

Welcome

ABO WIND



Welcome to this public exhibition of our wind farm proposal. It contains important information about our plans including visual material to show what the wind farm may look like from several viewpoints.

This is part of an on-going consultation process with members of the local community and other interested parties, which will continue up to the submission of a planning application and beyond. If you have any questions about our proposals, please approach a member of the ABO Wind team who will be happy to help.

We hope you find the information presented here today informative and helpful.

Who is ABO Wind?

Experience

ABO Wind is one of Europe's most experienced wind energy developers. ABO Wind now has interests in the United Kingdom, Ireland, Germany, France, Spain, France, Finland and Argentina.



ABO Wind has successfully been developing, constructing, operating and maintaining wind farms for almost two decades and to date has connected 500 wind turbines generating more than 1,000MW.

Expertise



Our team has expertise covering all phases of wind farm development, from site selection and land acquisition to assessing the specific wind yield for a project, technical wind farm design, planning and environmental impact assessment, bank financing, wind farm construction and operational maintenance.



Office Location

We have been operating in the UK since 2006 and have two offices, located in Livingston and Inverness.



ABO Wind's first operational UK wind farm is a three turbine development in Lairg, Sutherland which has been operational since January 2012. This is located on the common grazings of the Lairg Estate and includes a sizable crofting involvement in the project.

Consultation

ABO Wind recognises the importance of neighbours and the local community around a wind farm site. Our wind farm would become part of their environment for 25 years, so we design our projects to minimise environmental and visual impacts as well as manage construction to cause the least inconvenience for local people.



It's important to us that communities surrounding the site are involved early in the development process, so that suggestions and concerns can be taken on board. We hope that local residents will become involved in our wind farm proposal.



The Benefits of Wind Power

ABO WIND



Onshore wind is a mature and relatively low cost renewable energy technology with a large supply chain already established and capable of making a large contribution to the progress of Scotland's renewable energy target.

Addressing Climate Change



"Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased."

Intergovernmental Panel on Climate Change (IPCC) – Climate Change 2013 The Physical Science Basis

"Climate change is the single greatest long-term threat to people, wildlife and our environment. In Scotland, we need to prepare now for the impacts of a changing climate and understand the best ways to adapt our society, economy and environment."

RSPB – Helping Nature to Help Us, 2013



UK Policy

Climate change is recognised widely as the most serious environmental threat facing our planet. UK policy in this area is set through the Climate Change Act 2008. This reflects the Energy Policy for Europe established in 2007 which sets out the EU's vision for Energy in the period to 2020.

The UK Climate Change Programme has set targets required by the EU, whereby the UK has committed to a reduction of greenhouse gas emissions by at least 80% by 2050, relative to 1990 levels.¹

Targets

The Scottish Government's policy framework for addressing climate change is the Climate Change (Scotland) Act 2009. This mirrors the UK target of **reducing emissions by 80 per cent by 2050**, but with a higher interim target for a **42 per cent cut in emissions by 2020**.²



The Scottish Government has committed to a target for renewable sources to generate the equivalent of **100 per cent of Scotland's gross annual electricity consumption by 2020**. Achieving this target would help Scotland play a leading role in tackling climate change, increase energy security, and create an important renewable energy sector supporting thousands of jobs.³

The 2020 Routemap for Renewable Energy in Scotland states that the Scottish Government is committed to the continued expansion of onshore wind farms to help meet renewable targets. "Our ambition is that by 2020, onshore wind developments ranging from small community-scale to large power utility scale maximise engagement with communities: contribute electricity to renewable targets: and, through displacement of fossil fuel generation, help to reduce fossil fuel consumption."⁴

¹Climate Change Act 2008, s 1 (1)
²Climate Change (Scotland) Act 2009, s 1(1), s 2(1)
³Scottish Renewables (2014), Onshore Wind – What you need to know, http://www.scottishrenewables.com/media/uploads/publications/os_onshore_wind_briefing_040613.pdf
⁴2020 Routemap for Renewable Energy in Scotland (2011)



How Does a Wind Turbine Produce Electricity?

