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## International Comparison Cost Level OFW

17-06-2015

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# International developments cost level offshore wind

## United Kingdom

*“Vattenfall’s and Scottish Power Renewables’ 714MW East Anglia 1 [...] scooped up contract for difference under first allocation round”*

The strike price for the Round 3 East Anglia was £119.89



Image: Adapted from SPR

## Denmark

Vattenfall wins concession for Horns Rev 3

Vattenfall has won the concession to build and operate the offshore wind farm Horns Rev 3 outside the Danish west coast. The offered price of 77 ore/kWh (10,3 €-ct/kWh) was the most competitive bid.



Image: Offshorewindnews.biz

# How can we explain these differences?

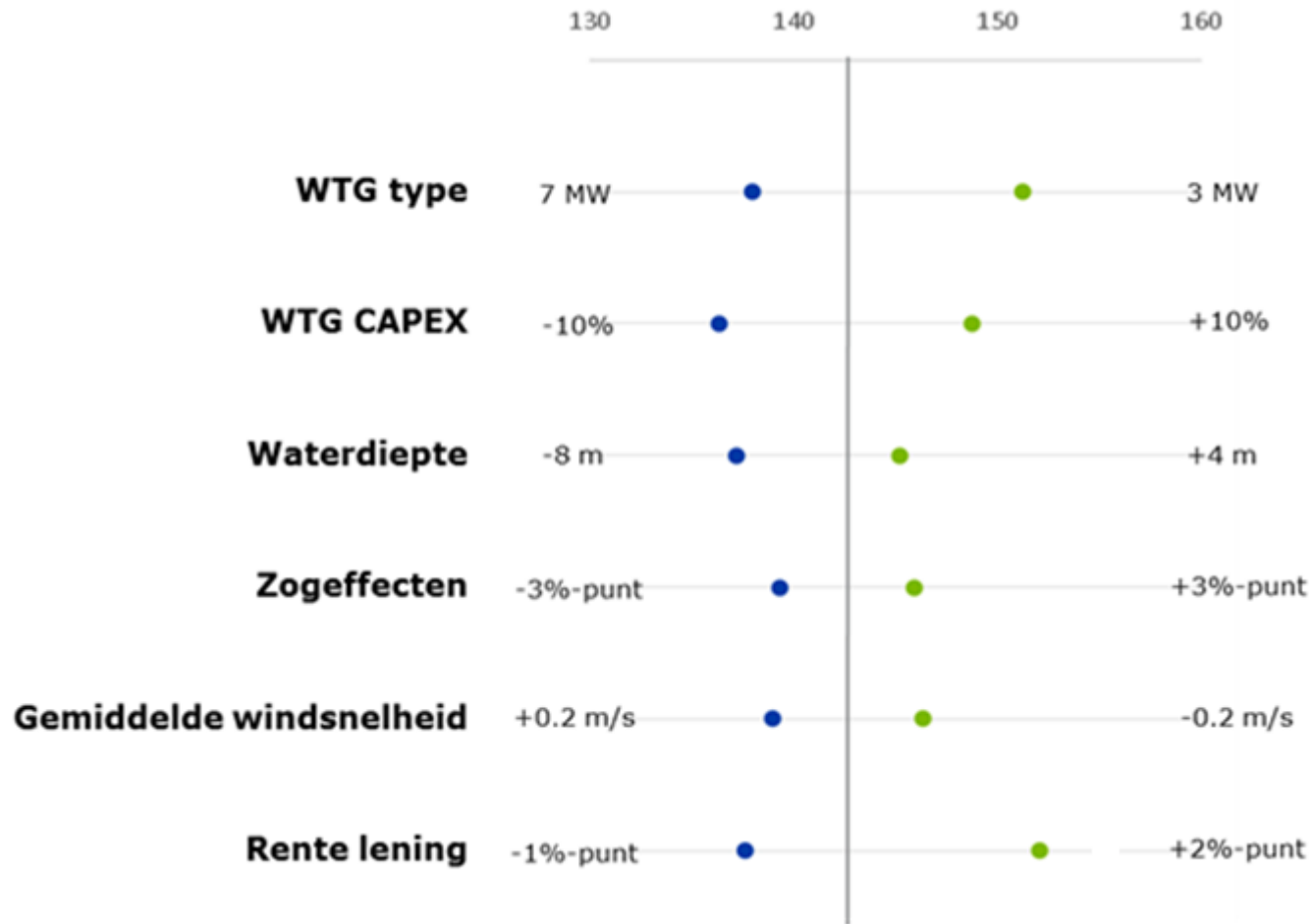
- Spread in cost levels (remains) significant
  - Horns Rev 3 – 103 €/MWh
  - East Anglia One – 156 €/MWh (assuming GBP to EUR: 1.3)

