Imperial College London

Cost trends in Offshore Wind Projects

Insights from global auctions

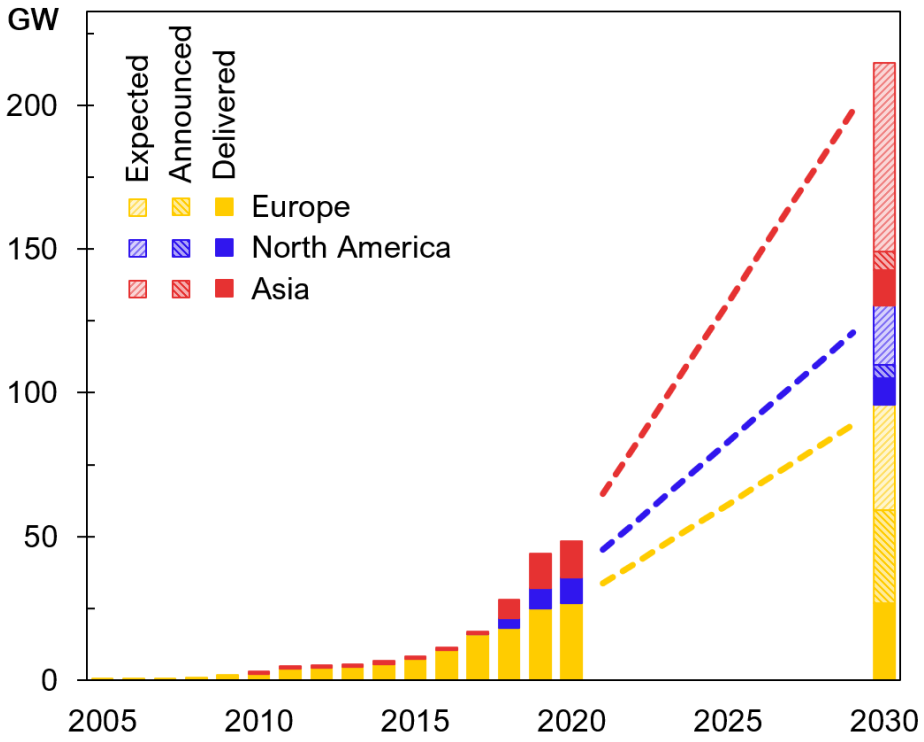
Dr. Malte Jansen
m.jansen@imperial.ac.uk

DFBEW Keynote “Offshore-Windenergie in Deutschland und Frankreich“, 8th September 2021

@mpunktjansen

Global Auction Schemes

Why are auction schemes so important?



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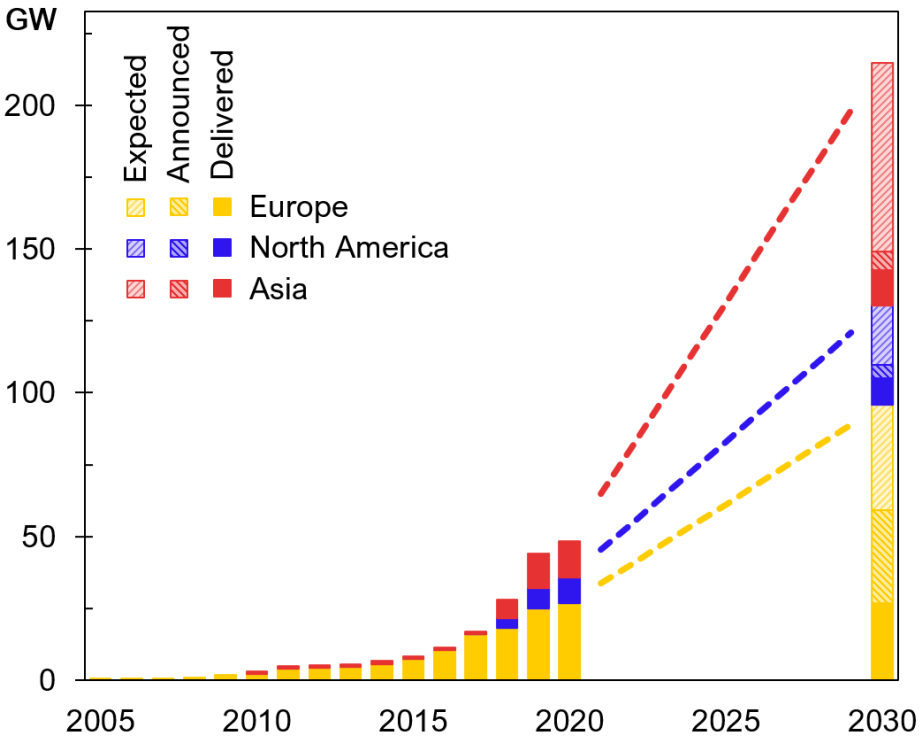