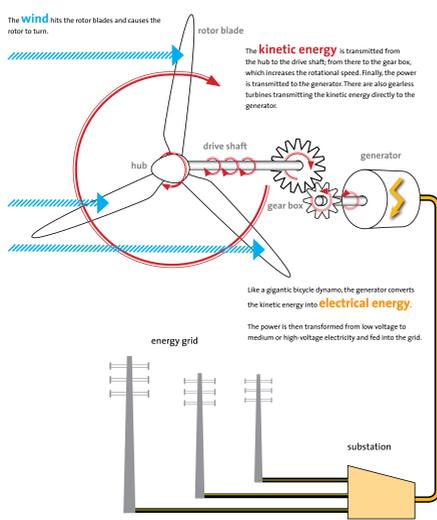
ABO WIND



Wind turbines harness the power of the wind and use it to generate electricity by converting kinetic energy into electrical power. The output from a single turbine will vary depending on wind speeds.

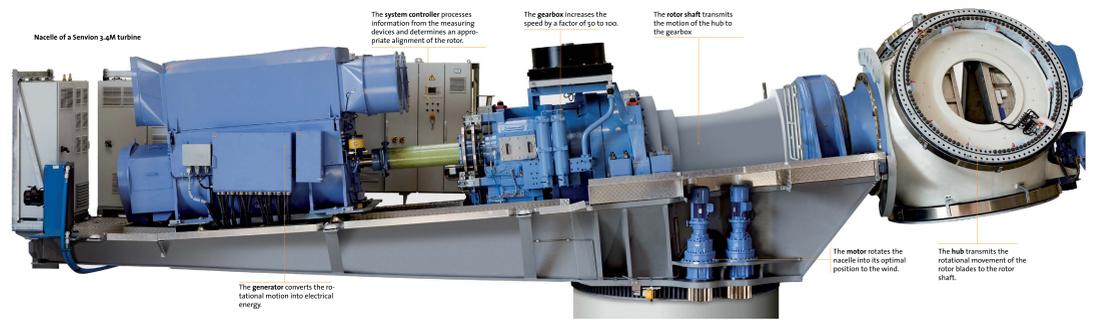
Converting Wind into Energy

Wind Turbine Generator



The main components of a wind turbine are the tower, nacelle and three blades attached to the hub. Put simply, the energy in the wind turns the blades around the hub. The hub is connected to a generator via a drive shaft, which creates electricity when the blades spin.

A look inside the nacelle



Power Output

The load factor of a wind turbine is the ratio of actual energy produced in a given time, compared with its full potential (rated capacity). A typical turbine is expected to generate approximately 20 to 40 per cent of its theoretical maximum output over a year. The average load factor for wind turbines in Scotland from 2000 to 2013 was 27.9 per cent.¹

The power output from a wind farm depends largely on the strength and constancy of the wind blowing across the site. Wind turbines start to generate electricity at a wind speed of approximately 4 metres per second (m/s) or 9 miles per hour (mph) with output increasing up to their maximum rated power at a wind speed of about 15m/s (34mph). If the wind

speed reaches 25m/s (56mph) the wind turbine shuts down automatically.

The proportion of time that the turbines will be generating electricity is therefore dependent on the time that the wind speed is between 4m/s and 25m/s. Generation output from a wind farm is also seasonally dependent, such that approximately two thirds of the total annual energy yield from the wind farm is expected to be delivered in the six months between October and March.

The electricity generated from a commercial scale wind farm such as our proposal would feed into the national grid.

¹ DECC (2014) Unchanged Configuration Load factors, Regional Statistics, Renewable Statistics
<https://www.gov.uk/government/statistics/regional-renewable-statistics>



Proposed Barrel Law Wind Farm



ABO Wind is preparing a planning application proposal for the construction of a wind farm approximately 9km west of Hawick, 7km southwest of Ashkirk, 3.5km northwest of Robertson and 1.8km south of the operational Langhope Rig Wind Farm. The Barrel Law site comprises mainly open moorland used for sheep grazing.

