INFINERGY

Frequently Asked Questions Clashindarroch Wind Farm Extension

1. Will the proposed wind energy project be noisy?

Improved technology of modern wind turbines has, among other things, resulted in an improved noise profile for many turbine makes and models. Noise is an important part of the Environmental Impact Assessment (EIA) that is being undertaken. Existing background noise and predictions of future potential wind turbine noise are taken into consideration in the assessment. The noise reports will be available for public viewing once the section 36 application is submitted.

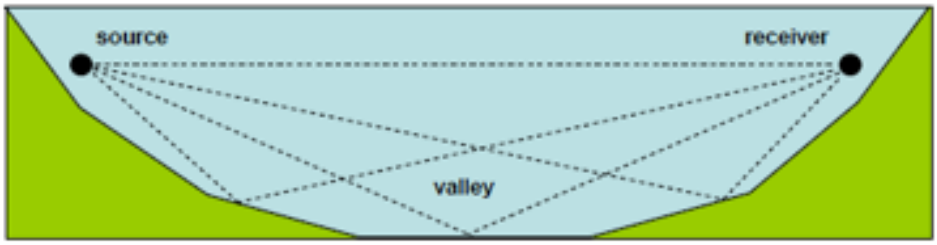
2. How about Amplitude Modulation (AM)?

Amplitude Modulation (AM), also referred as Blade Swish in some literature, does not occur with all turbines as this is a function of the aerodynamics of the turbine and the specific conditions on the site. The conditions giving rise to AM are complex, but are believed to be due to a difference in wind speed at the top and bottom of the turbine rotor when in rotation and the aerodynamic noise directivity. The noise limits suggested in ETSU-R-97 (the noise guidance used for wind turbine) take into account the fact that all wind turbines exhibit the character of noise, described as blade swish, to a certain extent. The current scientific literature defines two types of AM, Normal AM (NAM) and Other AM (OAM – also called Excessive AM). Research suggests that the primary source generation mechanism for OAM is local stall on the blades however studies of this topic are complex and assessment of OAM only possible after a wind farm is installed.

Practical strategies to overcome this issue have been developed, including the use of individual cyclical pitch control which could remove the risk of stall, while minimising any loss in energy yield. As a responsible developer, Infinergy would be happy to commit to an AM planning condition and would work closely with the relevant planning authorities to accommodate this matter.

3. What can you say about the valley effect?

Using topographical data and a formulae provided in the Institute of Acoustics Good Practice Guide for Wind Turbine Noise (IOA GPG) the predictions between a wind turbine (noise source) and a house (receiver) can be adjusted by +3dB to account for the potential of multiple reflection paths across a valley, as illustrated in the below graphic. This method has been used in the Clashindarroch Wind Farm Extension noise predictions.



4. Why develop more wind turbines if they have to be curtailed?

The national grid consists of the Transmission System, which carries high voltage electricity across the UK; and the Distribution Network, which delivers electricity locally. In Scotland, both networks are owned and operated by Scottish Power Energy Networks and Scottish and Southern Energy Networks. The electricity transmission system was built more than half a century ago and is in the process of being upgraded to cope with new ways of generating and using power; a costly and time consuming affair.

Because demand and supply vary continuously, the system operators need to constantly balance capacity on the network lines. This creates challenges, sometimes in the form of grid constraints. A constraint arises when the infrastructure required to transmit electricity – the power lines, transformers and other technology – limit the flow of power, in the same way a pinched hose causes a reduction in water pressure. One way of balancing is to request suppliers to the system to momentarily switch off their contributing generators. With wind turbines, this is relatively easy: one command from the remote control centre and any given turbine will cease operation for the required length of time. This is far easier and cheaper than for example turning off a nuclear power station, which has been designed to produce vast amounts of base load power and is not nimble or flexible in its operation. Turning off wind turbines is therefore a preferred balancing method.

But is it still worthwhile to develop wind turbines if the power system cannot take all the electricity generated at any time? Yes it is. There is still a long way to go on the road to net zero, which the Scottish Government has committed to achieving by 2045 at the latest. In order to meet that target, more wind turbines need to be developed, replacing more fossil fuelled generation and further harnessing Scotland's unparalleled wind resource. Demand for electricity will go up when the transport and heat sectors are electrified. Then there is the issue of security of supply. Home grown wind energy has a huge role to play in ensuring that, irrespective of what happens with gas and other power sources abroad, in the UK the lights will stay on, at the lowest cost to the consumer.

