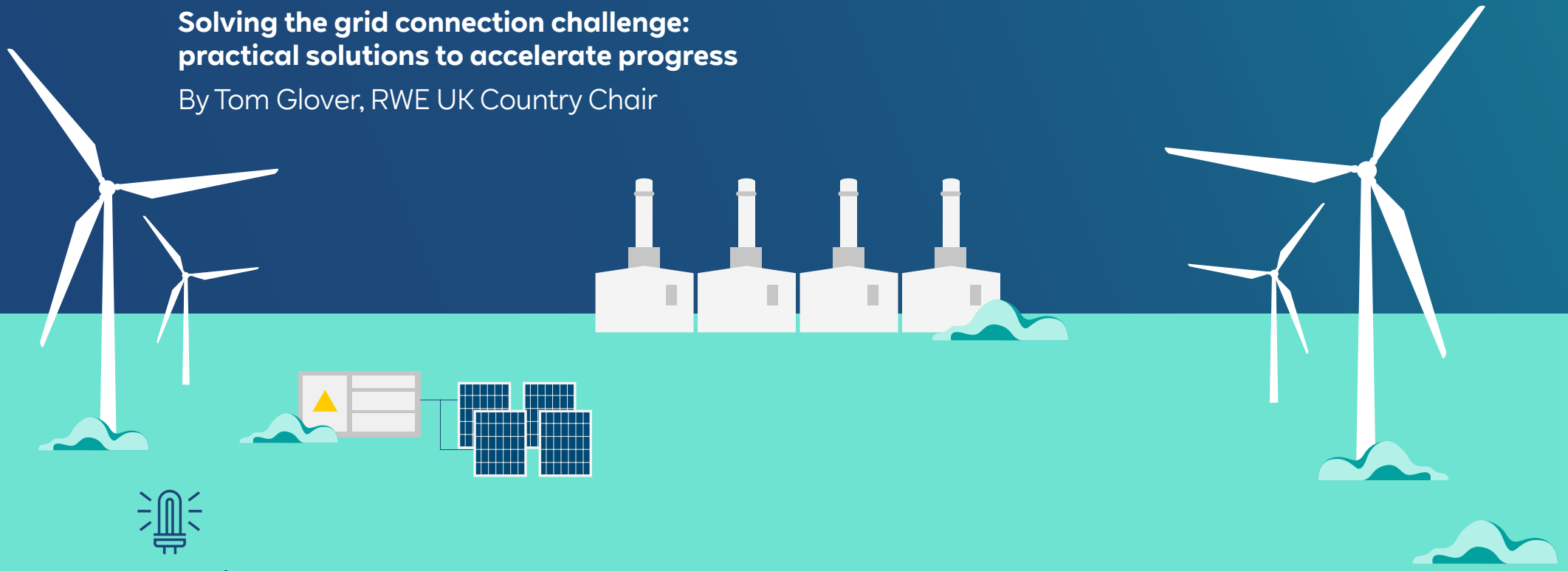
RWE

Removing the barriers to low carbon power

Solving the grid connection challenge: practical solutions to accelerate progress

By Tom Glover, RWE UK Country Chair



RWE Reflections

RWE is the largest power generator in the UK, producing around 15% of the country's electricity. We have ambitions to invest up to £15bn by 2030 in developing clean energy projects in the UK to support the energy transition, creating high quality jobs across the length and breadth of the country. To unlock this we need a stable and supportive policy and regulatory framework.

To fully decarbonise the power sector by 2035, we need a faster and more ambitious approach to resolving the significant barriers holding back the development of low carbon power: issues such as lack of grid, network charging and reform of the CfD.

Over the coming months, I will be publishing a series of thought pieces, sharing my ideas on how to tackle these challenges.

In this paper, I share my ideas which I believe need proper consideration from Government, Ofgem and the Electricity System Operator (ESO) in order to accelerate the connection of low carbon generation.

