

Better connected

How the UK can make the most of low cost,
low carbon energy from Europe

January 2019

Connected energy markets make sense

Electricity interconnection across Europe allows UK electricity demand to be met at times of need without building more infrastructure. It also allows access to the renewable capacity of other countries, helping to decarbonise our energy system. Britain is one of the least interconnected European countries, and has the most to gain from improving its connections, in spite of Brexit.

Considerable loss of EU energy and climate policy links – which would happen in the event of a ‘no deal’ Brexit, for example – would cost the UK £2.2 billion a year, at the current level of interconnection.

Remaining connected and improving energy trading with neighbouring countries avoids the need to build infrastructure and is a quick way to access affordable, secure, low carbon electricity. It also provides a market to export excess renewable power generated in the UK.

This analysis outlines how better interconnection between UK and European energy markets would benefit the UK in four ways:

- lower energy bills for consumers
- increased energy security
- more and cheaper renewables
- faster decarbonisation

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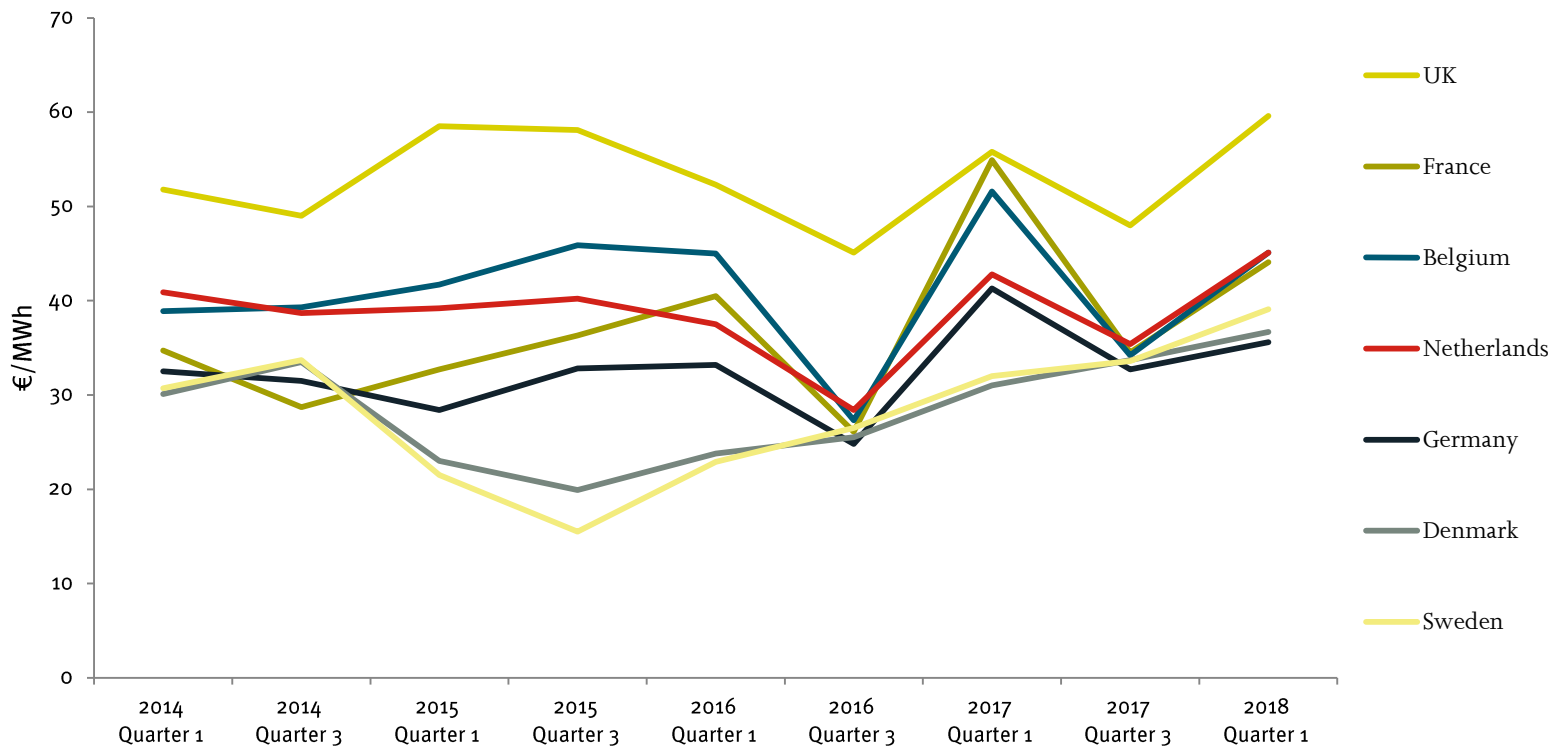
Helping to cut energy bills

Power is cheaper outside the UK

Despite fluctuations across countries, the UK consistently has the highest electricity price in Europe.

