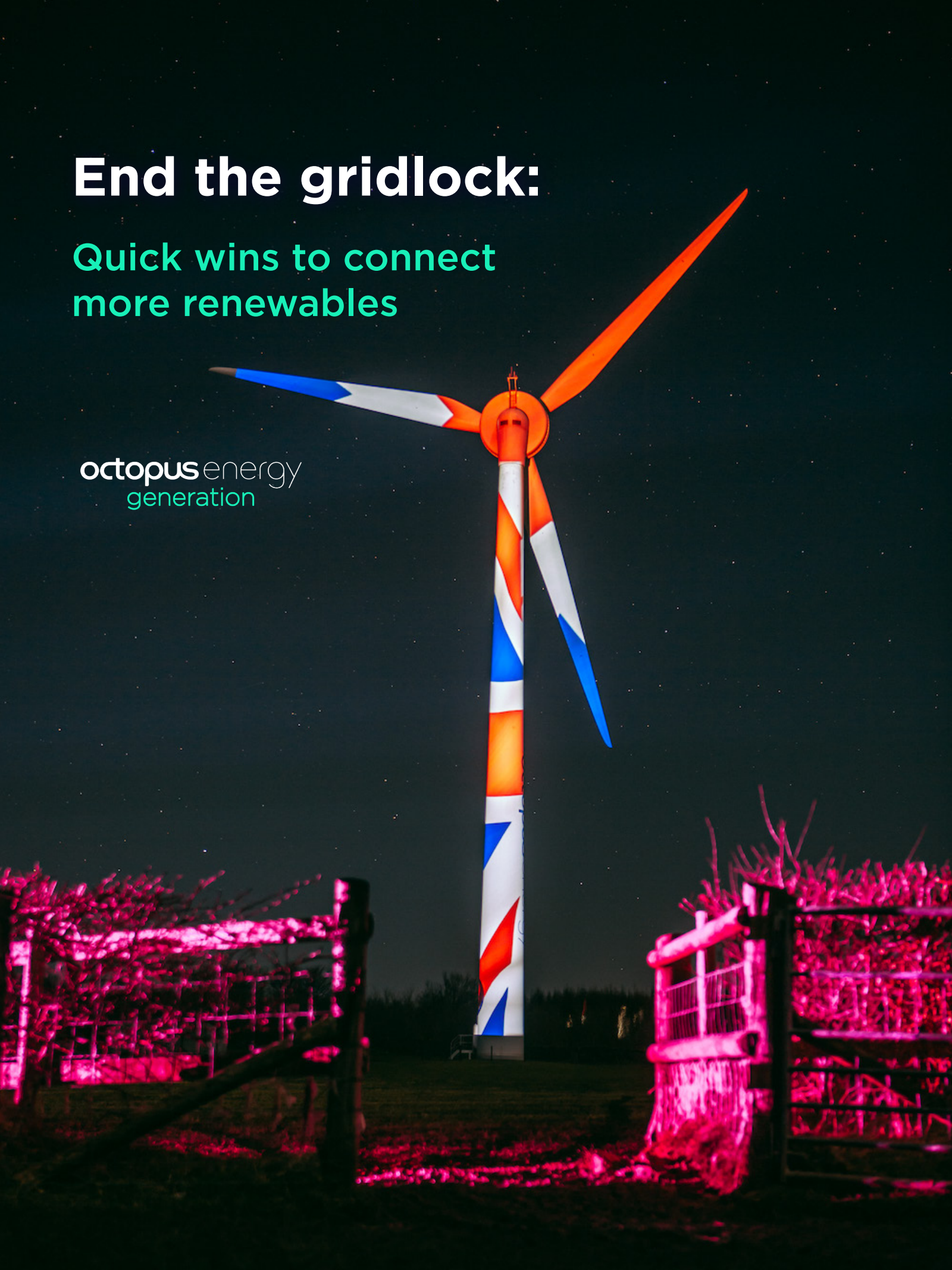
End the gridlock:

Quick wins to connect more renewables



octopus energy generation

Introduction from Zoisa North-Bond, CEO of Octopus Energy Generation

In this report, we paint a picture of **the landscape for connecting renewable projects to the grid** and what we see as **potential solutions**. We've drawn these recommendations from **first-hand experiences** as we represent a **sizable chunk of new green power development in Britain** - from our own development and through investments from the funds we manage.