Proposed Development

Site Selection and Site Attributes

The site has been identified as suitable for wind energy development due to:

- ▶ Good wind resource;
- ▶ Few known environmental sensitivities;
- ▶ Located in an area identified as having the highest capacity for wind farms*; and
- ▶ Availability of connection to the national grid.

A large area of forestry plantation lies to the north-west, outwith the site. There are no large waterbodies within the site, although the Todrig Burn flows in an easterly direction beyond the northern boundary of the site. The site is gently undulating moorland, lying generally west and southwest of the summit of Barrel Law. Access to the site would be from the commercial forestry to the northwest, mainly utilising existing forestry haul roads as used for the Langhope Rig Wind Farm.

*As identified in Figure 13 of Scottish Borders Council Draft Supplementary Guidance Renewable Energy, December 2016

Proposed Development

The proposed Barrel Law Wind Farm would consist of 7 turbines with a capacity of up to 3.5 megawatts (MW) each. Turbines could have a rotor diameter of up to 112m, with an overall blade tip height of up to 132m, however this will be subject to further detailed assessment.

The total installed generation capacity of the wind farm would be around 24.5 MW. If the wind farm performs as well as the Scottish average, it could produce electricity equivalent to the annual demands of approximately 16,300 households**.

Ancillary development would include access tracks, crane hardstandings, temporary construction compound and hardstanding, underground cabling and an electrical control

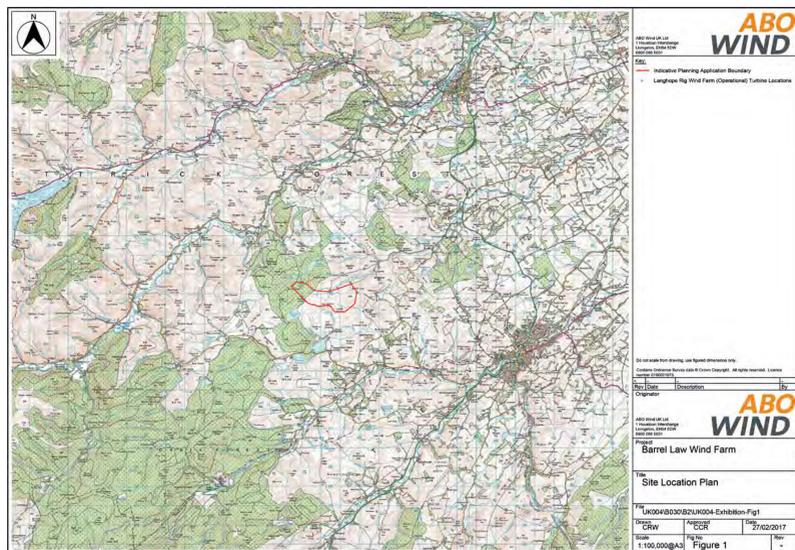
building housing transformers and switch gear. The wind farm would connect to the national grid at Hawick substation via a mixture of underground and overhead power lines, and would be developed by Scottish Power.

On display today is the initial wind farm design, for which various technical and environmental studies are ongoing to optimise the final design of the wind farm. The initial design has undergone an iterative design evolution process with the aim of reducing visual impact on local views, relating to the scale and landform of the site, surrounding area and the operational Langhope Rig Wind Farm, to create a compact, coherent design.

**Based on a load factor of 29% (Scotland 2015 average load factor for wind energy, Renewable Electricity Capacity and Generation Table 6.1c, BE15, 22 December 2016) and domestic electricity consumption per household of 3,800 kWh (UK Energy Statistics, Q3 2016, BE15, 22 December 2016).