Auctions:

- Large share of global capacity in eight countries
- 99% of globally competitively procured capacity to date
- 84 GW auctioned or in planning (42 GW fix + 42 GW announced)

Up to 200GW by 2030

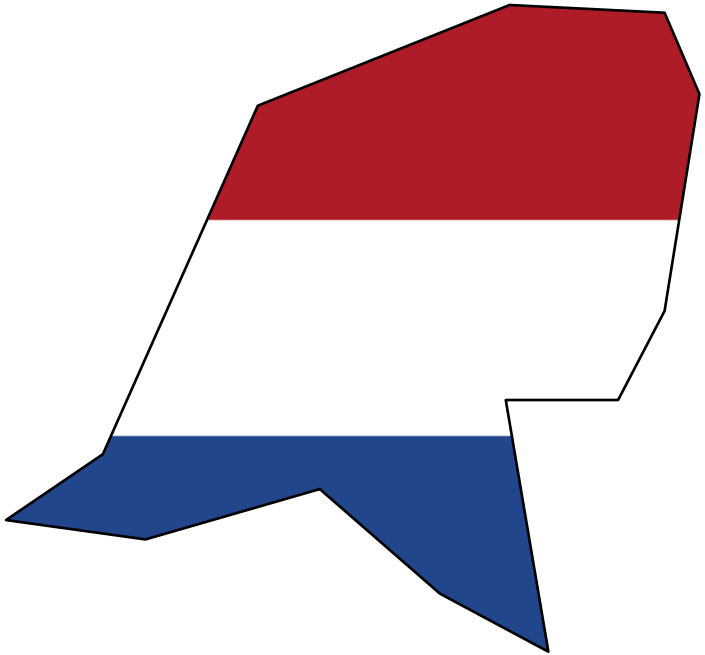
➢ Auctions are the way forward for Offshore Wind

5.9 GW procured to date

Feed-in-tariff with homogenous bidding behaviour on price

Long pause between early procurements (2010) and resumed scheme (2019)