It's vital the UK heavily invests in building the grid infrastructure needed for its green future. Indeed over the next few years, the UK must build six times the amount of electricity transmission infrastructure than it has done in the previous 30 years combined.

But simultaneously **there are quick wins we can do** now to accelerate progress within the current infrastructure. We're outlining a 5-point-plan we believe could enable us to connect 5.7 GW of renewable projects and rapidly accelerate renewables' share of Britain's energy mix. Simple and small steps can combine to lead to massive progress. **There's no time to waste** - we need to end this gridlock once and for all.

As ultimately there's only one path ahead for the UK's energy system: and this is being powered largely by cheap, green, homegrown energy built on our land, roofs and seas.

And we're seeing **huge investment appetite behind accelerating the UK's energy transition.** Our generation arm manages £6bn of renewable assets - and we're on a mission to invest and build billions more. We've already identified £26bn of investments set to unlock new green power in the UK alone. There's a massive renewables investment opportunity - so we need to be able to act much more quickly to enable grid connections for these.

We know **renewable energy is consistently the cheapest source of energy to build and generate.** So the more onshore wind, offshore wind, solar and energy storage we build, the faster **the drive to a secure energy system** not beholden to global fossil fuel prices.

What's holding Britain back? The grid consistently comes up as a major hurdle slowing things down.

There's an **extremely long list of projects waiting to be provided a connection** to the grid. Projects are being given connection times in the **next decade** - and this is only **getting worse**. At over 200 GW, the UK has **one of the worst connection queues** in Europe. And regional disparities in grid infrastructure and investment, particular rife in areas like Wales, is also slowing down equitable growth.

To help ease the energy crisis and **ensure this is the very last one** - we should all be doing everything we can to get to this new green reality **faster than ever before**. We can do this by building our way out through renewables and driving down energy bills. Now is the time to look at innovative ways to quickly connect more cheap green energy to places that want it.

And **the demand is there - we just need to be able to unleash it quicker.** We shouldn't underestimate how much we can achieve with a **proactive can-do mindset**, leveraging **tech and data**, improving **transparency** and greater **collaboration**. The grid was ultimately designed for fossil fuels, not renewables - which is why a new way of thinking is required.

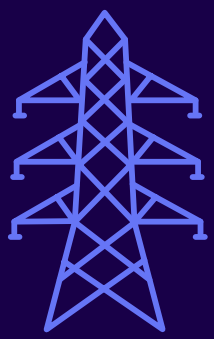
The opportunity to bring more cheap energy into people's homes and businesses and make a difference on bills is too urgent. As well as providing a more secure energy system, it'll **unleash a new wave of renewable-powered growth.**

The UK's grid landscape: Common challenges when connecting to the grid

The UK's grid system is not fit for purpose. Britain was ahead of the curve in setting up the world's first electricity grid. The flip side of being a first mover is we're now in a scenario where we're stuck with infrastructure and systems that are old, complex and creaking.

The cables transporting electricity literally aren't big enough to carry the volume of electrons we'll need as our heating and transport shift to electrification, powered by renewables. This is slowing down the UK's growth and ability to truly turbocharge its green energy transition.

The grid was set up for fossil fuels, not renewables. The grid used to receive a handful of requests to hook up large coal or gas fired power stations. It's now playing catch up as it receives thousands of applications from small decentralised renewable generators.



The grid's **legacy processes were simply not set up to deal with this level of applications** - and they're not being managed, evaluated and progressed quick enough. Insufficient resources are another major blocker to processing this growing queue. We need a fundamentally new way of thinking to manage this better, where renewables come first.

