Building Offshore Wind in Taiwan

Ørsted

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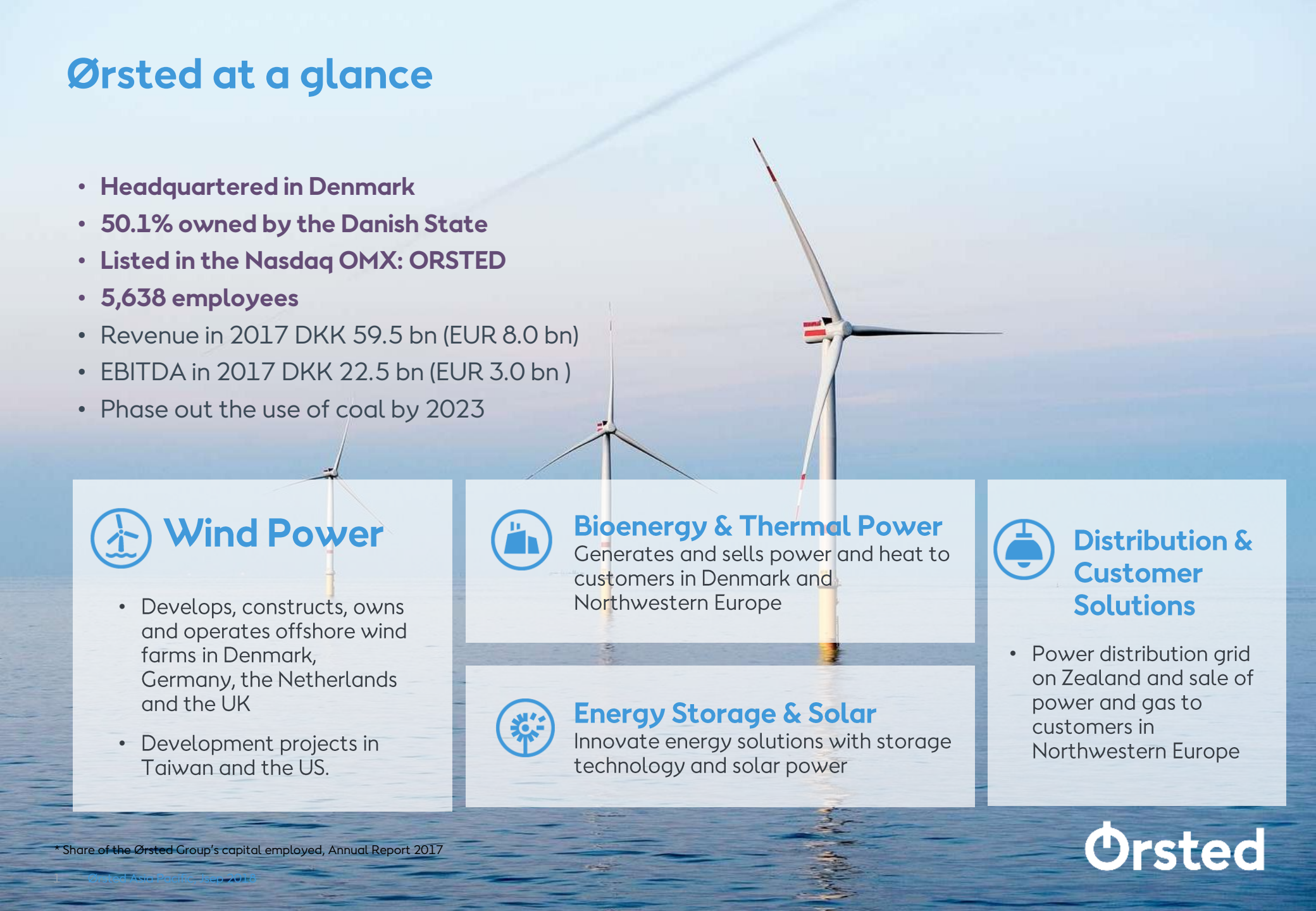
18th Sep, 2018

