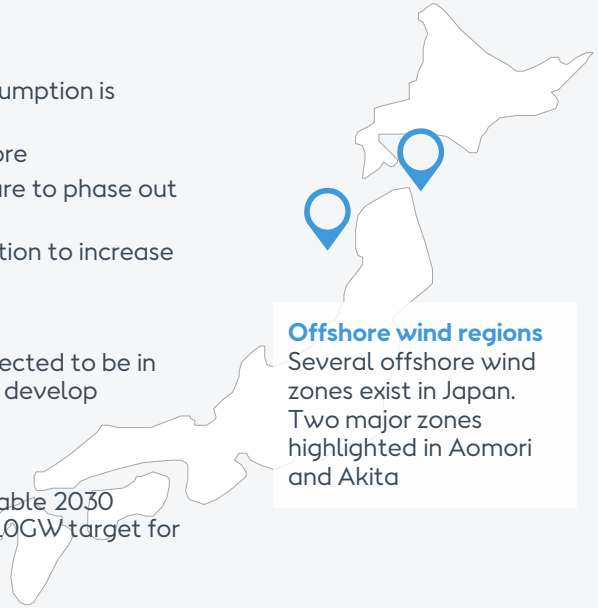
- New legislation expected to be in place early 2019 to develop offshore wind

### Market

- Government renewable 2030 target of 24% and 10GW target for wind power

### Support scheme

- FiT – 20 years in current legislation
- Auction system in place post 2019



**Offshore wind regions**
Several offshore wind zones exist in Japan. Two major zones highlighted in Aomori and Akita

## South Korea

- 94% of energy consumption is imported
- Lack of space onshore
- Strong public pressure to phase out nuclear and coal
- Clear political intention to increase renewables

### Timeline

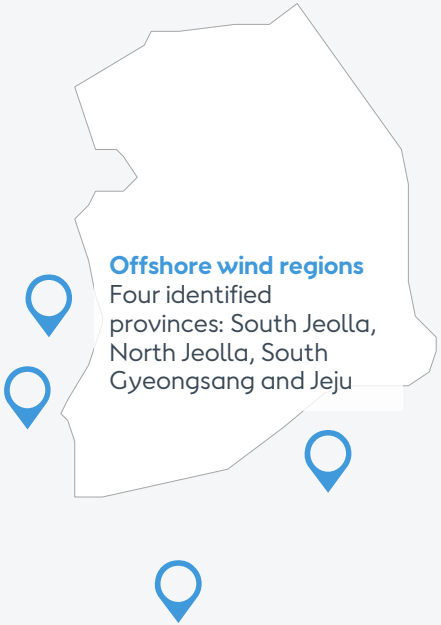
- First operational offshore wind project (30MW) to be commissioned in 2017

### Market

- 18GW wind build-out target towards 2030 of which 13GW is offshore

### Support scheme

- Renewable Energy Certificates (REC) for 20 years



**Offshore wind regions**
Four identified provinces: South Jeolla, North Jeolla, South Gyeongsang and Jeju



Source: Wood Mackenzie, Japanese Ministry of Economy, Trade and Industry, South Korean Ministry of Trade, Industry and Energy

# Selected next horizon markets for offshore wind

## Poland

- Coal phase out (60% of electricity consumption by 2030)
- Strong supply chain in place ready to expand if home market materialises
- Leverage the existing solid local position to become European hub

### Timeline

- New energy bill expected end of 2018. Current expectation of 8GW build-out in first phase

### Market

- Polish transmission system operator recently announced that 4GW of offshore wind capacity could be built by 2027

### Support scheme

- No firm support scheme in place



**Offshore wind regions**
Located in Baltic Sea. 1,980m2 designated to offshore wind build-out

## India

- Overall target of 175GW renewables by 2022
- Mature onshore wind power supply chain to be leveraged
- Extra financial support from the government expected compared to onshore wind

### Timeline

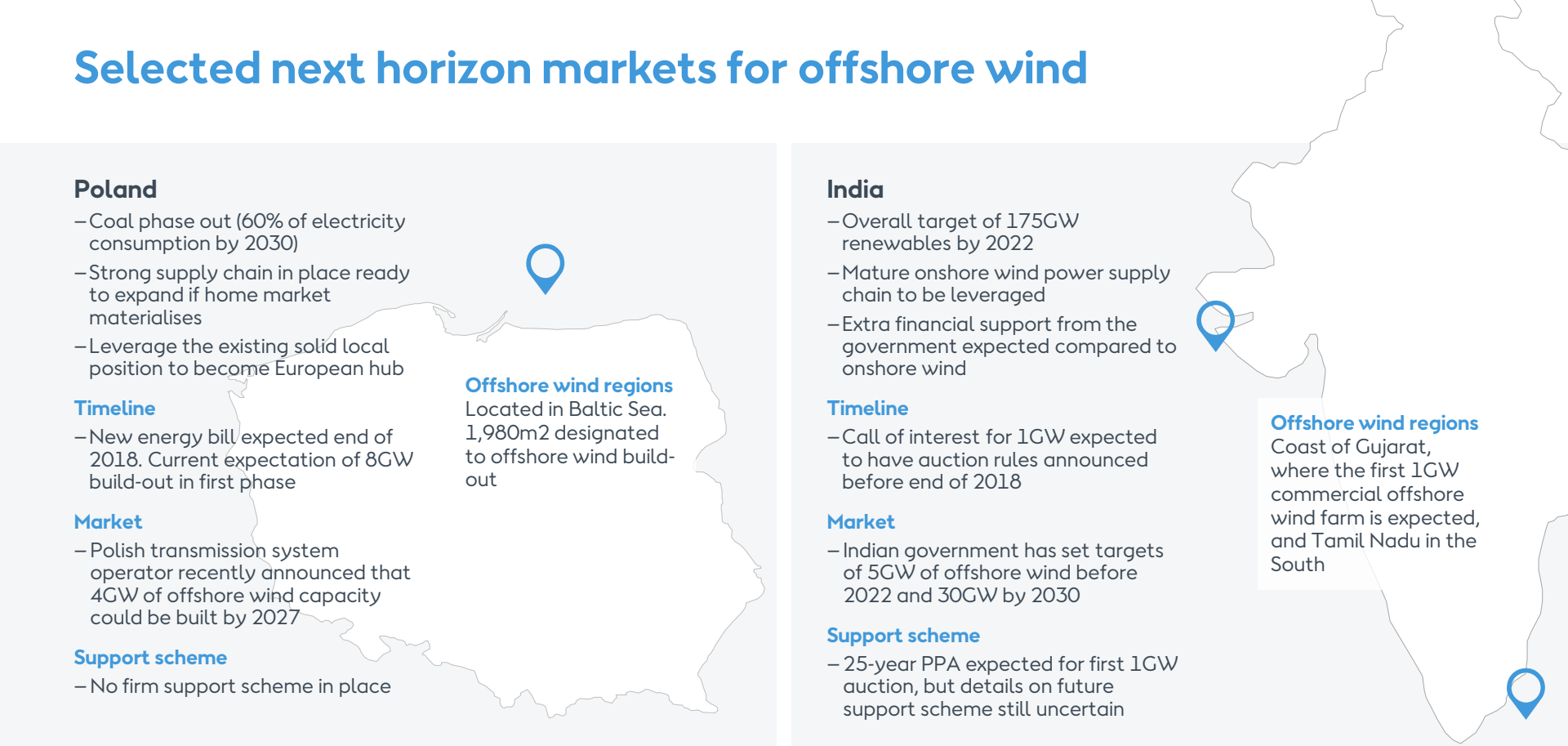
- Call of interest for 1GW expected to have auction rules announced before end of 2018

### Market

- Indian government has set targets of 5GW of offshore wind before 2022 and 30GW by 2030

### Support scheme

- 25-year PPA expected for first 1GW auction, but details on future support scheme still uncertain



**Offshore wind regions**
Coast of Gujarat, where the first 1GW commercial offshore wind farm is expected, and Tamil Nadu in the South

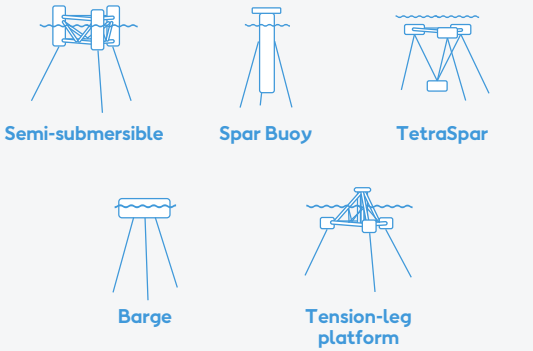


1. Total pipeline includes operational, under construction, planned, proposed and pre-project
Source: Wood Mackenzie

# Monitoring early stage development in floating wind

## Different technical concepts

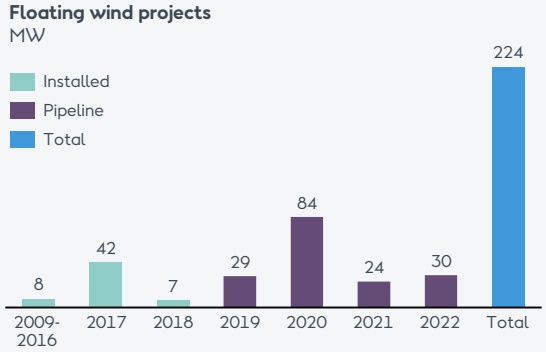
EXAMPLES




### Technology

- Several foundation designs currently being piloted
- No single design with superior technical capabilities in place

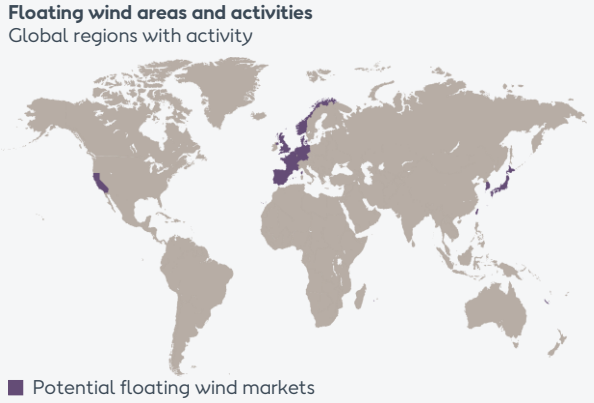
## Limited pipeline visibility with only small scale projects




### Pipeline

- Floating projects remain small scale in the short- to medium-term
- Limited long term visibility due to current lack of industrial cost-out roadmap

## Key floating markets in areas with significant bottom fixed potential




### Markets

- Major floating markets; UK, Germany, US, France, Japan, Portugal, Norway
- Market able to reach their offshore wind targets through bottom-fixed (California only exception)



Source: Bloomberg New Energy Finance (BNEF), Carbon Trust, Wood Mackenzie

Ørsted

# Ørsted is the clear market leader in a rapidly growing industry

Leading position in a high growth industry

Strong market fundamentals to support increased growth ambition

Proven methodology and track record in securing high value projects

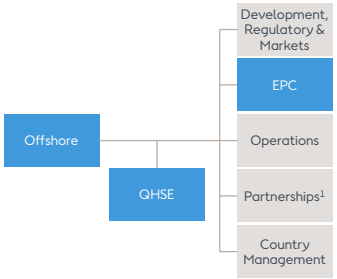


Ørsted

# EPC Excellence

Ørsted

Capital Markets Day
28 November 2018




## Anders Lindberg

## Executive Vice President, Head of EPC & QHSE

Born: 1965

Education: EMBA in Business Administration (SSE) & MSc. in Electrical Engineering (KTH)

| | |
|---|---|
| **2018 –** | **Ørsted A/S**<br>Executive Vice President, Head of EPC & QHSE in Offshore |
| **2015 – 2018** | **Ørsted A/S**<br>Senior Vice President, Head of EPC in Offshore Wind |
| **2014 –** | **IEC Holden**<br>Board member |
| **2011 – 2014** | **Bombardier Transportation**<br>President Rolling Stock Central & Northern Europe and Asia |
| **2007 – 2011** | **Bombardier Transportation**<br>President Rail Control Solutions |
| **2004 – 2007** | **Bombardier Transportation**<br>President Propulsion & Controls |



1. Partnerships & Structured Solutions, Revenue and Asset Management

# Strong inhouse capabilities and first mover on new technologies

## Large integrated EPC organisation with ~1,400 FTEs

- Strong technical capability with proprietary tools (layout, foundation, electrical system analysis, etc.)
- First mover on innovation, e.g. turbine platforms, foundations and cables
- Systematic, institutionalised approach to continuous LCoE reductions
- Industry leading procurement scale
- Multi-contracting approach with direct interactions with suppliers
- Ability to handle risk and uncertainties
- Ability to execute 4-6 large-scale projects at any given time

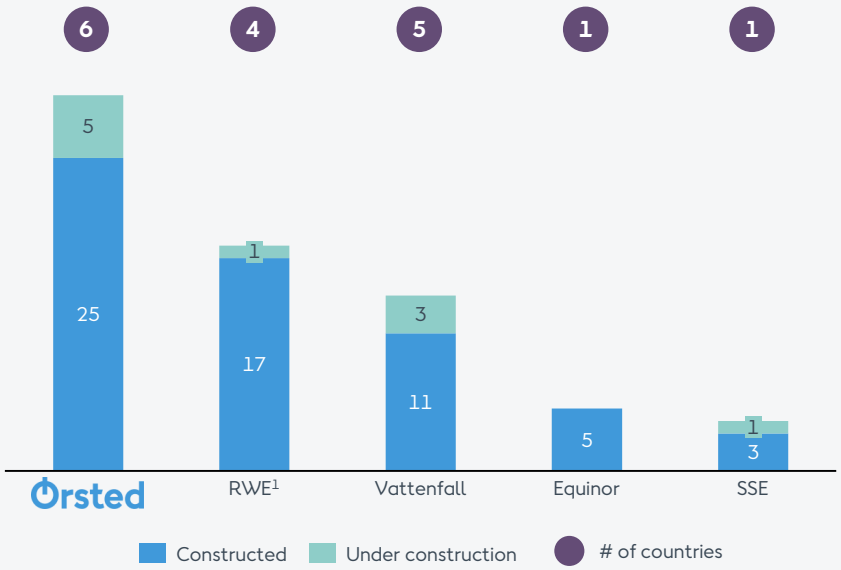


Ørsted

# Ørsted has a strong track record in delivering offshore wind farm projects on time and on budget

## Global offshore wind farm projects

# of projects




## Strong track record delivering projects below budget and on time

| | FID budget | Time schedule[2] | COD |
|---|---|---|---|
| Borkum Riffgrund 2 | Below | ✓ | 2018 |
| Walney Extension | Below | ✓ | 2018 |
| Race Bank | Below | ✓ | 2018 |
| Burbo Extension | Below | ✓ | 2017 |
| Gode Wind 1&2 | Below | ✓ | 2016 |
| Borkum Riffgrund 1 | ✓ | ✗ | 2015 |
| Westermost Rough | Below | ✗ | 2015 |

Compensation for TSO delay received for Gode Wind 1&2 and despite timing delays, subsidy milestones have never been jeopardised

1. RWE calculated as Innogy and E.ON's capacity installed and under construction combined
2. Delays have been due to grid issues at TSO or turbine supply delay



Ørsted

# Ørsted has strong confidence in delivering the current project portfolio and updates the expected completion dates

| Projects | Hornsea 1 | Borssele 1&2 | Virginia (EPC) | Hornsea 2 | Changhua 1&2a (Expected FID Q1 2019) |
|---|---|---|---|---|---|
| Country |  |  |  |  |  |
| Capacity | 1,218MW | 752MW | 12MW | 1,386MW | 900MW |
| Expected completion Original | 2020 | 2020/2021 | 2020/2021 | 2022 | Late-2021 |
| **Expected completion Updated** | **H2 2019** | **Q4 2020/Q1 2021** | **H1 2021** | **H1 2022** | **n.a.** |
| Status, time | Ahead | On track | On track | On track | n.a. |
| Status, cost | Below | Below | On track | On track | n.a. |

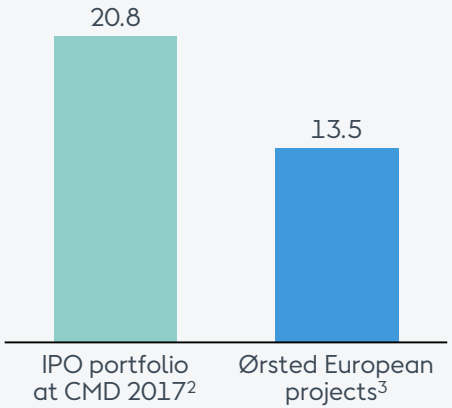


Ørsted

# Ørsted continues to drive down cost while creating a strong safety culture

## CAPEX

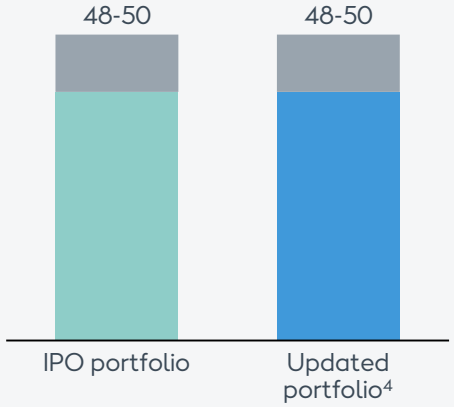
DKKm/MW, real 2019[1]




Significantly lower than IPO portfolio driven by continuous efforts to reduce costs, larger turbines and supply chain maturation