*What are the underlying causes?*

- Physical differences
  - Windspeed
  - Water depth
  - Distance to shore
- Tax regime differences
- Policy differences
  - Socialised grid vs. OFTO / developer
  - Front-end involvement government
- Support scheme differences
- Other aspects
  - Costs of financing?
  - Market differences? (negotiated tender, export credit)
  - Wind farm design & technology selection

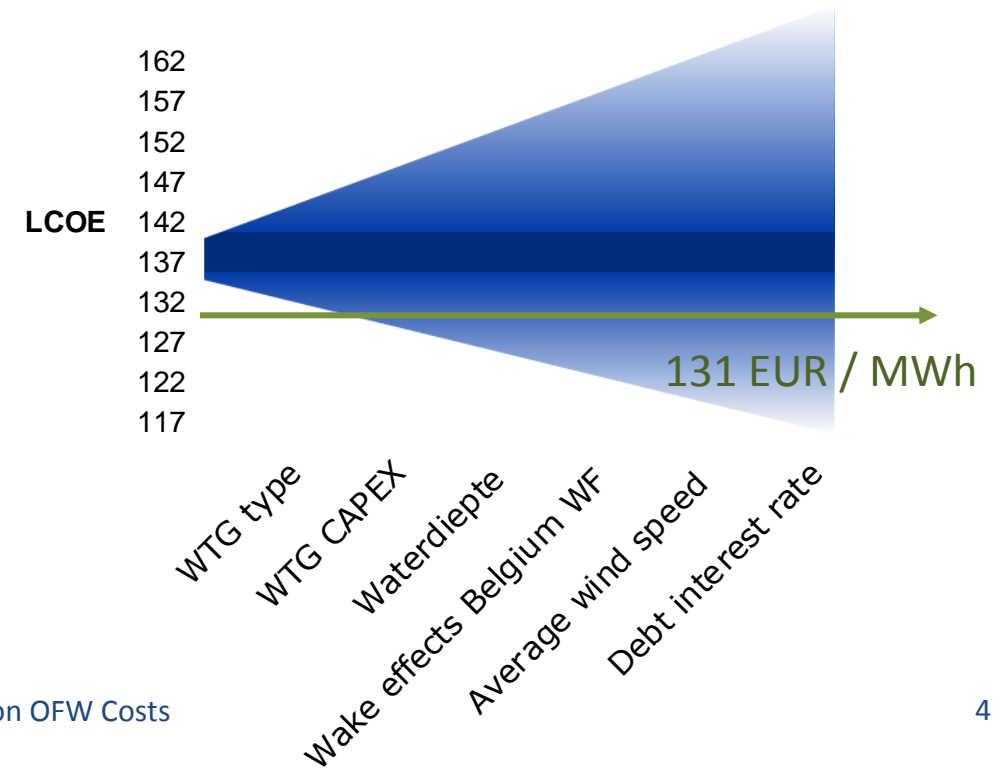
Quantified using the  
FLOW/TKI cost model

# Approach of quantification



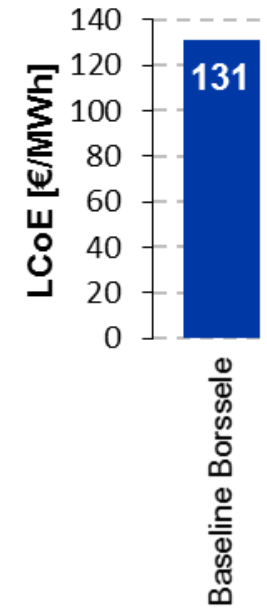
**Baseline case Borssele:**

- 350 MW
- 7 MW WTGs
- Annuity type debt
- 9.5 m/s, depth 30 m, distance 40 km



# Comparison Borssele - Horns Rev 3

Site conditions		
	Borssele	HR3
Water depth	30 m	17 m
Wind speed	9.3 m/s	9.7 m/s
Wake losses	15%	12%