For each project, wind developers pay vast amounts of money to the electricity system operators to help upgrade the transmission lines which enable the power transport off site. As so often with anything, this is not a linear process. Throughout Scotland, network infrastructure is improving, but it's taking a fair bit of time. For example, the Beauly-Denny line - with its capacity to transport 1,200MW of power from the north to the south of Scotland - took over 5 years to build. But investment is ongoing, and advances in technology are coming into play as well. Like many other wind energy proposals coming forward these days, Clashindarroch Wind Farm Extension is proposed in combination with a 50MW battery energy storage facility. Storing generated electricity until the electricity network is ready to absorb it will become another massive step forward for balancing the power network in Scotland.

5. Can the local Moray landscape accommodate all these wind turbines?

Landscapes change over time, as they are heavily impacted by land use and wind energy is one way to diversify land use. Moray enjoys a particularly favourable wind resource and some large-scale landscapes which are more able to accommodate wind farms, which are temporary structures and can be fully decommissioned.

The landscape and visual impacts of each wind farm application are assessed on a case-by-case basis by landscape professionals, in close consultation with local planning authorities, statutory consultees and with particular regard for potential impacts on sensitive landscapes such as National Parks and Wild Land Areas as well as on the character of the landscape and views.

The wind turbine layout has been designed with future views of the wind farm cluster as a whole in mind, meaning the adjoining Clashindarroch projects: the existing Clashindarroch Wind Farm and the proposed Clashindarroch Wind Farm II. In addition, the design of the project has also been mindful of any cumulative impacts with projects further afield, i.e., the combination of other wind developments in the area. The advantage from a landscape and visual impact perspective of wind farm clustering is that the wind farm can look like one integrated project which is a more limited impact compared to smaller projects scattered over a wider area.

Permission for the development will only granted if the landscape visual effects are deemed to be acceptable by the determining authority, the Scottish Government, when weighed against all the other considerations such as the need for renewable energy and other environmental considerations.

6. **How about Community Benefits? What will be the 'catchment area'?**

The project is committed to delivering a Community Benefit Fund that, based on best practice in the industry and a total installed turbine capacity of 145.2MW, could amount to just over £29m over the anticipated 40-year life of the project; this is based on the Scottish Government's recommended £5,000 per MW of installed wind turbine capacity, which would accumulate to up to £726,000 per year. Similar to nearby projects, it is anticipated that professional organisations such as Foundation Scotland will be involved in the set-up of the fund. Discussion with the local community will guide where and how the fund may be allocated.

7. **Why is the project called Clashindarroch Wind Farm Extension?**

The project's name was chosen to indicate that it immediately adjoins the existing Clashindarroch Wind Farm. The site also lies close to the proposed Clashindarroch II site. One of the advantages of this site is that the Clashindarroch projects would look like an integrated wind energy cluster, which would reduce visual impact across the area compared to a number of separate wind farms scattered over a wider area.

8. **Why will the wind turbines be lit at night? Will this industrialise the countryside?**

The wind turbines are over 150m in height and in accordance with current guidance from the Civil Aviation Authority, several of the turbines need to be lit with medium intensity (minimum 2000 candela at horizontal and slightly above) steady red aviation warning lights on their nacelle hubs.

A lighting layout has been designed for the Proposed Development and this has been discussed and approved by the Civil Aviation Authority.

The following nine perimeter wind turbines will be installed with medium intensity lights (minimum 2000 candela): T1, T2, T6, T7, T11, T16, T17, T20 and T21.

Although the lights could have an intensity of 2000 candela at horizontal and slightly above, the lights will be at reduced intensity at different angles above and below the horizontal. The reduction in intensity at different elevation angles will be substantial, for example, according to the applicable guidance, at an angle of -1 degree the minimum intensity reduces to 750 candela and at -10 degrees the recommended maximum intensity is only 75 candela. Perceived light intensity also diminishes with distance.

In addition, Civil Aviation Authority guidance allows lights to operate in a lower intensity mode "if the horizontal meteorological visibility in all directions from every wind turbine generator in a group is more than 5km." In these conditions the 2000 candela lights could be operated at "not less than 10% of the minimum peak intensity specified for a light of this type" (ie 200 candela).

Visibility sensors will therefore be installed on the wind turbines and the 2000 candela obstruction lights will be powered down to 200 candela in meteorological visibilities greater than 5km.

The applicant is prepared to accept a condition which requires the retrospective installation of an Electronic Conspicuity (ie transponder) based Aircraft Detection Lighting System, when the regulatory actions concerning the mandatory carriage of a compatible Electronic Conspicuity system on aircraft have been completed and signed into law. The implementation of a suitable

Aircraft Detection Lighting System would significantly reduce the occasions when the lighting would be visible.