## Load factor

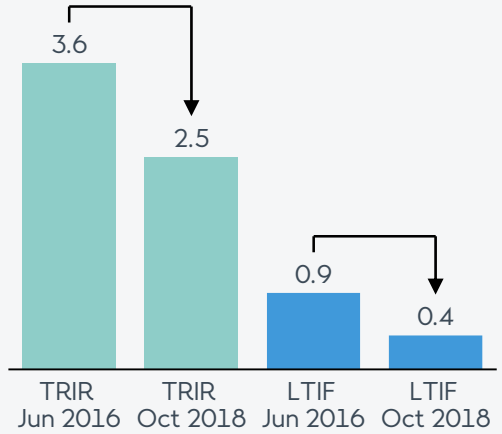
%




Maintaining load factor guidance for updated portfolio

## Safety record

TRIR[5] and LTI[6], 12 months rolling (Oct)




Safety in EPC significantly improved – well below 2018 TRIR target of 6.0

1. CAPEX cost (capacity weighted) excluding transmission asset costs
2. Gode Wind 1&2, Burbo Bank Extension, Race Bank, Walney Extension, Borkum Riffgrund 2 and Hornsea 1. Assumes 1% yearly inflation
3. Borssele 1&2, Hornsea 2, Gode Wind 3&4 and Cluster 1
4. IPO portfolio plus parks in note 3
5. Total Recordable Injury Rate per million working hours
6. Lost Time Incident Frequency per million working hours

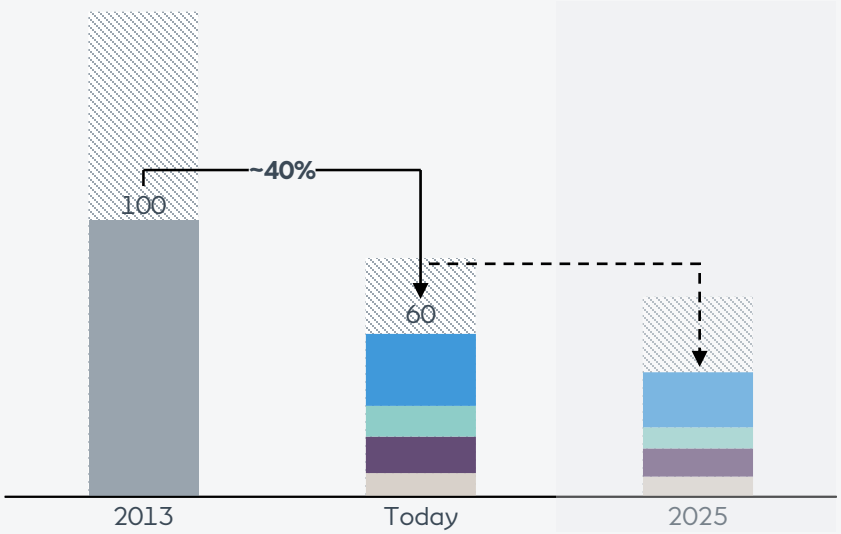


Ørsted

# LCoE has decreased substantially up to today since the first large scale wind farms

## LCoE for EPC areas[1]

2013 – today, Index




## Continuous improvements – reduced LCoE for EPC areas by more than 40% between 2013-18

### Turbines
Introduction of larger turbines
MHI Vestas Offshore Wind introduced as new supplier

### Foundations
Optimisation of primary steel design and tools
Internal and external structures completely redesigned and optimised

### Transmission
Dynamic rating of cables
Analysing seabed conditions to increase throughput
Reduction of export cable cross section
Move from copper to aluminium conductors

### Logistics
Move to purpose-built vessels
Single season installation



1. LCoE only includes Turbines, Foundation, Transmission and Logistics, i.e. OPEX, Construction Management, resource and other categories outside EPC scope are not included

Ørsted

# Continue working with turbine suppliers to be first movers in bringing new technology to the offshore wind market

## Technological updates towards 2025

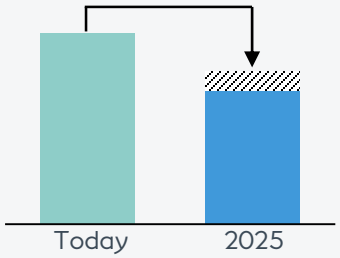
### Today

- 8MW turbines deployed
- 10MW turbines commercially available but not deployed yet

### 2025

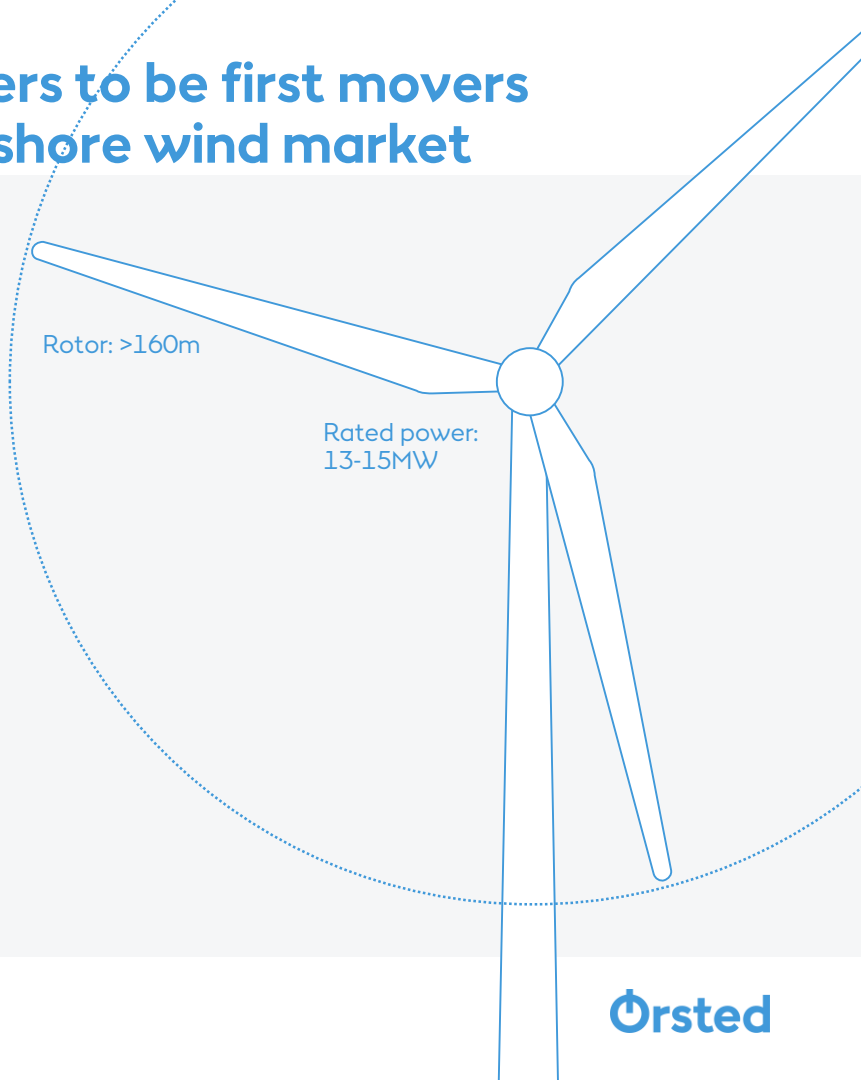
- 12MW turbine already announced
- 13-15MW turbine expected in 2025
- Qualification of new supplier, increasing competition

## LCoE for turbines



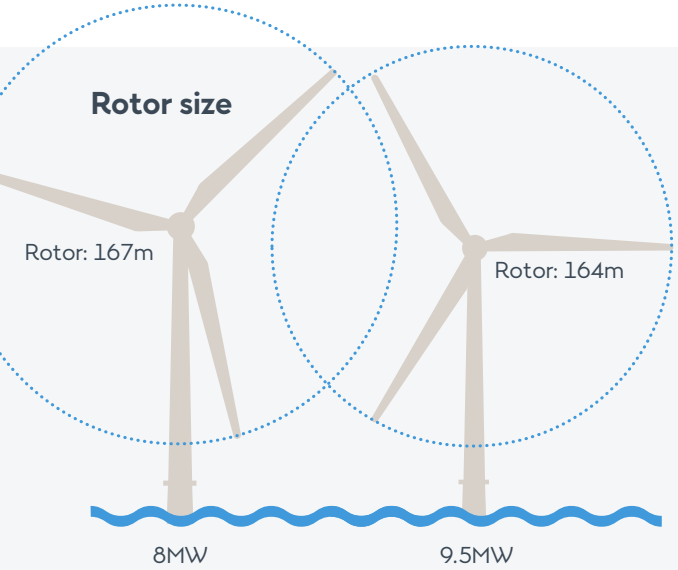

## What do larger turbines imply?

- Increased production due to higher rating and larger rotor
- Fewer positions enabling savings on foundations, array cables and installation
- Reduction of OPEX



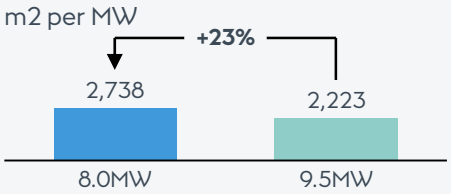
# Larger turbines are always better – a truth with modifications

## Rotor size

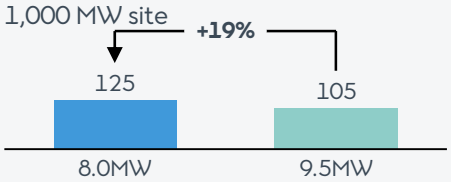



9.5MW turbine is larger on rated power, but has a smaller rotor than the 8MW

## Swept area

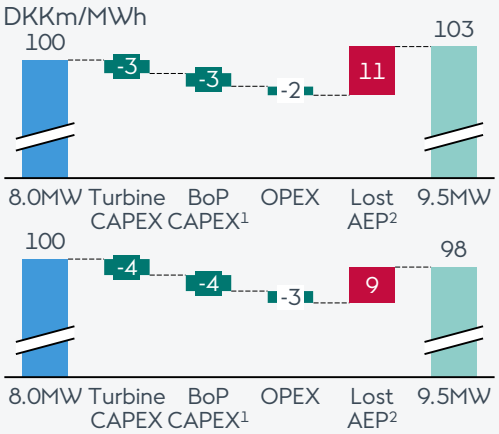



## Number of turbines




The total swept area will be ~23% larger with the 8.0MW turbine but 20 additional positions will be needed at a 1,000MW site

## LCoE illustrative




In general the 9.5MW turbine will gain on CAPEX and OPEX and lose on revenue and vice versa for the 8.0MW

In some cases, a smaller 8MW turbine with a large rotor could therefore provide a better business case than a 9.5MW turbine with a similar rotor



1. Balance of Plant
2. Annual Energy Production

Ørsted

# Foundation costs will decrease even further by focusing on steel weight and fabricator specific design

## Technological updates towards 2025

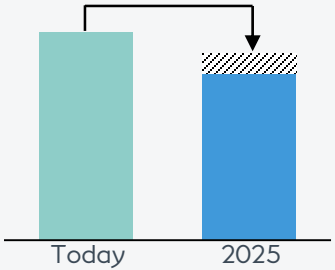
### Today

- Optimised diameter/thickness ratio of steel
- Improved design tools

### 2025

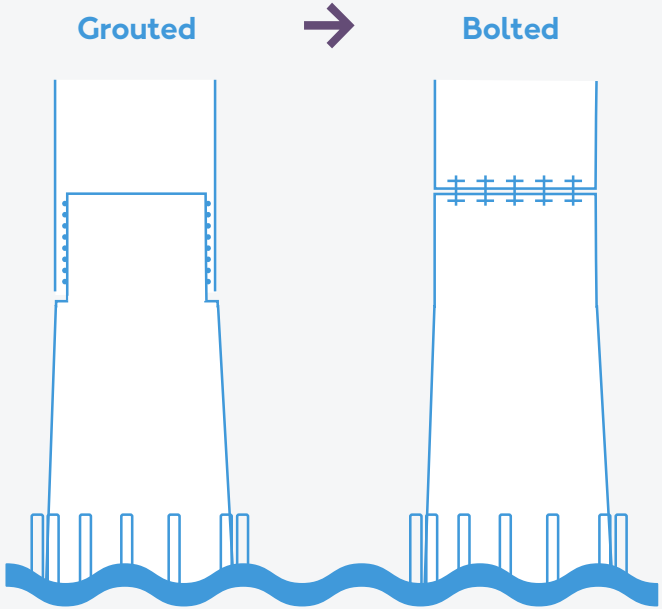
- Continue optimising diameter/ thickness ratio
- Consider the fabricators capabilities and the impact on steel while designing
- Improve modelling of fatigue over time and installation loads
- Secondary structures design optimisation

## LCoE for foundations




## Bolted connection at Borkum Riffgrund 2 and Hornsea 1

- Introduction of the bolted connection between monopile and transition piece, replacing the grouted connection
- Solution to be used as standard going forward
- Large cost reductions (15-20%) on foundation supply and possibility for all year installation



# Increasing capacity of transmission systems will continue to decrease LCoE

## Technological updates towards 2025

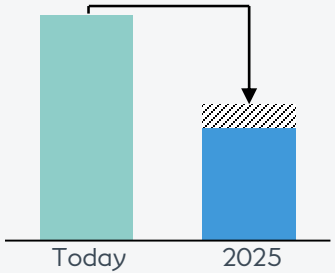
### Today

- Export cables with dynamic rating with a capacity of up to 230kV
- Reduced number of substations

### 2025

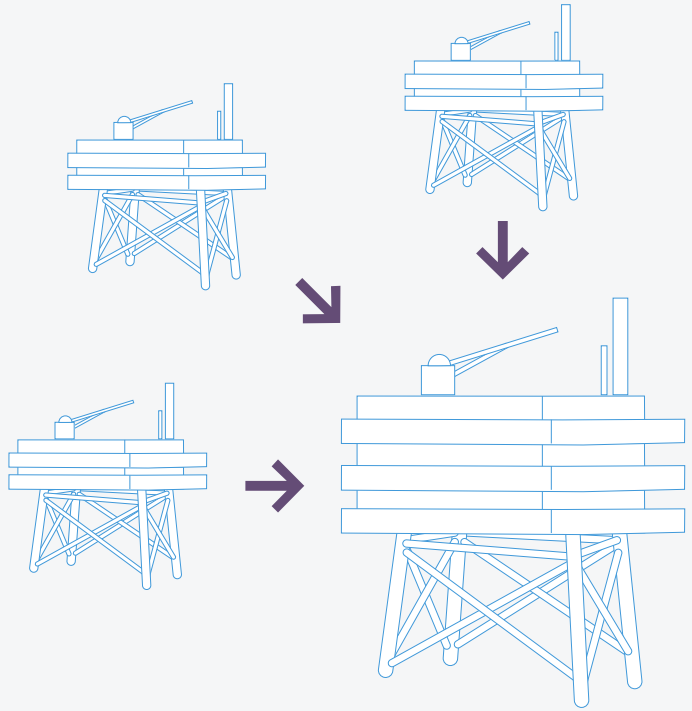
- Increase capacity of export cables by increasing voltage to 275kV and/or increase operating temperatures
- Reduce weight of substations to eliminate use of large offshore substation installation vessels (primarily new markets)

## LCoE for transmission




## Optimisation at Hornsea 2

- Cable route and seabed conditions analysed, allowing an increase in throughput from 400MW to 440MW per cable, while decreasing the average cross section size
- Reduction of number of substation from 3 to 1
- Asia Pacific sourcing
- ~20% steel saving on topside and ~40% CAPEX saving[1]





1. Including transportation and excluding electrical components

# Leverage supply chain and inhouse capabilities to further decrease logistics LCoE

## Technological updates towards 2025

### Today

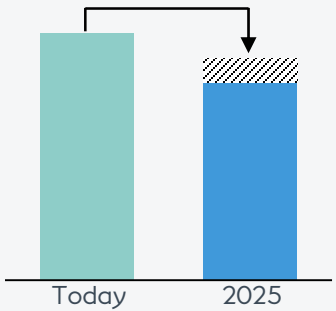
- Purpose-built vessels
- Improved vessel capabilities and dual turbine vessels to reduce installation time
- Work with the supply chain to promote new market entries and, thus, improved competition

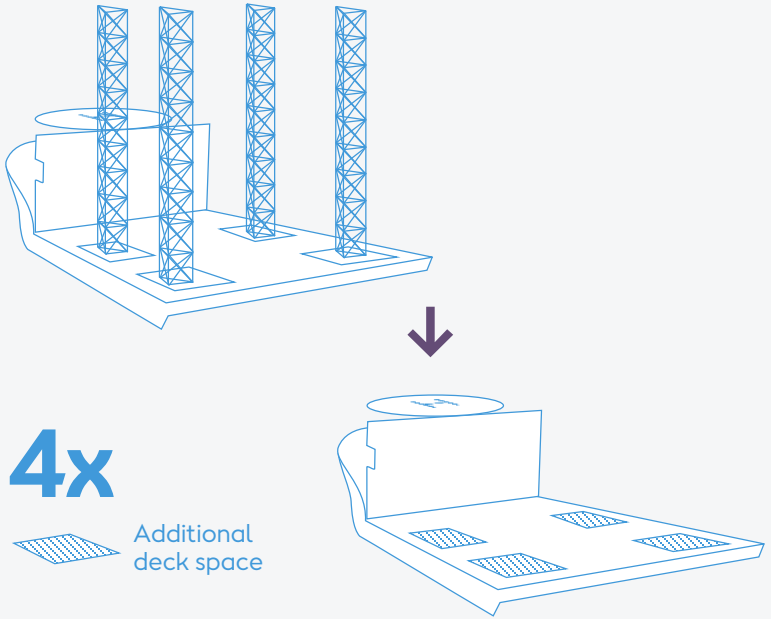
### 2025

- Introduce floating installation vessels that can carry larger foundations
- Improve workability to decrease downtime, i.e. ability to install in harsher weather
- Use data to optimise installation concepts based on best practice cycle-times

