

Cost reduction in offshore deployment

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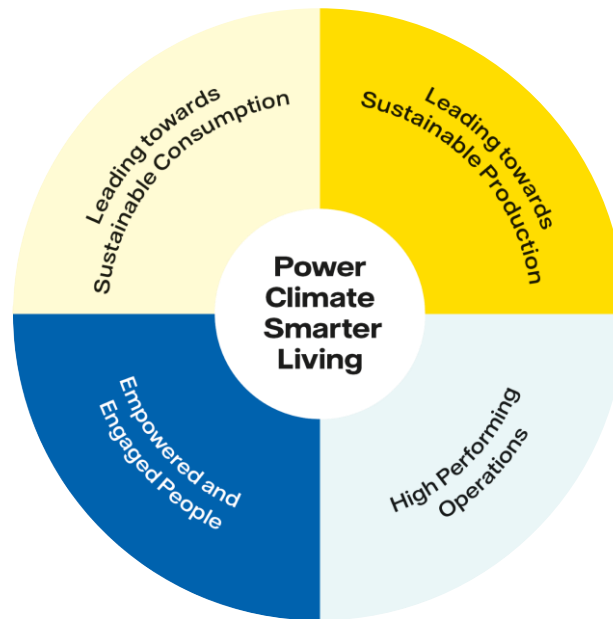
This is Vattenfall

Basic facts

- One of Europe's largest producers of electricity and heat
- 100% owned by the Swedish state
- Main products: electricity, heat, gas and energy services
- Main markets: Sweden, Germany, Netherlands, Denmark and the UK
- About 20,000 employees



Strategy – Fossil-free within one generation

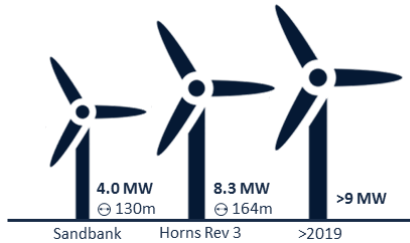


¹ Continuing operations (excluding divested lignite operations)

² Underlying operating profit excluding items affecting comparability

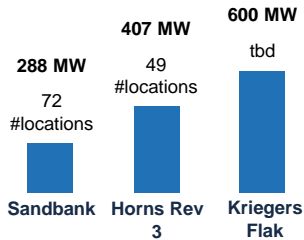
An industry in rapid change

Larger turbines



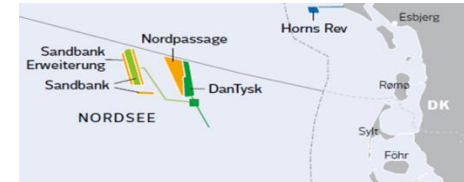
- Less locations but bigger capacity
- Less resources (concrete, steel etc.) and cables
- Less charter-times for vessels
- Shorter construction periods

Park size development



- Increasing Operational Efficiency
- Economies of scale in procurement and project management

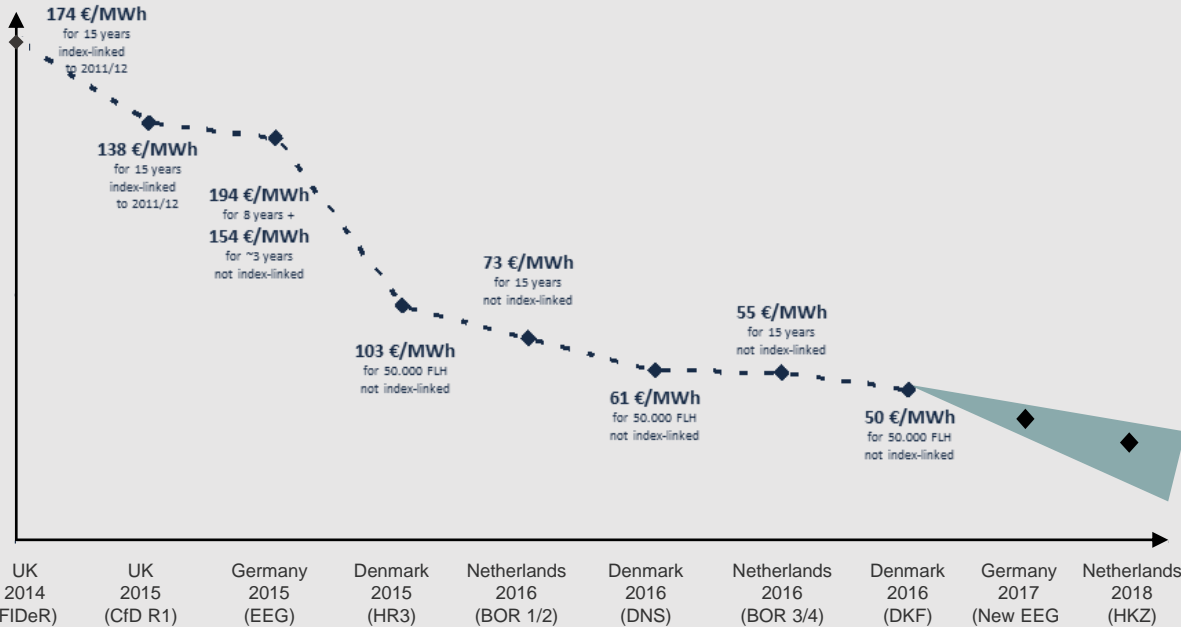
Clustering of assets



- Increasing Operational Efficiency
- O&M from shared Offshore Accommodation Platform
- Strategic Spare Parts Management
- Lessons Learned from past construction operations in the area

The offshore industry is maturing, leading to significant cost reductions

What is the industry's contribution to renewables cost reduction?



