

October 2019

PART OF THE RANDOLPH GROUP OF COMPANIES

In This Issue

- Preventative Maintenance During the Summer Months
- Data Analysis Services
- Condition Monitoring
- Next Steps in Grid Code Compliance
- Employee Spotlight
- Randolph Group News
- CCTV Installations

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Preventative Maintenance During the Summer Months

The lower wind speeds and *occasionally* warmer weather during the summer make it the ideal time to carry out turbine maintenance which may require turbines to be stopped for longer periods of time. Not only is it a safer working environment for our engineers, but loss of production should be minimal during maintenance due to the low wind speeds.

Preventative maintenance tends to involve rectifying faults picked up over the windier winter months which may not have been critical towards the safe running of the turbine for a period of time. Carrying out these works over the summer allows for appropriate planning and preparation to reduce down time and also ensures turbines are ready to run efficiently over the coming autumn and winter.



This summer, Realise Energy Services carried out a number of projects on various turbines across the UK. In August we completed blade bolt changes on three 250kW Pioneer Wincon turbines in Aberdeenshire, this required lowering the rotors to the ground to allow the original bolts to be removed and replaced with upgraded components. Whilst the rotors were on the ground, it allowed us to accurately re-pitch the blades to ensure the turbines were set up more appropriately for each particular site.

In Northern Ireland, we carried out a tip-cable replacement on a 150kW Bonus turbine, the old cables had become stretched which resulted in the blade tips causing drag and noise which was reducing generation efficiency.

General servicing and pitch optimisation has been the focus for our engineers across our large fleet of Vestas turbines. The good weather has allowed for pitch adjustment and testing to be carried out to maximise performance across the higher windspeeds in the coming months.



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Data Analysis

At Realise Energy Services, we have been putting significant time and effort into developing a comprehensive data analysis process which enables us to better monitor and evaluate turbine efficiency and availability.

Our system downloads and stores the data produced by turbines on a secure server. Our engineers are then able to analyse this data utilising various programs, producing graphical and numerical comparisons across the fleet of turbines which we operate.

The most basic form of data analysis which we carry out is evaluation of individual turbine performance. When plotted against the manufacturers' published power curve, our engineers are able to determine whether your turbines are performing as they were designed, or whether there are any adjustments that can be made to improve generation or efficiency.

Manufacturers' power curves are generated in controlled 'ideal' conditions and it is not always advantageous or possible to set up a turbine to meet its manufacturers power curve in the real world. Often it is necessary to adjust a turbine to perform just above or below the manufacturers' power curve due to site specific conditions. For example, this may help to reduce downtime due to overspeed faults on turbulent sites.

Our engineers are trained to analyse power curves and make site specific adjustments to ensure that turbine performance and availability is optimal for your site.

Realise Energy Services also carry out recurring fault and error analysis. This involves processing the data in turbine error logs to pick out any recurring faults which may be easily prevented from happening again. This also helps to carry out preventative maintenance as often a component close to failure will increase the frequency of certain faults. Proactive replacement of components can reduce downtime as maintenance can be planned in advance and carried out more efficiently, often in conjunction with pre-arranged service works.

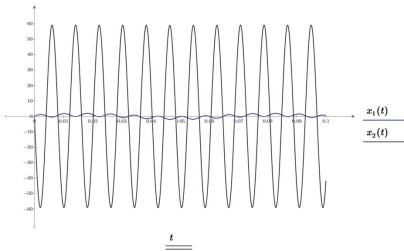
Fault analysis can also be used to analyse the quality of the grid connection and incoming supply to the turbine. Often a weak grid can result in significant downtime and increased wear on turbine components. Sometimes it can be possible to adjust turbine parameters to allow for more variation in the grid however this can lead to further problems in the future, particularly on stall regulated machines. Realise Energy Services are able to liaise with the DNO on your behalf if required and assist in resolving grid quality issues that might affect turbine performance.

If you would like more information on our data analysis services, please get in touch.

Condition Monitoring

In order to further improve proactive and preventative maintenance, additional sensors are becoming more common place in the industry.

Vibration and Temperature



Advances in technology in recent years have allowed newer turbines to be manufactured with vibration and temperature sensors fitted to the majority of mechanical components within the nacelle. With many older turbines, it is now possible to retro-fit similar additional sensors to components such as gearbox and generator bearings. This

allows for comprehensive analysis of vibration and temperature, potentially allowing failures to be detected early on, and before any potential knock-on effects.

These additional sensors can be fitted permanently or temporarily dependant on cost and turbine condition.

Noise

Realise Energy Services have a blade condition sensor which monitors turbine blades through acoustic recordings. These recordings are then analysed and blade defects can be easily identified, allowing for repair work to be carried out before issues further develop.

Defects such as hairline cracks or pitting can be detected without the need for a costly visual inspection. If repaired, blade efficiency would be improved, resulting in increased turbine performance.



The Advantages of a Fleet

Many of our customers only own one or two turbines. In this situation it is difficult for them to draw comparisons and evaluate how their turbine is performing in relation to similar machines. At Realise, we compare turbines across our whole fleet. This allows us to better understand how your turbine should be performing before highlighting and potentially rectifying any anomalies that we see.