Ørsted at a glance



- **Headquartered in Denmark**
- **50.1% owned by the Danish State**
- **Listed in the Nasdaq OMX: ORSTED**
- **5,638 employees**
- Revenue in 2017 DKK 59.5 bn (EUR 8.0 bn)
- EBITDA in 2017 DKK 22.5 bn (EUR 3.0 bn)
- Phase out the use of coal by 2023

Wind Power

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

Bioenergy & Thermal Power

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

Energy Storage & Solar

Innovate energy solutions with storage technology and solar power

Distribution & Customer Solutions

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

* Share of the Ørsted Group's capital employed, Annual Report 2017

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

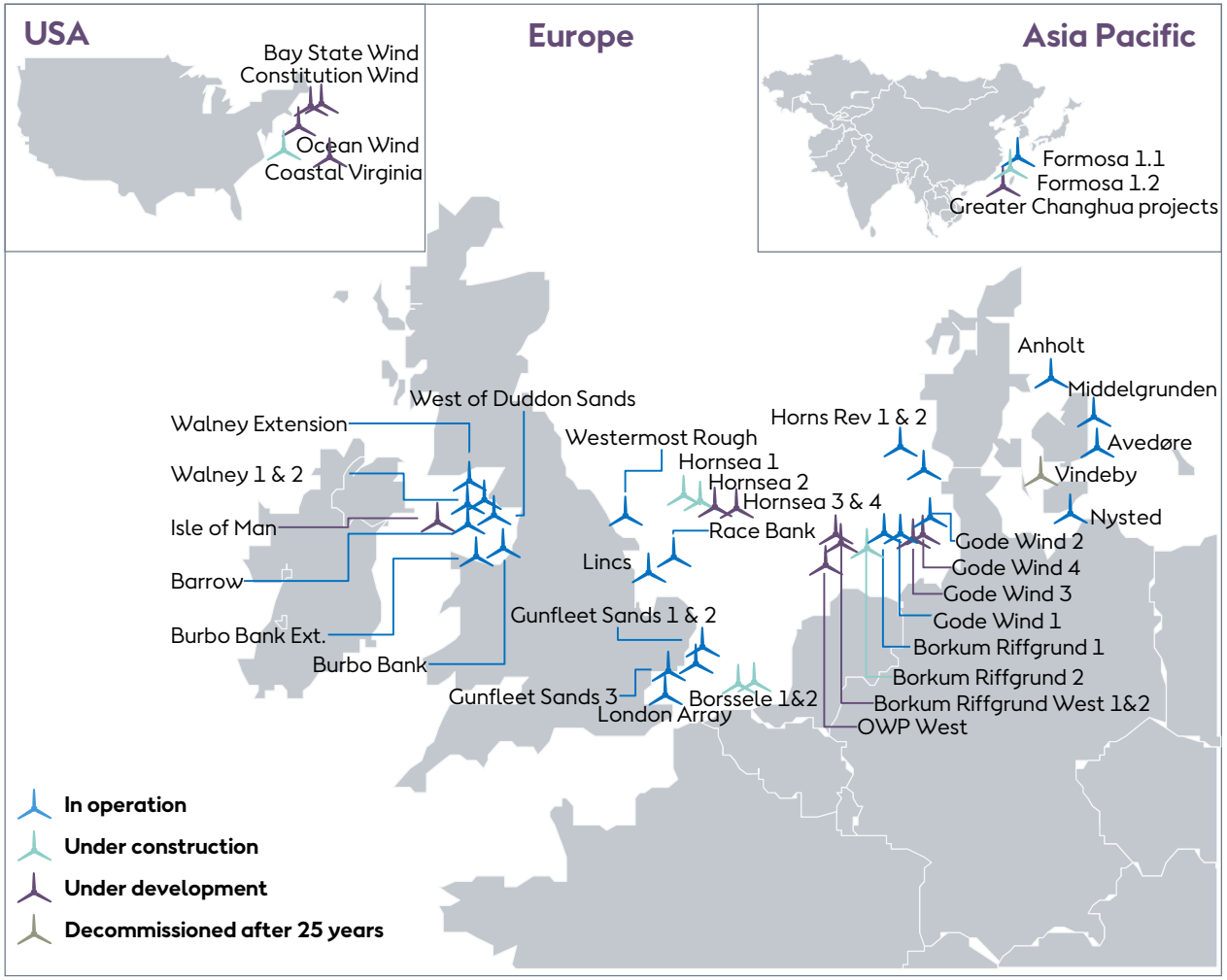
Strong integrated end-to-end business model