Price only 40% of total scoring

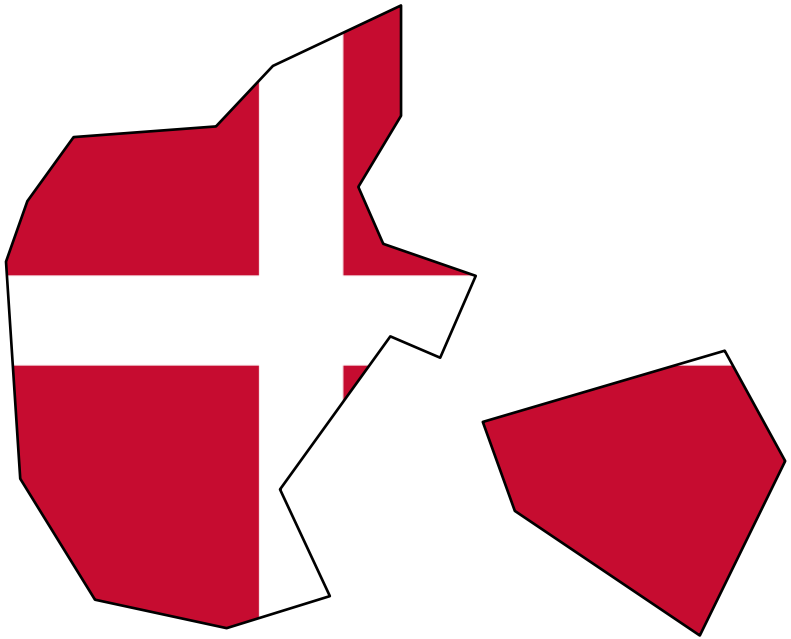


4.5 GW procured to date

Zero-subsidy 1-sided CfD with ‘beauty contest’ for enhanced capabilities

Short time between bidding and FID, and high share of FID taken

Ground rent €1 mil. per year per wind farm

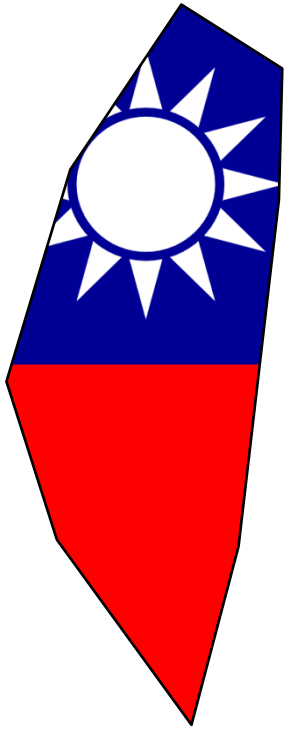


4.5 GW procured to date

2-sided CfD

One wind farm, one procurement, with specific design for each site

Close coordination between bidders, governments and other stakeholders



5.5 GW procured to date

Partially through ‘Selection Procedure’ and ‘Competitive Bidding Procedure’ (exclusively bidding in future)