Turbine size development has the most significant impact on reduction of LEC

- New winning bid levels in Germany and Netherlands reached subsidy-free, revenues being fully impacted by merchant risk and market price exposure
- Overall, tremendous decrease in subsidies in a competitive tender environment over the last 2-3 years
- Figures are only considering revenue streams and are not scope-adjusted, e.g., UK OFTO and grid charges. This might lead to 5-15% correction factor, which does not impact the trend as such.

Vattenfall's competitive advantage is based on three pillars: 1) fast adaptation to the tender landscape, 2) ability to decrease O&M costs applying latest business standards and 3) a lean and agile organisational set-up

Deep dive: Hollandse Kust Zuid

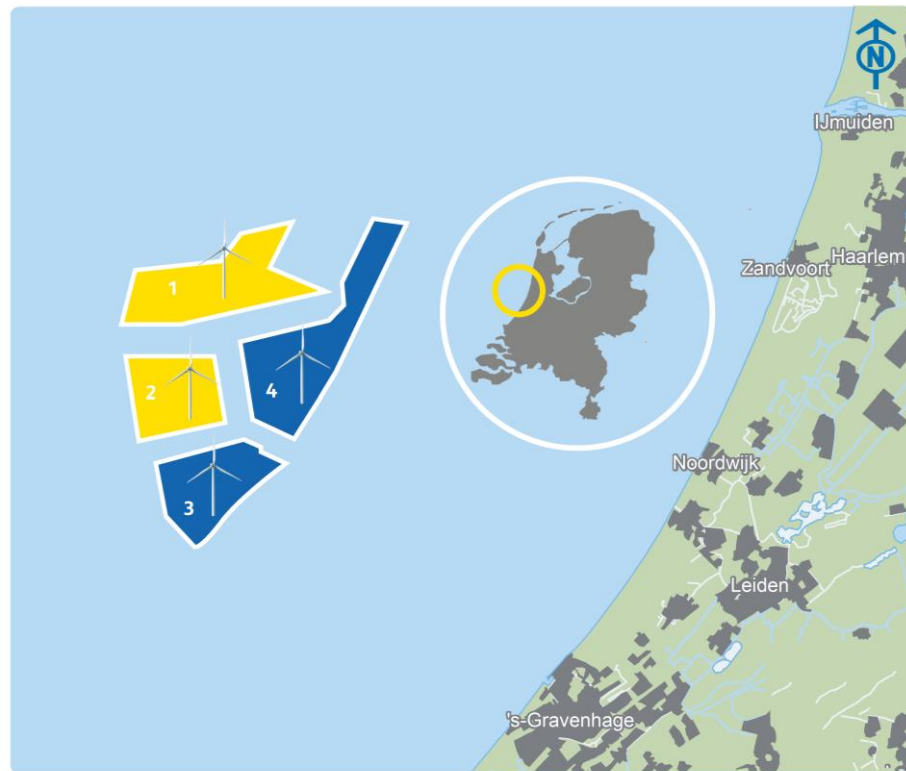
Commitment to build the world's first subsidy-free offshore wind farm in the Netherlands

Key facts Hollandse Kust Zuid 1&2

- 700 – 750 MW installed capacity
- Renewable electricity for 1-1.5 million homes
- Distance to shore: 22 - 35 km
- Full operations scheduled for 2023 at the latest
- Ownership: 100% Vattenfall

First zero-subsidy tender was a beauty contest

- Vattenfall's bid was ranked highest out of four, based on qualitative risk assessment criteria
- An independent expert committee scored the criteria with the highest weighting: risk analysis and quality of mitigation measures, within three categories:
 - financial/market risks;
 - design/construction risks;
 - operational/maintenance risks.



Success factors for cost-efficient offshore wind development in the Netherlands

- Continuous **cost reductions throughout supply chain & project pipeline** of Vattenfall
- Nuon/Vattenfall **experience with market-exposed assets** and **large customer base** in NL
- Netherlands has a **clear decarbonization strategy** and **large potential for offshore wind** development (investment climate)
- **Solid framework** that reduces risks & costs for the developer, set up by the government in consultation with the industry:
 - grid connection available (at no cost)
 - ready-made permit available with flexibility on technology
 - good site conditions
 - high-quality site investigations available
 - competitive tender (well balanced qualification criteria)



In a zero-subsidy environment, revenue stabilization becomes key

Contracts for Difference

- **promote competition** on developing, constructing and operating renewables at lowest cost
- will ensure **continued** overall **cost reductions** for renewables
- will **ensure project realization** in order for Europe to complete its energy transition and to live up to its decarbonization commitments.

Corporate Power Purchase Agreements

- For energy utilities, CPPAs are a **new business model responding to the customers' desire for renewable power supply**, produced locally and more cheaply.
- CPPAs help tackle merchant risks and stabilize the cash flow.

Sector Coupling

- Electrification of transport, heating and industry will be **key for the decarbonization** in Europe.
- The use of excess renewable power for electrification purposes contributes to **revenue stacking** and can be a **solution to the general oversupply situation** in many countries.