Develop → Build → Operate → Own

- 25+ years in offshore wind sector
- Long-term commitment, we enter a market to stay!
- Proven track record in developing local long-term partnerships
- Always built on time, on budget!
- A trusted partner & advisor

Ørsted Offshore Wind Power overview

Global footprint



Unparalleled experience and track record

1991 — **25+ years of experience and track record in the offshore wind power sector** — 2018

24 offshore wind farms in operation

4 offshore wind farms under construction

5.1 GW Constructed capacity

~ 2,300 Dedicated employees

3.8 GW under construction

14 million people with clean electricity

~ 1,200 turbines World's leading operator

19 Partnerships

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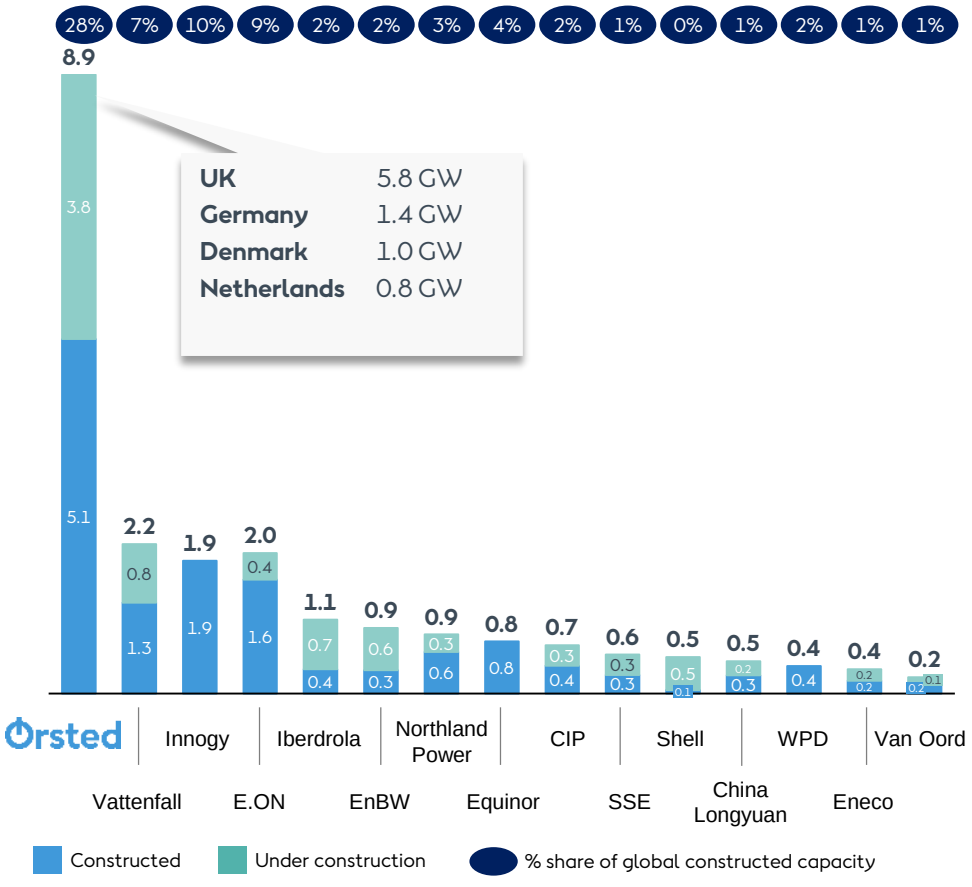
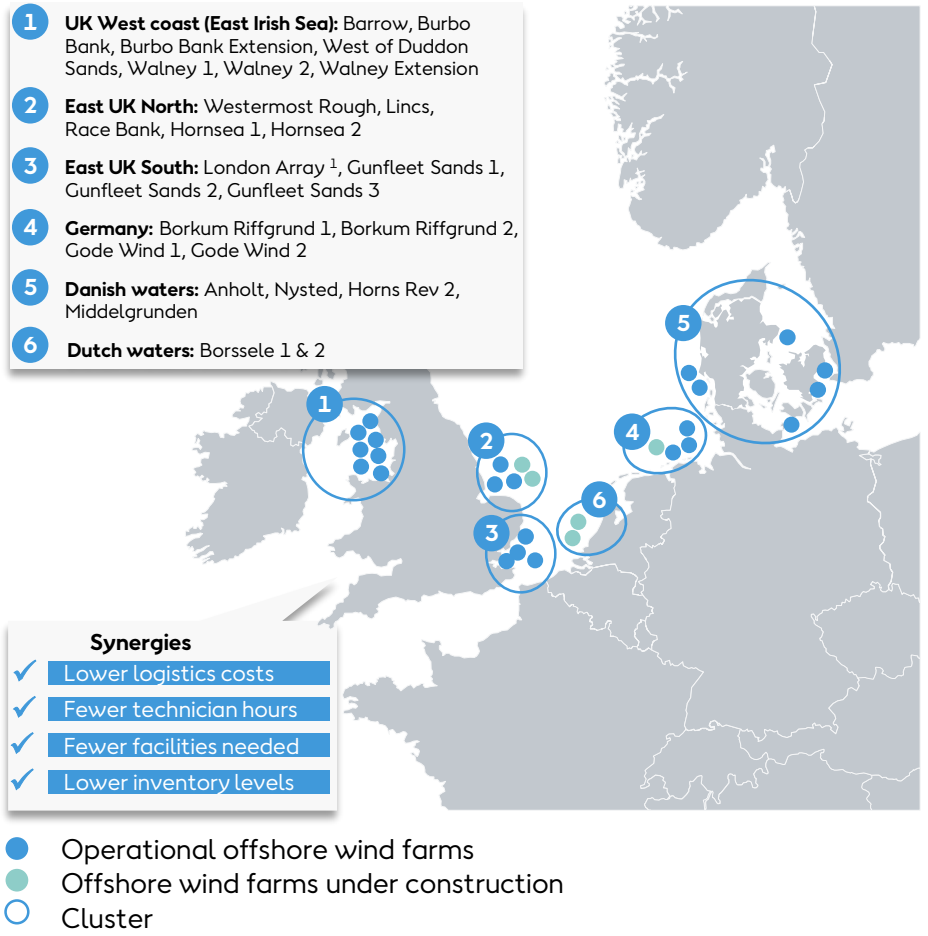
Ørsted as Global leader in offshore wind

Largest offshore wind power player globally today

Global offshore wind capacity, GW



Ørsted Wind Power's scale enables cluster synergies



Source: Bloomberg New Energy Finance, August 2018, Ørsted analysis

Note 1: London Array is operated by London Array Limited

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World's largest offshore wind farm - Walney Extension is bigger than twice the size of Manhattan

Walney Extension produces electricity to power over 600,000 UK homes.
Number of turbines: 187
Generation capacity: 659MW
Commercial operation: September 2018