In the first quarter of 2018, high UK electricity prices were largely due to higher gas prices for electricity generation.

Average wholesale baseload electricity prices



Trading energy across borders saves money

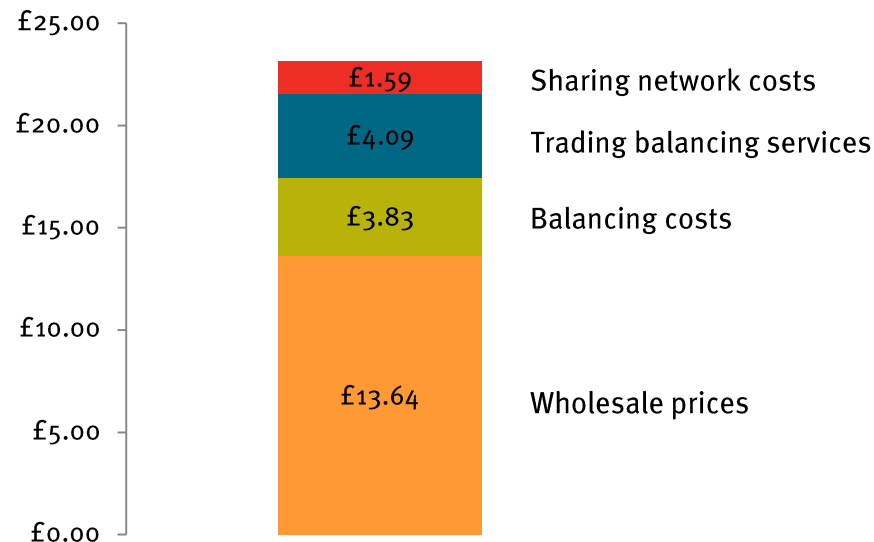
Doubling interconnection to 8GW by 2021, and importing cheaper power from the EU, could save UK consumers £1 billion a year in lower wholesale prices.

Sharing back up reserve capacity could reduce Europe-wide costs of balancing services by 35 to 40 per cent.

Sharing offshore transmission costs in the North Sea alone would save the UK between £0.5 billion and £3.5 billion in the period to 2030.

The overall 9.5GW potential pipeline of further interconnectors could be worth £11 billion to UK consumers over 25 years. This is the saving on new generation capacity to provide the same level of system reliability.

Estimated savings on an average household electricity bill from doubling interconnection



2.