For more information on Condition monitoring solutions for your turbines, please contact Realise Energy Services.



Contact Us

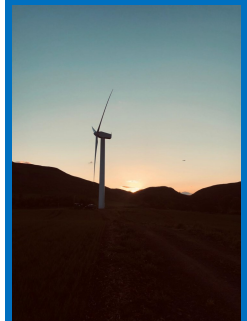
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Employee Spotlight:

Chris Cannon

Realise Energy Services are delighted to welcome wind turbine technician Chris Cannon to the company. Chris, formerly with WTN UK, joins us to strengthen our growing team of service and maintenance technicians across GB and Northern Ireland.

Chris is a hugely experienced technician with a wealth of knowledge when it comes to servicing and maintaining wind turbines and his detailed knowledge of the WTN turbine is a particular benefit to the company.



"Retrofit your Vestas turbine's COTAS controller and optimise availability that will improve your annual energy generation and extend the lifetime of your turbine."

- Improved monitoring and control
- Increased turbine availability
- Assured access to spare parts
- Modern fibre-optic technology

Compatible with Vestas V27/29,
V39 and V42/44/47

Realise Energy Services are the
authorised partner of DEIF
Wind Power in the UK.



CCTV Installation

Realise Energy Services now offer CCTV security systems to keep a safe eye on turbines.

The system works independently from the turbine's SCADA system and power source to provide added protection in the event of a power cut.

The camera's work in both day and night time and automatically trigger when motion is detected. Images are recorded on the camera's memory and also in the cloud in case of theft or vandalism.

Realise Energy Services offer a daily monitoring service to support the camera's use.

For more information and pricing, please do get in contact.



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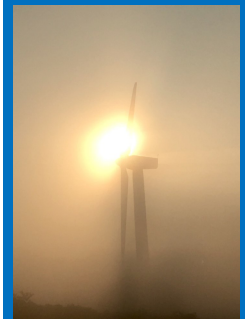
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If you need an experienced and reliable turbine support service and your current service and maintenance contract is due to expire over the next few months, please do contact us to get a free, no obligation quotation.

BREXIT and the Wind Industry

With net imports of electricity accounting for 4% of the UK's power supply in 2017, it is not surprising that the potential of a no deal Brexit is causing some uncertainty in the energy industry. This could result in a greater requirement for locally generated renewable energy (potentially providing financial incentives to the medium wind industry), however the government may instead turn their focus towards the development of larger nuclear or CCHP plants to make up the shortfall.

In Northern Ireland, this issue is particularly prevalent due to the I-SEM (Single Electricity Market between NI and ROI). This secure and low-cost energy supply is critical to homes and businesses and every effort will need to be made to preserve this during the Brexit negotiations.

Co-ordination of environmental standards between the UK and EU has allowed for strong development in the renewable energy sector over the past decade. Similar environmental standards would be critical in allowing future development of the industry if the UK leaves the EU.

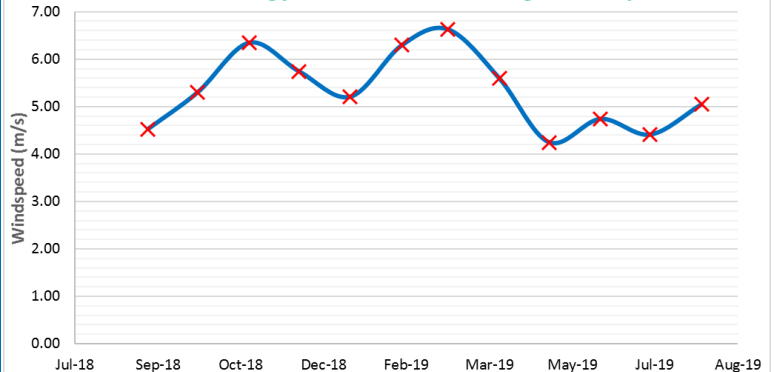
It is well known that Denmark and Germany are two of the worlds leading countries in terms of manufacturing, research and development within the wind industry. It is therefore important for the UK's renewable energy sector that trade with these countries remains simple and cost effective otherwise many components may become more costly to source with increased lead times.

The issue of currency continues to be at the forefront of many discussions. As uncertainty has grown over the position of Brexit, the pound has continued to fall against the Euro. This has generally increased service and maintenance costs where they are being charged in Euros.

2018/19 Wind Report

The previous 12 months have reinforced how variable the UK's wind can be. Overall the general trend has been the expected high wind over the winter months and lower wind through the summer. However January 2019 saw surprisingly little wind in what is often one of the most productive months of the year. Early spring saw good wind across all of our sites before it died down for the summer, allowing us to carry out large amounts of scheduled works.

Realise Energy Turbine Fleet Average Windspeed



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Next Steps for Grid Code Compliance

With an increasing number of renewable energy generators across the UK, this additional generation has had a significant impact on the transmission network and on the stability of the network frequency and reactive power consumption in recent years.