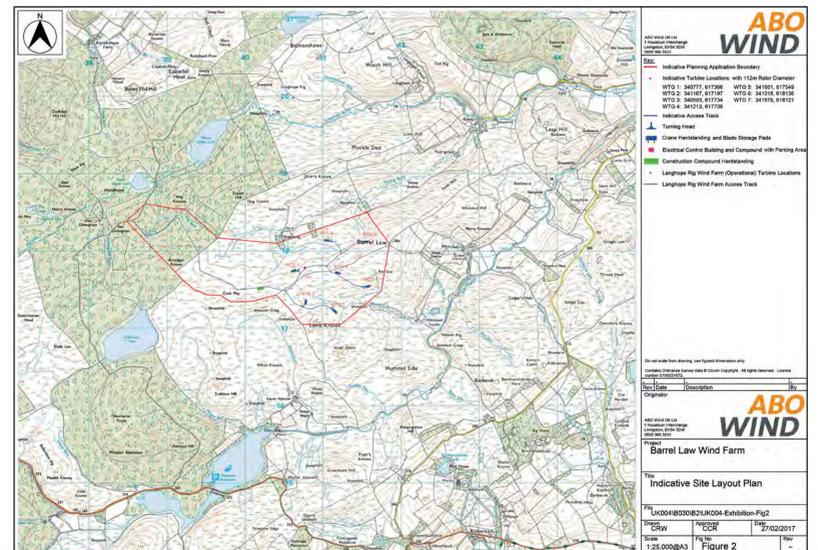
Site Location Plan

Contains Ordnance Survey data © Crown copyright and database right 2017



Site Layout Plan

Contains Ordnance Survey data © Crown copyright and database right 2017



Barrel Law Site



Environmental Impact Assessment

ABO WIND

We are currently undertaking an Environmental Impact Assessment (EIA), a formal process to identify and assess the effects a development may have on the environment. The findings of the EIA will be reported in an Environmental Statement, which will also outline how the assessment process led to the final project design and addressed any potential adverse environmental impacts.

Environmental Receptors

Landscape and Visual Amenity

The ongoing landscape and visual impact assessment follows guidelines promoted by the Landscape Institute, the Institute of Environmental Management and Assessment, and Scottish Natural Heritage and Scottish Borders Council. The main objectives of the assessment are to determine the potential landscape and visual effects of the proposed development on the existing landscape resource and visual amenity of people. A cumulative landscape and visual impact assessment, taking into account existing and consented wind farms and proposals in the planning system, is also being carried out. The potential Zone of Theoretical Visibility (ZTV) displayed at the Public Exhibition is a computer generated image which shows areas where there may be a view of the proposed Barrel Law Wind Farm. The ZTV shows the area of potential visibility of any part of the proposed turbines to a blade tip height of 132m. It is important to note that the ZTV is based only on landform and does not take account of existing built development and vegetation which can significantly reduce the area and extent of actual visibility. The Barrel Law Wind Farm is not located in an area designated for its landscape importance.

Telecommunications and Aviation

Wind turbines, as with any large structure, can potentially interfere with electromagnetic signals. Consultations with telecommunications operators will be undertaken to determine whether telecommunications links will be affected. All fixed radio link transmitter and receiver sites, television transmitter sites and aeronautical radio facilities within a 30km radius of the Barrel Law site will be included in the study, sufficient to cover those facilities with the potential to be affected by the development. The assessment will consider all aviation radars and all airports and airfields within 30km of the Barrel Law site.

Climate and Air Quality

The assessment will consider atmospheric emissions arising from the proposed development, considering both the construction and operational phases of the development. The effects of emissions of particulate material during the construction of the wind farm, and emissions from road traffic associated with the construction phase of the development, will be assessed. The assessment will also consider climate effects of the proposed development. The findings of the assessment will be presented in the form of a carbon payback time for the proposed Barrel Law Wind Farm, that is the time taken for the offset of carbon emissions from other sources to outweigh carbon emissions through the development lifecycle of the project.

Noise

There is strict guidance on operational noise emissions from wind turbines to ensure the protection of residential amenity. The proposed development will seek to ensure that predicted operational noise levels would be within the derived noise limits. Therefore significant noise effects are not expected to arise from operation of the wind farm. Noise generated from wind farm construction activities would occur only for limited periods of time and working hours would be controlled through planning conditions.

Shadow Flicker

Shadow flicker is the flickering effect caused when rotating wind turbine blades periodically cast shadows through narrow openings, such as the windows of local properties. The EIA will consider any potential effects of shadow flicker on the residential properties within 2km of the turbines, using computer modelling to show if, when, and for how long, the effects could be experienced by local residents. Preliminary modelling has found no exceedance of shadow flicker thresholds at any of these properties.