Feed-in-Tariff

Grid connection paid by grid operator, but timely connection not guaranteed

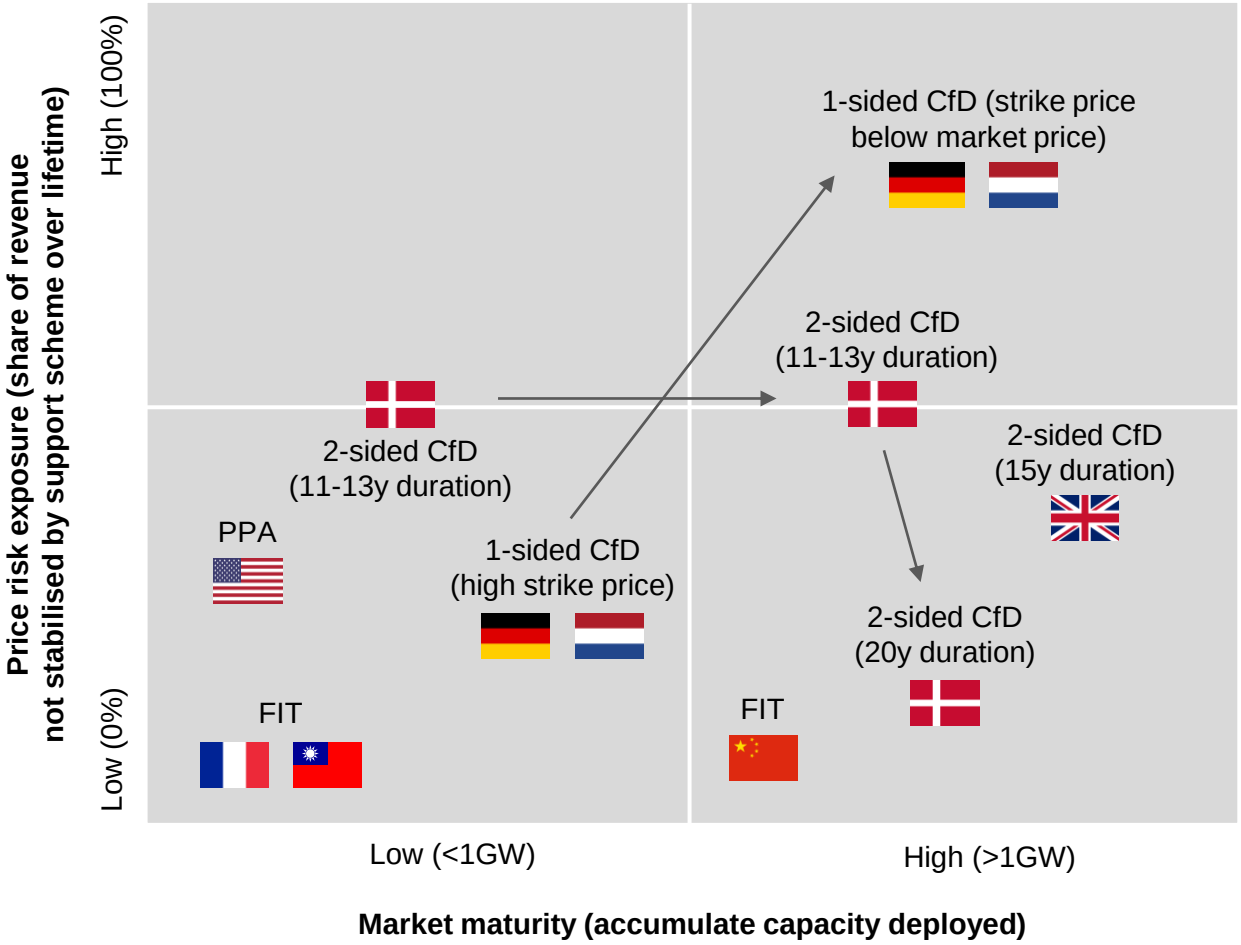
8.5 GW procured to date

PPA and ORECs + Tax Incentives

Different for each state, but usually through lease awards

(Almost) No installed capacity to date, with competitive procurement from the ‘Get Go’

Revenue Stabilisation


Price risk exposure (share of revenue not stabilised by support scheme over lifetime)
High (100%)
Low (0%)
1-sided CfD (strike price below market price)
2-sided CfD (11-13y duration)
2-sided CfD (11-13y duration)
2-sided CfD (15y duration)
PPA
1-sided CfD (high strike price)
2-sided CfD (20y duration)
FIT
FIT
Low (<1GW)
High (>1GW)
Market maturity (accumulate capacity deployed)

The era of subsidy-free offshore wind

Malte Jansen, Iain Staffell,
Lena Kitzing, Sylvain Quoilin, Edwin Wiggelinkhuizen, Bernard Bulder, Iegor Riepin, Felix Müsgens

https://www.nature.com/articles/s41560-020-0661-2

(Levelised) Costs vs Revenue for Borssele III&IV

Costs are often lagging

Cost ≠ Revenue, but show (potential) profitability gaps and refine data

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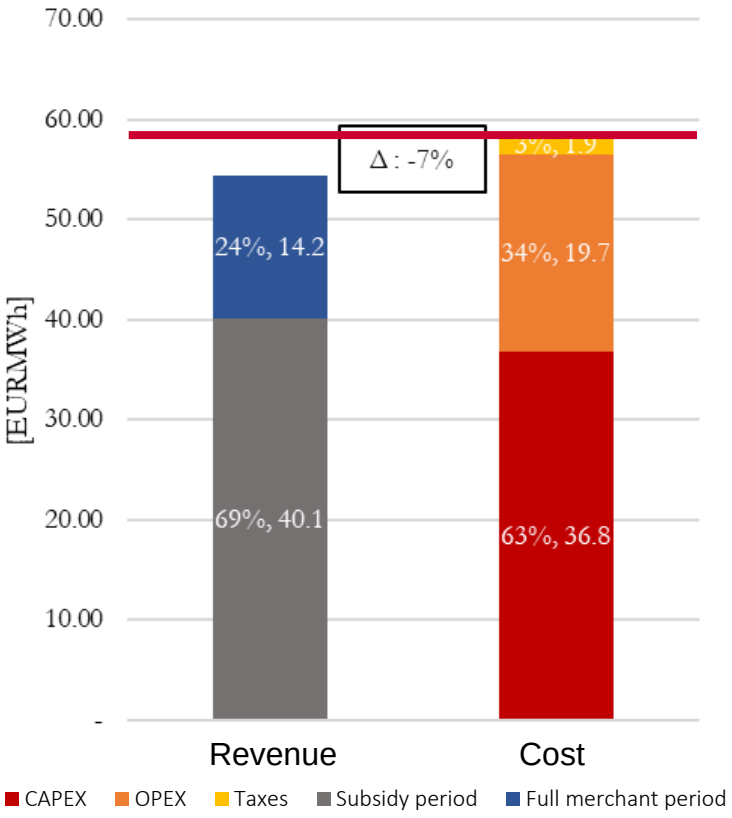