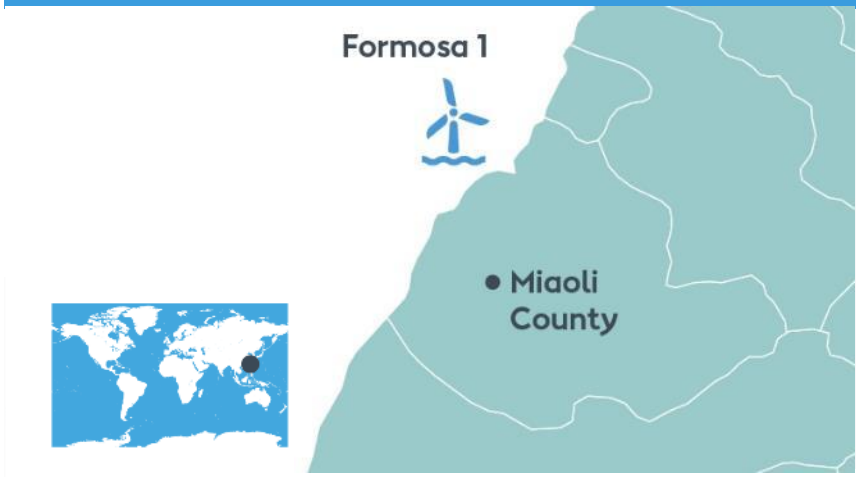
- The wind farm covers an area of 145 km^2 in the Irish Sea, UK.
- Each turbine stands 190m high - about **twice the height of Big Ben**
- Orsted has pledged a **Community Benefit Fund** worth up to £600,000 for each of the wind farm's 25-year expected lifespan.

Formosa 1 Project – Gaining first hand offshore wind financing experience in Taiwan

Ownership structure

- Ørsted: 35%
- Swancor: 15%
- Macquarie: 50%

Wind farm location



Project highlights

- The 1st offshore wind farm in Taiwan (demonstration project)
- Distance to shore: 2-6 km
- Water Depth: 15-32 m
- Capacity: 128 MW

  Phase I 8 MW (2 x 4 MW) completed in Apr 2017

  Phase II 120 MW (2 x 6MW) to be installed in 2019

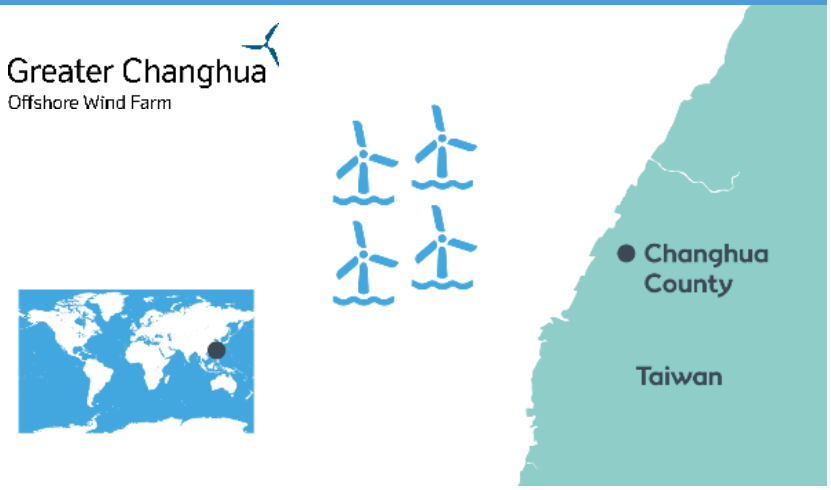
- Signed Phase II PPA with TaiPower in Dec 2017
- Financial close in Jun 2018

Greater Changhua projects – Large-scale offshore wind power plants for Taiwan's green energy future

Ownership structure

- Ørsted: 100%
- Local investors and partners to come in post FID

Wind farm location



Projects highlights

- Large-scale offshore wind power plants
- Distance to shore: 35-60 km
- Water Depth: 30-45 m
- Development timeline1 for 1.82 GW pipeline

900 MW awarded through grid application

- Onshore construction work to start 2019
- First power for each project: 2021+

920MW won in auction

- Onshore construction work to start 2023
- First power for each project: 2025

[1] subject of further permitting and final investment decision (FID)

Taiwan as Ørsted's hub for Asia Pacific has grown significantly over the last 2 years

- Established Taipei office as the APAC hub in May 2016
- APAC team growing to over 30 employees, >50% local employees

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Frontrunner to develop large-scale offshore wind farms in Taiwan

