Beatrice Onshore Transmission Works

Project Context

Who are we?

Beatrice Offshore Windfarm Limited (BOWL) is a joint venture partnership formed between SSE Renewables (75%) and Repsol Nuevas Energias UK (25%) (formerly SeaEnergy Renewables).

In February 2009 we were awarded exclusivity by The Crown Estate to develop the Beatrice Offshore Wind Farm in Scottish Territorial Waters.

SSE Renewables is responsible for the development of SSE’s renewable energy projects across Europe. SSE is the leading generator of renewable energy in the UK, with over 2,530 Megawatts (MW) of renewable energy generation capacity.

Repsol Nuevas Energias UK (Repsol) was formed following Repsol’s purchase of 100% of SeaEnergy Renewables Limited in June 2011. Repsol has development rights for a total of 1,190 MW in the United Kingdom, equivalent to a third of the offshore wind capacity currently installed worldwide.

What is the need for the project?

UK renewable energy policy centres around two key factors:

- The need to reduce our levels of CO2 emissions to help tackle climate change; and
- The need to ensure security of energy supply.

In order to achieve this, the UK and Scottish Governments have set a number of objectives to move towards a ‘low carbon economy’, with increased reliance on renewable energy and reduced dependency on fossil fuel generation from oil and gas:

- The UK Government has set a target of 15% energy generation from renewable sources by 2015 and 20% by 2020.
- The Scottish Government is committed to reducing Scotland’s CO2 emissions by 42% from 1990 levels by 2020 and by at least 80% by 2050.

What is the project?

The Beatrice Offshore Wind Farm (the Wind Farm) site is located in the Outer Moray Firth on the north-western point of the Smith Bank. The site is adjacent to the world’s first deep water wind farm development – the two-turbine (10 MW) Beatrice Demonstrator Project. The Beatrice Demonstrator turbines are owned and were developed by SSE and Talisman. The turbines have been operational since 2007. Building on the success of the Beatrice Demonstrator Project, we are proposing to develop an offshore wind farm which will generate up to 1,000 MW of renewable energy, enough to power up to 796,000 homes.

Project Boundary

The Transmission Works consist of two elements:

- Offshore Transmission Works – up to three offshore substation platforms and approximately 65 km of subsea cable to the landfall envelope, west of Portgordon; and
- Onshore Transmission Works - approximately 20 km of underground cable from the landfall envelope to the substation site and a new substation adjacent to the existing substation at Blackhillock.

We will be using a cable to connect the electricity generated by the wind farm to the existing electricity grid at Blackhillock, near Keith, Moray, known as the ‘Transmission Works’.

This exhibition relates to the Onshore Transmission Works.

As the generating capacity of the Wind Farm is not yet finalised, there are two possible development options which are being applied for as part of the Onshore Transmission Works. We will be applying for both an Alternating Current (AC) and Direct Current (DC) connection, though only one option will be finally installed and constructed.

The Applications

The Project will require a number of separate consents. Applications for the consents required for the Wind Farm and subsea cable were submitted to Marine Scotland in April 2012. We will submit the application for the Onshore Transmission Works to The Moray Council in June 2012.
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**Landfall**

**Where?**

The subsea cable will come ashore, in an area known as the ‘landfall’, west of Portgordon. The figure below illustrates the area the landfall will be located within. Detailed ground investigation works will take place once consent has been granted. Once these investigations have taken place, the exact landfall point will be determined.

![Cable landfall location map](image)

**What is at the Landfall?**

The cable landfall works will involve the pulling ashore of the offshore export cables. The offshore cables will be pulled ashore through ducts installed via a drilling process which commences at the launch site, which is onshore and will be approximately 70 – 100 m distance away from the shore. The landfall construction area will be approximately 120 m x 85 m. Within this area there will be buried transition bays where the offshore cables will be jointed into onshore cables.

There will be a maximum of three offshore cables associated with the Wind Farm and therefore a maximum of three transition bays will be required. Permanent access to these will be required during the operational life of the Wind Farm but all that will be visible at each of the transition bays will be a large manhole cover.

![Transition bay and internal cable jointing pit](image)

**How?**

Due to the beach to the west of Portgordon being designated as a Site of Special Scientific Interest (SSSI), the cable will come ashore via cable ducts underneath the beach installed using the technique of Horizontal Directional Drilling (HDD) as outlined in the graphic below.

![Cable installation onshore using horizontal directional drilling](image)

This involves drilling an arc between two defined points, the ‘reception site’ (offshore) and the ‘drilling site’ (agricultural land behind the beach). This will protect the integrity of the SSSI, minimising any environmental effects. The cable will then be pulled through the ducts created by the HDD to ‘transition bays’ where the offshore and onshore cables will be jointed together.
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Onshore Cable Route

What is it?
The onshore cable route will consist of underground trenches containing transmission cables, exporting either AC or DC power from the Wind Farm; cable jointing bays and cable crossings. The route also allows space for working areas for construction access and equipment lay down.