Tax regime		
	Borssele	HR3
Corporate tax	25 %	23.5 %
Depreciation	linear	Accelerated: Decl. balance (15%)

# Comparison Borssele – East Anglia One

## Site condities

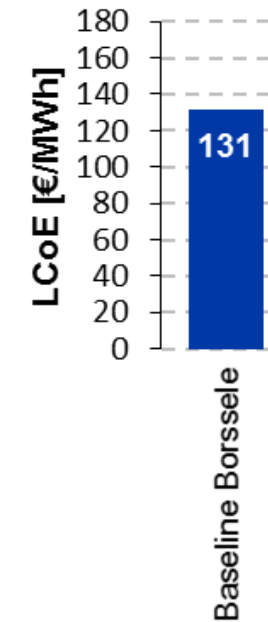
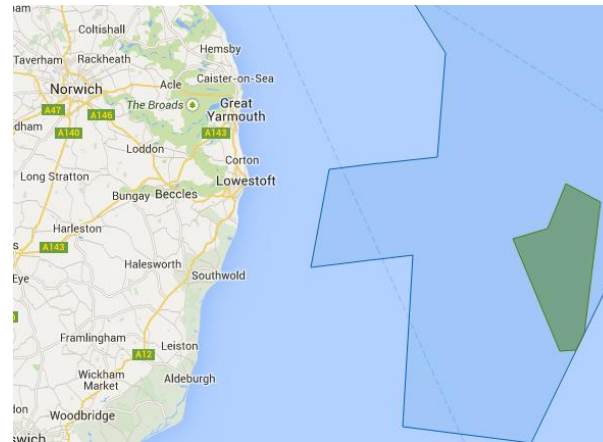
	Borssele	EA1
Water depth	30 m	43 m
Wind speed	9.3 m/s	9.5 m/s
Wake losses	15%	12%
Export cable length	40 km	73 km

## Grid connection

	Borssele	EA1
Developed by	TSO	Developer
Paid by project?	No	Yes

## Tax regime

	Borssele	EA1
Corporate tax	25 %	20 %
Depreciation	linear	Decl. balance (18%)

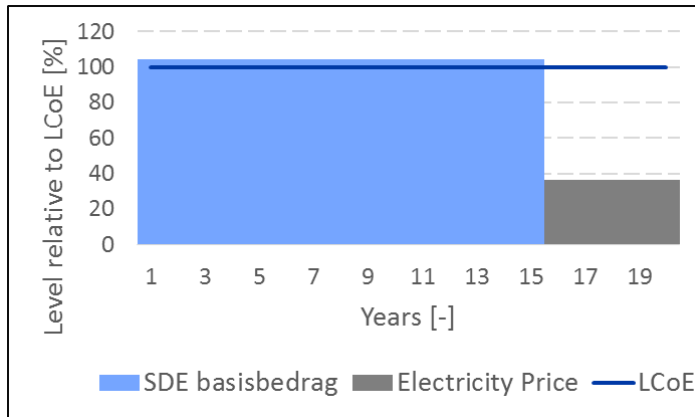


# Translation LCoE ↔ Strike price

## Netherlands

### SDE

- 15 year
- Not indexed
- Yearly full load hour cap
- Banking vollasturen



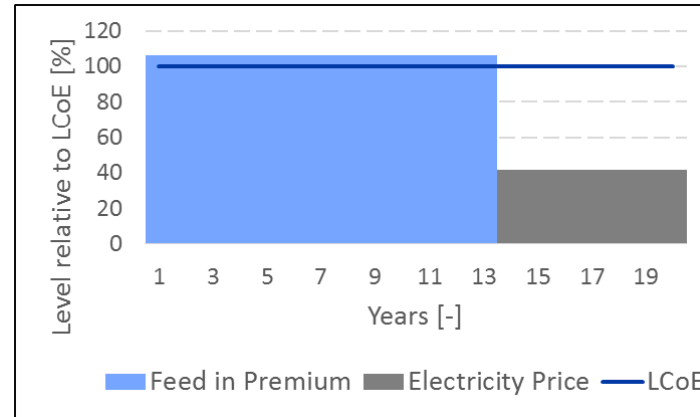
LCoE -> SDE: +4.3%  
SDE Borssele basecase: 137 €/MWh