(Levelised) Costs vs Revenue for Borssele III&IV

Costs are often lagging

Cost ≠ Revenue, but show (potential) profitability gaps and refine data

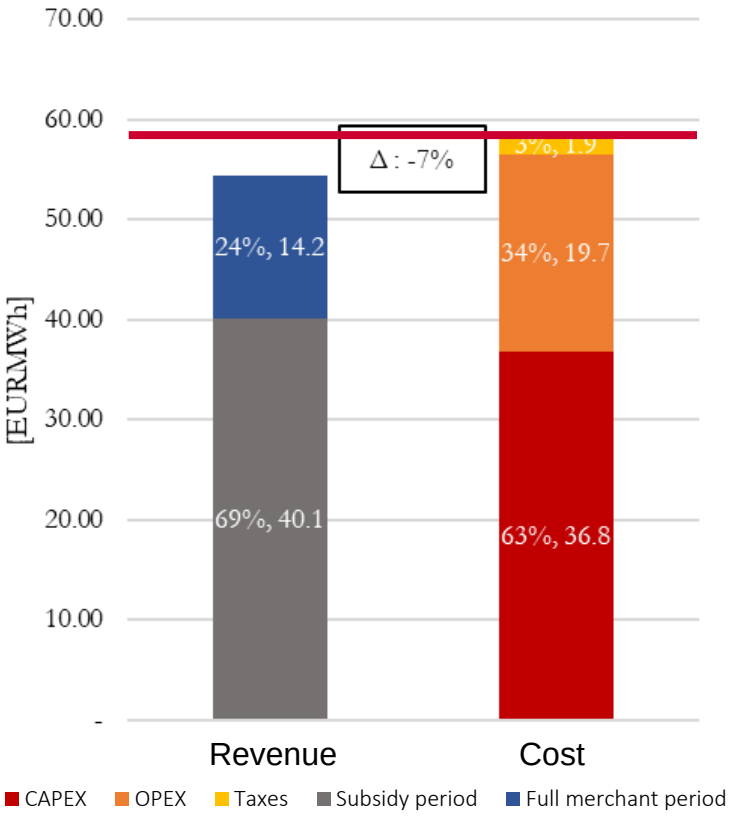
↓ 12% Capex

↓ 24% WACC

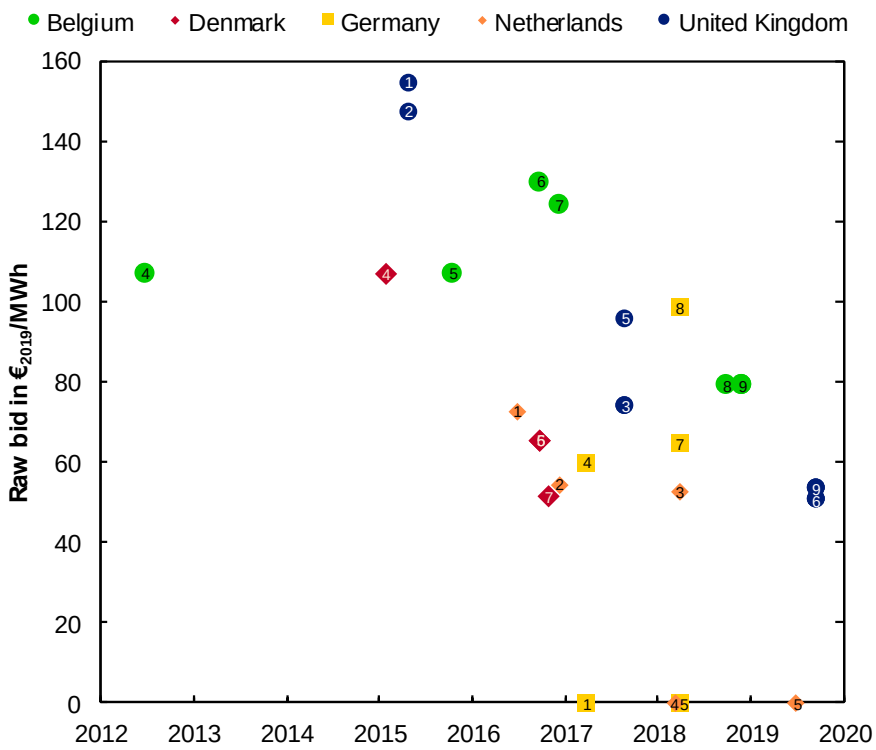
↓ 25% Opex

↑ 9% Capacity Factor

↑ 20% Market Prices



It’s messy – The raw bids



Belgium:

- 4 Northwind
- 5 Nobelwind
- 6 Rentel
- 7 Norther
- 8 Northwester 2
- 9 Seastar
  Mermaid

Denmark:

- 4 Horns Rev 3
- 5 Versterhav Nord
- 6 Versterhav Syd
- 7 Kriegers Flak

Germany:

- 1 OWP West
  He Dreiht
  Borkum Riffgrund West II