## From jack-ups to floating installation vessels

- No jackup-legs result in larger deck space which means more loading capacity and hereby reduced number of trips
- No dependency on seabed conditions
- No seabed footprint reduce dependency towards cable installation
- Reduces positioning time (~15%)[1] between turbine locations






1. Equivalent to approximately DKK 1m per position

Ørsted

# Ørsted continues to optimise each project after FID to further reinforce economics

**Value enhancement areas**

**Hornsea 1 achievements[1]**

**Cost reductions**

- Enhanced foundation design, logistics and installation process improvements – **CAPEX reduction of DKK 0.7bn**
- Optimised O&M setup with new processes and best practice logistical solutions utilising helicopters, CTV[1] and SOV[2] when operating far from shore – **OPEX reduction of DKK 0.5bn (lifetime)**

**Risk mitigation**

- Bringing forward the substations and cables to ensure there is time for testing and commissioning
- Address risks with supply chain delivery, such as re-allocating work to mitigate fabrication delays and ensure on-time installation
- De-risking CAPEX baseline has **released DKK 1.7bn of contingency**

**Revenue optimisation**

- Accelerated turbine installation and commissioning – Production ramp up accelerated 2 months (average) per turbine
- Improved park production curves and lifetime availability – **Energy production (AEP) increased 2.4% over project's lifetime** (similar uplift on load factor)

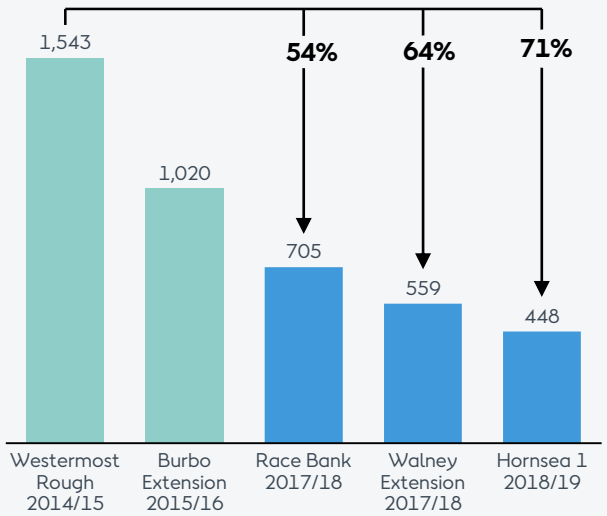
Hornsea 1 has realised a significant IRR uplift (~2.0%-point) since FID excl. FX & power price impact

1. Numbers exclude FX and power price
2. Crew Transfer Vessel
3. Service Operations Vessel

# In addition to bringing down cost, Ørsted also pushes to deliver even faster

## Installation duration (normalised)[1]

Days from first foundation installation to first power of last turbine




- Smaller projects with 32 or 35 turbines each
- Both parks deployed a new turbine platform with delays from suppliers

- Deployment of known turbine platforms
- Continuous installation schedule (i.e. incl. Winter)



1. Calculated as duration from foundation installation start until first power of last turbine scaled to 125 position. Based on full scope

# Our capabilities enable us to handle issues arising on all projects

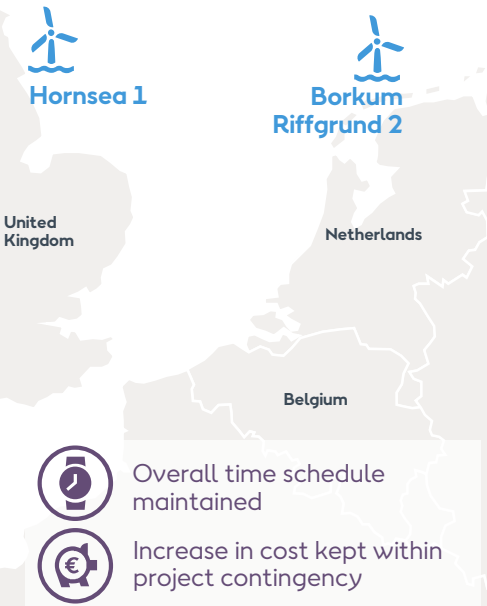
## Hornsea 1

**Issue**

Manufacturing delays, quality and HSE issues for Reactor Compensation Station (RCS) at supplier

**Action taken**

- Early and direct interaction with supplier to resolve issues
- Attempted to incentivise supplier to improve performance
- Qualification of impact on project time schedule utilising on-site Ørsted staff and in-house planning expertise
- Worked stopped by Ørsted several times to address HSE issues
- Scanning market for new supplier(s) to take over work and transportation
- Decision taken to move RCS to new supplier
- Tent erected at new supplier to secure optimal working conditions
- Physical presence at supplier – continuous monitoring and optimising works




Overall time schedule maintained

Increase in cost kept within project contingency

## Borkum Riffgrund 2

**Issue**

Financial restructuring (bankruptcy risk) at supplier of the 20 jacket structures for the suction bucket jackets

**Action taken**

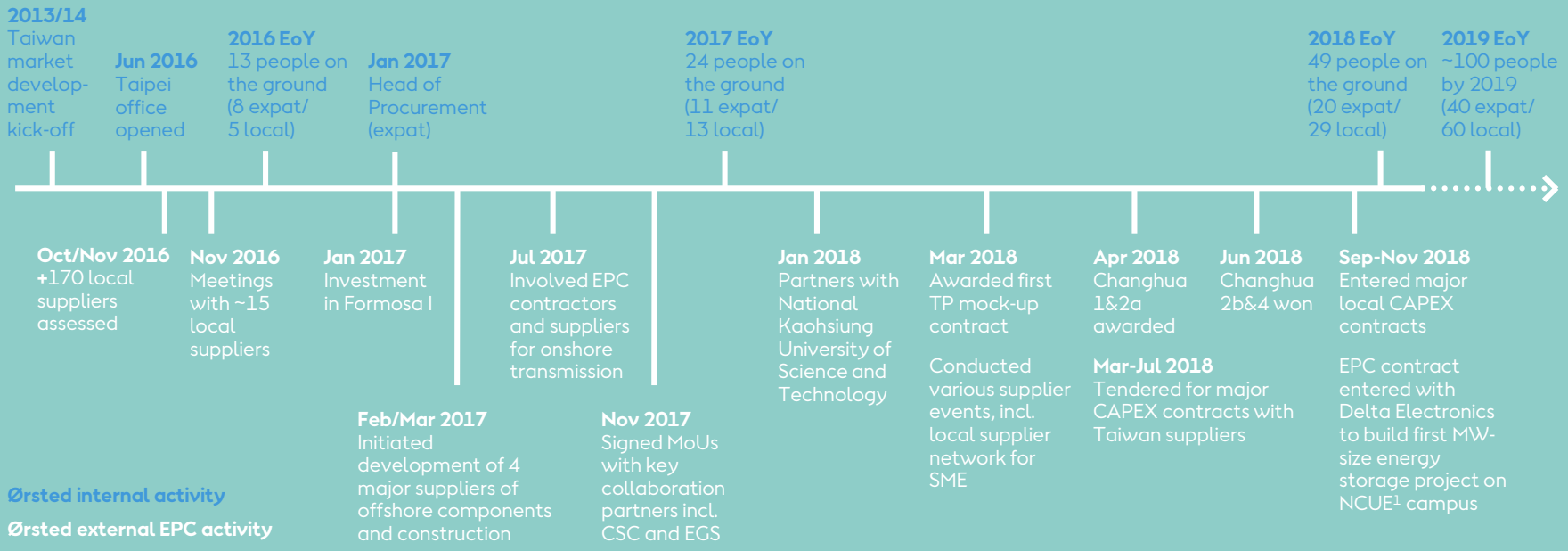
- Task force created to deal with supplier
- Direct negotiations with supplier, owners, banks and other contractors
- Ørsted took over scope to allow supplier to continue with reduced scope
- Frequent visits to supplier by senior project management
- Physical presence at supplier – continuous monitoring of progress and financial situation



Ørsted

# Establishing a presence in a new market takes time and hard work

## Selected key milestones in establishing Ørsted's presence in Taiwan



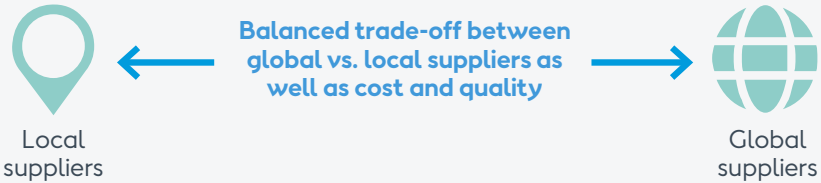



1. NCUE: National Changhua University of Education

# Ørsted's capabilities and in depth knowledge enable the development of the supply chain in Taiwan

### Key parameters within organisation when entering new markets

- Robust and experienced organisation to develop the supply chain in new markets
- Balancing global supply chain opportunities with local supply chain requirements
- Partnering with other important stakeholders in building the offshore wind industry




### Major local contracts entered

| Contract | Supplier | Localisation |
|---|---|---|
| Turbines | Siemens Gamesa Renewable Energy | Locally produced towers and establishing nacelle assembly factory |
| Jacket foundation | Sing Da Marine Structures | 56 jacket foundations |
| Onshore Substation | Taiwan Cogeneration Corporation | Full EPC contract |
| Foundation pin-piles | CSBC Corporation | Significant number |
| Foundation pin-piles | Formosa Heavy Industries | Significant number |
| Array cable installation | Woen Jinn Harbour Engineering | Significant scope |

# Ørsted has a leading EPC and innovation capability in offshore wind

Delivering continuous reduction in LCoE

On time and within budget

Fully capable of delivering in new markets

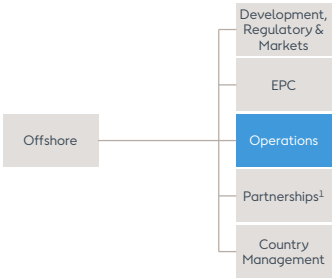


Ørsted

# O&M Excellence

Ørsted

Capital Markets Day
28 November 2018




## Mark Porter

## Senior Vice President, Head of Operations

Born: 1972

Education: BSc(Hons) Engineering & Management (Durham University), MBA (Warwick University), Fellow of the Institution of Mechanical Engineers

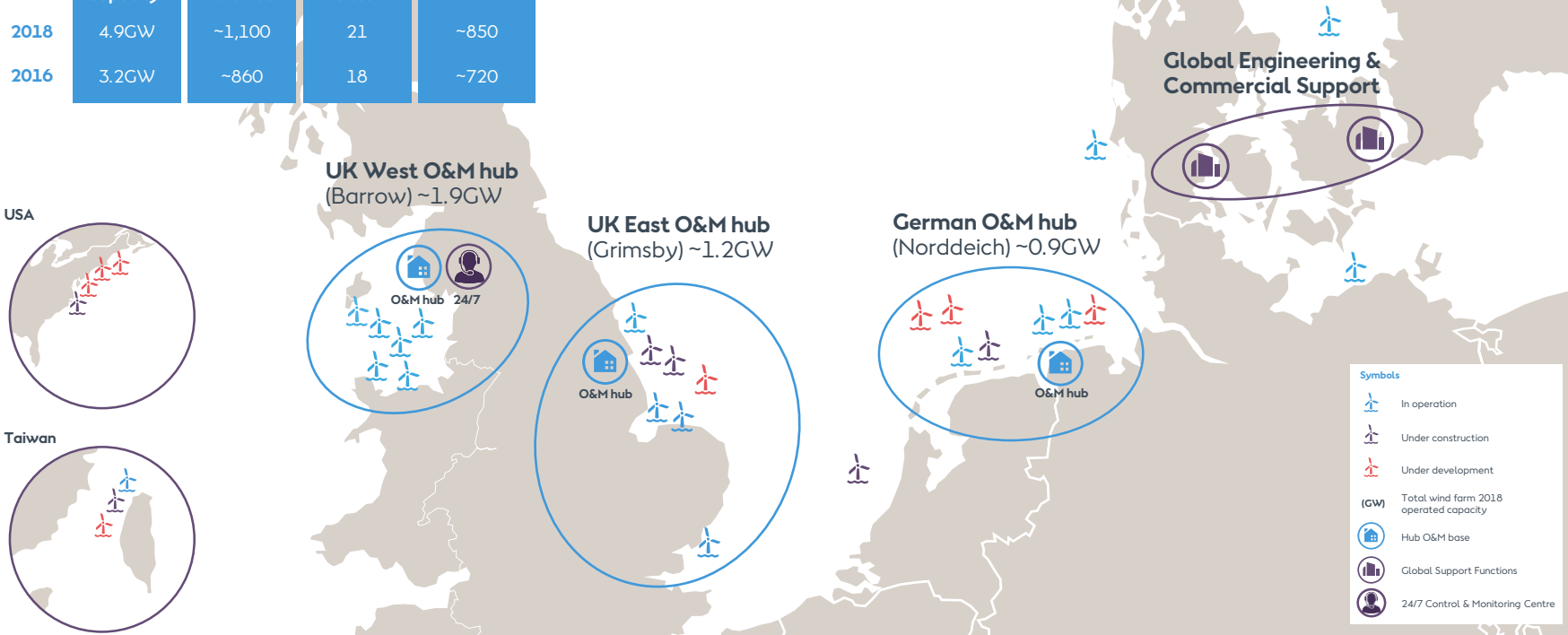
| | |
|---|---|
| **2018 –** | **Ørsted A/S**<br>Senior Vice President, Head of Operations in Offshore |
| **2016 – 2018** | **E.ON Climate & Renewables**<br>Director Asset Management |
| **2014 – 2016** | **E.ON Climate & Renewables**<br>Director Wind Operations |
| **2009 – 2014** | **E.ON Climate & Renewables**<br>Regional Director |
| **1995 – 2009** | **E.ON UK & E.ON Sweden**<br>Various Management Positions |



1. Partnerships & Structured Solutions, Revenue and Asset Management

# Largest offshore wind O&M owner/operator globally with growth of >50% since 2016 and operation across 3 hubs of 1-2GW each

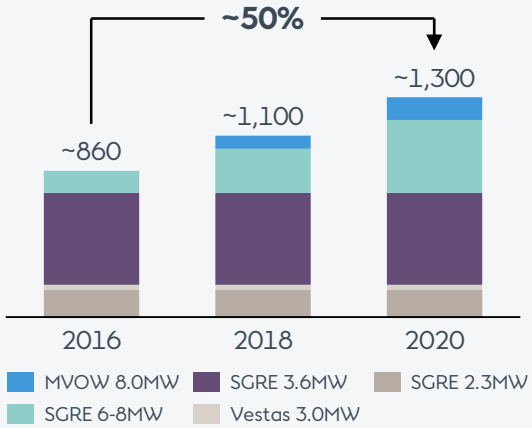
| | Operated by Ørsted | | | Operations FTEs Total |
|---|---|---|---|---|
| | Capacity[1] | Turbines[1] | Sites[2] | |
| 2018 | 4.9GW | ~1,100 | 21 | ~850 |
| 2016 | 3.2GW | ~860 | 18 | ~720 |




1. Turbine capacity operated not equal to capacity constructed by Ørsted (among other due to operation of third party constructed assets such as Lincs Offshore Wind Farm in the UK).
2. Excludes test/demonstration sites.