View from Barrel Law looking West



Environmental Impact Assessment

ABO WIND



Environmental Receptors

Ornithology

Surveys of breeding birds and bird flight activity were conducted at the Barrel Law site between 2010 and 2011 and were updated between 2014 and 2016. Winter bird surveys were also conducted in 2010/11. The results of these surveys demonstrated that the habitats associated with the wind farm site support a bird species assemblage which is typical of the upland habitats within the region. However the Barrel Law site is assessed to be of generally low ornithological sensitivity, with only a few species of conservation concern found to be using the habitats regularly.

Flight activity surveys recorded a number of species of conservation concern flying within and immediately surrounding the Barrel Law site. A 'collision risk model' will be completed to determine whether the wind farm poses any risk to these species, however, the low frequency and number of birds recorded suggests that the proposed development is not expected to have adverse impact on local bird populations.

Surveys indicated that the habitats of the Barrel Law site support low numbers of black grouse, though no lek sites were identified. Breeding raptors also occur in the nearby surrounding area. Any potential disturbance to breeding raptors and black grouse would be mitigated for during the wind farm construction period.

Ecology

A number of designated sites of nature conservation importance are located within 5km of the Barrel Law site, including ones associated with the River Tweed, but no part of the application site is designated for nature conservation importance.

Ecological surveys undertaken at the Barrel Law site between 2010 and 2011 and updated in 2016 have identified that the habitats associated with the site and the vegetation they comprise, are typical of upland environments in the Scottish Borders, being dominated by bog, heathland and grasslands.

Protected species surveys confirmed the presence of common bat species, otters, badgers and common lizard in or around the site while connecting watercourses support Atlantic salmon and brown trout, as well as a rich and diverse aquatic invertebrate community.

Once the development layout is finalised, surveys will be carried out to determine the presence of any ground water dependent wetland habitats in proximity to the development footprint.

Measures will be developed to ensure that any potential impacts on important habitats and species of conservation concern are avoided or minimised through sensitive timetabling and protection measures.

Cultural Heritage

An assessment of any direct effects on features of cultural heritage interest as well as effects on the setting of off-site features is being conducted. The assessment is being carried out in accordance with the principles laid down in the Chartered Institute for Archaeologists (CIFA) Standards and Guidance for Historic Environment Desk-Based Assessment (CIFA, 2014, updated January 2017).

Preliminary findings indicate that no designated features lie within the Barrel Law site or will be directly affected by the proposed Barrel Law Wind Farm. The nearest scheduled monument (Kemp's Castle, SM4422) and listed building (Todrig, HB1918) lie approximately 1.95km and 2.1km from the nearest turbines, respectively.

Hydrology, Hydrogeology and Geology

An initial review of published geological mapping indicates that the underlying geology of the Barrel Law site is characterised by Hawick Wacke. The superficial geology is variable with lenses of alluvium and till apparent within the areas surrounding the site, providing a reasonable indication that shallow groundwater may be

present. However, the underlying bedrock is not a significant aquifer, and therefore any groundwater present is likely to be generally at shallow depth. While existing geological mapping does not appear to indicate a presence of peat within the site itself, site surveys indicate isolated pockets of peat located to the north of the ridge from Barrel Law to Cock Play and around Lamb Knowe.

There are a number of named burns and surface watercourses surrounding the Barrel Law site, draining to the Ale Water, running to the south of the site. The Ale Water is a tributary of the River Teviot, which in turn forms part of the River Tweed system (a designated Special Area of Conservation). To the north of the site, the Todrig Burn flows in a north easterly direction to its confluence with the Langhope Burn and continues until it joins the Ale Water approximately 3km further east at Essenside. The Bleakhill Burn flows through the south of the site, flowing in a south easterly direction towards Ale Water. These streams support local ecosystems and retaining the natural flow regime (quality and quantity) throughout the development process is therefore a key design objective.

The proposed development will be designed to minimise the potential for any adverse effects by avoiding watercourse crossings and any development in close proximity to water features on the Barrel Law site, where practicable.