- 4 Gode Wind 3
- 5 Borkum Riffgund West I
  Wikinger Süd
- 7 Baltic Eagle
- 8 Gode Wind 4

United Kingdom:

- 1 East Anglia One
- 2 Neart Na Gaoithe
- 3 Hornsea Two
  Moray East
- 5 Triton Knoll
- 6 Doggerbank Creyke Beck AP1
  Sofia Offshore Phase 1
  Forthwind
- 9 Doggerbank Creyke Beck BP1
  Doggerbank Creyke Teeside AP1
  Seagreen Phase 1

Netherlands:

- 1 Borssele I & II
- 2 Borssele III & IV
- 3 Borssele V
- 4 Hollandse Kust Zuid I & II
- 5 Hollandse Kust Zuid III & IV

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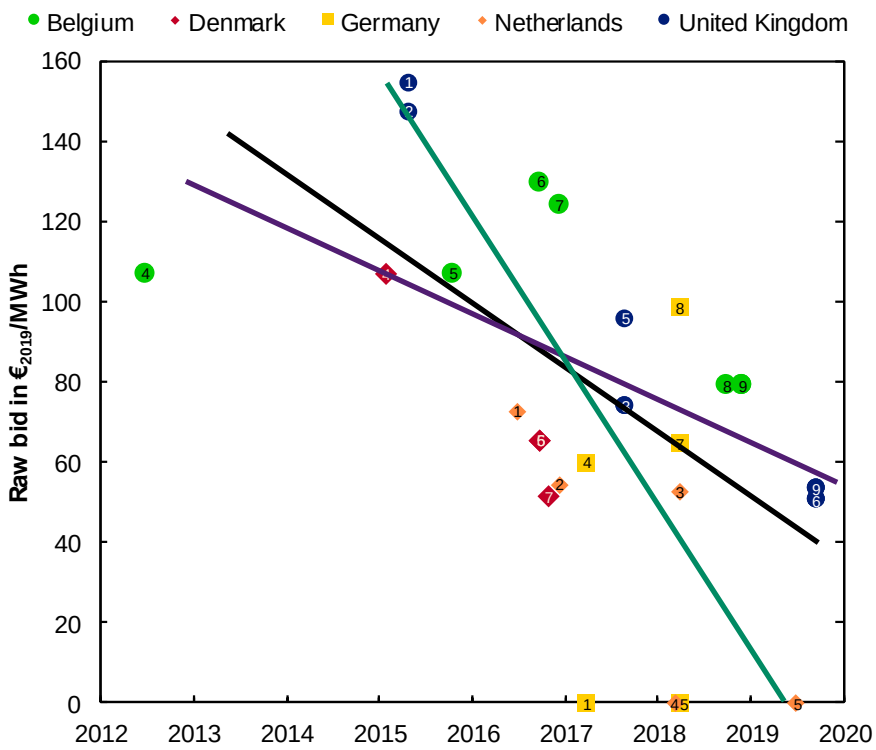