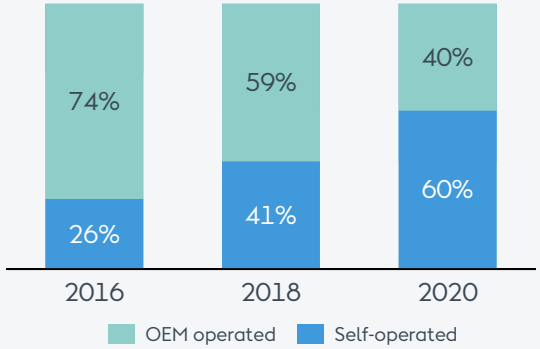
# Portfolio based on few turbine platforms with increasing self-operation share delivering sustainable performance improvements

## Number of turbines in operation




- Portfolio is growing providing substantial scale benefits
- Fleet complexity remains low allowing for deep technical insights (5 turbine platforms from 2 OEMs with majority of turbine portfolio being SGRE 3.6MW turbines)

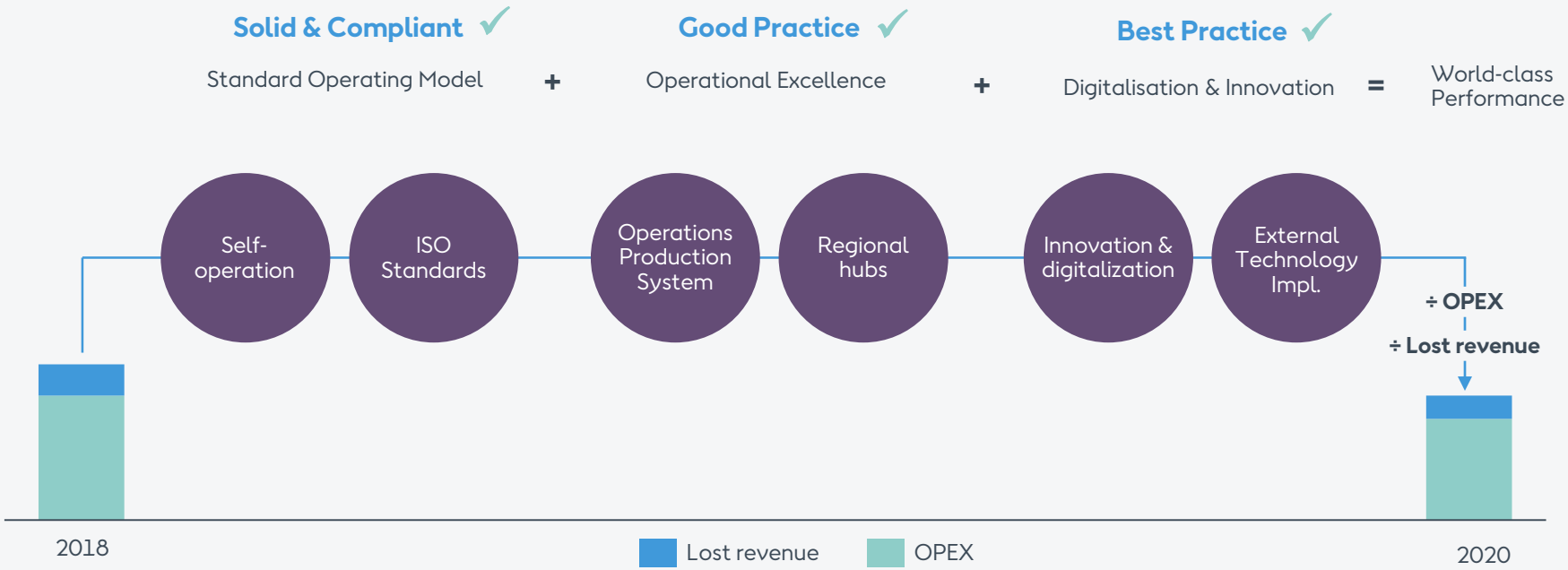
## Share of turbines self-operated




- Share of self-operation is increasing improving ability to drive standardisation, performance improvements, implement hubs, etc.
- Improved ability to implement digital solutions reducing O&M service hours and increasing power from turbines

# Ørsted Operations Framework combines several elements to deliver world-class performance

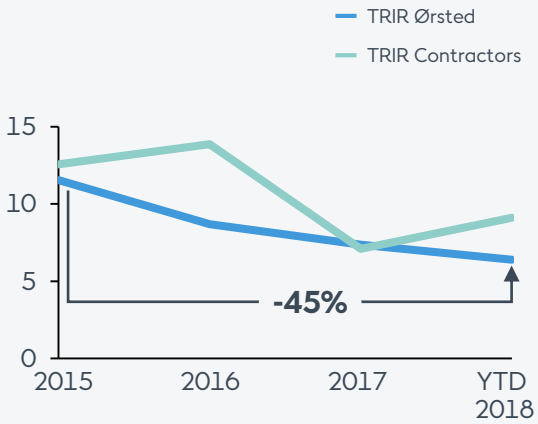
## Ørsted Offshore Operations Framework



# Consistent improvement in safety, yield and cost performance after full take-over of operations from OEMs

## Safety

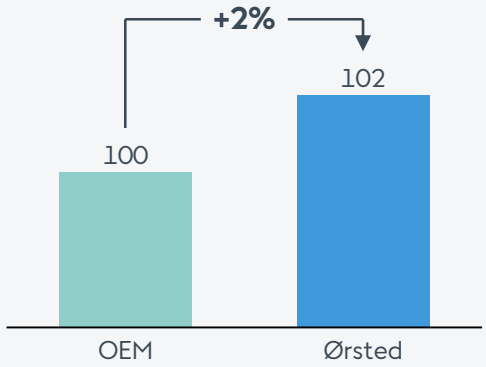
Total Recordable Incident Rate (TRIR[1]), 2015-2018




Ørsted TRIR improved by 45% while contractors improved 28%

## Yield

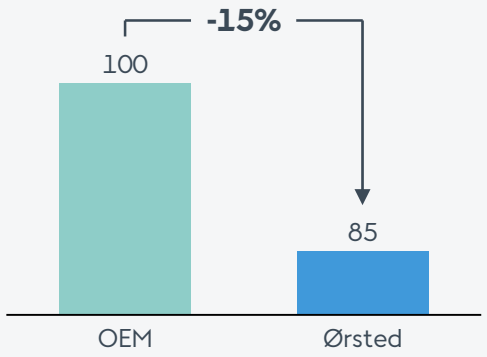
Index, Production Based Availability, portfolio average 2016-2018




Self-operated sites on average sustain 2% higher availability than OEM operated sites

## Cost

Index, OPEX/MW (normalised), portfolio average 2016-2018




Self-operated sites on average sustain 15% lower OPEX/MW than OEM operated sites



1. TRIR: calculated as the number of recordable incidents per 1 million hours worked.

# Standardised (ISO certified) O&M system enabling portfolio wide optimization and a blueprint for globalization

**55001:2014**
Asset Management (O&M & Integrity)

**9001:2015**
Quality Management

**14001:2015**
Environmental Management

**45001:2018**
Health & Safety Management


**6** Sites certified
**148** Work Instructions
**63** Troubleshooting guides
**270** Approved Written Procedures

First operator worldwide to become ISO certified for offshore wind power assets; ISO certified in Asset Management (O&M and Asset Integrity), Quality and HSE management

Full standardisation of workflows and site organisation (roles and responsibilities)

O&M setup transformed from site by site to portfolio optimisation

Centralised development and optimization of maintenance plans, Work Instructions, etc.

- ✓ Control of HSE, risks, compliance and economic performance
- ✓ Portfolio standardisation and optimisation of ways of working
- ✓ Blueprint for future global expansion
- ✓ Differentiating factor for equity partners and their lenders



Ørsted

# Operations 'Production System' implemented delivering operational excellence methods at site

## Industrializing O&M setup

- Performance culture
- Planning excellence
- Process optimization
- Lean mindset

## Example benefits from sites with Production System implemented

Improvement (9 month average comparable periods pre and post implementation)

### Average vessel mobilisation and transport to site

**Before**

**45%**
time used on mobilization[1]

**After**

**32%**
time used on mobilization[1]

**Changes implemented**

- Vessels pre-packed with tools, PPE and spares
- Daily work-plan debrief on vessel
- ~5 minutes mobilisation and departure from dock

### Average production lost during service

**Before**

**20**
MWh /turbine

**After**

**9**
MWh /turbine

**Changes implemented**

- No service on high-wind days
- Faster service (more technicians per service activity)
- Improved bundling of O&M activities

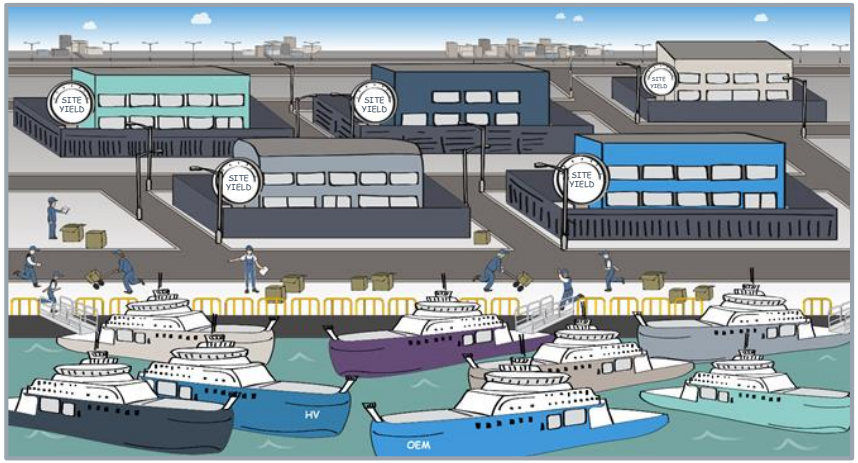


1. Mobilization of vessel as well as transport time. Residual is Productive time

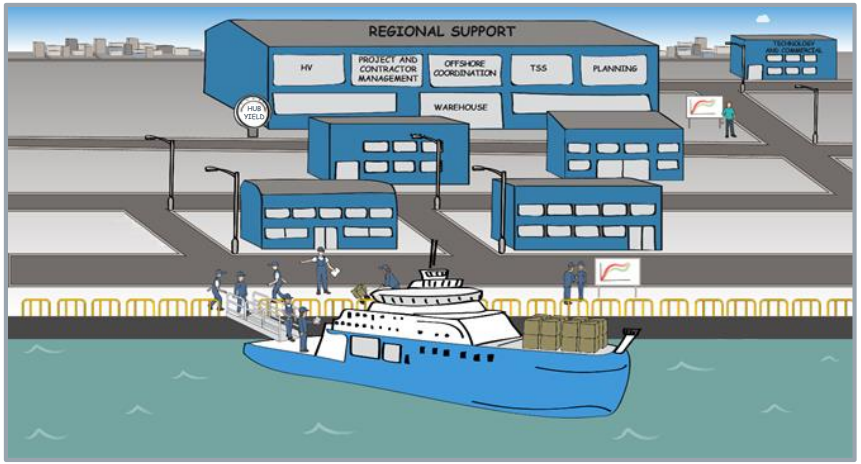
Ørsted

# Regional hub structure being implemented across portfolio to reap full scale and synergy benefit from clusters

## Simple site focus




## Hub focus




### Example hub benefits

Shore-based support organisation consolidated allowing for planning synergies and knowledge sharing

Standardisation of processes/activities and performance optimization across region

Growing cluster capacity allows for investment in better logistics (moving from CTV to SOV[1] based operation)

Reduces time spent on travelling to site and increases access to turbines (improved weather window)

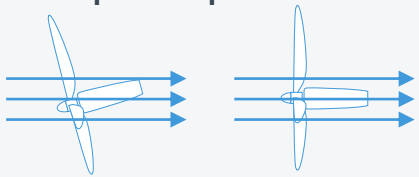


1. CTV: Crew Transfer Vessel. SOV: Service Operations Vessel.

Ørsted

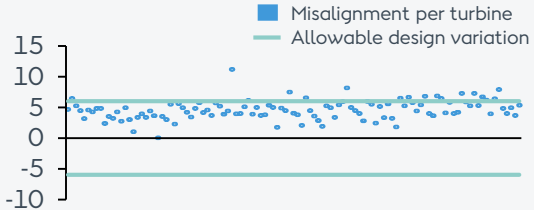
# More than 40 Minimum Viable Products (MVPs[1]) released by the Ørsted Lab in 2018, including solution correcting yaw misalignments

## Situation pre and post solution

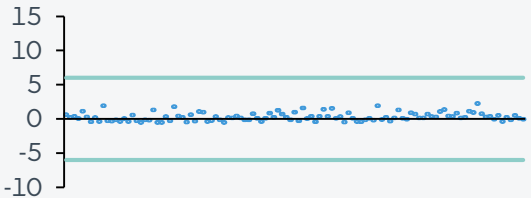


**Example site:**

Turbine alignment (degrees) – pre




Turbine alignment (degrees) – post




## MVP & solution introduced

1. Smart wind sensors installed replacing wind vanes (at low cost) for high accuracy wind speed and direction data capture
2. Turbine yaw misalignment data captured
3. Data used - in the Ørsted Lab developed HYPE (patented) algorithm - to correct yaw misalignment
4. Additional Service agreement entered into with JV partnerships to implement solution at site

## Results achieved

**Uplift in production**

0.2-0.3% for SGRE fleet equal to ~21m DKK in EBITDA[2] per annum

**Additional contract revenue**

From agreements with JV partnerships

**Reduced lifetime integrity cost**

From reduced loads on the structure and components



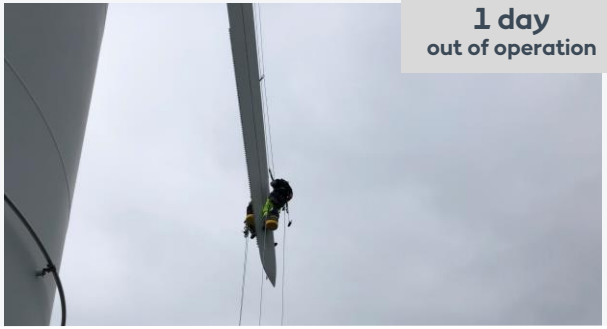
1. MVPs are products/solutions developed using agile workstreams.
2. Equal to Ørsted ownership share from production uplift once implemented for SGRE 3.6MW and SGRE 6-8MW portfolio operated by Ørsted.

# Ørsted fast to identify, assess and implement 3rd party technology developments and innovations

Ex.

Blade inspection

Before



**1 day**
out of operation

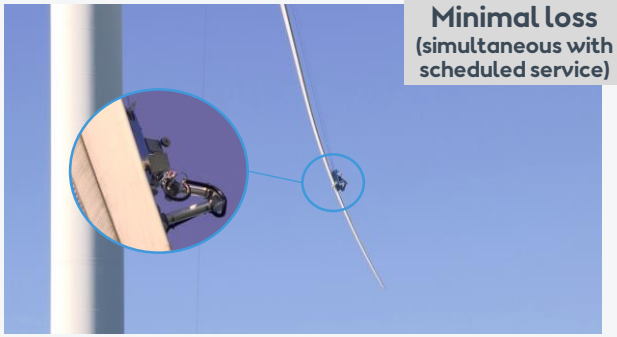
After

**18 min.**
out of operation

Blade inspections now performed via autonomous drones equipped with HD cameras capturing close up blade images

Blade maintenance

**1-2 days**
out of operation



**Minimal loss**
(simultaneous with scheduled service)

Blade maintenance via remotely operated robot currently being tested



Ørsted

# OPEX divided into three different cost categories with very different cost drivers

## Key cost categories[1]

### Owner's cost

Owner's cost
- Seabed and cable lease
- Land lease
- Property damage insurance
- Decommissioning guarantee
- Overhead cost allocation

### Logistics

Vessels
- Vessel rates

Distance to shore
- Distance to site base harbor
- Distance to other operated wind farms

Accessibility
- Weather conditions & sailing restrictions

# Turbines
- Number of turbine positions serviced

### Operations

FTE's
- # service/repair hours
- Salary level in region

Spare parts
- Freq. of spare parts replacement
- Spare parts prices

Jack-up cost
- Vessel rates
- Component weight and effective lifting height

Facility
- Facility setup
- Local environmental requirements

## Examples

Seabed lease costs

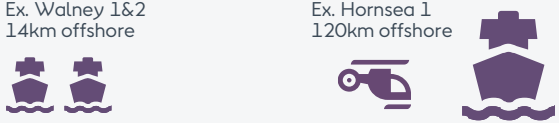
2% of revenue or MWh tariff

No seabed lease cost

**Logistics setup (nearshore vs. farshore)**

**CTV setup**
Ex. Walney 1&2
14km offshore

**SOV & helicopter setup**
Ex. Hornsea 1
120km offshore



**Technicians for scheduled service**

~ Constant
# service hours (and thereby technicians) per WTG position


## Drivers

Cost are primarily driven by country specific factors

Costs are primarily driven by site specific factors such as distance to shore

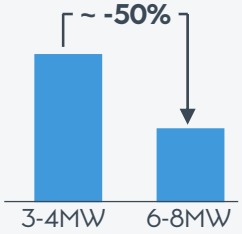
Costs are primarily driven by scale and number of positions



1. Cost categories exclude CoGS (covering TNUoS (wider & local), BSUoS and DNUoS charges).

Ørsted

# Offshore wind OPEX/MW continues to decrease driven by scale and continuous operational optimization

| Categories | OPEX/MW | Development (portfolio level) |
|---|---|---|
| Owner's cost |  | Roughly flat development per MW on portfolio level |
| Logistics |  | Roughly flat development per MW on portfolio level |
| Operations |   | Roughly constant per turbine position on portfolio level |

## Lifetime OPEX/MW guidance

### Guidance given at IPO

**15-17** DKKm/MW Real-2015[1]

OPEX/MW for existing operating portfolio

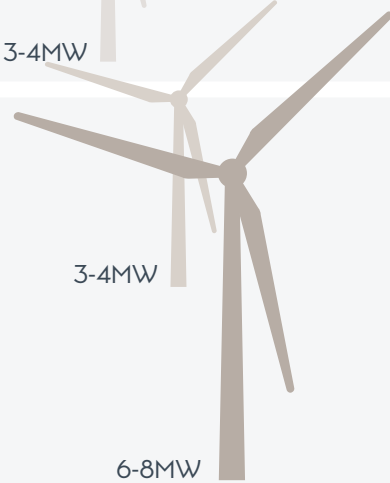

### Guidance given at CMD 2018

**~15** DKKm/MW Real-2019[2]

OPEX/MW for 3-4MW turbines

**~10** DKKm/MW Real-2019

OPEX/MW for 6-8MW turbines




1. Adjusted to real-2019 the range is 15.6-17.7 DKKm/MW.
2. Adjusted to real-2015 the number is 14.3 DKKm/MW.
Note: Difference between real term 2015 and 2019 assumes 1% yearly inflation



Ørsted

# World-class offshore wind operations

Leverage market leading scale to implement industry best practices and technologies

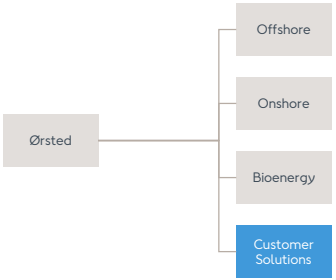
Standard Ørsted Operations framework delivering superior operational performance and platform for global growth

World-class offshore wind operations creating value for our partners and shareholders

# Customer Solutions

Ørsted

Capital Markets Day
28 November 2018




## Morten Hultberg Buchgreitz

## Executive Vice President, CEO Customer Solutions

Born 1967

Education: M.Sc., Business Administration and Computer Science, Copenhagen Business School, 1992

| | |
|---|---|
| **2013 –** | **Ørsted A/S**<br>Executive Vice President, Distribution & Customer Solutions |
| **2013 – 2013** | **Ørsted A/S**<br>Executive Vice President, Energy Markets |
| **2012 – 2013** | **Ørsted A/S**<br>Acting Deputy CEO, Wind Power |
| **2002 – 2012** | **Ørsted A/S**<br>Senior Vice President, Group Treasury & Risk Management |
| **1999 – 2002** | **KPMG**<br>Partner, KPMG Consulting, Financial Services |
| **1995 – 1999** | **KPMG**<br>Consultant, KPMG Consulting |
| **1987 – 1995** | **Unibank / Privatbanken**,<br>Various positions in Intl. Division and in Treasury |

# Customer Solutions is the route-to-market for Ørsted

**Energy generation...**

- Offshore
- Onshore
- Bioenergy

**... packaged as products...**

- Commodities
- Corporate PPA
- Certificates trading
- Balancing Service
- Solutions
- Green gas
- Portfolio management
- ...