This all means renewables projects trying to connect to the grid are met with mounting challenges, including:

1. **You simply join a long queue - even behind fossil fuels projects.** There's no prioritisation. Old coal and gas power projects sit on vital capacity, despite them likely never getting built. Even with renewable projects, applications further along with e.g. land, funding, planning consent, environmental surveys, still end up sitting behind projects without any tangible progress on hitting their key development milestones.

2. **There's no expiration on grid connection offers.** Projects pay just a minimal fee to secure their offer, without needing to show proof of a viable project. Speculative applications take up capacity and old grid offers block up the system.

3. **Waiting times of 5-10+ years.** Despite the urgency to build more renewables, projects are being given connection times of 5 to 10+ years. Multiple projects have even been given outrageous connection dates of 13 years away or more.

4. **Being told there's 'no capacity'.** The grid needs to ensure it's safe and not overloaded, but an overly cautious attitude, modelling the worst case scenario across thousands of projects, means in reality there's lots of unused capacity, despite being told otherwise. There can also be unused capacity where projects don't end up using all the grid capacity allocated to them.

5. **Met with prohibitively high costs.** On some occasions, a wind or solar farm project which could take e.g. £5m to build is quoted over £20m for the grid connection alone. This can prevent projects from progressing at all.

Anecdotes from companies trying to connect projects

Sarah Smith, Wind 2, onshore wind developer: More collaboration needed.

"When developers apply for grid connection, there's no bigger picture of who/how many others have applied. If lots want to connect in one area and upgrades are needed, the grid could open up these discussions between developers and we could all share that cost."

Spencer Thompson, Eclipse, independent DNO: More accurate modelling required.

"The grid has been assessing batteries as 'always-on' i.e. that they store a certain amount of capacity the whole time. This isn't the case, and using technology to reflect the reality of how batteries work in practice would free up a significant amount of capacity without needing to build new infrastructure."

Alison Miles, Gridsource, solar and battery developer: Better coordination across regions.

"Regionally across different DNOs there are different practises with some DNOs taking 12 weeks just to validate an application, while others validate in just 7 days. Time makes a huge difference when planning these projects, as in those 12 weeks, lots of time is wasted when we could get moving."

Mark Rowcroft, Exagen, solar and storage developer: Making better use of capacity we have.

"We don't necessarily always need more copper in the ground, we need to use the capacity we already have more effectively. We can free up capacity in the system through changing the way we think about it."

Neil Clayton, Zestec, rooftop solar developer: Better understanding of smaller renewable schemes needed.

"We're seeing huge demand from companies wanting to install solar on their roofs and at their sites, where this energy is consumed on-site and not fed back into the grid. Yet we're often still quoted high curtailment costs. Greater understanding is needed in this area of renewables development."

Paul Loran, head of innovation and development at Octopus Energy Generation:

"Through our Winder (Tinder for wind) platform alone, we've identified potential for thousands of new onshore wind turbines amounting to 2.3 GW - and we're taking a data-led approach to map out where communities are demanding wind power. Yet the single biggest barrier to doing this quickly is grid connection times, with some projects given waiting times of 8 years or longer."

Solutions: What can the UK do differently to speed up renewable projects' connections to the grid?

While the UK needs to build billions of pounds more grid infrastructure, a simple change of mindset can also go a long way to make positive change quickly. Here we outline some quick wins the country can do in parallel right now to make the most of the grid we have today and truly move the needle. We should all be doing everything in our collective power to connect and bring online more cheap green energy.

Below is our action plan we propose to help clear the grid connection queue:

1. Proactive queue jumping to connect renewable projects that are further along

To build our way out of the energy crisis, we should prioritise connecting projects that are more advanced. Tangible projects that already have, e.g. land, funding, environmental surveys underway, planning consent, can jump ahead to connect. This would clear the queue by pushing speculative, less progressed projects down the list. A similar approach has proved useful in countries like Australia.

Plans have been announced to manage the queue more according to project progress, but if something as simple as proactively enabling more progressed renewable projects connect quicker which has proven useful elsewhere, it's worth exploring now. A fast-track process for renewable projects that are simply ready quicker could unleash huge amounts more cheap, home-grown power.