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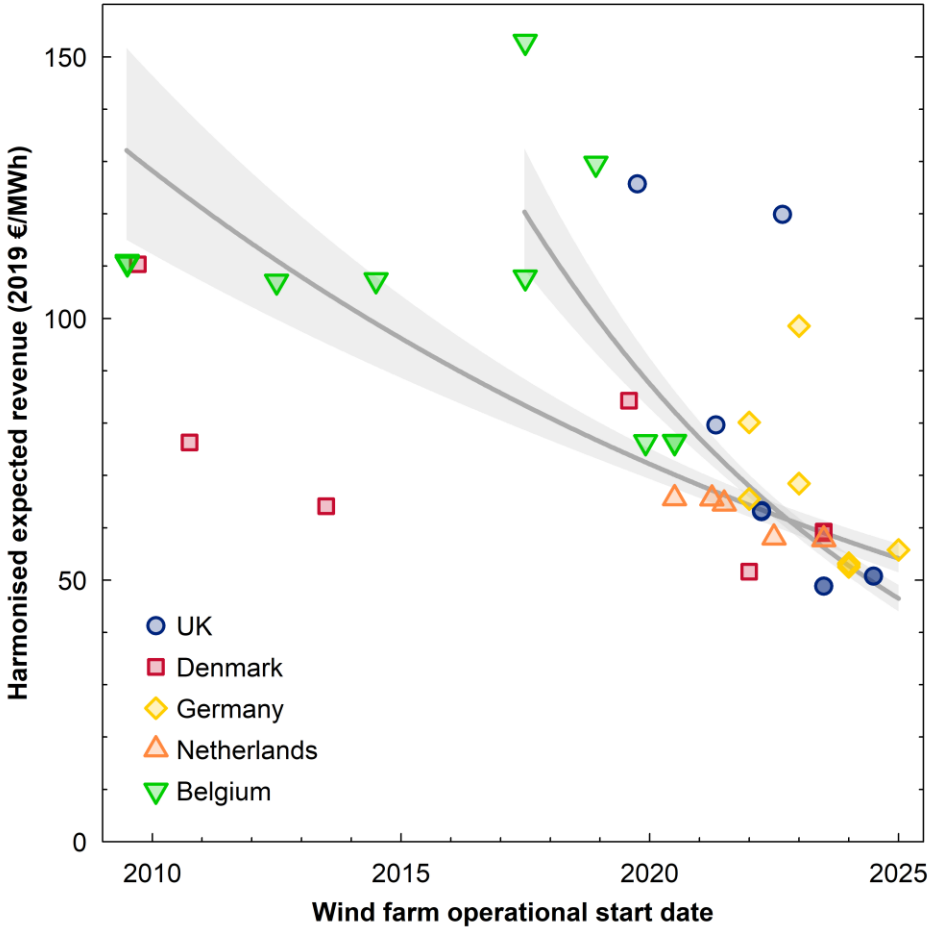
It’s messy – The raw bids

LCOE???

Adjusting the Bids for…

Harmonised expected revenue (HER)

- Cash-flow based methodology
- Cost reduction
  - 11.9±1.6% p.a. (5y)
  - 5.8%±1.1% (all bids)
- Threshold of €50 /MWh beaten
- However, large uncertainty in future power market prices



But is it subsidy free?

(it depends whether the state should pay for transmission)

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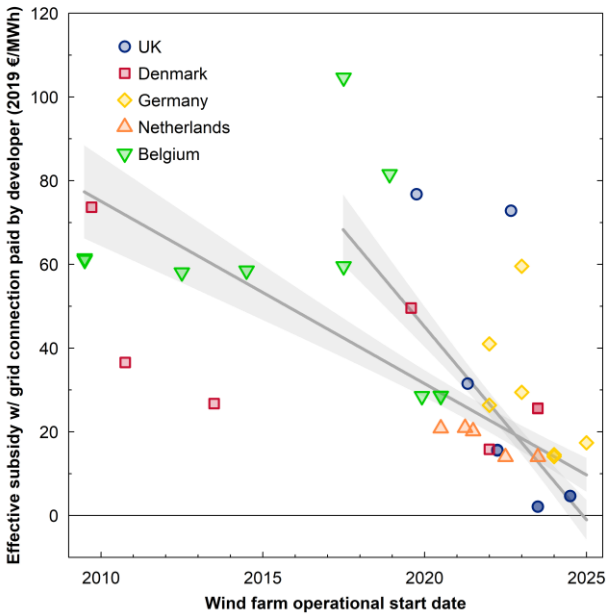