**...sold across customer groups**

- Small and medium sized enterprises
- Commercials & Industrials
- Wholesale Markets
- Traded Markets

**Customer Solutions ambition**
We deliver world-class energy solutions to customers as their natural partner in the green transition

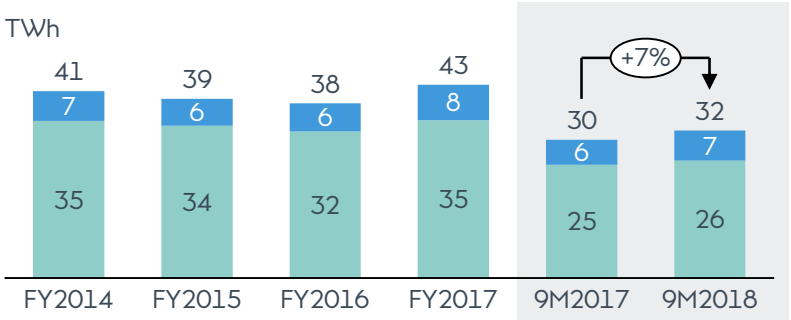


Ørsted

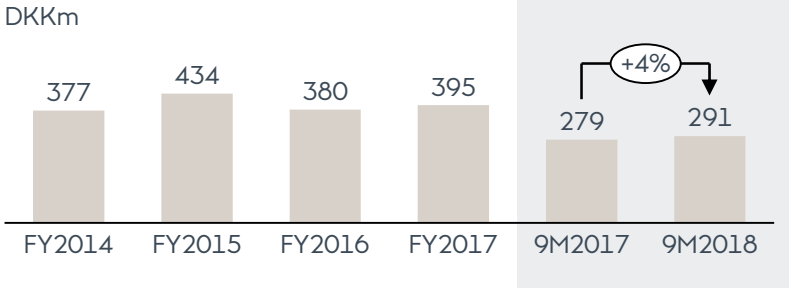
# Commodities: The backbone

## Commodity sales is the foundation...

**B2B sales volumes**[1] Power Gas




**B2B gross margin** Gross margin




## ... for building customer relationships

- Highly competitive market
- Point of access to customers
- Capabilities enable other products

1. B2B sales volumes are for Denmark, Sweden and UK

# Corporate PPA: Mitigates Ørsted's merchant price risk

## Different sources of merchant risk

### Existing offshore wind portfolio (UK)

**UK ROC wind farms**

- Exposed to merchant power prices
- Need to reduce merchant price risk

**E.g. Race Bank[1]**

### Existing offshore wind portfolio

**Wind farms with ending subsidies**

- Exposed to merchant power prices
- Need to reduce merchant price risk

**E.g. Nysted[2]**

### New build zero subsidy offshore wind farms (DE & NL)

**Zero subsidy**

- Fully exposed to power prices
- Need to provide revenue certainty to drive forward new build projects



**E.g. Cluster 1[3]**

## Different markets to mitigate merchant risk

Merchant risk can be mitigated through **traded markets**

Merchant risk can be mitigated by contracts on the **wholesale market**

Merchant risk can be mitigated by corporate PPAs with **C&Is**

Key focus for Customer Solutions to market corporate PPAs to C&Is

1. Race Bank offshore wind farm is an operational wind farm in the UK with a total capacity of 573MW and 50% owned by Ørsted
2. Nysted offshore wind farm has been operational since 2003 and full subsidy expired in 2016 on the DK 166MW and 42.75% owned wind farm
3. Cluster 1 is a development offshore wind farm project in Germany with a total capacity of 900MW



Ørsted

# Corporate PPA framework: Fixed price PPAs with C&Is from Ørsted offshore wind farms

## Fixed price Corporate PPA

Long-term power purchase agreement under a fixed price structure

Customers purchase power from specific offshore wind farm

Green certificates transferred 100% to customers for sustainability claim

Ørsted can balance and shape wind output to match customer consumption

## Customers

### Sustainability focused

- Consumer facing companies (e.g. retail, water, telecoms, food manufacturing)
- Commitment to source 100% renewable (e.g. RE100 companies)
- Link to specific wind farms strengthen CSR communication

### Cost certainty

- C&Is with high power costs and requirement for long term cost control (e.g. machinery and chemical production)
- Minimise exposure to future volatility of power prices

## Benefits

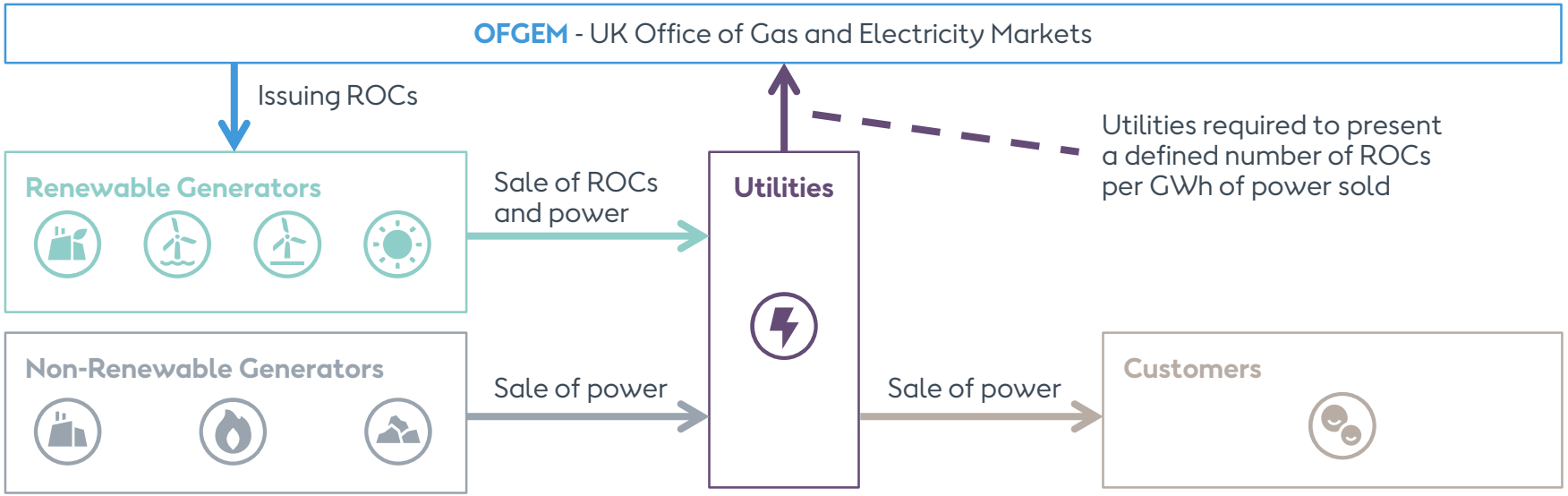
### Ørsted

- Long term price certainty for wind farm power production
- Develops long term customer partnerships

### Customers

- Long term certainty on power costs
- Reduce carbon emissions
- Enable sustainable products (green value chain)

# Certificates trading – ROCs: OFGEM rewards renewable UK assets with tradeable ROCs




- **~100m ROCs** were delivered to OFGEM in 2018[1]
- Renewable assets receive ROCs during the first **20 years** of production
- Last ROCs will be issued in **2037** (no new assets entitled to ROCs since 2017)



1. OFGEM

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# Certificates trading – ROC Auction: Ørsted tenders ROCs from UK offshore wind portfolio

## ROC tender

Annual ROC tender selling excess ROCs from wind farms

**5-7** Billions DKK annual ROC sales

**~13%** ROC market share[1]

## Customers

- UK supply companies
- Without sufficient renewable generation, supply companies will have ROC imbalances
- ROC balance can be obtained by purchasing ROCs from renewable generators with surplus
- Potential imbalances are penalized annually by fees payable to OFGEM

## Benefits

Ørsted
- Effectively sells large volumes with a longer tenure
- Achieves competitive prices

Customers
- Fulfil their obligations towards OFGEM
- Effectively purchase large volumes with a longer tenure



1. ~13m of the ~100m ROCs presented to OFGEM in 2018 were from Ørsted

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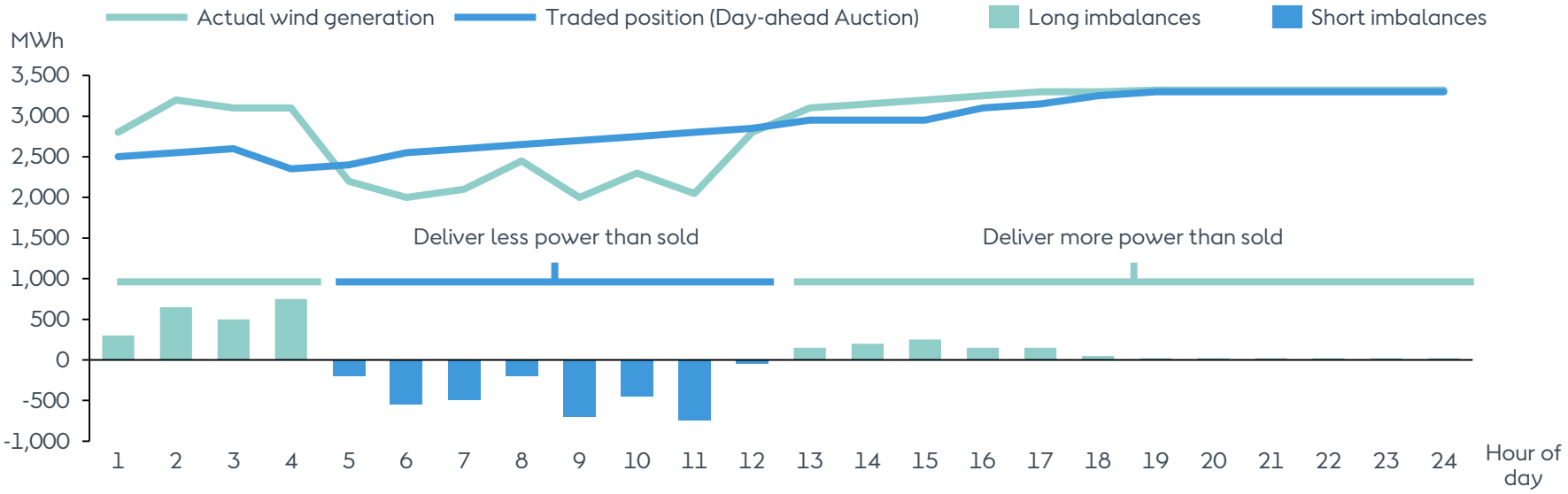
# Balancing Service: Balancing is a cost for power generators




- Actual wind generation creates imbalances settled at varying imbalance prices
- Balancing costs (imbalance income from long positions less imbalance costs from short positions) covered by fee
- Value creation through efficient intraday trading[1], power portfolio size and diversification across generation technologies and geographies



1. Intraday trading is trading after the day-ahead auction which takes place at noon the day before delivery

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# Balancing Service example: Triton Knoll - balances wind farms leveraging our existing setup

## Balancing services to Triton Knoll

15 Year contract

Power route-to-market

Balances and offtakes wind farm's production

No long-term power price risk, only balancing risk

## Triton Knoll

- 860 MW offshore wind farm to go into operation in 2021
- Owners
  - Innogy 59%
  - J Power 25%
  - Kansai Electric Power 16%
- Innogy will operate the wind farm

## Benefits

Ørsted
- Obtains balancing fee less imbalance cost
- Leverages existing systems and processes
- Diversifies own portfolio

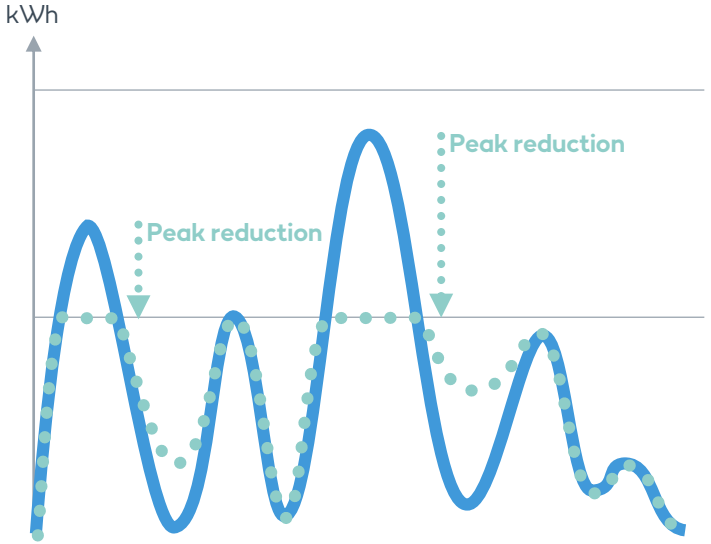
Customer
- Cost efficient route-to-market
- Eliminates imbalance risk

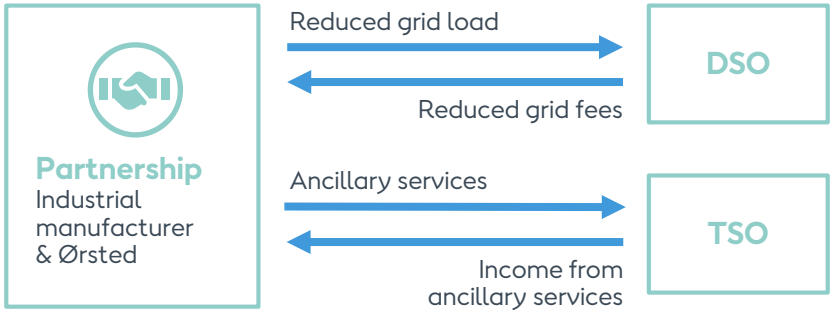
### UK wind power balancing market

- Total annual UK wind power balancing cost is DKK ~1.0bn[1]
- UK wind power capacity expected to grow 8% CAGR from 21GW in 2018 to 36GW in 2025[2]

1. Total balancing cost calculation: Energy produced form UK wind power last 12 months (54.5 TWh, source: Renewable UK) multiplied by wind power balancing costs (avg. €2-3/MWh, source: The European Wind Association) at EUR/DKK exchange rate of 7.46
2. BNEF

# Solutions – peak shaving: Integration of behind the meter technologies reduces grid load




~5,000 German companies hold **peak shaving potential**[1]

Manufacturer and solution provider **share value creation**

Peak shaving solution reduces grid load and costs and offers ancillary services from batteries



1. ~350 German companies have "intensive grid usage" and ~4,500 companies have "atypical grid usage". Both have peak shaving potential, the former a bit higher than the latter

# Solutions – example: Peak shaving solutions for material manufacturer's German sites

## Peak shaving at production sites

10 Year peak shaving contract

Solutions consist of
- Batteries
- PV systems
- Back-up generators

Ørsted finances, installs and operates the assets

Reduced grid loads and reduced grid fees

Ancillary services provided to TSO

## Customer

- Material manufacturer
- Germany-based
- Global production facilities
- Thousands of FTEs
- Annual revenue of DKK billions

## Benefits

Ørsted
- Obtains share of grid fee reduction
- Utilises batteries to provide ancillary services to TSO

Customer
- Grid fee reduction
- Reduces carbon emissions
- De-risks business by leasing energy assets

Solutions financials
- IRR range: High single-digit to mid-teens
- Investment range: Mid single-digit to low-double digit DKKm



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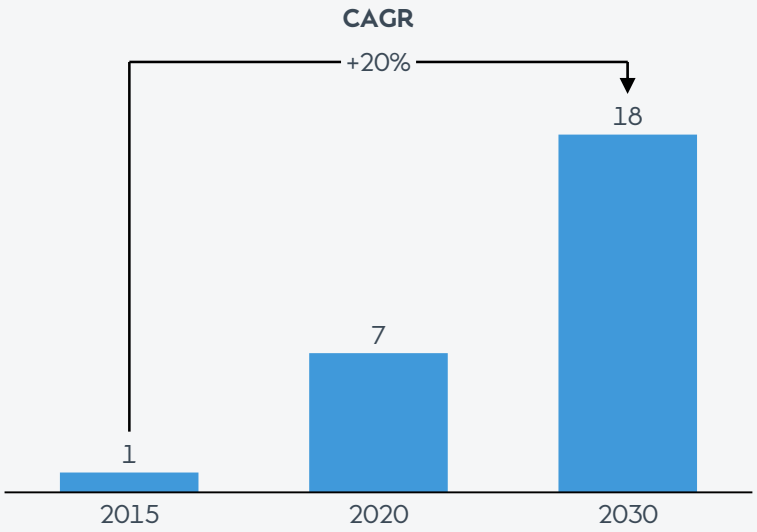
# Green gas: destination fuel in the green transformation