17 June 2015

## Denmark

### Feed-in premium

- Full load hour cap of 50.000 over lifetime (~13 years)
- Not indexed



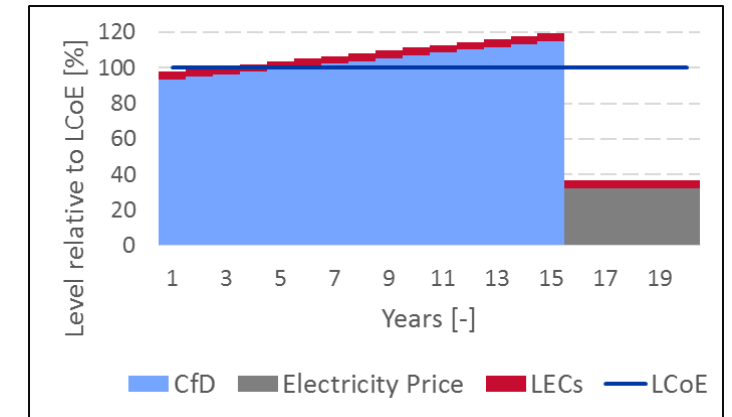
LCoE -> DK FiP: +6.5%  
FiP Borssele adjusted: 120 €/MWh  
FiP Horns Rev 3: 103 €/MWh

TKI WoZ – International Comparison OFW Costs

## UK

### Contract for Difference

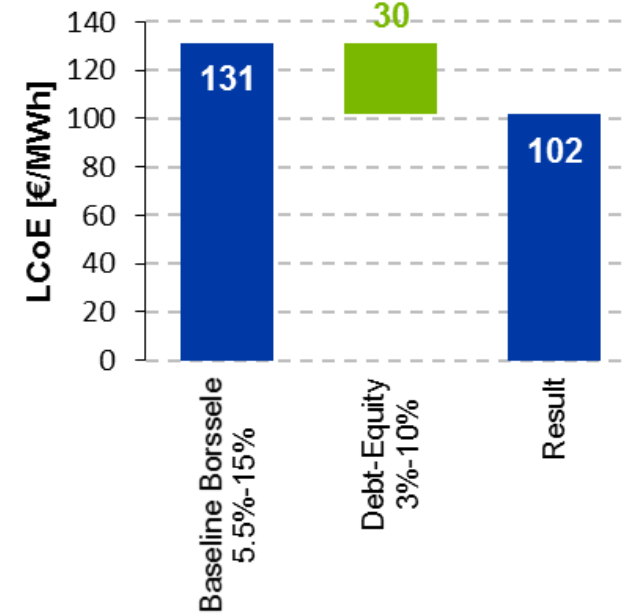
- 15 year
- No full load hour cap
- Indexed
- Additional revenue: Levy Exemption Credit



LCoE -> CfD: - 6.5%  
CfD Borssele adjusted: 154 €/MWh  
CfD East Anglia One: 156 €/MWh

# Remaining differences

- Costs of financing?
  - Large impact on LCoE
  - Currently: low Libor/Euribor, Reduced margins on debt
  - Potentially movement in equity rate of returns
- Market differences
  - Negotiated tender procedure
  - Role by export credit?
- Wind farm design
  - Wind turbine selection
  - Total capacity / economies of scale





1. Spread in cost level recent EU announcements can in part be explained by:
  - a) Physical / site conditions
  - b) Tax regime and support scheme
  - c) Policy differences, notably grid connection
  
2. The last tender results in Denmark are sharp, and not completely explained by differences mentioned above. Further investigation of the differences (for instance the tender procedure) could provide insight into cost reducing opportunities.
  
3. Translation between LCoE and strike prices is not trivial, and varies significantly between the three countries examined (from -7% to +7%)



[www.tki-windopzee.nl](http://www.tki-windopzee.nl)

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