Dated fossil fuel project applications also sit on grid capacity but will likely never get built - so they should also be deprioritised. As we shift towards net zero, the focus should be on low carbon energy that can get us there quicker.

2. Enforce a sunset clause on grid connection offers

Reports of National Grid's amnesty enabling developers to voluntarily cancel grid connection requests they'd previously made without incurring penalty, show that uptake overall has not been high. This does not go nearly far enough.

Instead of making it voluntary, huge swathes of the system could be reviewed proactively. If projects aren't green and have been on the system for a certain time, then these could be automatically removed. Instead of putting the onus on the developer, the onus should be on the grid system to enforce and free up capacity quickly and proactively.

3. A more transparent can-do attitude with data and tech driving it - creating ‘zones’ ripe for developing renewables nationally quickly

We must make the grid smarter, more digitised, and fit for a dynamic renewable system. A live database could make connecting to the grid less opaque and more transparent.

Through Octopus’ Winder platform, we’ve mapped out current substation capacity, piecing together the picture using regional DNO data. Yet in other countries this information is much easier to come by, for example in Spain, the Distribution Systems Operator (DSO) is obliged to share information about available capacity on a monthly basis.

This doesn’t mean development will be guided only by where there’s capacity. But if we’re trying to accelerate building more green energy, this approach provides a helpful tool to show where it’s popular, and if there is capacity, we should be able to move really quickly.

And every time a developer makes an application, they start from scratch to carry out a wide range of surveys - so we can do more with data here too. Previous surveys could be collated into a central database, layered with new surveys to create ‘zones’ ripe for green power. Pre-agreed ‘zones’ could have quicker planning and grid connection time-frames.

This type of proactive approach already works very well for offshore wind in the UK and has led to a huge acceleration in Britain’s offshore wind capacity. This could be applied to onshore wind and solar too.

4. Increase competition in the grid connection process

During a time where the need to build more cheap green energy is so urgent, it can’t be right any one entity should have so much power over where and when so many vital new renewables can be brought online.

There is a case to be made for the power of the free market. In other areas of the energy sector, competition has driven scale, speed and innovation. It’s possible the same could be applied to the grid.

There are learnings from other markets like Italy, Poland and Greece who enable a free market for grid connections, which can enable more competition and drive speed.

5. Greater collaboration between developers to share and drive down costs

The system currently operates opaquely. Different developers applying for grid connections have no understanding of who else is making similar applications. If substation or grid upgrades are needed, these could be done collaboratively. Instead of high costs prohibiting projects from going ahead, more could move forward if costs were shared.

There are learnings from other markets like Italy, where the grid operator appoints a lead engineer to coordinate what infrastructure is needed in a certain area, enabling collaboration with developers to pay for it and be compensated at a later stage.

Conclusion

The energy crisis is not waiting for anyone. **We need to see more action, speed and results** to clear the grid connection queue and end this gridlock quickly. **The UK can't possibly go into another winter with renewable projects still being told they can connect in a decade or longer** - this is unacceptable and simply too late.

You can **physically build a wind or solar farm in a matter of months**, but the main blockers are red tape and connecting to the grid. Tweaks to the planning process are already underway but **the grid remains the single most important blocke**r holding back huge amounts of renewable energy coming online.

As we've outlined, **in reality grid capacity is not 'full'**, and with **another mindset** the UK could unleash large amounts of grid capacity to connect more renewables in a matter of weeks or months.

We know that **renewables are the cheapest and quickest forms of energy** we can build and generate. We're sitting on a huge opportunity with **strong demand and popularity from the public** and **high levels of investment appetite** - we just need to be able to unlock it at scale and at pace.

We're keen to work closely with National Grid, Distribution Network Operators (DNOs), Ofgem and across the industry to collaborate and do whatever we can to accelerate progress. **The time to act is now** - as it could truly make a difference before next winter.

Please note: For more information about wider reforms suggested for the grid, please see Octopus Energy Group's 'manifesto' for the grid, covering flexibility, and more