Key messages

Lack of grid infrastructure is the **single biggest blocker** to deployment of new low carbon power. As well as building new grid infrastructure, **we need to make the connections process work better, and use the existing grid we have more efficiently**. On this, some progress is being made, but it is not yet having the impact needed.

The main area that has yet to be fully explored is the **use of sharper economic signals to accelerate and optimise grid connections**. A move to more market-based solutions will mean that the most economically viable projects are the ones best placed to proceed – ultimately leading to lower costs for consumers.

More specifically I believe the following ideas need to be explored further:

- **Greater transparency of connection availability:** Poor visibility of network availability is a material issue, meaning developers must place multiple applications to find a viable site.
- **Higher / earlier connection liabilities:** Currently, the cost of applying for and holding a connection agreement is extremely low, and the limited cost of holding the place in the queue encourages parties to hold the agreement, even if the project is unviable or delayed, Higher upfront costs, or higher and earlier liabilities for grid connection agreements would mean that only viable projects with a high chance of commitment would apply for and hold connection agreements.
- **Allowing parties to 'trade' connection capacity:** For example, if one onshore windfarm is progressing more quickly, or is more economically feasible (i.e. larger, newer technology), but is behind in the queue, they should be able to come to a commercial agreement to trade places. Equally, a new offshore windfarm could pay an old gas station to close earlier and take over its grid capacity.
- **More flexible and commercial arrangements for grid entry:** Instead of building a new connection, two users (e.g. an existing gas station with a firm connection, and a new offshore wind farm) could agree to share the same grid capacity - when it's windy, the windfarm uses the capacity, and vice versa the gas station. The windfarm would be prepared to compensate the gas generator for lost income, in exchange for getting onto the grid earlier.

Facilitating such commercial arrangements would allow for a **more efficient optimisation of grid connections between assets and accelerate connections**. Low cost, low carbon generation would potentially come on earlier, and ultimately localised increases in grid capacity (and therefore new infrastructure) may be reduced, or even not be required at all.

Introduction

There is now a broad consensus across government and industry that the single biggest barrier to accelerating towards decarbonisation, energy independence and therefore lower costs for consumers is grid infrastructure.

Whilst there is good intent, and some recent initiatives to address this issue, the reality is that the process of connecting to the grid is too slow and bureaucratic. For example, RWE's low-carbon projects face between 2-5 years delay purely because of lack of grid – this is slowing down our investment in the UK and reducing our ability to supply lower cost, lower carbon energy – and is putting the Government's targets for decarbonising electricity at significant risk.

The Electricity System Operators (ESO's) 'Five Point Plan' to accelerate grid connections is welcome, in particular, the updated treatment of storage and updated modelling of connection and attrition rates. However, the Plan lacks the ambitious and strategic thinking required to get projects connected earlier – in particular, it could go further in terms of using the existing grid more efficiently through the use of economic signals because, ultimately, money talks!

More specifically, Point 2 of the Five Point Plan (terminating grid connections of projects that do not meet certain criteria/milestones) needs greater consideration. I support this in principle, as it requires projects to demonstrate they are moving through the development cycle at an acceptable pace - or have their agreements terminated. However, in practice there will be a tricky balance to strike - the ESO must ensure it has the "teeth" to terminate projects that have become unviable, without undermining investor confidence where there are genuine delays beyond the control of a project (e.g. in planning, supply chain). Indeed, there is a material risk that the "wrong" projects get terminated (i.e., high value, large scale, more efficient projects may get terminated ahead of low value, easy-to-develop, less efficient projects) and that developers challenge the ESO's decisions, undermining its effectiveness.

I suggest that imposing higher liabilities, as discussed below, in conjunction with the milestone approach and the "trading of grid connections", may be more effective, as this gives greater control to the developer who has the most insight into their own projects, and who determines whether the project is attractive or not.

It is this kind of pragmatic, real-world thinking that can shift the dial on grid connections and open up opportunities in the future.