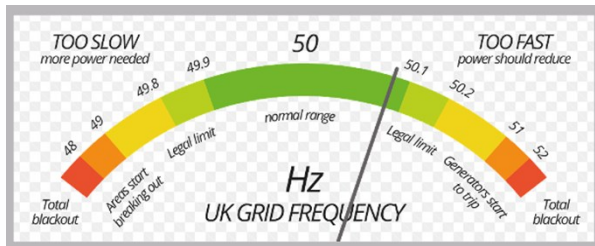
Because renewable energy generators (eg. wind turbines) are generally non-synchronous this causes difficulties for both Transmission Network Operators – National Grid and SONI - in managing overall grid frequency and the Distribution Network Operators such as NIE (Northern Ireland) and SSE, Scottish Power etc. This is because non-synchronous generators are less responsive to changing grid conditions or requirements. In order to accommodate a requirement for increased generation from renewables across the UK, the Energy Networks Association (ENA) have introduced a number of modification proposals to address these issues. Currently a small disturbance or "loss of mains" on an individual generator can have a large effect on the surrounding grid, affecting transmission frequency potentially causing a significant loss in distributed generation.

In Northern Ireland, following the regulator's approval of SONI's new Rate of Change of Frequency (RoCoF) limit, NIE Networks were requested to move the G59 RoCoF setting on all distribution connected generation to accommodate the new standard. G59 protection is required to ensure that turbines trip off following a loss of mains in order to avoid danger to the public and damage to the generator. As a result, NIE have begun to roll out a programme of changes to the overall network and individual generating sites such as wind turbines. Stage One is designed to address the SONI grid frequency requirements and affect small scale generators of all sizes. However, Stages Two and Three seem more focused on bringing small scale generators in line with large scale generators by giving NIE more control over power factor and reactive power consumption through remote SCADA access to each individual generator. Currently NIE are targeting these stages at generators with a grid connection capacity of 200kW or above except for some smaller turbines in more sensitive areas.

A similar programme will follow across the rest of the UK in due course but with a key difference. In Northern Ireland, NIE are requiring individual generators to meet the cost of these changes while, in England, Scotland and Wales, it seems the cost will be met by the wider industry through the Balancing Services Use of System (BUSoS) charges. These recover the cost of day-to-day operation of the transmission system. Generators and suppliers are liable for these charges, which are calculated daily as a flat tariff for all users.

In Northern Ireland, Stage One is already nearly complete with Stage Two to be complete by this time next year. In contrast, in the rest of the UK, DNOs are only at the very early stage of inviting contractors to tender for approved status to be considered

suitable for carrying out these works so it is unlikely to become a reality in the imminent future. Watch this space.



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Additional Services

- All Inclusive Service Contracts with availability guarantees
- Turbine inspections and reporting (Operation and Health and Safety Reporting)
- DEIF and SCADA system upgrades
- Latchway certified engineers and climb assist hoist upgrades
- Blade inspection, repair & pitching optimisation
- Tower and nacelle painting
- Site maintenance
- Transformer inspection and servicing plus oil analysis
- Re-powering and site purchase
- Research & Development

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Randolph Group News

With the completion of the purchase of Realise Energy Services Ltd. by the Randolph Group earlier in 2019, Realise is now part of a Group of Companies operating in the UK energy sector. Taken together the Group offers a suite of products and services that create and support energy projects for their entire lifetime.

The Group operates in the following energy sectors:

- Renewable Energy – Wind, solar, Biomass, hydro and CHP
- Energy Efficiency
- Energy Storage Solutions
- Energy Offtake and Supply
- Project Finance and Investment

As well as **Realise**, Companies in which the Group has an interest comprise:

- **Farm Energy Northern Ireland (FENI)** - a membership group comprising businesses and individuals in the Northern Ireland rural sector who have an interest in energy, both from a generation and efficient use point of view.
FENI are holding their next information evening on the 30th October 2019 in Cookstown. For more information please visit: www.farmenergyni.co.uk
- **Farm Energy Northern Ireland Trading (FENI Trading)** - a company that provides a range of optional commercial products and services to FENI members who operate wind, solar, AD and hydro projects.
- **RG Developments** - a company that specialises in the acquisition and development of pre-development or operational renewable energy assets.
- **Future Renewables Energy Eco Ltd.** – a renewable energy investment company. FREE has recently launched its first ISA Wind Bond. Please visit www.free-wind-isa-bond.co.uk for more information.

Taken together, the Group companies now have the ability to manage projects from their inception to operation. The skills and experience in the various Group companies allow us to finance and acquire sites, obtain planning permission, install, connect, service and maintain projects and sell electricity generated to the local grid. We do this for our own projects as well as for other landowners, developers and turbine owners, either directly or, in the case of FENI, through the provision of helpful information and advice and collective buyer agreements.

Creating the Group underpins each company with financial security and stability, which in turn can be passed to our customers and members. This allows work and projects to be progressed in the knowledge there is financial backing and payment guarantees.

The Group has offices in Perth, Edinburgh, London and Magherafelt, Northern Ireland.



Randolph Renewables



RG Developments



Farm Energy^{NI}



FREE FUTURE RENEWABLES
ECO ENERGY