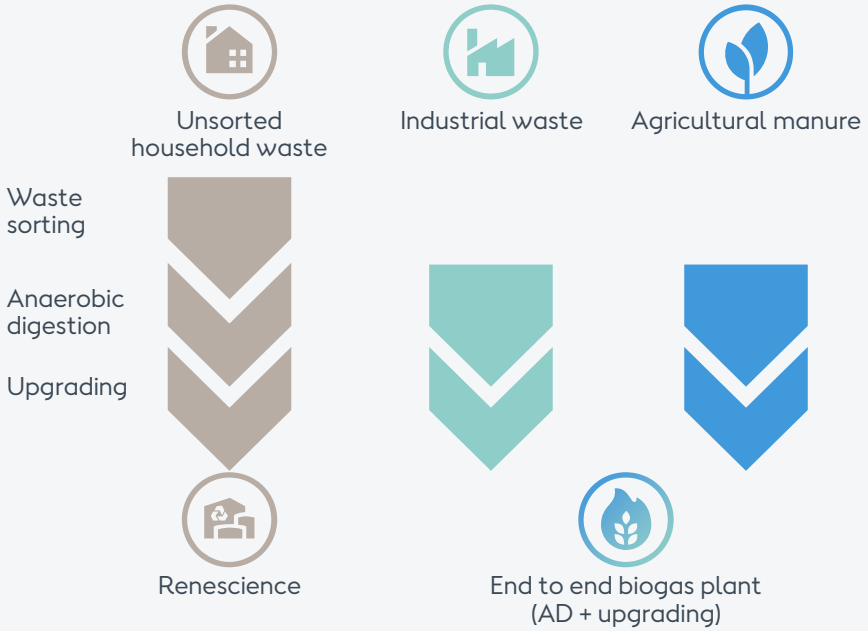
## Biomethane[1] growth expectations are high

Expected annual biomethane supply in the EU, BCM[2]




## Key steps in biomethane production process

Different input sources require different process steps




1. Biomethane is upgraded biogas injected into grid or used in transportation
2. KPMG – Green Biogas for the Future

# Green gas example: Kalundborg Bioenergy – an industrial waste biogas plant

## Annual figures

Capacity: 300,000 tonnes of by-products

**8** Million $m^3$ production of biomethane
(~5t households' consumption)

**17** Tonnes carbon emission reduction

## Customers

- World-leading manufacturer of insulin Novo Nordisk
- World-leading manufacturer of enzymes Novozymes
- Co-owned with operator Bigadan

## Benefits

Ørsted
- Monetize the value in industrial by-products
- Delivers significant carbon savings by replacing fossil natural gas

Customers
- Reduce carbon emissions
- Utilise waste streams to produce green energy

Biogas plant financials
- IRR range: High single-digit to low-teens
- CAPEX (AD + upgrading): DKK 200-400m



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# Ambition to co-create strong, green energy partnerships

**Novo Nordisk and Ørsted partners...**

- **11** Years of climate partnership
- Energy consumption reduced >20%
- **50** DKKm annual energy savings
- Accumulated carbon emission reductions of +200,000 tonnes

**... for a greener future**

- The full power consumption of Novo Nordisk's Danish production facilities has been covered by renewables since 2011
- Partnership with Novo Nordisk supported Ørsted's FID on Horns Rev 2
- In 2018, the Kalundborg Bioenergy plant became operational
- By 2020, Novo Nordisk aims to run all global production facilities on green power



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# Customer Solutions enables Ørsted's green growth

Route-to-market for Ørsted's product portfolio

Mitigates merchant risk through trading and green energy partnerships with customers

Drives incremental profits by supporting customers in becoming greener



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# Financials

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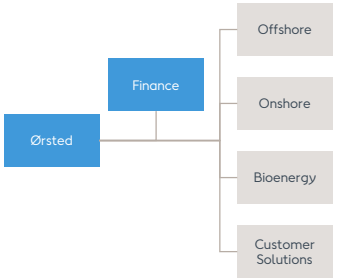
Capital Markets Day
28 November 2018




## Marianne Wiinholt

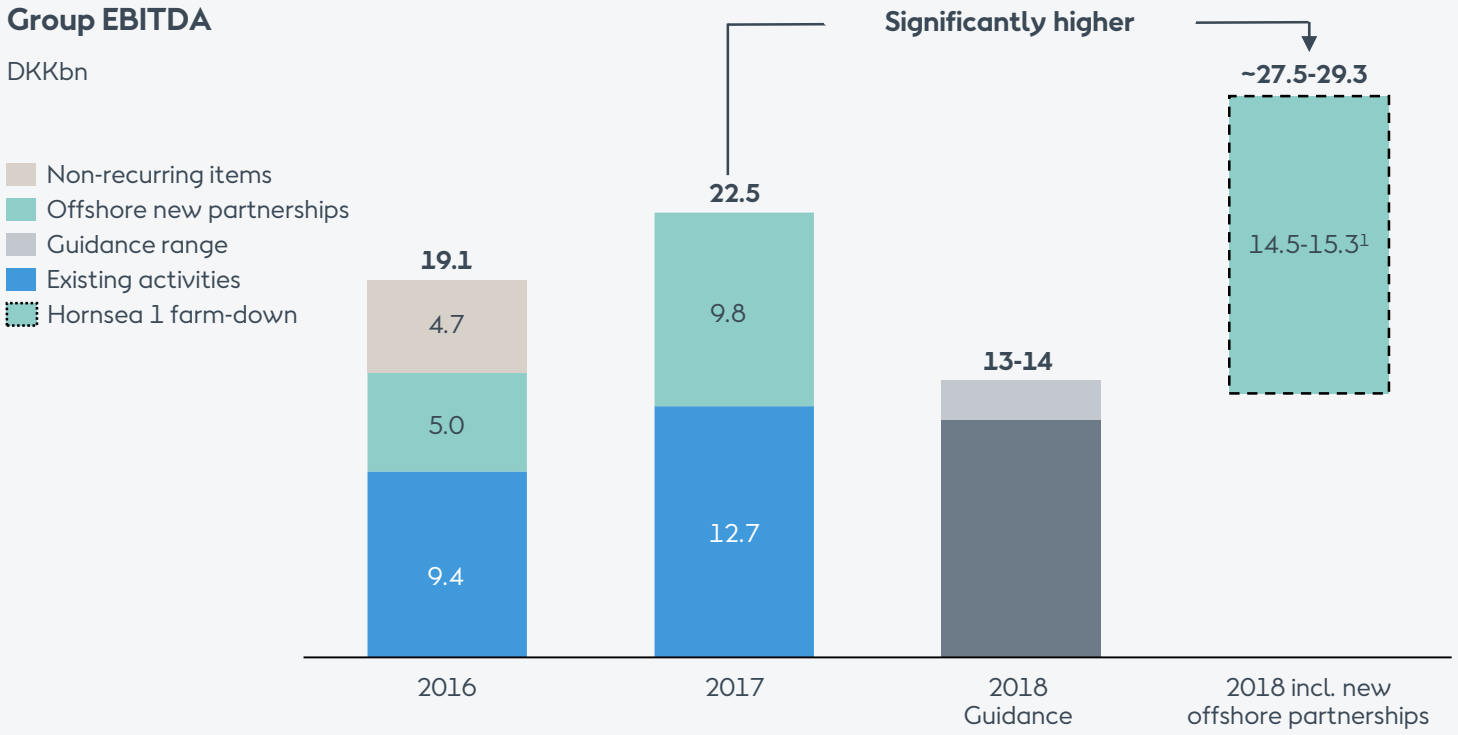
## Chief Financial Officer

Born: 1965

Education: MSc in Business Administration and Auditing, Copenhagen Business School.
State Authorised Public Accountant

| | |
|---|---|
| **2013 –** | **Ørsted A/S**<br>CFO |
| **2006 – 2013** | **Ørsted A/S**<br>SVP, Group Finance incl. periods as Business Unit CFO at DCS & Energy Markets |
| **2004 – 2006** | **Ørsted A/S**<br>VP, Group Finance |
| **1997 – 2003** | **Borealis A/S**<br>Various management positions with Finance |
| **1987 – 1997** | **Arthur Andersen**<br>Accountant |

# Follow-up on 2018 EBITDA

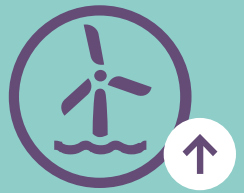



1. Based on expectation to recognise roughly 85% of expected profit of DKK 17-18bn from Hornsea 1 farm-down

# Follow-up on business unit EBITDA and gross investments for 2018

## Business unit directional EBITDA guidance

FY2018 vs. FY2017

| Offshore | Bioenergy | Customer Solutions |
|---|---|---|
|  |  |  |
| Higher | Higher | In line |

### Full year EBITDA 2017

| | | |
|---|---|---|
| DKK 10.8bn[1] | DKK 0.2bn | DKK 2.1bn |

## Gross investments 2018 guidance

**23-25** DKKbn

incl. Lincoln Clean Energy and Deepwater Wind acquisitions



1. Excluding new partnership agreements (Borkum Riffgrund 2 and Walney Extension)

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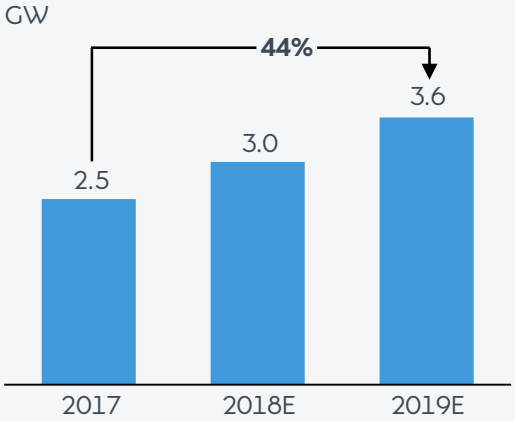
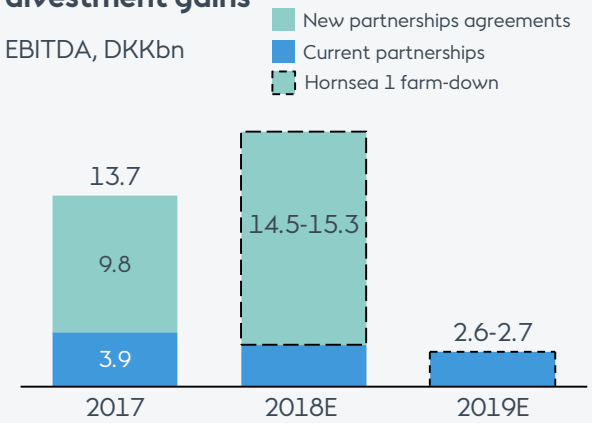
# Offshore financials

## Sites generation capacity



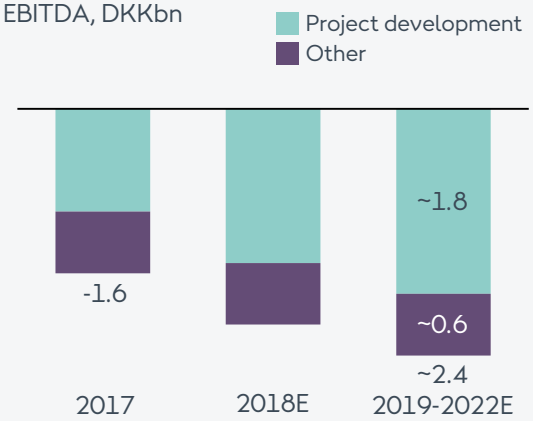

- Earnings from operating wind farms expected to increase driven by ramp-up in generation from:
  - Race Bank, Walney Extension and Borkum Riffgrund 2 commissioned in 2018
  - Hornsea 1 commissioned in 2019
- Increase of 44% in generation capacity from 2017 to 2019

## Construction agreements and divestment gains




- Expected profit from Hornsea 1 amounts to DKK 17-18bn of which 85% will be included in 2018 and the remaining 15% in 2019
- Currently no further farm-downs in Europe expected
- Potential for future farm-downs in Taiwan

## Project development and other




- Expected increased project development costs from 2017 to 2019. Thereafter, stable level expected
- Increase reflects higher level of activities related to market entry in new countries, regimes where FID is taken late in project lifetime and increased build-out ambitions
- All IRRs presented are lifecycle incl. project development costs

# Update on Offshore CAPEX guidance

## CAPEX cost development excluding transmission asset costs

DKKm/MW[1]

### Guidance at IPO

**22.9-25.0**
Real 2019

**22-24**
Real 2015

Average CAPEX/MW for the FID'ed build-out portfolio at IPO[2]

### Updated guidance at FY2017

**20.8**
Real 2019

**20**
Real 2015

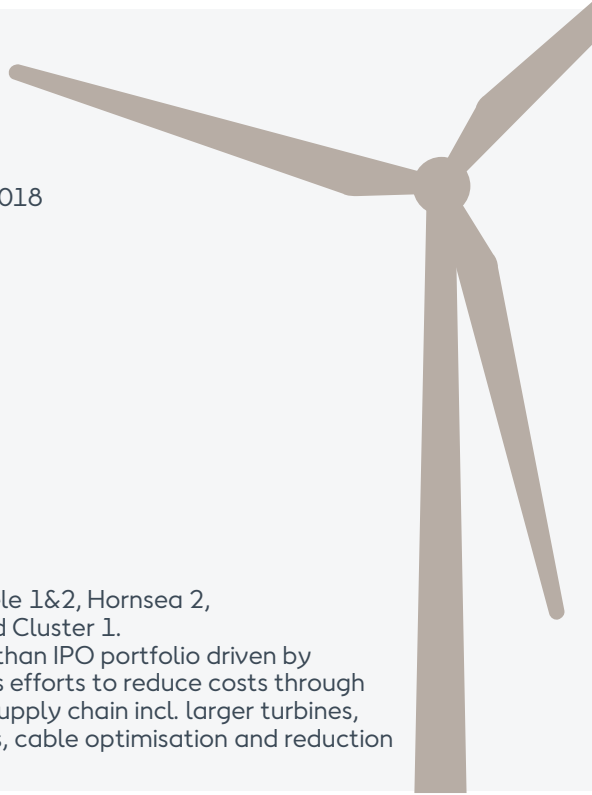
Updated guidance on FID'ed build-out portfolio at IPO[2]. CAPEX/MW lowered as projects have been substantially matured, increasing visibility on CAPEX

### Guidance at CMD 2018

**13.5**
Real 2019

**13.0**
Real 2015

Guidance on Borssele 1&2, Hornsea 2, Gode Wind 3&4 and Cluster 1. Significantly lower than IPO portfolio driven by Ørsted's continuous efforts to reduce costs through maturation of the supply chain incl. larger turbines, foundation updates, cable optimisation and reduction in installation time



1. Capacity weighted
2. Gode Wind 1&2, Burbo Bank Extension, Race Bank, Walney Extension, Borkum Riffgrund 2 and Hornsea 1
Note: Difference between real term 2015 and 2019 assumes 1% yearly inflation

# Significant higher CAPEX for the Changhua 1&2a project in Taiwan

**CAPEX per MW for the Changhua 1&2a project is expected to be approx. twice as high as the CAPEX multiple of European projects under construction and development**

| Factor | Comment | Impact |
|---|---|---|
| **Design revisions** | – Adaptation of key components<br>• Turbines enhanced to withstand typhoons<br>• Piled-jacket foundations to withstand typhoons, earthquakes and poor soil conditions | **High** |
| **Developing supply chain** | – Localisation commitments (e.g. foundations, onshore transmission, towers, etc)<br>– Added costs to suppliers, e.g as part of their efforts to upgrade production facilities and finance new built vessels<br>– Upgrade of harbour facilities | **High** |
| **Transmission** | – Full-scope projects including on- & offshore transmission asset<br>– Costs related to build out of national grid infrastructure | **High** |
| **Installation** | – Longer installation campaign to accommodate delivery of local supply and adverse weather conditions during winter | **Medium** |
| **Transport** | – Transportation of key components from Europe and APAC | **Low** |



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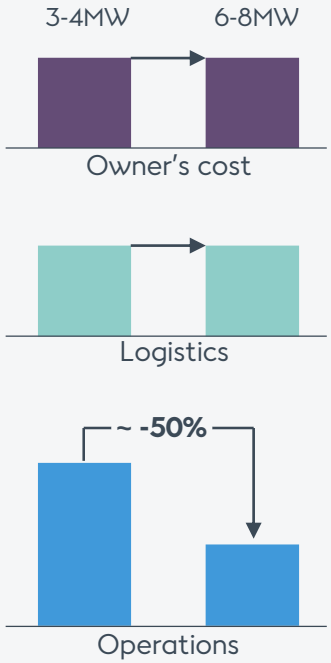
# Offshore wind OPEX/MW continues to decrease driven by scale

## OPEX/MW




## Average lifetime OPEX/MW guidance

DKKm/MW

**3-4MW**

Guidance at IPO

**15.6-17.7**

Real 2019

**15-17**

Real 2015

**3-4MW**

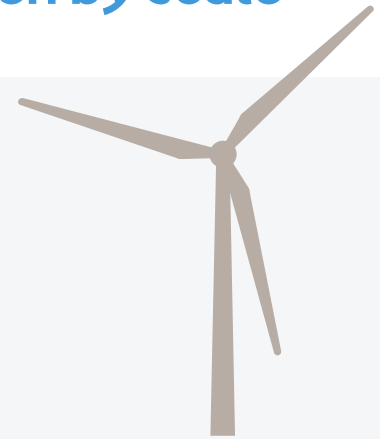
Guidance at CMD 2018

**15**

Real 2019

**14.3**

Real 2015



**6-8MW**

Guidance at CMD 2018

**10**

Real 2019

On a portfolio level the OPEX/MW profile is expected to decrease 2% annually in real terms over the operational lifetime