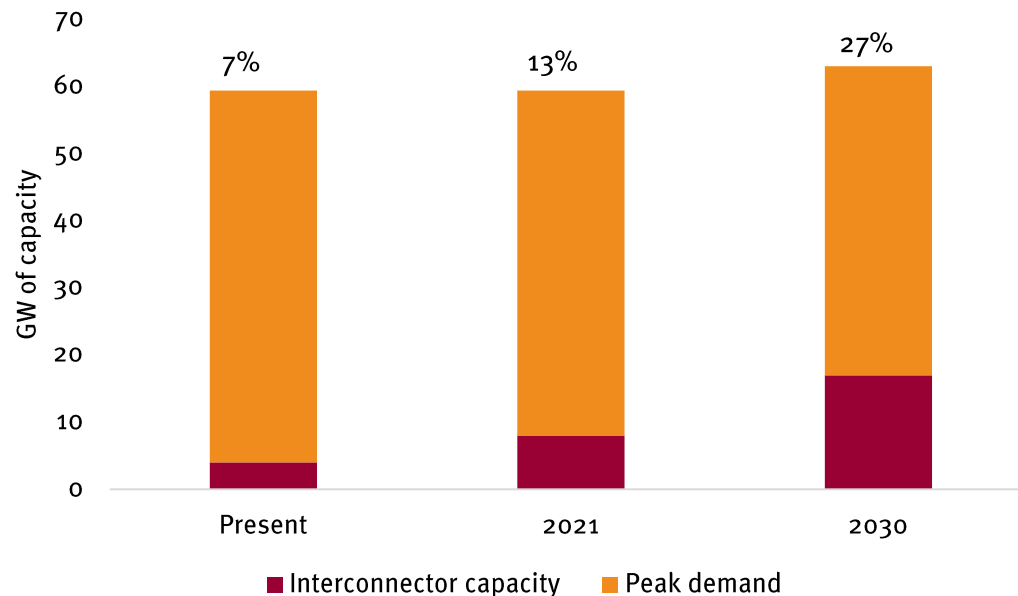
Improving energy security

A source of energy at times of need

Interconnectors have been available when needed in the past, underpinned by EU internal energy market rules. A Brexit outcome in which the UK was unable to participate in the EU's internal energy market might mean that interconnectors would be less able to provide the UK with electricity at times of high need.

However, there is no reason why the UK and the EU could not maintain trade by agreeing to abide by the rules that enable interconnectors to provide energy security.

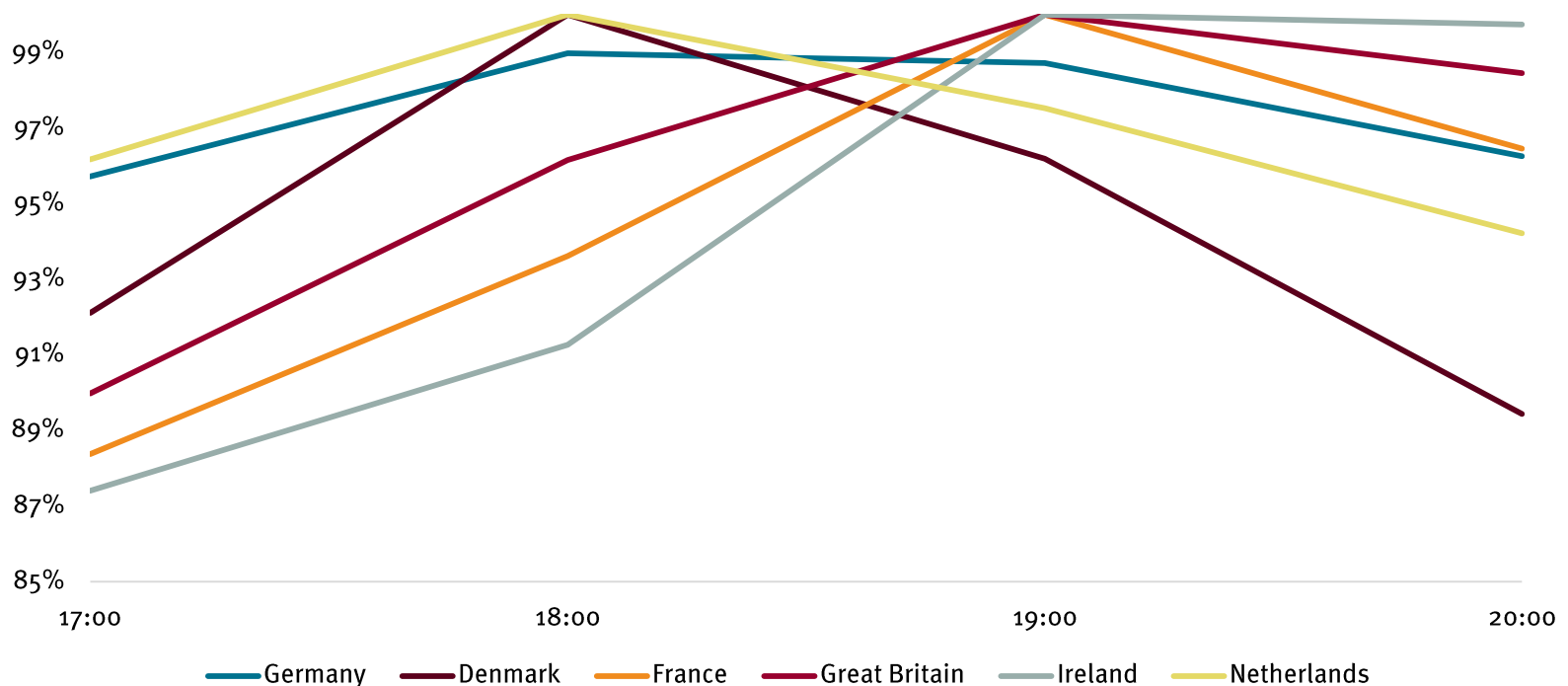
Interconnector capacity in relation to UK peak demand



Europe wide demand response

Managing demand response via a better integrated European electricity network could decrease the need for UK grid capacity by ten per cent and back up capacity by 35 per cent. This is possible because times of peak demand vary across the continent.