Since late 2014
Taiwan market development

Oct 2016
Business alliance, LoI with MOEA

Nov 2016
Taiwan office inauguration
MOU signed with ITRI

Dec 2016
MOU with Changhua County Government

Jan 2017
Joint venture entered with Swancor & Macquarie

Feb 2018
CHW1-4 EIA approval

April 2018
CH1-2 900MW Grid allocation

Apr 2018
FOW1 Phase 2 FID

Jun 2018
CH2-3 920MW Grid allocation

Jun 2018
FOW1 Phase 2 Financial close

Nov/Dec 2018
EP, PPA
Localization

Q1/2 2019
FID GCW1/2a projects

2019
FOW1 COD

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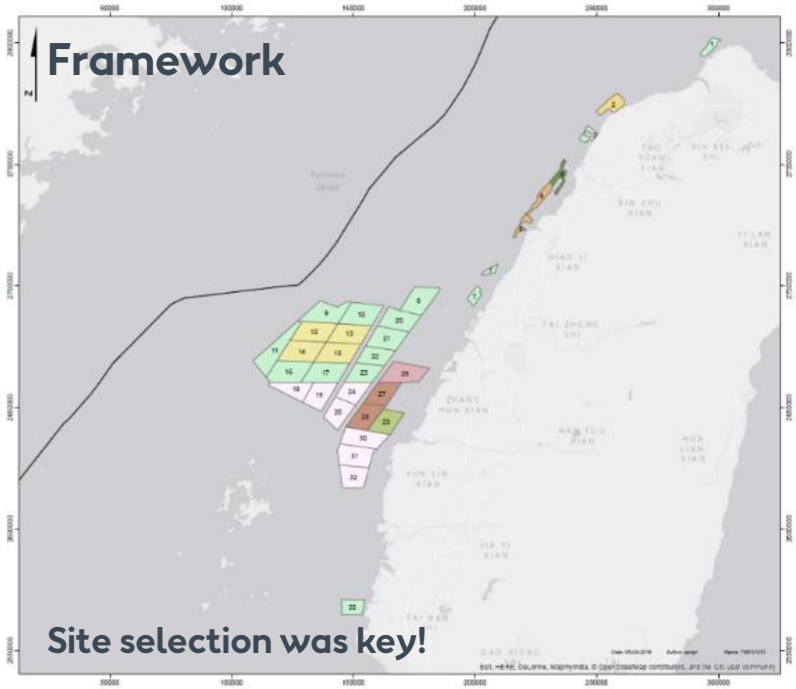
Taiwan has developed into the front runner .... And will benefit tremendously

Why is that?
Ambitious renewable targets, clear regulations and site selection process encourage investment in offshore wind

Fundamentals

- Taiwan **is heavily reliant on fossil fuels** and 98% of Taiwan's total fuel supply in was imported.
- Taiwan has furthermore no interlinks to other countries
- 2/3 of Taiwan is covered by mountains and forest
- The sites have **high wind speeds** of approx. 9-11 m/s, low water depth and are relatively close to shore