Note: Difference between real term 2015 and 2019 assumes 1% yearly inflation

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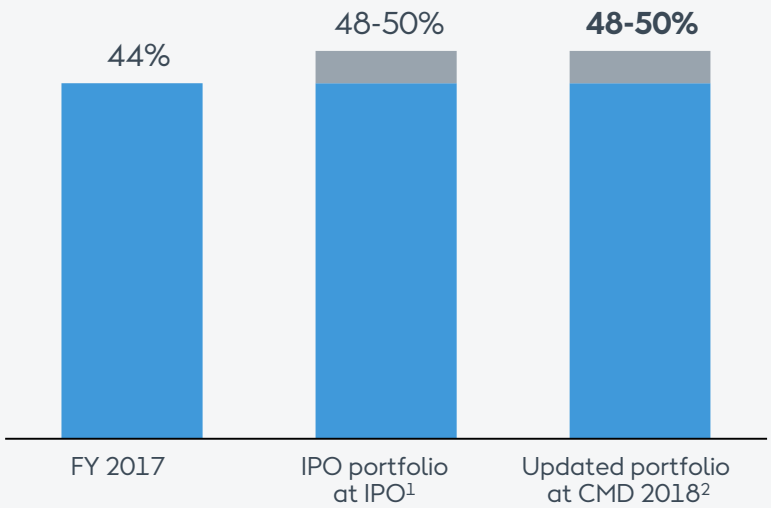
# Strong load factors across Offshore portfolio

## Load factors

Capacity weighted average




**IPO portfolio marked a step-up in load factor**

- Load factor of 48-50%
- Burbo Bank Extension as a negative outlier with lower than average expected load factor

**Updated portfolio with equivalent load factor**

- IPO portfolio with addition of Borssele 1&2, Hornsea 2, German Cluster 1 and Gode Wind 3&4
- Load factor of 48-50% reiterated for the extended portfolio of assets
- Hornsea 1&2 are positive outliers with higher than average expected load factors
- German Cluster 1 is a negative outlier with lower than average expected load factor. Despite high wind speeds the turbine density will have adverse effect on load factor



1. Gode Wind 1&2, Burbo Bank Extension, Race Bank, Walney Extension, Borkum Riffgrund 2 and Hornsea 1
2. Updated portfolio include: IPO portfolio, Borssele 1&2, Hornsea 2, Gode Wind 3&4 and Cluster 1

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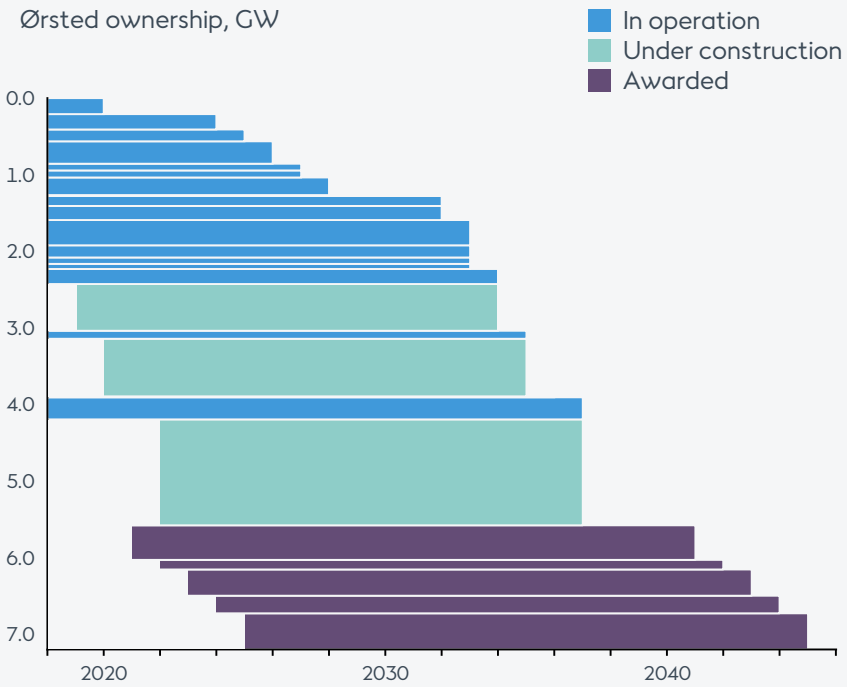
# High visibility on future earnings

## Offshore wind farms – Average subsidy/PPA lifetime




## Key metrics

**~15** years

**Average subsidy lifetime**
Projects in operation, under construction and awarded

**~90** %

**Group regulated and contracted EBITDA average 2019-2025**
Increased from 80-90 percent[1]

1. Based on EBITDA excluding project development cost. Market exposed includes activities related to the portion of wind power generation that is sold at market price and gas & power purchases and sale. Contracted comprises farm-downs from Offshore partnerships and construction agreements, long-term O&M agreements, PPAs and fixed price hedges, long-term ancillary service contracts and income from Renescience project. Regulated comprises subsidised income from wind farms (Production Tax Credits and Tax incentives in the US), income from regulated Power Distribution and Oil Pipe, and income from heat generation under long-term contracts with regulated heat prices

# Onshore Wind key metrics

**Operational portfolio – 813MW**

**~45%** Average historical load factor

**<1.5** USDm/MW CAPEX multiples lower than BNEF 2017 benchmarks

**22** USD/MWh Avg. nominal offtake pricing for operational portfolio[1]




[1]Weighted average including escalation for PPA lifetime

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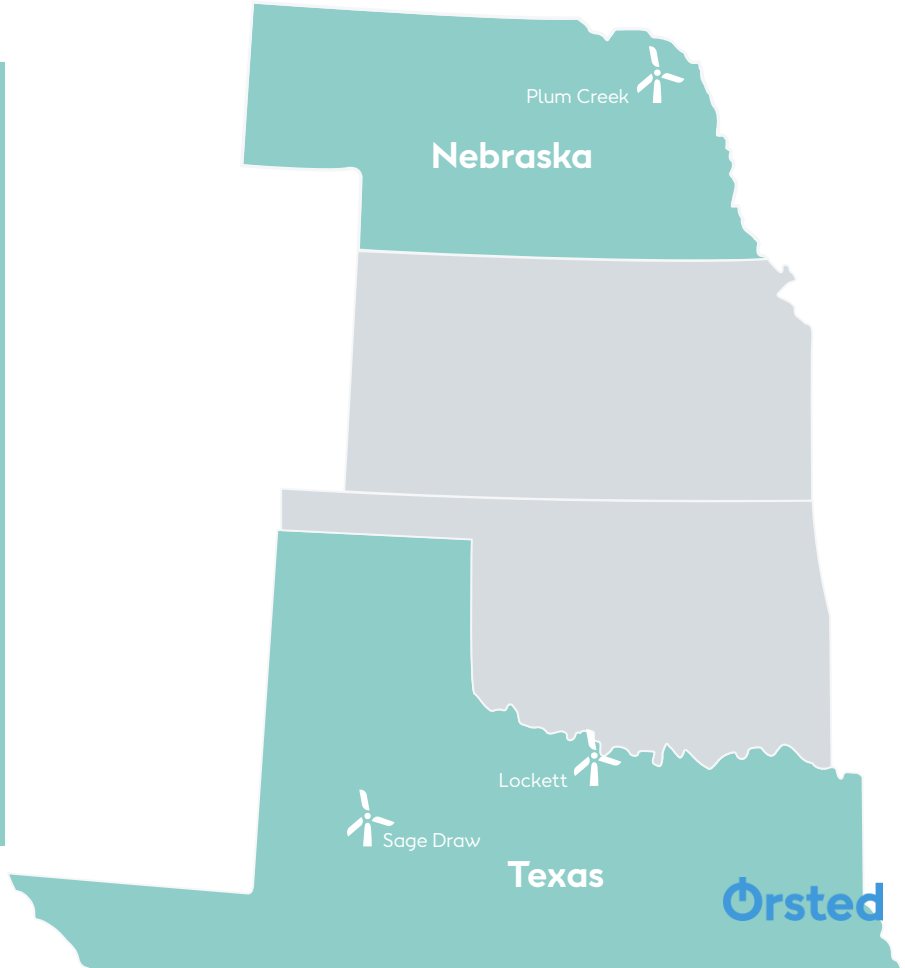
# Onshore Wind key metrics

**Near-term portfolio – 714MW**

**~47** %
Expected average load factor[1]

**<1.2** USDm/MW
CAPEX multiples lower than BNEF 2019 benchmarks

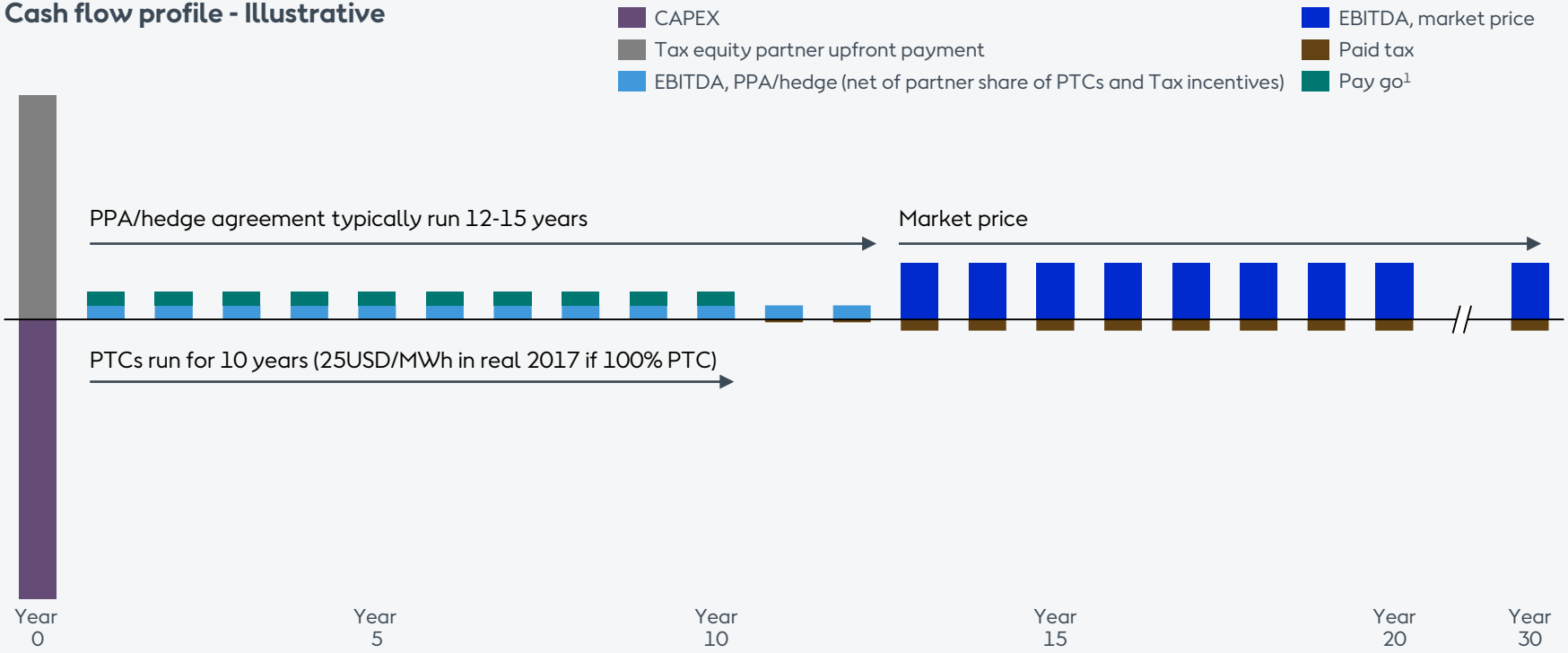
**12-15** USD/MWh
Avg. nominal offtake pricing for development portfolio[2]




1. Weighted average expected load factor
2. Weighted average including escalation for PPA lifetime

# Onshore wind farm including tax equity partner

## Cash flow profile - Illustrative






1. Example assumes a pay go structure. Depending on the project optimisation, a structure where everything is paid upfront is also common. In the this structure there is no risking of PTCs production, and therefore no pay go's

# Onshore Wind – Acquisition, EBITDA and Operating cash flow

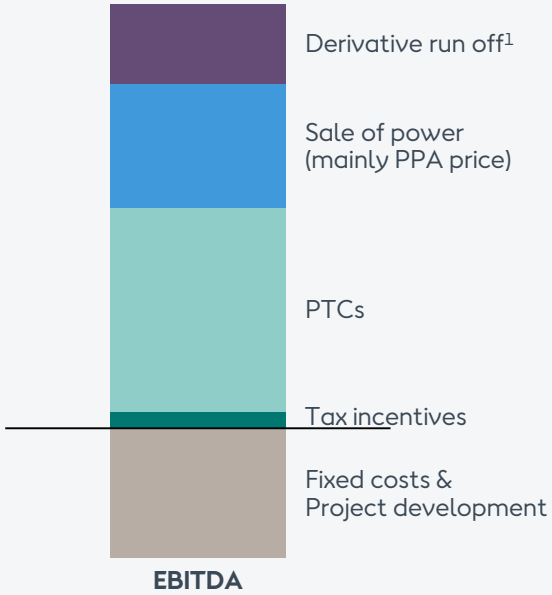
## Lincoln Clean Energy

Deal financials

- Acquired 100% of equity placing an enterprise value on LCE at USD 580 million
- Tax equity end of year estimate amounts to USD 600 million, split between:
  - USD 550 million as NWC
  - USD 50 million as NIBD

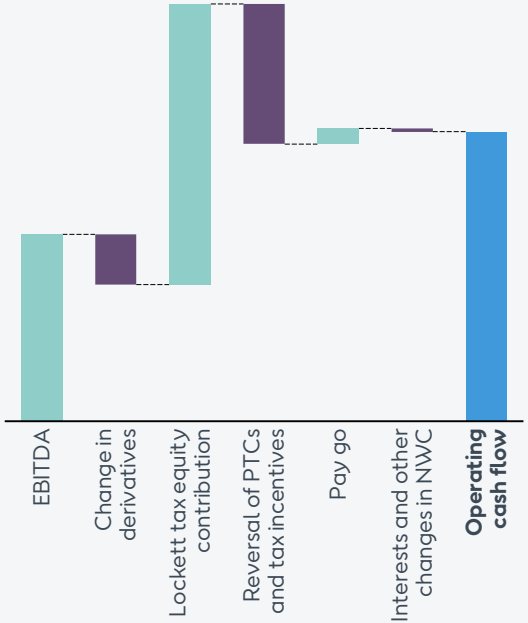
## EBITDA full consolidation

Illustrative 2019




## Operating cash flow

Illustrative 2019



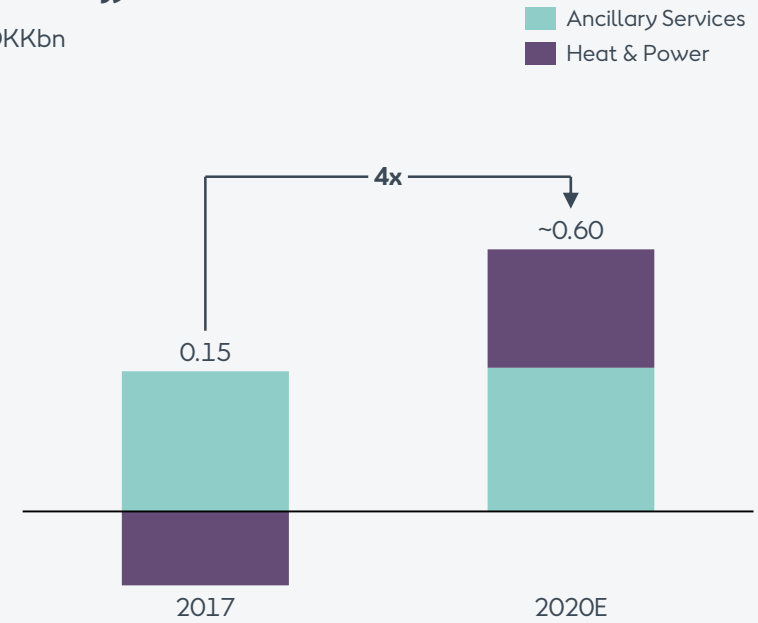



1. The power purchase agreements (PPAs) for Dermott, Willow Springs Tahoka and to some extent Plum Creek, which were entered into at closing of the LCE acquisition, are considered cancelled under IFRS 3, which results in the power being recognised at the market/spot price rather than the price in the PPAs

# Bioenergy expected to quadruple EBITDA from 2017 to 2020

## Bioenergy EBITDA

DKKbn




## Directional 2020 EBITDA guidance

### Heat & Power – Higher

- Recovery in power prices and spreads over the medium-term
- Bioconversions of CHP plants increase EBITDA driven by long-term heat contracts

### Ancillary services – Stable

- Stable EBITDA supported by mid-term manual reserve contract with Energinet until the end of 2020
- Hereafter, the Daily Capacity Auction market is expected to replace the Kyndby agreement for manual reserves in DK2



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# Structural change to Customer Solutions portfolio