Hourly electricity demand across Europe, 5-8pm, 22 January 2018



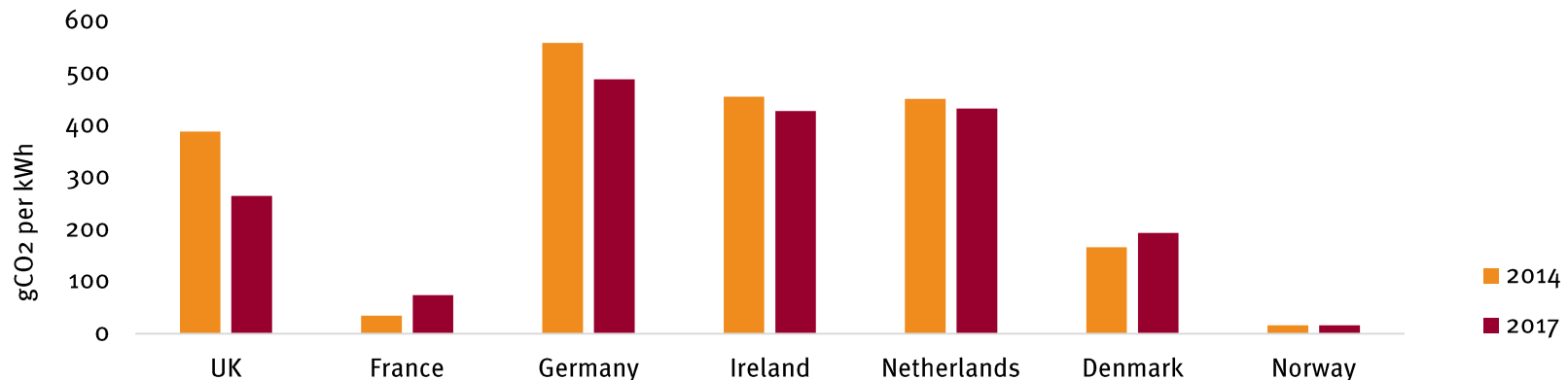
3. Enabling more and cheaper renewables

Falling EU emissions can help the UK to decarbonise

Building renewables in optimal locations and trading power with efficient markets could save up to €300 billion across Europe in the period to 2030. Shared transmission networks would reduce the need for 73GW of wind and 16GW of solar capacity across the EU because existing power would be used more efficiently. Both factors make renewables cheaper.

However, interconnection needs to be prioritised with those countries that are rapidly decarbonising: ie France, Denmark, and Norway. Further interconnection with Germany, Ireland and the Netherlands might increase emissions, unless these countries join the UK in phasing out high carbon fuels.