How long is the cable and where will it go?
The onshore cable follows a route which extends to some 20 kilometres (km), it will be underground and for the majority of this route will pass under arable agricultural land. The exact route is yet to be finalised, and will be subject to detailed design and feasibility assessment, but will be within the ‘corridor’ shown in the figure below. The route will be the same for the AC or DC development options.

What will be developed along this cable route?

AC Cable Trenches
A maximum of three cable trenches would be required for the AC option; each trench would be up to 1 metre (m) wide and at a target depth of 1.5 m to 2 m. An additional area of approximately 5 m to 10 m width either side of the trenching area would be required for access and equipment. A typical trench layout is shown in the illustration below.

DC Cable Trenches
A maximum of two trenches would be required for the DC option; each trench would be approximately 2.5 m to 6 m in width and at a target depth of 1.5 m to 2 m. An area of approximately 5 m to 10 m width either side of the trenching area would be required for access and equipment.

Cable Jointing
Cable is typically supplied in lengths of 1,000 m, and as such a number of cable joints will be required along the 20 km cable route. The individual cable lengths will be joined together in ‘jointing bays’, the precise location of these will be determined prior to construction. Jointing bays will be positioned in locations that will minimise impacts from construction and ongoing maintenance.

Cable Crossings
There are a number of obstacles which the cable route will have to cross; including rivers, roads, railways, boundary markers (e.g. hedgerows, fences) and utility cables and pipelines. Detailed consultation will be undertaken in relation to the most appropriate crossing method for each obstacle which may include Horizontal Direction Drilling (HDD).

How will it be laid?
Following site preparation the following will occur:

- Cable trenches will be excavated and material stored for reinstatement;
- Cables will be by installed in lengths up to 1,000 m by winches; and
- Cable trenches will be reinstated with subsoil and topsoil.

Onshore cable route

This route can be summarised as:

- Landfall west of Portgordon;
- Southwards towards Mill House;
- West towards the A990, across the A990;
- Southwards on the eastern side of the A990 to the junction with the A98;
- Across the A98 and southwards alongside the eastern side of the B9016;
- Across the B9016 and along the western side of the B9016 towards Aultmore;
- Across the A96 in the vicinity of Bridge of Rumbuch;
- South east across fields and across the Aberdeen to Inverness railway line and A95;
- South east towards and across the B9014 and Keith to Dufftown Railway line; and
- East towards the substation site to the south of Keith at Blackhillock.
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Onshore Substation

Why is it required?

In order to manage and export the electricity generated from the Wind Farm to the electricity transmission network a substation is required. A cable will then connect our substation with the adjacent Blackhilllock substation, owned by Scottish Hydro Electric Transmission Limited (SHETL). The Blackhilllock substation will be upgraded by SHETL, who have Planning Permission in Principal for the development.

What will it do?

The final design of the substation will be dependent upon the current of the power exported (AC or DC). For AC, a transformer station will be required to step up the voltage. For DC, a convertor station will be required to convert from DC to AC.

Where will it be located?

Our substation will occupy an approximately 13 hectare (ha) site located at NGR 342925, 848632 on land between 180 metres (m) and 204 m elevation. This site is currently used for agricultural purposes.

What will it look like?

Either option of substation design will be constructed upon a platform terraced over three levels to minimise landscape and visual impacts. Within the substation compound there will also be temporary construction, parking and laydown areas. Descriptions of our substation designs are provided below, the illustrations / figures below show examples of what the substations will look like. Please also see our photomontages showing how the substations will appear once constructed.

AC Substation Design

The AC substation would be a ‘wirescape’ with a maximum height of 11.5 metres and an associated control building with a maximum height of 6 m. The dimensions of the compound incorporating the substation, control building and associated infrastructure would be a maximum of 253 m x 160 m, with the control building occupying a maximum footprint of 30 m x 12 m. Two access points are proposed for the substation which will allow components to be delivered to the site and vehicles to access the substation for ongoing maintenance requirements. There would also be a road around the perimeter fence to allow for the safe delivery of components and ongoing maintenance requirements.

Our final design for the AC substation is likely to have a smaller footprint and associated smaller components, therefore the dimensions stated above represent a worst case scenario.

The main components associated with the AC substation design are as follows:

- 3 x Super Grid Transformers;
- 3 x Transformer Coolers;
- 3 x Earthing Transformers;
- 2 x Auxiliary transformers;
- 3 x Reactors;
- 3 x Reactor Coolers; and
- 1 x Set of High Voltage Switchgear.

The components listed above are all external components which form the ‘wirescape’, the only indoor equipment is the infrastructure contained within the control building.