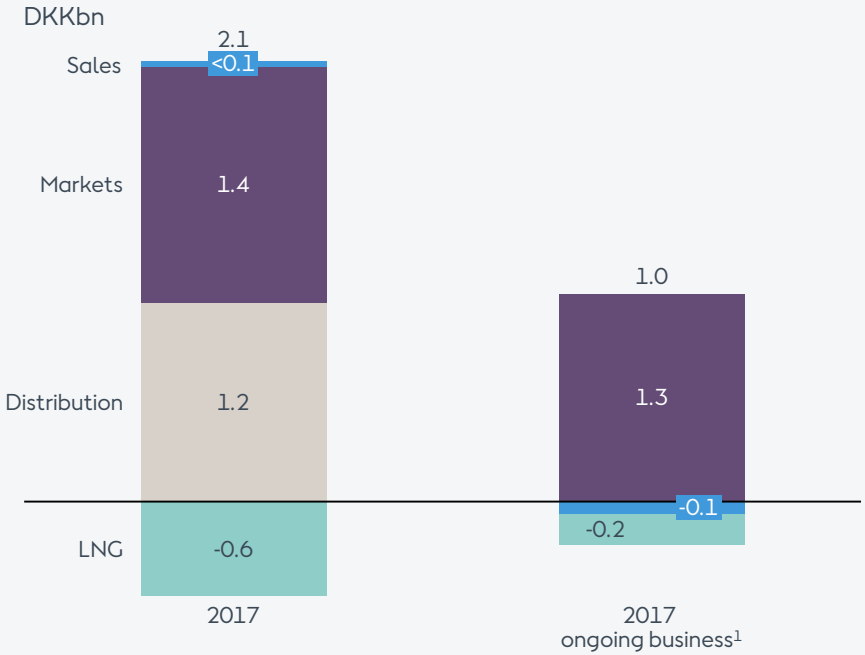
**Strategic divestments**
Power distribution and residential businesses


**Divestments agreed ahead of IPO**
Oil and gas pipeline infrastructure


**Ongoing business**
Enabling Ørsted through market access

# Customer Solutions financials

## Customer Solutions EBITDA




## Mid-term EBITDA expected to be significantly lower

Compared to adjusted 2017

### Markets - Significantly lower

- In 2017 Markets was positively affected by high portfolio and trading gains
- From 2018 negative effect from lower volumes managed following the 2017 divestment of O&G
- Volatile gas prices will continue to impact Markets through valuation of gas storage and gas storage hedges
- Partly offset by higher power volumes from our offshore wind farms

### B2B - Higher

- Earnings from B2B commodity and solutions sales expected to turn positive following business development initiatives

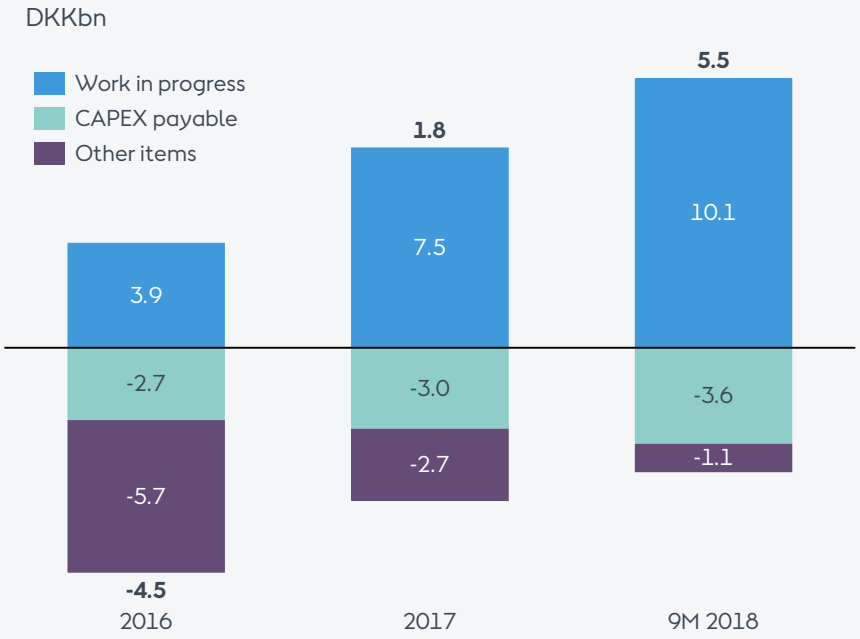
### LNG - Stable

- LNG is expected to stabilise at the 2017 adjusted level going forward
- Continued loss making as earnings from regasification and optimisation of volumes cannot cover capacity payments at the Gate terminal[2]

1. Adjusted for Power distribution (1,164m), Oil pipe (39m), Gas distribution (-3m), Residential Business (68m), City Light (40m), Oil pipe system (39m), Gas pipe system (248m) and adjustments to provision in LNG (-389m) and Markets (-77m)
2. Provision only covers earnings gap related to capacity without long-term sourcing contracts

# Net Working Capital development

## Capital employed - Net working capital




### Work-in-progress

- We tie up significant funds in offshore transmission assets in the UK. The duration of the construction period until divestment is up to 3-4 years[1]
- Construction of offshore wind farms for partners tends to balance over the years (although with fluctuations) as we receive milestone payments from the partners

### Trade payables related to capital expenditure (CAPEX payable)

- These payables form part of our cash flow from investments and will fluctuate with the investment activities

### Other items

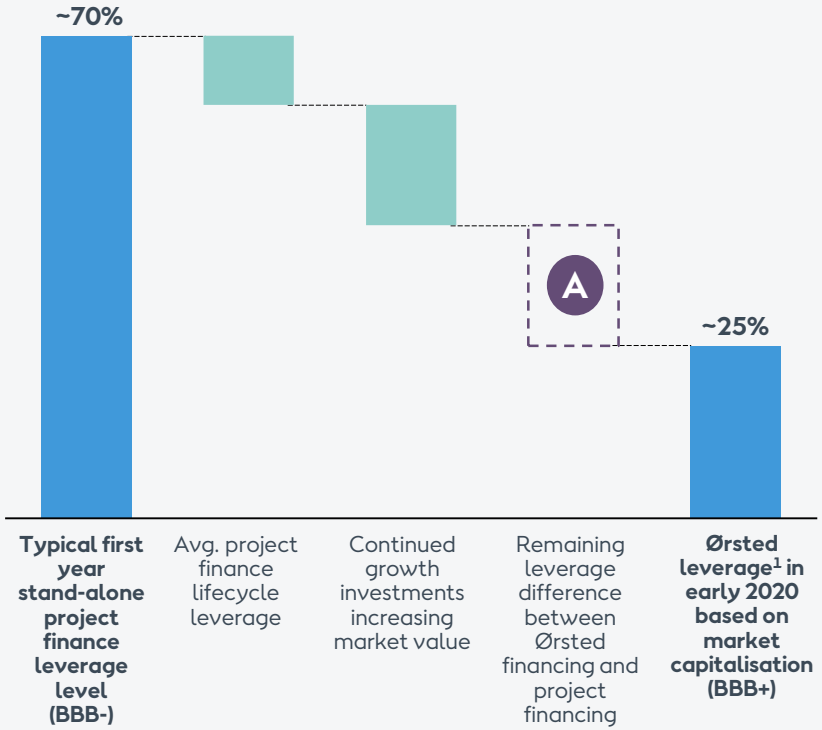
- Standard NWC items such as trade receivables, trade payables, inventories and VAT will fluctuate with the seasons
- Prepayments from heat customers build up during the construction period of our biomass conversions
- Prepayments of approx. DKK 2bn related to grid connection charges in the Power Distribution business will expectedly be divested in 2019

### Tax equity

Tax equity partners' upfront payment (and Pay gos) related to PTCs and tax incentives will be included in NWC during Q4 2018

1. Our project companies in the UK are required to divest their offshore transmission assets to an OFTO within 18 months from the approximate date on which power is first generated from the asset. At 9M 2018, the balance primarily included Race Bank, Walney Extension and Hornsea 1, which we expect to divest in Q1 2019, Q4 2019 and Q1 2021, respectively

# Ørsted leverage compared to project finance




A Lower risk and higher parent rating enables benefits for Ørsted through

| Lower return requirement | Lower direct costs | Flexibility | Business |
|---|---|---|---|
| - Lower company risk profile<br>- Lower credit spreads on debt (discount of 100-120bps) | - Lower structuring and bank fees<br>- Scale in financing activities<br>- PCG's instead of LC's | - Simple and transparent debt structure<br>- No covenants or pledge of assets<br>- No restrictions on construction and operation<br>- Markets for senior bonds more stable | - Easy access to capital in new markets<br>- Long-term contracts, e.g. construction agreements, O&M and CPPAs |



1. Net debt (incl. hybrid capital) to enterprise value

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# Key drivers of long-term wind capture power prices

| | Comment | Correlation | Impact |
|---|---|---|---|
| **Gas, $CO_2$ and coal prices** | Gas, coal and CO2 prices are key when forecasting long-term wind capture prices | Positive |  |
| **Thermal phase-out** | Phase-out of baseload power plants (nuclear, lignite, coal) would increase wind capture prices. Final effect depends on what replaces it as more renewable decrease wind capture prices | Positive |  |
| **Renewable build-out** | Build-out of wind and solar power would decrease wind capture prices | Negative |  |
| **Power demand** | Increasing power demand would increase wind capture prices – and even more so if demand can be shifted in time, e.g. electric vehicles | Positive |  |
| **Interconnector** | Increasing the interconnector capacity between price zones with respectively high and low wind capture prices will decrease wind capture prices in the high price zone and increase in the low price zone | Positive/Negative |  |
| **Electricity storage** | Increasing amounts of electricity storage would increase wind capture prices | Positive |  |



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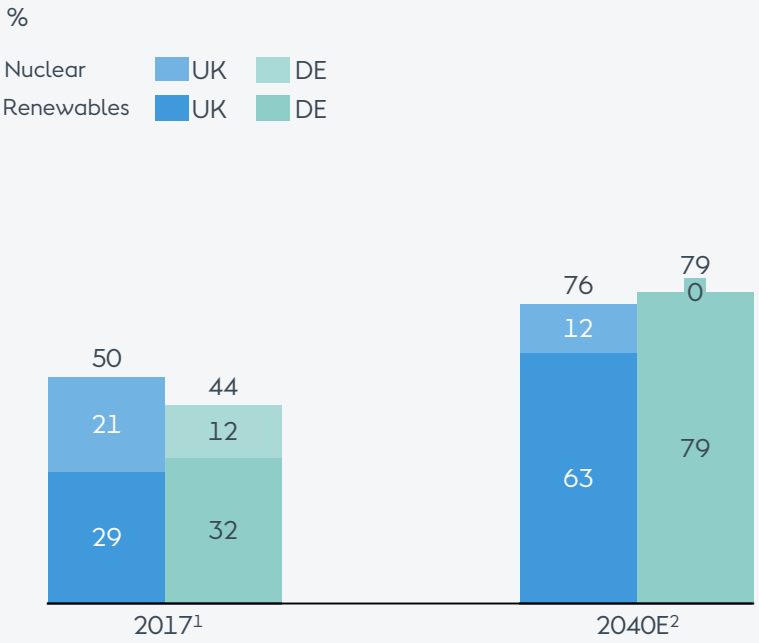
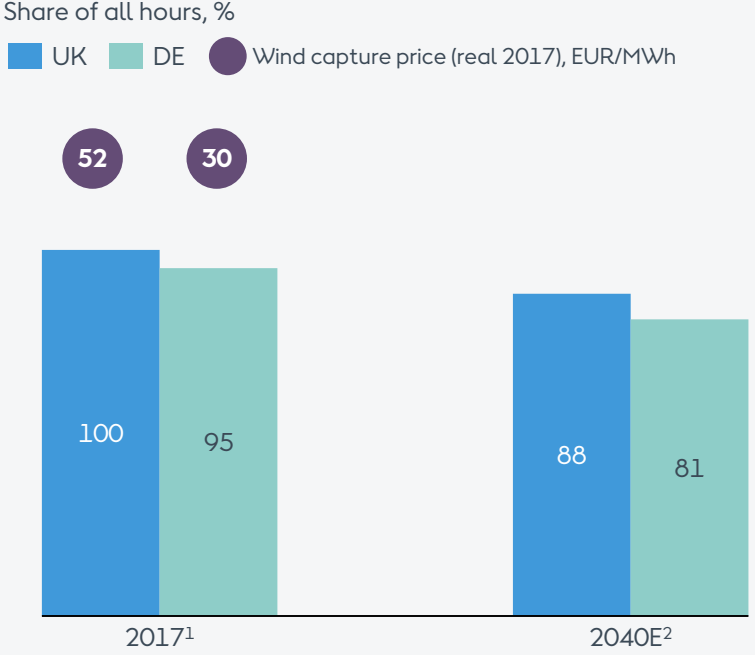
# Fossil fuel expected to be price setting in 80-90% of hours in 2040

## Power generation mix for UK and DE




## Prices above 10 EUR/MWh in UK and DE




1. Source 2017 production mix: Department for Business, Energy and Industrial strategy, UK Energy statistics 2017, AGEB Energy consumption in Germany in 2017
Source 2017 electricity prices: ENTSO-E Transparency Platform https://transparency.entsoe.eu/dashboard/show
2. Source 2040 numbers: © 2018 IHS Markit. All rights reserved. The use of this content was authorized in advance.

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# Key metrics, financial targets and policies

## Financial targets

| | |
|---|---|
| Total CAPEX spend, 2019-2025 | DKK 200bn |
| CAPEX allocation split, 2019-2025 | |
| Offshore | 75-85% |
| Onshore | 15-20% |
| Bioenergy + Customer Solutions | 0-5% |
| Unlevered lifecycle IRR from competitive offshore wind tenders[1] | 7.5-8.5% |
| Average share of EBITDA from regulated and contracted activities, 2019-2025 | 90% |
| Average ROCE, 2019-2025 | ~10% |
| Average yearly growth in EBITDA from offshore and onshore wind farms in operation, 2017-2023 | ~20% |
| Green share of generation, 2025 | 99% |

## Financial policies

| | |
|---|---|
| Corporate rating | Baa1/BBB+/BBB+ (Moody's/S&P/Fitch) |
| Dividend policy | Ambition to increase the dividend paid by a high single-digit rate compared to the dividends for the previous year up until 2025 |



1. Borssele 1&2, Hornsea 2, German Cluster 1, Gode Wind 3&4, Greater Changhua 1&2a, Greater Changhua 2b&4 and Revolution Wind

# Wrap-up

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Capital Markets Day
28 November 2018

# Summing it all up

Leverage industry leading market positions and capabilities in green energy and balance sheet capacity.

Invest DKK 200bn in value creating, global growth towards 2025 with a strong emphasis on wind energy.

Grow dividend by high single digit annually and maintain financial strength and credit ratings.

Deliver long-term return on capital employed of ~10%.

Drive annual operating profit growth of ~20% between 2017 and 2023.

Maintain share of contracted and regulated revenues around 90% providing significant financial visibility and predictability.

Combines into a compelling value creation formula which we believe to be among the very best in the industry.

By 2030, Ørsted will remain a growing and value creating, global powerhouse in green energy with more than 30 GW of installed renewables capacity...

...and our production will be emission free.



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# Appendix

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Capital Markets Day
28 November 2018

# Onshore wind farm including tax equity partner

## Accounting treatment for new wind farms – Illustrative, excl. derivatives run-off

| Impact on accounts | Y0 | Y1 … | Y11+12 | Y13 → |
|---|---|---|---|---|
| Ørsted cash ownership | 70% | 70% | 100% | 100% |
| Ørsted tax ownership | 1% | 1% | 100% | 100% |
| Revenue (full consolidation) | | +100 | +100 | +300 |
| OPEX (full consolidation) | | -75 | -75 | -75 |
| Other operating income | | +250 | - | - |
| Partner's share of PTCs and Pay go | | +200 | - | - |
| Partner's share of tax incentives | | +50 | - | - |
| **EBITDA (full consolidation)** | | **+275** | **+25** | **+225** |
| Interest on tax equity | | -5 | - | - |
| Tax | | - | -5 | -47 |
| NWC | +1.525 | -230 | - | - |
| Upfront payment | +1.525 | | | |
| Pay go | | +20 | - | - |
| PTCs and tax incentives (added-back) | | -250 | - | - |
| **Operating cash flow** | **+1.525** | **+40** | **+20** | **+178** |
| CAPEX | -2.000 | | | |
| **Free cash flow** | **-475** | **+40** | **+20** | **+178** |
| | | | | |
| **Financing cash flow** | | | | |
| Cash distribution from and to equity partner | +75 | -10 | - | - |

**Accounting considerations**

Revenue from years 1-12 reflects presence of long-term, fixed price offtake arrangements, which are required to secure tax equity investments and efficiently monetise PTCs

Partner's share of PTCs and tax benefits fully consolidated into EBITDA

Tax equity partner upfront payment related to PTCs and tax incentives included in NWC and amounts on average to 80% of CAPEX

Deferred contributions (Pay gos) represent the delta between actual PTCs generated and PTCs monetized upfront. Pay go is calculated as delta between actual and risked (approximately 80%) production

Tax equity partner receives PTCs, tax incentives and a small share of operating earnings to achieve an agreed upon return after which the partner exits the project. Partner receives part of operational earnings as cash contributions



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# Structural change to Customer Solutions portfolio

**Strategic divestments**
- Power distribution and residential business

Power Distribution
2017 EBITDA DKK 1.2bn
2017 RAB DKK 10.6bn
Expected 2020 RAB DKK 13.7bn
The leading regulated power DSO serving c. 1 million connections in and around Copenhagen

Sales, B2C
2017 EBITDA DKK <0.1bn
Denmark's largest power and gas sales company with 733,000 power connections and 91,000 gas connections
Operates mainly in Northern Zealand

City Light
2017 EBITDA DKK <0.1bn
Operates and services c. 157,000 street lights across 17 municipalities
Operates in Northern Zealand

**Regulatory divestments**
- Oil and gas pipeline infrastructure

Oil pipe system
2017 EBITDA DKK <0.1bn
Oil pipeline with a total length of 330 kilometers

Gas pipe system
2017 EBITDA DKK 0.2bn
More than 600 kilometers pipeline



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