



NG Bailey



Solving grid connectivity via **Point of Connection Mast (POC-MAST™)**

The challenges of complex overhead line high voltage grid connections have led many companies to explore new innovative techniques. At Freedom, an NG Bailey Group company, we have firmly placed an emphasis on developing a solution to support the UK governments net zero energy transition. As the UK moves from fossil fuel reliance to electrification, creating a safe, reliable and cost-effective method to connect to the grid is paramount.

Our Freedom business has developed the innovative Point of Connection Mast (POC-MAST™) product, which allows generation technologies to be connected to overhead lines, up to 132kV. But how could this revolutionary technology support grid connections and what are some of the challenges in its development?

Martin Buckland, Managing Director Freedom Professional Services shines a light on how the business is stepping up to solve grid connectivity.

Could you tell me a bit about the POC-MAST™ technology?

In the modern world, being able to connect into the electricity distribution network is more important than ever. Freedom, an NG Bailey Group company, developed a transformative way of connecting new customers to existing high voltage Distribution electricity networks.

The POC-MAST™ is a revolutionary way of making the connection process for generation or demand connection projects faster, safer and cost-effective. Suitable for connecting to overhead lines up to 132kV, the POC-MAST™ can connect to either tension or suspension towers using a tee-in or loop-in loop-out configuration.

The POC-MAST™ can eliminate the need to construct a new tower and the associated temporary diversion of the adjacent circuit. This reduces the scope of works for new connections, which saves time, costs and minimises health and safety risks – this can make the difference to whether a connection scheme is viable, or not.

What are some of the challenges associated with grid connectivity? How does the POC-MAST™ product overcome these?

Traditional methods for connecting projects into the electricity distribution network usually require either a new junction tower, back-to-back terminal towers or extensive modifications to an existing tower. This can involve lengthy outages on both circuits and often a temporary circuit diversion by way of temporary mast or single circuit tower.

Such modifications cause significant disruption to the network putting other circuits under increased load, meaning they can only be carried out during British Summer Time (BST) months. Traditionally, these new connections are expensive and lengthy to complete.

POC-MAST™ provides a simple, more cost-effective solution, by being located adjacent to an existing tower it can be assembled and erected without being connected to the network. Then it only requires a short, single circuit outage of the connecting circuit to make the final connection, significantly minimising network disruption.

POC-MAST™ also has significant health, safety and environmental benefits, when compared to the traditional connection method. Working at height is reduced, as the POC-MAST™ is assembled at ground level, with screw anchor foundations eliminating the requirement for working within deep excavations and reducing concrete use by up to 30 tonnes. With a POC-MAST™ connection no heavy lifting operations are required for the construction as the mast is lifted into place by a hydraulic ram.



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It has minimal environmental and visual impact on the surrounding area and the mast itself is also low maintenance and is fully galvanised, with a design life of 40 years.

The POC-MAST™ is also quick to complete, taking less than 20 weeks from concept to construction. Traditional installations typically take 6-12 months.

How could the UK solve the current delays witnessed with grid connectivity?

With the UK government committing to achieve net zero emissions by 2050, over the coming decades we will see an ambitious drive and transition to a greener and more sustainable future. Renewable energy has grown ten-fold since 2004 and will need to continue to increase significantly in the next decade to meet the government's target for all electricity to come from 100% zero-carbon generation by 2035.

As our economy moves from fossil fuel dependency to increasing electrification and renewable energy generation, access to the electricity distribution network is a growing need. A major challenge for developers, across a host of different sectors, is obtaining a point of connection offer from DNOs at the right cost and timeframe to ensure the project is viable, both from a cost and speed perspective.

As a business, we recognised the need for quicker more sustainable grid connections several years ago, hence the investment we have made in our POC-MAST™ product. To date we have invested over £750,000 in the product, including full scale structural testing, as part of the DNO approval process.

The POC-MAST™ was tested in accordance with BS EN 60652:2004 - Loading tests on overhead line structures. As part of the structural tests the POC-MAST™ deflection was measured at each load increment, confirming that under high wind the cross-leads would not either become taut imposing unnecessary load on the existing tower or sag too much infringing electrical clearances.

Could you tell me about how to install a POC-MAST™ for a project?

Freedom undertakes a three-stage design process for every POC-MAST™ connection. Stage one is a high-level review, offered free of charge, to confirm suitability of the tower and site for a POC-MAST™ connection solution. This review includes optioneering, where we look at the entire site.

Because POC-MAST™ is built offline without the need of a crane for erection or a temporary diversion, it provides more flexibility to establish the most suitable location for the point of connection and associated electrical infrastructure, ensuring our clients can maximise the use of the technology to minimise the point of connection scope of works and provide the most cost-effective overall solution.

All we require to undertake the initial review is an image of the existing towers and the site boundary, sometimes Google Earth is suitable for the imagery. We then move to concept design and provide drawings suitable for a planning application, before progressing to detailed design and furthermore the installation.

The POC-MAST™ installation commences with the screw-anchor foundations. A group of four piles are installed using a 20-tonne excavator with rotating drive head. A steel grillage is bolted to each pile connecting the group together and providing the base plate for the mast.



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The POC-MAST™ sections are jacked together at ground level to form a single unit. Only at this point is an outage required to lift the assembled mast sections to vertical, using the hinge mechanism and a hydraulic cylinder. Post insulators and vertical conductor runs are fixed to the mast using a mobile elevated work platform (MEWP) and the mast is ready for the final cross-lead connection to the tower.

The time it takes to install a POC-MAST™ connection depends on both the connection type (tee-off/looped) and tower type (suspension/tension) but is typically between six and twelve days with the lifting of the POC-MAST™ itself taking just six minutes.

The generic POC-MAST™ is designed for connecting to 132kV towers. The 132kV POC-MAST™ geometry is based on the most common 132kV distribution towers. Tower geometry is driven by both statutory ground clearance and electrical clearance requirements. As such all 132kV towers have a similar bottom cross-arm height and cross-arm separation, meaning most 132kV tower specifications would be suitable for connection using the generic POC-MAST™.

What is the future for NG Bailey and grid connectivity?

We have a significant pipeline of POC-MAST™ projects, including an installation this summer in a new DNO region. To support this pipeline and to ensure we are able to meet client and project timescales, we hold stock of the POC-MAST™, saving on individual production time.

Currently when connecting to towers remote from the point of supply substation where an underground cable run is necessary, a small cable sealing end compound is required next to the POC-MAST™. We are currently developing a freestanding POC-MAST™ to cable solution, which does away with the compound and associated maintenance of it. The “remote” POC-MAST™ will widen the scope of the technology to cover solutions where currently towers with cable sealing end platforms are required, which again require tower modifications that are disruptive to the network.

We are seeing more enquiries for connections at higher voltages so in time may look to develop this further. We are NERS accredited to 132kV but we also provide support services at 275kV and 400kV, so this progression seems only natural.

As part of our over-arching net zero mission, we are evolving to be at the forefront of the UK's transition to a low-carbon economy, innovating to create the infrastructure we need for a sustainable future.

To find out more about POC-MAST™ visit www.ngbailey.com/poc-mast