ESO's 'Five Point Plan' consists of five short term connection initiatives:

1. **Transmission Entry Capacity (TEC) Amnesty** - where the developer is offered an opportunity to terminate their connection contracts without incurring liabilities;
2. **A proposal to add connection queue 'milestones' to agreements,** so that projects that are not progressing are removed and prevented from blocking the queue;
3. **Changing how storage, including batteries, is treated** on the network to allow them to connect faster or free up capacity for other connections;
4. **Undertaking updated modelling** to reflect current connection rates and attrition rates, reducing the assumption that most projects in the queue will connect;
5. **Offering an interim offer for storage projects such as batteries to connect faster,** initially on a 'non-firm' basis i.e. they may be required to turn off more frequently when the system is under stress.

We need to build more grid to achieve our electric future. However, even if we eventually manage to build more capacity faster, it will still take time to deliver. Therefore, it is critical that in addition to speeding up delivery of more grid, there needs to be more focus on:

1. Taking a different approach to evaluating new connections;
2. Better managing the connection queue;
3. Better use of the current grid.

I will discuss each of these in turn, putting forward some 'strawman ideas' for consideration.

I present them as ideas that should be considered further, to enable some projects to connect sooner than the post 2030 dates currently being offered. Proper appraisal of the following ideas will be complex but necessary in order to determine any negative impacts and unintended consequences.

[1] In Network Options Assessment 7 (NOA 7), published August 2022, National Grid ESO estimate that annual constraint costs could rise from around £500m per year in 2022 to a peak of £3bn per year by 2030, depending on the scenario.
www.nationalgrideso.com/document/266576/download

1 Taking a different approach to evaluating the grid

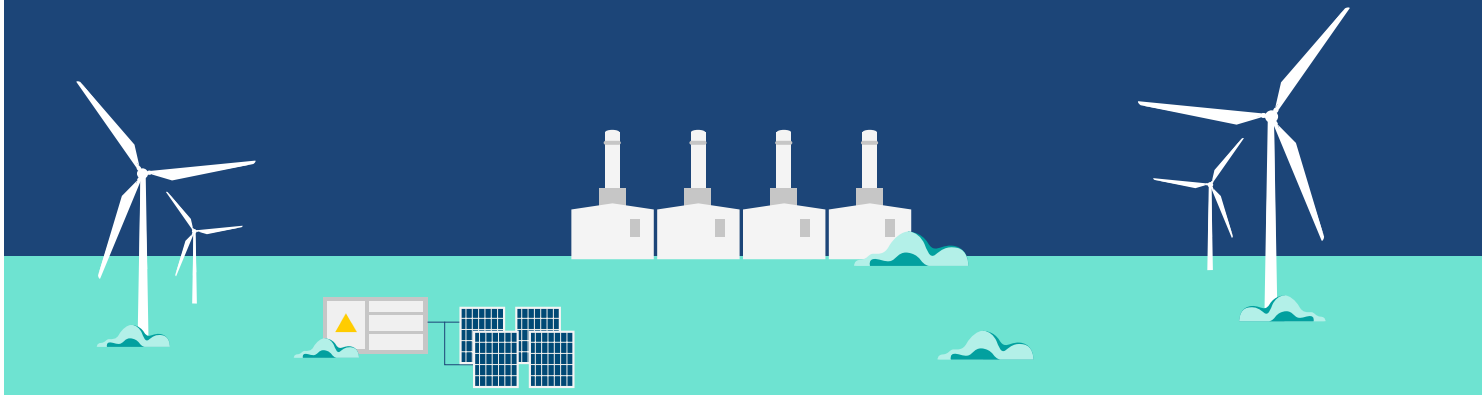
The costs of balancing the system has increased rapidly over the last few years, and are set to rise further[1]. A significant proportion of these costs are due to management of constraints on the transmission grid. However, it is unclear what proportion of that is due to increasing volume of constraints; or more generally, the increasing cost of providing balancing services in a high cost commodity world.