DC Substation Design

The DC substation design comprises both external and housed components. The substation compound would have maximum dimensions of 221 m x 145 m. The building containing the housed components would have maximum dimensions of 125 m x 75 m x 21 m. There would also be a road around the perimeter fence to allow for the safe delivery of components and ongoing maintenance requirements.

Our final design for the DC substation is likely to have a smaller footprint and associated smaller components, therefore the dimensions stated above represent a worst case scenario.

The main components associated with the DC substation design are as follows:

- 1 x DC Converter Building;
- 6 x Supergrid Transformers;
- 6 x Transformer Coolers;
- 2 x Convertor Cooler Banks; and
- 1 x Set of High Voltage Switchgear.

Landscaping

Due to the height of both the AC and DC design options and the topography of the substation site, we will be constructing a landscaped bund around the substation. This bund will be planted with vegetation and trees which will in time grow to a sufficient height to partially screen the substation.
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**Environmental Impact Assessment (EIA)**

**What is it?**

Environmental Impact Assessment (EIA) is a process aimed to ensure that applications for developments with potentially significant effects on the environment are appropriately assessed and the environmental effects quantified. The assessment must be carried out following consultation with statutory consultees, other interested bodies and members of the public. The findings of an EIA are contained within an Environmental Statement (ES) which accompanies the applications for consent for major developments such as this.

The Onshore Transmission Works were the subject of a Scoping Exercise which sought the views of statutory consultees on the form and content of the ES which will accompany the planning application for these works.

The three main impacts which the Onshore Transmission Works could potentially have are considered to be:

- Landscape and Visual;
- Noise and Vibration; and
- Transport and Access.

Brief summaries of these specific topics are provided below; environmental assessments have also been carried out for other potential impacts including ecology and hydrology. If you would like to know more information about any other potential environmental impact of the Onshore Transmission Works, please ask a member of the Project Team at today’s exhibition.

**Landscape and Visual Impacts**

The landscape and visual impacts of the Project have been examined and the potential effects are considered to relate to effect upon landscape character and sensitive visual receptors.

Our landscape consultants (LDA) have:

- Agreed a series of representative viewpoints with Scottish Natural Heritage (SNH) and The Moray Council (TMC). Photomontages from some of these viewpoints will be used to provide visual representations of what the substation would look like, a selection of these are present at this exhibition;
- Used computer-generated images to consider and revise the substation layouts to reduce effects where possible on key transport routes, settlements and designated landscape areas; and
- Produced Zone of Theoretical Visibility diagrams (ZTVs) to illustrate the theoretical visibility of both of the proposed substation options.

**Noise and Vibration**

The potential noise effects of the Project have been examined and the principal effects are considered to relate to operational noise of the substation.

Our noise consultants (ERM) have:

- Examined the effects of the operational noise of the substation in line with BS4142 Rating industrial noise affecting mixed residential and industrial areas; and
- Consulted with TMC Environmental Services department in relation to the noise assessment.

During construction, noise will be managed through the use of planning conditions specifying, for example, restrictions to the times during which construction activities and site deliveries can take place.

**Transport and Access**

Our transport consultants (JMP) will:

- Establish a proposed route to site of the substation components and identify any ‘pinch points’ along this proposed route; and
- Examine the potential swept path associated with abnormal load vehicles.

During construction it is likely that any abnormal loads will be brought to site outside of normal working hours in order to avoid creating delays in the local road network.
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Project Timeline

Project Programme

The project programme illustration below shows the main activities that BOWL has undertaken so far in the development of the Wind Farm and the offshore and onshore transmission works. It also indicates the expected timetable that will follow submission of the applications. One continuous activity that runs throughout this programme is ‘consultation’.

Consultation with decision makers, regulators, consultees and other interested parties has, and will continue to be, undertaken throughout the entire project programme. Consultation is a key tool in helping define the project design and agreeing the scope of the surveys and assessments to be undertaken.

The construction programme needs to tie in with both the installation of the offshore cables and the construction of the substation, although work may be undertaken in parallel with these activities. It is anticipated that the construction programme will last approximately 24 months.

The next steps

An application for Planning Permission in Principle will be submitted to The Moray Council (TMC) in June 2012. It will be accompanied by the Environmental Statement (ES) for the Project. The statutory determination period for this application is four months.

Once a decision has been made as to whether power will be exported as AC or DC, additional details on the design will be submitted to TMC. If Planning Permission in Principle is granted, a further application will be required for matters specified in the conditions.

Your views and comments

Your views and opinions about the proposals are welcomed and valued. If you have any comments, queries or views you would like to share with BOWL please feel free to contact us at the address below, or fill in a comment sheet available from BOWL staff here at the exhibition.

Any comments you make to us now will not be representations to the planning application: there will be an opportunity to provide comments to the planning authority on the proposals (as may be revised following consultation) after the planning application has been submitted to TMC.

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