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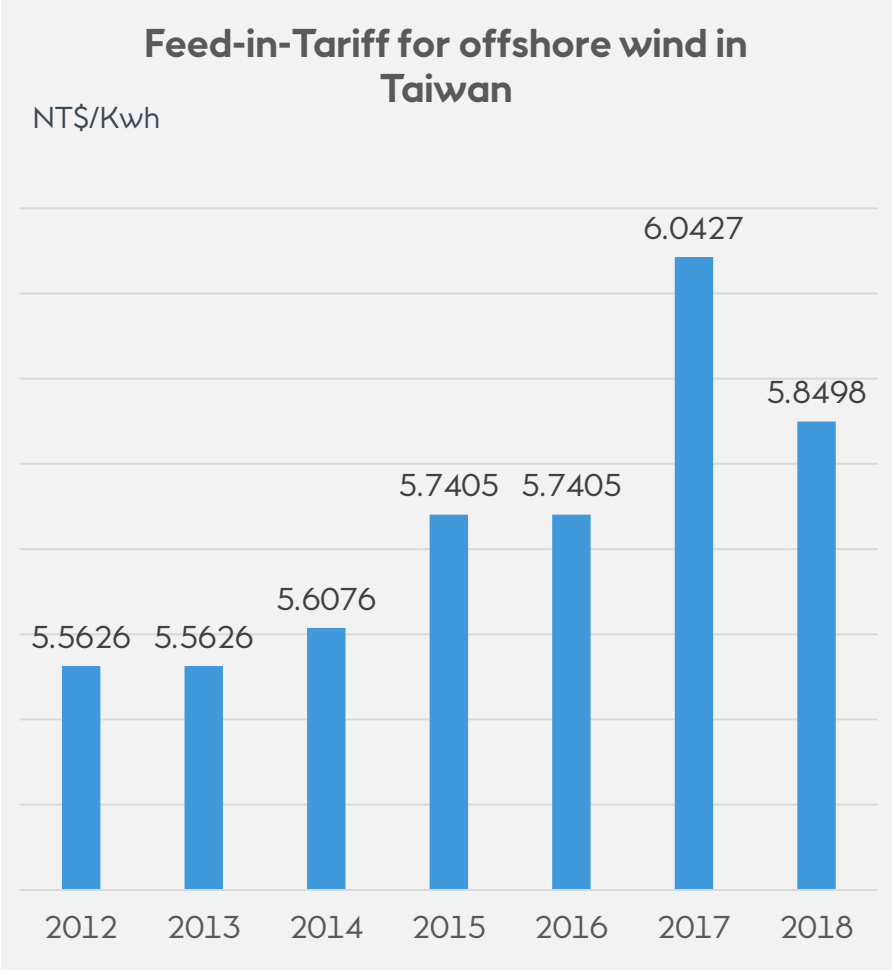
Feed in Tariff ensures timely build out, and also boosts market and industry development - and paves the way for cost reduction



Orsted's auction price 2025 projects NT$ 2.548 /KWh

- Investment of 2021 CHW projects will help to establish and mature a local supply chain.
- Further cost-out in the industry towards FID by technology advances.
- Scalable O&M
- Transmission synergies
- Learnings from our first Greater Changhua projects