Further, and more importantly, we have not seen a rigorous Cost Benefit Analysis that considers the full welfare benefits of connecting renewables earlier, possibly without meeting full (and potentially conservative) grid standards.

We urgently need this analysis. Why?

Because it may be the case that the benefits of connecting renewables earlier (including investment, employment, lower CO_2 and the overall lower electricity prices from low marginal cost generation), is greater than the extra costs of managing constraints. In other words, increasing constraint costs (in isolation) are not necessarily a 'bad' thing – if the overall welfare benefit is positive (i.e. through lower CO_2, lower bills, higher employment etc.). The same argument may be applied to decisions to reinforce parts of the network. To put it a different way - when a holistic view is taken, rather than simply weighing the cost of constraints against the cost of reinforcement, is there a credible case for moving faster?

In evaluating the grid and making decisions about investment, we should be taking more of a holistic approach.



2 Better managing the connection queue

It is clear that many viable projects are delayed due to less viable, more speculative projects being ahead of them in the connection queue. Consequently, the ESO has difficultly in planning the future system because they do not know which of the many connection requests will become a reality.

In order to address this issue, the ESO recently conducted a "connection capacity amnesty" which, unfortunately, has resulted in little uptake. In my view, this is unsurprising, given there is little/no incentive to give up a place in a queue which costs little to maintain, and hence effectively holding your place in the queue is a "no-regrets, low cost option".

While I note the ESO's recent efforts, including their 'Five Point Plan' to better manage the grid queue, is a step in the right direction, we're up against the clock. Therefore, we should consider further ideas that could work in tandem in order to accelerate projects.[2]

To provide proper signals as to what is most likely to be connected and to ensure that the "best" projects[3] are connected, this "free option" needs to be addressed.

I see a number of ways this could be addressed that are worthy of further appraisal:

There is little to no incentive to give up a place in a queue which costs little to maintain, and hence effectively holding your place in the queue is a "no-regrets, low cost option".

[2] ESO: 'Get on, get back or get out of the energy queue' - ESO announces urgent action to speed up electricity grid connections by up to 10 years"

[3] 'Best projects' defined as highest NPV which is a good proxy of the highest welfare value.

Greater transparency of connection availability.

Many of the new connection requests in the queue are not related to a "real development".

The ESO has highlighted that between 2018-2022, 42% of applications have fallen out of the process (withdrawn, rejected, or terminated), and of those that remain many will be subject to modification applications and will continue to go round the process. In my view a material issue causing this problem is the poor visibility of network availability ahead of making a formal application meaning developers must place multiple applications to find a viable site.

Further consideration should be given to improving the transparency relating to opportunities to connect and connection timescales (building on the work taking place under the connection reform process). In addition, high-tech approaches for the application process could reduce the pre-application workload and automatically produce offers.

Higher/earlier connection liabilities.

The current cost of applying for and holding a connection agreement is extremely low, encouraging speculative applications at early stages in project lifecycle in order to secure the place in the queue.

Further, the limited cost of holding the place in the queue encourages parties to hold the agreement, even if the project is unviable or delayed, until the last possible moment the liabilities increase. At this point, parties can then modify the agreement until a later date – NGESO confirmed that 30% of the workload in 2022 was driven by modifications to existing contracts.

Higher upfront costs, or higher and earlier liabilities for grid connection agreements would mean that only viable projects with a high chance of commitment would apply for and hold connection agreements, and there would be a clear incentive to hand back agreements if projects become uneconomic/unviable. An obvious disadvantage of this approach is that development costs would increase due to higher upfront grid costs. The recently launched "two-stage offer process" for England and Wales whereby developers can take a place in the queue without having to place any securities risks further exacerbating this issue.

Tradeable connection agreements.