Transport, Construction and Decommissioning

ABO WIND



Lairg Wind Farm Construction



Lairg Wind Farm Foundation



Blade Delivery



Lairg Wind Farm Erection



ABO Wind Engineers at Lairg Wind Farm

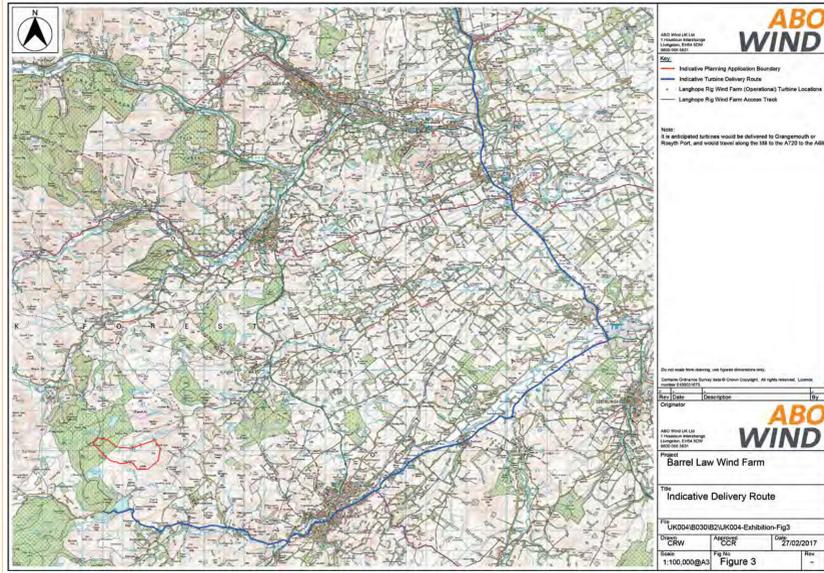
Traffic and Transport

It is anticipated that turbines will be delivered to a port near Edinburgh, such as Grangemouth or Rosyth. Deliveries would then proceed south by road, likely using the A68 and A698 until reaching the B711. Deliveries would make use of the modifications to Martin's Bridge and along the B711 that were constructed for the delivery of the turbines for the now operational Langhope Rig Wind Farm.

The proposed access for construction traffic to the Barrel Law site is from the existing B711 access junction at Hyndhope/Ale Moor Forest. The existing access track for Langhope Rig Wind Farm would be used up to a point west of the Barrel Law site, from where a new access track would be constructed to the turbine locations.

Delivery Route Plan

Contains Ordnance Survey data © Crown copyright and database right 2017



Construction and Decommissioning

The construction of the wind farm would take approximately 12 months. The proposed route and timing for deliveries would be agreed with the Local Authority, Trunk Road Authority and Police Scotland. Delivery of turbine components would be intermittent over several weeks, timed to minimise impacts on local traffic.

Additional traffic during construction would include:

- Movement of staff and machinery to site for preparation works;
- Delivery of road aggregate in the event this cannot be sourced from the site; and
- Delivery of concrete, fuel and other materials.

The large turbine components, namely towers, blades and nacelles, would likely be delivered with a police escort.

Heavy goods vehicles accessing the site during the construction phase of the development would cause the main increase in temporary traffic during the construction of the wind farm.

■ At our operational Lairg Wind Farm in the Highlands, we were in regular contact with local community bodies and local residents to provide updates about the construction process. We would work towards a similar relationship with the local communities near Barrel Law Wind Farm.

On completion of the operational lifetime of the wind farm, which would typically be 25 years, the wind turbines would be dismantled and taken away and the site would be restored to the condition required by the local planning authority.

Next Steps

Following the collection of feedback on the proposal and conclusion of the EIA studies in the spring of 2017, ABO Wind intends to submit the planning application for the proposed Barrel Law Wind Farm in the summer of 2017. Members of the public will then have the opportunity to formally comment on the detailed planning proposals.

For further information and updates on the project as it progresses, please visit www.barrellawwindfarm.com, or email barrellawwindfarm@abo-wind.com or by phone on 0800 066 5631.

Blade Delivery