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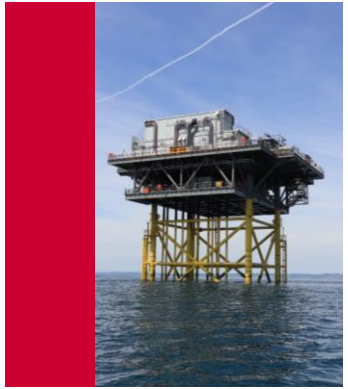

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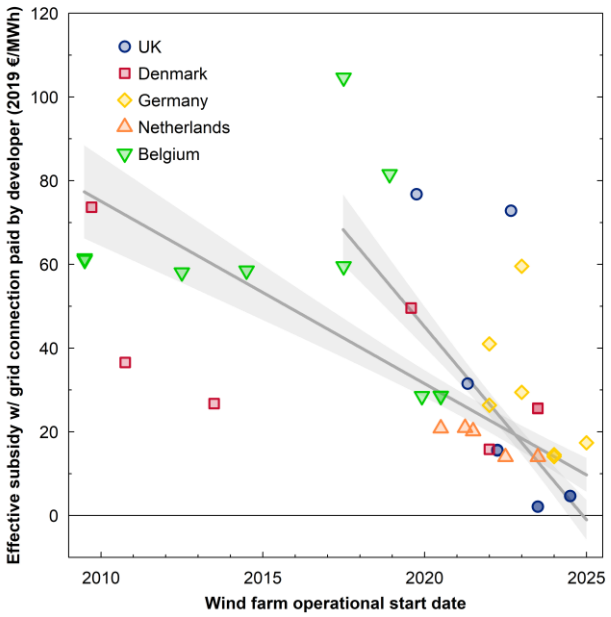
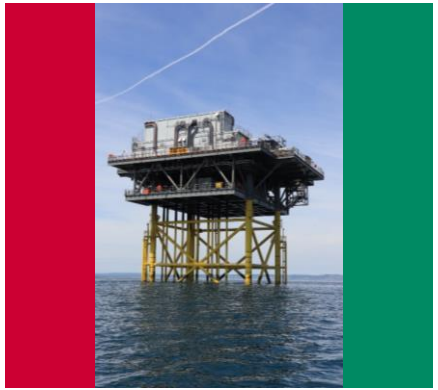


No (just) Yes



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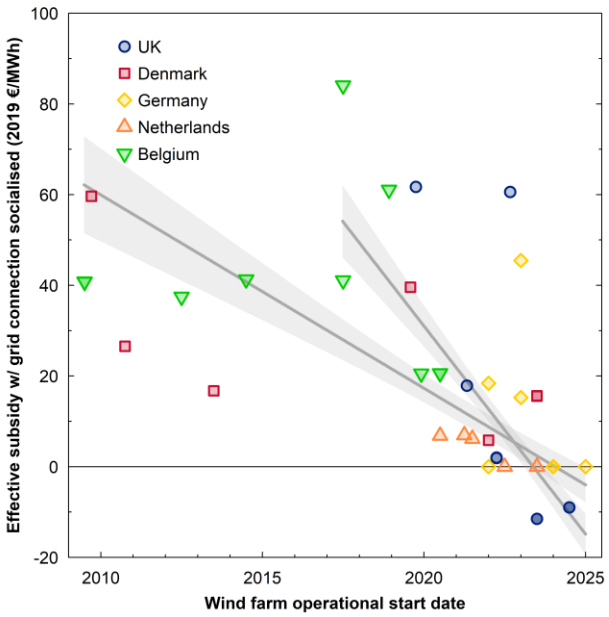

Very likely negative-subsidy wind farms

Prices are coming down FAST and keep falling

Inferring costs from auctions is possible

New (non-financial) policy design needed

$€_{2019}$ 51±3/MWh =£46/MWh=$60/MWh

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Q&A after the panel session

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