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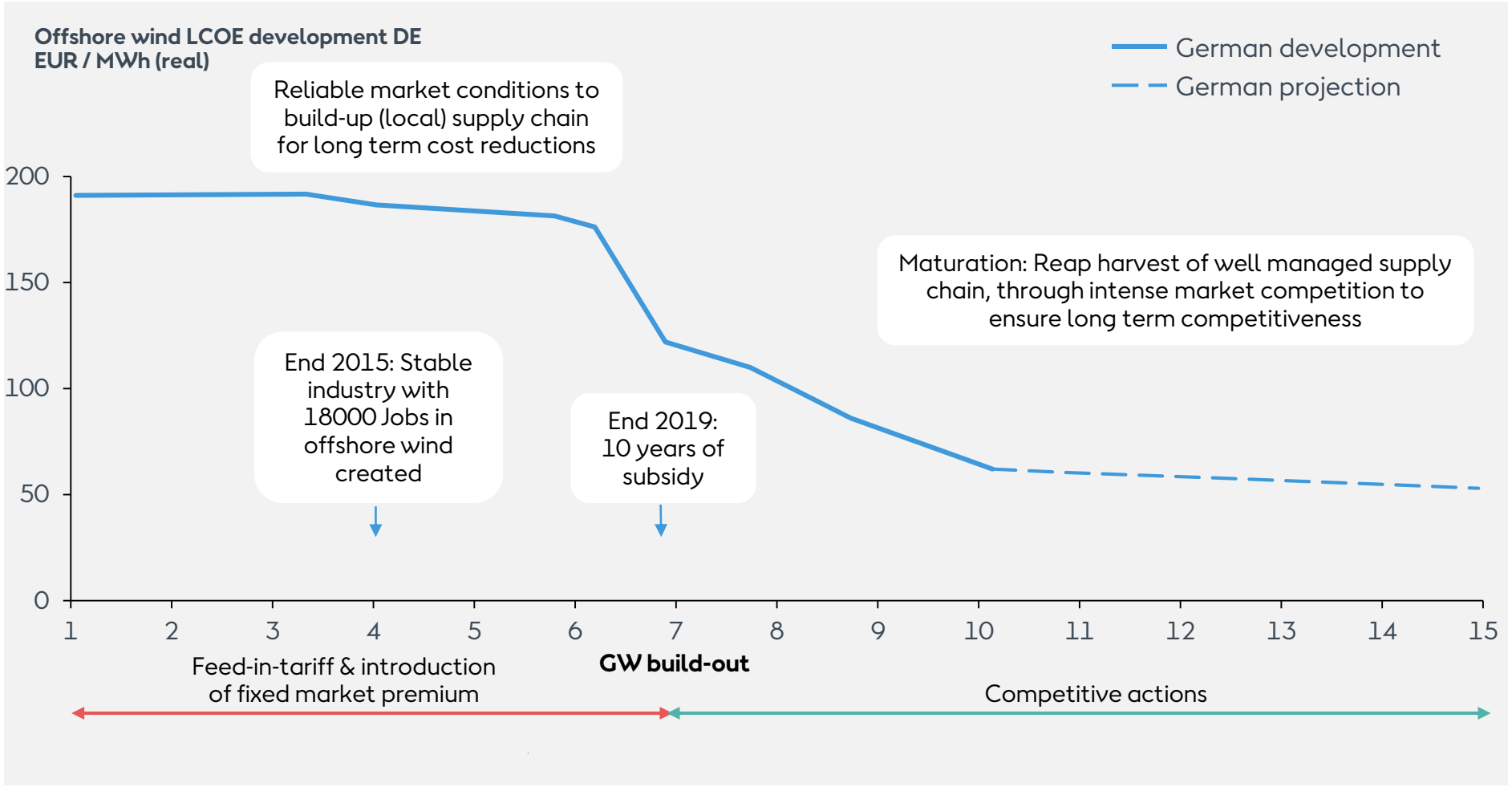
Stable subsidy in establishment phase (over 10 years), enabling long term lowering of prices



Strong local partnerships required to realize offshore wind in Taiwan

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Localising offshore wind in Taiwan

Supply chain development

Financing Strategy

Energy Storage

DD Radar

Research & development

Job creation & talent training

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Leading supply chain localization in Taiwan

Development

- Assessed over 170 local companies since 2016
- have signed 60 contracts with around 30 local suppliers

Construction

- expects to award 10 more major contracts for Greater Changhua 2021 projects within the next two months

Operation & Maintenance

- Fully funded sub-supplier web platform to Changhua County to enage local SMEs
- Plan to work with local fishery association in part of O&M services

Challenges

- **Time pressure: localization plan deadline on 15th November**
- **Price & capacity: local suppliers' maturity and capability**
- **Unclear pipeline for post 2025 projects**

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Build Partnerships with Local Suppliers- Woen-Jinn as a best practice

NT$1 bn cable installation contract

- Hard work from **both parties** for **past 2 years**
- **Ørsted** set up **a dedicated team of 10 specialists** to support and exchange knowledge with Woen Jinn, elevated their standards and expertise
- **Ørsted** made special financial arrangement in the contract so **Woen Jinn can invest in a new cable lay vessel WJ#7**
- **Woen Jinn has hired 20 more staff** since working with Ørsted and will recruit and train more young talents through working with universities and **offer scholarships**.

Key Successes to Offshore Wind Projects in Taiwan

- **Regulation:** long-term stable framework, transparency
- **Safety**: world-class QHSE, embed in business journey, value creating processes
- **Trust:** strong track records, world-class technical and financial capabilities to deliver
- **Commitment:** early investment, long-term thinking, benefits to local society
- **Partnership:** with government authorities, key suppliers and all stakeholders

Our vision

Create a world that runs entirely on green energy

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