Power sector emissions intensity gCO₂ per kWh

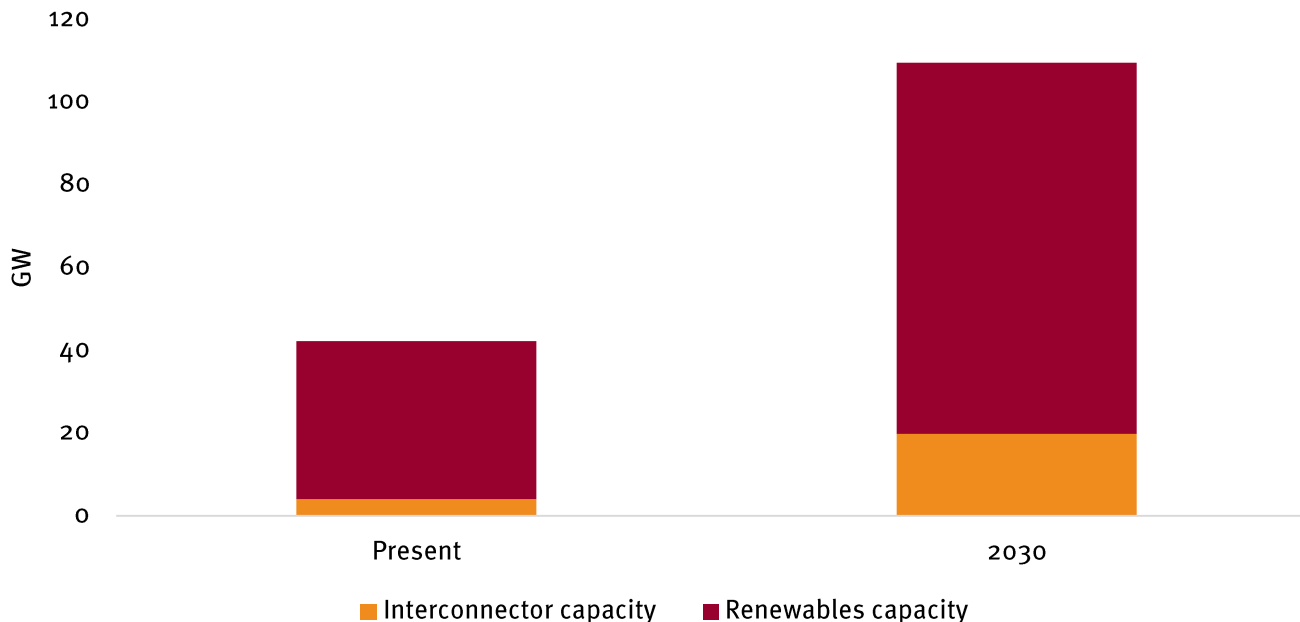


Interconnection uses renewables more efficiently

Without interconnection, nearly 30TWh of renewable generation (8.5 per cent of UK demand) could be curtailed (ie wasted) in Britain annually by 2030, due to times of very windy or sunny conditions when electricity is produced but there is low demand. But this curtailment could be halved with 19GW of interconnection, as the UK could export its renewable energy at times of low demand and high generation.

In addition, interconnection, energy storage and demand response would enable existing renewables to be used more efficiently, reducing the amount of renewables investment needed to meet UK carbon targets by 25-60 per cent.

Proportion of interconnector capacity compared with renewables



4. Speeding up decarbonisation

Trading to avoid new high carbon generation

Increasing interconnection to 17 GW could displace over 60TWh of UK gas generation (22 per cent of electricity demand) by the mid 2020s. Fewer gas power stations would need to be built, and those remaining power stations could be run more often to meet demand when necessary, making them more economic and less reliant on government support via the capacity market.

Using interconnection instead of gas turbines in this way could keep greenhouse gas emissions 70Mt lower over the course of the 4th carbon budget (2023–27). Trading electricity with neighbouring countries is already displacing high carbon power in the UK: 3.1GW of coal capacity is due to be replaced with interconnectors by early 2020s, supported by capacity market contracts.

More storage would make it cost effective to decarbonise sooner, as cheaper renewables are more widespread. Interconnectors enable the UK to access and share storage in other countries. This is especially valuable for longer term storage of energy from hydro plants, which make up a large share of Norwegian power generation.

30GW of storage would make a power sector emissions target of 50g of CO₂ per kWh by 2030 cheaper than the current target of 100g of CO₂ per kWh, as cheap excess renewable electricity can be stored and released at times of peak demand.

There is great uncertainty about the amount of domestic electricity storage capacity there will be in 2030, with projections ranging from 8GW to 38GW. By contrast, more interconnection would give the UK access to storage which already exists abroad.

5. Conclusion

Staying connected, despite Brexit

The UK will double its interconnection capacity to 8GW over the next few years. But optimal levels of interconnection are estimated to be much higher at 17-19GW, as the government has recognised in the Clean Growth Strategy.

But how well interconnectors work is only as good as the market trading rules that govern them. These rules enable physical interconnections to act as firm capacity and, as the EU builds a zero carbon electricity grid, they can ensure energy imports to the UK are low carbon.

After Brexit, the UK may lose the ability to set these rules, but it will still be able to influence the technical standards that underpin them if it stays within the EU's standards bodies and internal energy market. This would mean it could continue to trade energy efficiently, operating according to common standards alongside its European neighbours.

To get the most from greater interconnection - ie accelerating the development of its low carbon energy system and increasing energy security – the UK should expand its renewable capacity and develop flexibility services like demand response and storage. It can also turn this capacity into a valuable revenue stream in the form of clean energy exports to the EU.

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Slide 7

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