A more market-based approach would be to allow parties to "trade" connection capacity. For example, if one onshore windfarm is progressing more quickly, or is more economically feasible (i.e. larger, newer technology), but is behind in the queue, they should be able to come to a commercial agreement to trade places.

Equally, for example a new offshore windfarm could pay an old gas station to close earlier and take over its grid capacity.

Further consideration could be given to any restriction of tradeable MWs between technologies (i.e., XMW of offshore wind may only be equal to YMW of a gas station) and between locations (i.e., if the bottleneck on the network is a long way from the generator selling its grid capacity, then there may be multiple locations where the generator buying the grid capacity could choose to connect (i.e. it wouldn't necessarily have to be right next door).

> **"A more market-based approach would be to allow parties to "trade" connection capacity."**

3 Better use of the current grid

At the moment, most users simply have a firm grid connection – allowing them to export on the grid as required or receive constraint payments. An alternative would be to allow users to enter more flexible and commercial arrangements for grid entry.

As a simple example, an offshore windfarm may not be able to get an early connection agreement because of a lack of grid capacity in the location. However when looked at in detail, this may be because the grid capacity was held by a number of older gas stations. In reality though, in windy conditions, it is highly unlikely the gas stations would run, and if they did likely margins would be small.

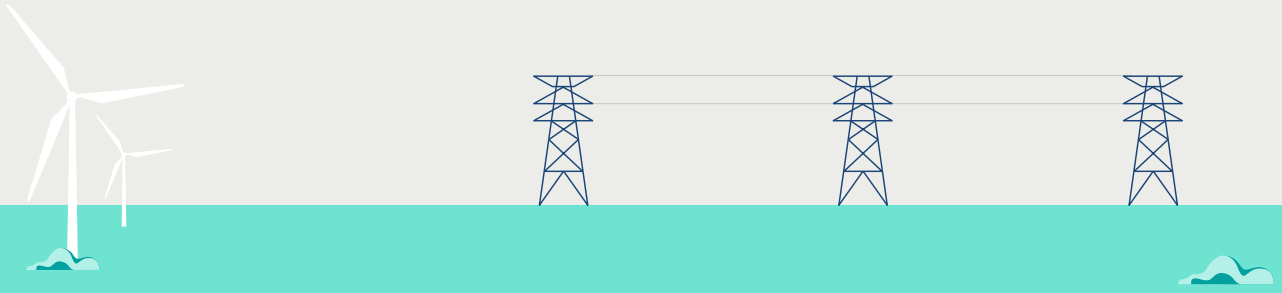
The first issue is that the current grid security standard (known as the Security and Quality Supply Standard – SQSS) does not adequately consider this happening. Reviewing and updating this element of the SQSS is urgently required.

Further, a more efficient commercial arrangement than building a new connection could be for a gas station and an offshore windfarm to agree to share the same grid capacity, and in doing so commit to the ESO never to jointly export any more than that capacity.

Therefore, put simply, when it's windy the windfarm would use the capacity, and vice versa the gas station, with the windfarm getting priority despatch due to its low carbon and low marginal cost status. In this scenario, the windfarm would be prepared to pay the gas generator any lost income, in exchange for getting onto the grid earlier.

From a consumer perspective, these kinds of commercial arrangements could be attractive because low cost, low carbon generation would potentially come on earlier, and ultimately localised increases in grid capacity (and therefore new infrastructure) may be reduced, or even not be required at all.

Permitting and facilitating commercial arrangements to allow more efficient optimisation of grid connections between assets in this way would accelerate connections and facilitate a lower cost transition to net zero.



Security and Quality Supply Standard

The SQSS assumes that in high-wind conditions, all gas stations run at the same percentage load to meet the remainder of national demand. This overlooks that some plants (not adjacent to a windfarm) may be able to increase their output more to compensate for the constrained output for those gas plant that connect alongside a windfarm.

In other words, grid planning rules are blind to the fact that one gas plant can run at 100% to compensate for another one only running at 50% to allow more wind power onto the system.

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